Bk5	R: Revision of natural numbers up to 10 000. Grouping by 10 **C: Review of Y4 work. Natural numbers and the number system** *E: Numbers over 10 000*	*Lesson Plan* *1*

Activity | ***Notes***

1 **Numbers**

Look at this set of numbers.

BB: 79, 1.6, 104, – 5, 2, $\frac{2}{5}$, 21, 60, 10

T points to each in turn and chooses a P to read it aloud.

Notes: Whole class activiry. Numbers written on BB or SB or OHT

Which three numbers do not belong with the others? T asks several Ps what they think and why. Class agrees/disagrees. Agree that the 3 numbers are

$$-5,\ \frac{2}{5} \text{ and } 1.6 \qquad \text{(T crosses or rubs them out)}$$

because all the others are positive, whole numbers.

Notes: Discussion, agreement, praising. Elicit the names of the 3 numbers (negative number, fraction and decimal)

What name do we give to positive, whole numbers? (Natural numbers)

T shows the mathematical notation for natural numbers.

Notes: BB: Natural numbers

$\mathbf{N} = \{1, 2, 3, 4, \ldots\}$

3 min

2 **Natural numbers**

T has BB or SB or OHT already prepared, but with T's actual numbers covered up.

I wrote down different kinds of natural numbers earlier, but before I show them to you, let's see if you can think of examples yourself.

Notes: Whole class activity. Written on BB or use enlarged copy master or OHP

BB: [this part of BB covered up at start]

a)	1-digit numbers:	0	7	~~–10~~	~~$\frac{3}{4}$~~	~~11~~
b)	2-digit numbers:	19	83	~~06~~	~~$\frac{1}{2}$~~	80
c)	3-digit numbers with two equal digits:	122	~~022~~	~~$1\frac{2}{3}$~~	252	303
d)	4-digit numbers with two zeros:	1007	~~8140~~	6200	~~0704~~	01040

Deal with one row at a time. Ps suggest numbers, T writes them on BB and class points out errors. Then T uncovers T's numbers and Ps come to BB to cross out any numbers which should not be there and explain why they are wrong.

Notes: At a good pace. In good humour! Agreement, praising

6 min

3 **Base 10**

Each pair of Ps has about 100 dried peas (or any other item that the school has plenty of) in a box on their desks.

Notes: Paired work, monitored (e.g. counters, plastic cubes)

Estimate the number of peas in your box and write it in your *Ex. Bk.*

Now group the peas in 10s and then group the tens in tens, etc. . . . stop! **A**, explain to us what you did and what your result is.

Notes: Reasoning with T's help if necessary

(e.g. After the 1st grouping, there were 12 groups of 10 and 3 peas were left over. Then we grouped them in tens again, and there was 1 group of 10 lots of 10, which equals 1 hundred, 2 groups of ten, which equals 20, and 3 single peas.) So how many peas do you have? (123)

Notes: Agreement, praising

Who estimated the same as the actual number? (Probably nobody!)

Notes: Class applauds Ps who were closest.

Let's show the number 123 in a place-value table. T draws table on BB and Ps dictate what T should write. Agree that:

BB: $1 \times 100 + 2 \times 10 + 3 \times 1 = \underline{123}$

Notes: BB:

H	T	U
1	2	3

9 min

Bk5

Lesson Plan 1

Activity		*Notes*

4

Place-value

This place value table helps us to count in groups of 10. Who can explain what the columns mean? Choose different Ps to explain each column and to write its actual value above its name.

(e.g. 1 million = 1 thousand thousands = 1 000 000)

BB:

(1 000 000) Millions	(100 000) Hundred Thousands	(10 000) Ten Thousands	(1000) Thousands	(100) Hundreds	(10) Tens	(1) Units
				8	0	4
		1	0	0	4	0
. . .	. . .	. . .	. . .	. . .	. . .	. . .
1	0	2	3	6	7	8

Let's write these numbers in the place value table.

e.g. BB: 804, 10040, 1006, 7014, 72, 600 006, 1 023 678

Ps come to BB to write digits in table and explain reasoning. Class agrees/disagrees. T could write one and make a deliberate mistake. Hopefully class will correct it!

T could ask various questions throughout. e.g.

- Who can read the next number? (or class reads it in unison)
- What does the 1 in the previous number mean? What does the 3 in the last number mean? etc.
- Decompose, e.g. 7014 , in your *Ex. Bks,* then write it in words.

  B, come and show us what you wrote. Who agrees? Who wrote something else? etc. Mistakes discussed and corrected.

  BB: <u>7014</u> = $7 \times 1000 + 0 \times 100 + 1 \times 10 + 4 \times 1$

  Seven thousand and fourteen

13 min

Notes:

Whole class activity

Table drawn on BB or use enlarged copy master or OHP

Reasoning, agreement

Table is blank to start with.

Numbers already written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

In good humour!

Ps could think of questions to ask too!

Individual work, monitored

Resoning, agreement, self-correction, praising

5

Bases

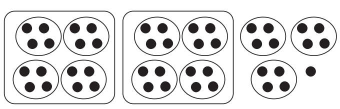
In ancient India, Hindu mathematicians discovered that if they gave a place value to the <u>position</u> of digits, then they needed only 10 different digits (0, 1, 2, 3, . . ., 9) to abe able to write any natural number. We say that this system of counting in tens is <u>base 10</u>.

However, there are other numbers systems which are <u>not</u> based on 10.

For example, if we count in groups of 4, we say that we are counting in <u>base 4</u>. How many digits would we need then? Elicit that 4 digits are enough (0, 1, 2, 3).

We can show it in this diagram. Who can explain it? If no P volunteers, T explains but Ps contribute where they can.

BB:



. . .	Sixty-fours $4 \times 4 \times 4$	Sixteens 4×4	Fours 4	Units 1
		2	3	1

$2 \times 16 + 3 \times 4 + 1 \times 1 = 45 = 231_4$

T shows the notation for writing a number in other bases.

e.g. $231_4 = 45$ (We use base 10 most of the time, so we do not usually write 45_{10}. unless we are using other bases at the same time.)

16 min

Notes:

Whole class activity

T explains. Ps listen and contribute where they can.

Diagram drawn on BB or use enlarged copy master or OHP

Extra praise if Ps remember the concept from Y4.

(Or start with 45 dots drawn (stuck) on BB and build up the diagram gradually.)

T points out that 231_4 is read as 'two three one, base 4' and <u>not</u> '2 hundred and thirty one', which is in base 10.

Bk5		*Lesson Plan 1*
Activity		***Notes***
6	***Book 5, page 1*** Q.1 Read: *In your exercise book, write these numbers as the sum of hundreds, tens, units, etc.* Use the example to help you. I will give you 4 minutes! Review at BB with whole class. Ps come to BB or dictate what T should write. Mistakes discussed and corrected *Solution:* a) $135 = 1 \times 100 + 3 \times 10 + 5 \times 1 = 100 + 30 + 5$ b) $309 = 3 \times 100 + 0 \times 10 + 9 \times 1 = 300 + 9$ c) $3245 = 3 \times 1000 + 2 \times 100 + 4 \times 10 + 5 \times 1$ $= 3000 + 200 + 40 + 5$ d) $9280 = 9 \times 1000 + 2 \times 100 + 8 \times 10 + 0 \times 1$ $= 9000 + 200 + 80$	Individual work, monitored (If Ps are unsure what to do, go through the example with whole class first.) Discussion, reasoning, agreement, self-correction, praising Ps underline their mistakes in *red* and write the answer again correctly.
Extension	• How many tens are in 100 (1000, 10 000, 100 000, 1 000 000)? • How many hundreds are in 1000 (10 000, 100 000, 1 000 000)? • Who can write 9280 in words? P comes to BB to write and explain. Class agrees/disagrees. *23 min*	Whole class activity At a good pace Ps might notice that the number of zeros indicates the number of tens. Praising, encouragement only!
7	***Book 5, page 1*** Q.2 Read: *In your exercise book, write these numbers in words.* Set a time limit of 5 minutes. Review at BB with whole class. T could have solution already prepared to save time (or Ps finished early could come to BB or SB or OHT to write the solutions but keep them hidden from class until the review). Ps dictate the words and T uncovers that solution. Class agrees/disagrees. Mistakes (including spelling mistakes) discussed and corrected. Stand up if you had them all correct. Let's give them a clap! *Solution:* a) 234 = two hundred and thirty four b) 1740 = one thousand, seven hundred and forty c) 2009 = two thousand and nine d) 3000 = three thousand e) 4097 = four thousand and ninety seven f) 8016 = eight thousand and sixteen g) 9999 = nine thousand, nine hundred and ninety nine h) 7705 = seven thousand seven hundred and five *30 min*	Individual work, monitored, (helped) Written on BB or SB or OHT Dicussion, agreement, self-correction, praising Accept any correct form, e.g. 9999 = ninety-nine hundred and ninety nine but ask P to say it using thousands too. All the discussions and corrections done at speed.

Bk5		*Lesson Plan 1*

Activity		***Notes***

8

Book 5, page 1

Q.3 a) Read: *Write these numbers as digits.*

Set a time limit. [If class is not very able, deal with i) to v) then review before continuing with vi) to viii).]

Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

i) Five thousand, three hundred and four = <u>5304</u>

ii) Three thousand, five hundred and four = <u>3504</u>

iii) Four thousand and five = <u>4005</u>

iv) 5 thousands + 2 hundreds + 3 tens + 4 units = <u>5234</u>

v) 4 thousands + 7 tens + 2 units = <u>4072</u>

vi) 23 units + 50 hundreds = 23 + 5000 = <u>5023</u>

vii) 3 hundreds + 52 tens + 6 units = 300 + 520 + 6 = <u>826</u>

viii) 5 thousands + 2 hundreds + 410 units
= 5000 + 200 + 410 = <u>5610</u>

b) Read: *List them in increasing order.*

Let's see who is quickest to do it! Start . . . now!

P finished first dictates results to T and explains their quick strategy to class. (First look at the thousands digit, then the hundreds digit, then the tens digit, etc.)

Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

$826 < 3504 < 4005 < 4072 < 5023 < 5234 < 5304 < 5610$

Notes:

Individual work, monitored

Written on BB or SB or OHT

Differentiation by time limit.

Discussion, reasoning, agreement, self-correction, praising

(Or Ps could write digits on scrap paper or slates and show in unison on command.)

Allow 1 minute.

Discussion, agreement, self-correction, praising

37 min

9

Book 5, page 1

Q.4 a) Read: *Write these numbers in the place-value table.*

First elicit what the headings in the table mean.

e.g. TTh = Ten Thousands = 10×1000 = 10 000

Deal with one part at a time. Set a time limit.

Review at BB with whole class. Ps come to BB to complete the table, explaining reasoning in detail. eg.

e.g. 5409 = 5000 + 400 + 9 = 5Th + 4H + 0T + 9U

Class points out errors. Mistakes discussed and corrected.

Solution:

a)

	TTh 10 000	Th 1000	H 100	T 10	U 1
5409		5	4	0	9
9521		9	5	2	1
1935		1	9	3	5
2050		2	0	5	0
5499		5	4	9	9
5499 + 1		5	5	0	0
5499 + 2		5	5	0	1

b)

	TTh 10 000	Th 1000	H 100	T 10	U 1
35				3	5
10 times 35			3	5	0
100 times 35		3	5	0	0
1000 times 35	3	5	0	0	0

Notes:

Individual work, monitored, (helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit.

Discussion, reasoning, agreement, self-correction, praising

Extension

- Which is largest (smallest) number?
- What does this 3, etc. mean?
- Which is the greatest (smallest) digit? etc.

Ps can think of questions to ask too!

42 min

Bk5		*Lesson Plan 1*
Activity		***Notes***
10	***Book 5, page 1***	
	Q.5 Read: *Write the next two terms in the sequence.*	Individual work, monitored (helped)
	Let's see if you can do it in 1 minute. Write the rule you used below each sequence. Start . . . now! . . . Stop!	Written on BB or SB or OHT
	Review with whole class. Ps dictate to T and give the rule they used. Who agrees? Who used a different rule? etc. Mistakes discussed and corrected.	Reasoning, agreement, self-correction, praising
	Solution:	Feedback for T
	a) 413, 418, 423, 428, <u>433</u>, <u>438</u> (*Rule:* Increasing by 5)	(or + 5)
	b) 1200, 1100, 1000, <u>900</u>, <u>800</u> (*Rule:* Decreasing by 100)	(or – 100)
	45 min	

Bk5	R: Number line **C: Review of Y4: comparison. ordering, rounding of natural numbers** *E: Numbers beyond 10 000. Roman numerals. Bases other than 10.*	*Lesson Plan 2*

Activity — ***Notes***

1

Base 5

Ian had some marbles and he decided to count them by grouping them in 5s, then by putting the groups of 5 in 5s. This is the table he made to show his grouping.

BB:

(125) $5 \times 5 \times 5$	(25) 5×5	(5)	(1)
1	0	4	3

How many marbles did Ian have if we count as we normally do in base 10? Show me . . . now! (148)

P answering correctly comes to BB to explain reasoning. Class agrees/ disagrees. Remind Ps of the notation for showing bases other than 10.

BB: $1043_5 = 1 \times 125 + 0 \times 25 + 4 \times 5 + 3 \times 1$

$= 125 + 0 + 20 + 3$

$= \underline{148}$

Answer: Ian had 148 marbles.

Whole class activity

Drawn on BB or SB or OHT

Responses shown on scrap paper or slates in unison.

Reasoning, agreement, praising

Extra praise if Ps remember notation without help from T.

2 min

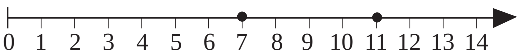
2

Number line

Who can mark these natural numbers on the numbers line? Ps come to BB to draw dots and label them. Class points out errors. T helps with extra calibration where needed.

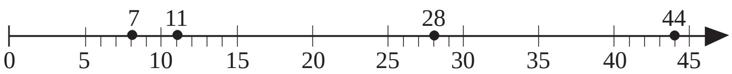
BB:

a) 7, 11



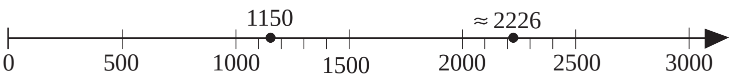
Which natural numbers are between 7 and 11? (8, 9, 10)

b) 7, 11, 28, 44



Tell me a number between 11 and 28. (e.g. 20) How could we write it mathematically? Ps come to BB. e.g. $11 < \underline{20} < 28$)

c) 1150, 2226



Which is more and by how much? BB: $1150 \underset{1076}{<} 2226$

Whole class activity

Number lines drawn on BB (without the addiitional calibration) or use enlarged copy master or OHP

At a good pace

Agreement, praising

Feedback for T

5 min

Bk5

Lesson Plan 2

Activity		*Notes*

3

Roman numerals

The ancient Romans did not know about place value. They used different letters to show numbers. What letters did they use and what did they stand for? Ps come to BB or dictate to T. What do we call these letters which represent numbers? (Roman numerals)

BB: I = 1, V = 5, X = 10, L = 50, C = 100,
D = 500, M = 1000

How could they make all the natural numbers using these letters? Allow Ps to explain if they remember, otherwise T does so. Elicit that:

a) Letters after a larger or equal number are added: e.g.

BB: II = 1 + 1 = 2, VIII = 5 + 1 + 1 + 1 = 8,
XI = 10 + 1 = 11 LXIII = 50 + 10 + 1 + 1 + 1 = 63

What does this number mean? Write the addition in your *Ex. Bks,* then show me the result when I say.

Show me . . . now! P answering correctly comes to BB to explain reasoning. Mistakes discussed and corrected.

BB: MMMDCLXXXVI (= 3000 + 500 + 100 + 50 + 30 + 6
= 3686)

b) A letter before a larger number is subtracted: e.g.

BB: IV = 5 – 1 = 4, XL = 50 – 10 = 40,
XLIX = (50 – 10) + (10 – 1) = 40 + 9 = 49

What does this number mean? Write the subtraction in your *Ex. Bks,* then show me the result when I say.

Show me . . . now! P answering correctly comes to BB to explain reasoning. Mistakes discussed and corrected.

BB: MCMXCIX (= 1000 + [1000 – 100] + [100 – 10] + [10 – 1]
= 1000 + 900 + 90 + 9
= 1999)

10 min

Notes:

Whole class discussion to start, followed by individual work in *Ex. Bks.*

If Ps miss out a letter, T writes it on BB and Ps say the number it represents.

Discussion, agreement, praising

Involve several Ps.

Individual work, monitored

Written on scrap paper or slates and shown unison.

Reasoning, agreement, self-correction, praising

Also elicit that a letter is not added more than 3 times.

e.g. 8 = VIII,
but 9 = IX

300 = CCC,
but 400 = CD

(Ps might also notice that the Romans did not have a numeral for zero.)

Feedback for T

4

Which is more?

a) I am going to underline the greatest number in this list. Watch carefully and check that I am correct. e.g.

BB: 28 014, 28 410, 28 140, 28 041

Am I correct? (No, it should be 28 410!)

b) This time I am going to underline the smallest number in this list.

BB: 1 003 156, 1 651 300, 1 561 300, 1 006 531

Am I correct? (No, it should be 1 003 156)

T points to certain numbers and Ps read them aloud in unison.

12 min

Notes:

Whole class activity

Written on BB or SB or OHT

Agreement, praising

Agree that to determine the greatest or smallest number, compare the M digits, then the HTh digits, then the TTh digits, etc.

Bk5

Lesson Plan 2

Activity		Notes

5

Rounding quantities

I want to round these quantities to the nearest whole 10 units. Which rounding is correct? Ps come to BB to underline the correct rounding, explaining reasoning. Class agrees/disagrees.

How can we write it in a mathematical way? Elicit that the ≈ sign means 'approximately equal to', or 'roughly equal to', or 'rounds to'.

BB:

a)	47 cm	40 cm	or	<u>50 cm</u>	47 cm ≈ 50 cm
b)	52 litres	<u>50 litres</u>	or	60 litres	52 litres ≈ 50 litres
c)	7 kg	0 kg	or	<u>10 kg</u>	7 kg ≈ 10 kg
d)	4 km	<u>0 km</u>	or	10 km	4 km ≈ 0 km

Elicit that 5 or more units rounds <u>up</u> to next whole ten, and less than 5 units rounds <u>down</u> to previous whole ten.

15 min

Notes:

Whole class activity

Quantities written on BB or SB or OHT

Discussion, reasoning, agreement, praising

Ps could write the approximations in *Ex. Bks.*

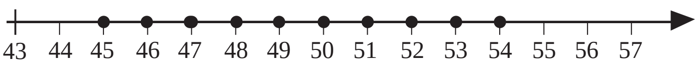
Feedback for T

6

Rounding numbers

Let's mark on this number line all the natural numbers which round to 50 as the nearest whole ten. Ps come to BB to draw dots. Class agrees/disagrees.

BB:



T asks some Ps to write a mathematical statement about it. e.g.

BB: 45 ≈ 50, 54 ≈ 50, etc. – but elicit that: 55 ≈ 60

18 min

Notes:

Whole class activity

Number line drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement , praising

7

Book 5, page 2

Q.1 a) Read: *In your exercise book, write these numbers in words.*

Set a time limit or deal with one number at a time.

Review at BB with whole class. T has solution already prepared and uncovers each number as it is dictated by a P. Mistakes (including spellings corrected.

Solution:

i) 1240 = one thousand, two hundred and forty

ii) 324 = three hundred and twenty four

iii) 2001 = two thousand and one

iv) 5430 = five thousand, four hundred and thirty

v) 10 101 = ten thousand, one hundred and one

vi) 1027 = one thousand and twenty seven

b) Read: *List them in increasing order.*

Let's see if you can do it in 1 minute! Ps list numbers as digits in *Pbs*. Review with whole class. Ps come to BB or dictate to T. Mistakes discussed and corrected.

Solution:

324 > 1027 > 1240 > 2001 > 5430 > 10 101

25 min

Notes:

Individual work, monitored, (helped)

Written on BB or SB or OHT

At a good pace

Agreement, self-correcting, praising

Extension

Ps write the Arabic numbers as Roman numerals

Feedback for T

Bk5

Lesson Plan 2

Activity		***Notes***

8

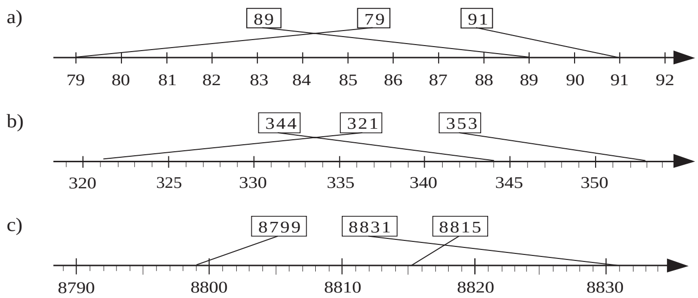
Book 5, page 2

Q.2 Read: *Join up each number to the corresponding point on the number line.*

Deal with one part at a time or set a time limit.

Review at BB with whole class. Ps come to BB to draw joining lines. Class agrees/ disagrees. Mistakes discussed and corrected.

Solution:



Let's compare the numbers. Who can write an inequality about them? Ps come to BB to write and say inequalities. Class agrees/disagrees.

(e.g. $89 > 79$, $79 \not> 91$, $321 < 353$, $344 \not< 321$, etc.)

Notes: Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Extra praise for clever statements, e.g.

$8799 \leq 8815$, $79 \geq 79$

30 min

9

Book 5, page 2

Q.3 Read: *a) Follow the pattern and complete the table.*

b) Write an approximation sign nearest the correct rounding to the nearest whole ten.

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

Next smaller ten	Number	Next greater ten
0	≈ 3	10
80	86 ≈	90
390	≈ 392	400
4530	4535 ≈	4540
10320	≈ 10324	10330

Notes: Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

At a good pace

For each row, T chooses a P to say the inequality.

e.g.

'Three is approximately equal to 0, rounded to the nearest whole ten.'

34 min

10

Book 5, page 2

Q.4 Read: *Round each number to the nearest whole ten and nearest whole hundred.*

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) $299 \approx 300 \approx 300$ b) $4604 \approx 4600 \approx 4600$

c) $2875 \approx 2880 \approx 2900$ d) $9048 \approx 9050 \approx 9000$

Notes: Individual work, monitored, (helped)

Reasoning, agreement, self-correction, praising

Show on relevant segment of number line drawn on BB if there is disagreement.

38 min

Bk5		*Lesson Plan 2*
Activity		***Notes***
11	***Book 5, page 2*** Q.5 Read: *Complete the statements.* Set a time limit. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) 345 < 410 b) 410 – 345 = <u>65</u> c) 345 + <u>65</u> = 410 d) 1320 > 1120 e) 1320 – 1120 = <u>200</u> f) 1120 + <u>200</u> = 1320 g) 7479 < $\square$ < 7485 $\square$: 7480, 7481, 7482, 7483, 7484 (Assuming that the solution is a natural number.) *43min*	Individual twork, monitored Written on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising Elicit that in g) if the solution includes fractions too, then the inequality is correct as it is.
12	**Statements in context** I will say a statement containing some numbers and you must tell me whether you think the numbers are exact or approximate. Listen carefully, write E for exact or A for approximate on your slates and show me when I say. a) Greg has 3 brothers and sisters. Show me . . . now! (E) b) Children start school when they are 4 years old. (A) c) This house cost £80 000 to build. (A) d) Chorleywood has 5000 inhabitants. (A) e) I live 500 m from my school. (A) T chooses Ps to explain their responses. After discussion, agree that: a) is definitely exact; b) is aproximate, as very few children start school on their 4th birthday; c), d) and e) <u>could</u> be exact, but it is more likely in real life that they have been rounded to the nearest thousand or hundred. *45 min*	Whole class activity Responses shown in unison Discussion, reasoning, agreement Involve several Ps in the debate. If no P responds with 'A' to c), d) or e), T guides Ps' thoughts towards what happens in real life.

Bk5	R: Place-value. Money **C: Multiplication and division of positive integers by 10 or 100** *E: Numbers up to 10 000. Multiplication and division by 1000*	*Lesson Plan 3*

Activity | ***Notes***

1

Money

Let's complete the missing items in these statements. Ps come to BB to write missing values, explaining reasoning by writing an operation. Class points out errors.

BB:

a) 45 £10 notes are worth £ $\boxed{450}$ — 45 × 10 = <u>450</u>

b) 32 £1 coins are worth $\boxed{3200}$ p — 32 ×100 = <u>3200</u>

c) 10 £10 notes are worth $\boxed{10\,000}$ p — 10 × 10 × 100 = <u>10 000</u>

d) $\boxed{54}$ £10 notes are worth £540 — 540 ÷ 10 = <u>54</u>

e) $\boxed{5400}$ £10 notes are worth £54 000 — 54 000 ÷ 10 = <u>5400</u>

f) $\boxed{63}$ £1 coins are worth 6300 p — 6300 ÷ 100 = <u>63</u>

g) 10 £5 notes are worth £ $\boxed{50}$ — 10 × 5 = <u>50</u>

h) 100 £20 notes are worth £ $\boxed{2000}$ — 100 × 20 = <u>2000</u>

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Ask Ps to say the whole statement and the operation.

e.g.

'45 £10 notes are worth £450 because 45 times 10 equals 450'

T helps with wording if necessary.

5 min

2

Multiplying by 10 and 100

A gardener planted 24 flowers in each row, like this.

BB: * * * * * * * * * *   * * * * * * * * * *   * * * *

Who can write 24 in the place value table? (2T + 4U)

a) How many flowers did he plant altogether if he planted 10 rows?
P comes to BB to write the operation. (BB: 10 × 24 = <u>240</u>)

Let's write the result in the place-value table. (2H + 4T + 0U)

Who can explain the multiplication in detail?

'Ten times 4 units equals 4 tens. Ten times 2 tens equals 2 hundreds'

What do you notice? Elicit that when multiplying by 10, each digit of the number being multiplied (<u>multiplicant</u>) is put in the next greater place-value column and a zero is put in the units column.

b) How many flowers did he plant altogether if he planted 100 rows?
(BB: 100 × 24 = <u>2400</u>)

Let's write it in the place-value table. (2Th + 4H + 0T + 0U)

Who can explain the multiplication in detail?

'One hundred times 4 units equals 4 hundreds.
One hundred times 2 tens equals 2 thousands'

What do you notice? Elicit that when multiplying by 100, each digit of the multiplicant is put in the column which is 2 place-values greater and zeros are put in the units and tens columns.

c) How many flowers would be in 100 (1000) rows? Ps come to BB to write the result directly in the place-value table, explaining reasoning. Class agrees/disagrees.

Ps might notice that the number of zeros in the product is the same as the number of zeros in the multiplier (unless the multiplicant has a zero to start with).

Whole class activity

Drawn on BB or SB or OHT

BB:

TTh	Th	H	T	U	
			2	4	1 row
		2	4	0	10 rows
	2	4	0	0	100 rows
2	4	0	0	0	1000 rows

(Table is built up gradually.)

Discussion, reasoning, agreement, praising

At a good pace

Involve several Ps.

T helps with wording of explanations if necessary.

Ps should understand that :

- moving a digit 1 place to the <u>left</u> in the place-value table means <u>multiplying</u> it by 10, etc.
- moving a digit 1 place to the <u>right</u> in the place-value table means <u>dividing</u> it by 10, etc.

10 min

Bk5

Lesson Plan 3

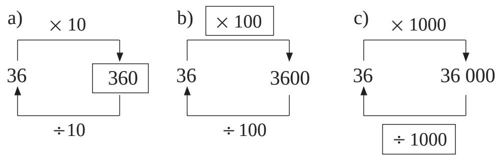
Activity | ***Notes***

3

Missing items

Let's complete the diagrams. Ps come to BB to write missing numbers and operation signs, explaining reasoning. Class agrees/disagrees. Elicit that division is the opposite (or <u>inverse</u>) of multiplication.

BB:



Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, praising

What is missing from these sentences? Ps come to BB or dictate to T. Class agrees/disagrees. Ps say the completed sentence and write it in their *Ex. Bks*.

BB:

a) Natural numbers are exactly divisible by 10 if they have a $\boxed{\text{zero}}$ in the $\boxed{\text{units}}$ column.

b) When dividing by 10, each digit of the dividend is moved to the next $\boxed{\text{smaller}}$ place value column and the last $\boxed{\text{zero}}$ is cancelled.

c) Natural numbers are exactly divisible by $\boxed{100}$ if their tens and $\boxed{\text{units}}$ digits are zero.

d) When dividing by $\boxed{100}$, each digit of the dividend is moved $\boxed{\text{two}}$ columns to the right in the place -value table and the last two $\boxed{\text{zeros}}$ are cancelled.

Notes: Written on BB or use enlarged copy master or OHP

At a good pace.

Encourage Ps to read the sentences loudly and clearly.

Encourage quick but neat work when writing in *Ex. Bks*.

Ps underline, or highlight in colour, the missing words.

14 min

4

Rounding

Let's round these numbers. T says a number and Ps say the rounded value.

a) Round to the nearest 10:

7 ≈ <u>10</u>, 9 ≈ <u>10</u>, 5 ≈ <u>10</u>, 4 ≈ <u>0</u>, 1 ≈ <u>0</u>, 5460 ≈ 5460, etc.

b) Round to the nearest 100:

74 ≈ <u>100</u>, 99 ≈ <u>100</u>, 50 ≈ <u>100</u>, 49 ≈ <u>0</u>, 10 ≈ <u>0</u>,
145 ≈ <u>100</u>, 319 ≈ <u>300</u>, 5460 ≈ <u>5500</u>, etc.

c) Round to the nearest 1000:

840 ≈ <u>1000</u>, 1760 ≈ <u>2000</u>, 1180 ≈ <u>1000</u>, 2310 ≈ <u>2000</u>,
4650 ≈ <u>5000</u>, 5460 ≈ <u>5000</u>, etc.

Tell me a number which is exactly divisible by 10 (100, 1000).
Class points out errors.

Notes: Whole class activity

At speed round class

If a P makes a mistake, the next P must correct it.

Ps can think of numbers too!

At speed. T chooses Ps at random.

Praising, encouragement only

18 min

Bk5		*Lesson Plan 3*
Activity		***Notes***
5	***Book 5, page 3*** Q.1 Read: *Fill in the missing numbers.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate results to T, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected. (If disagreement, show in a place-value table.) *Solution:* a) $\underline{23} \times 10 = 230$ b) $75 \times \underline{100} = 7500$ c) $27 \times \underline{1000} = 27\,000$ $120 \times \underline{10} = 1200$ $\underline{22} \times 100 = 2200$ $\underline{75} \times 100 = 7500$ $445 \times 10 = \underline{4450}$ $120 \times 100 = \underline{12\,000}$ $85 \times 100 = \underline{8500}$ *25 min*	Individual work, monitored Written on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising T points to a multiplication and Ps give the inverse operation. e.g. $12\,000 \div 100 = 120$
6	***Book 5, page 3*** Q.2 Read: *Fill in the missing numbers and signs.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate results to T, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected. *Solution:* a) $840 \div \underline{10} = 84$ b) $7200 \div \underline{100} = 72$ c) $9600 \div 100 = \underline{96}$ d) $\underline{10\,000} \div 100 = 100$ e) $1720 \underline{\div} 10 = 172$ f) $850 \underline{\times} 10 = 8500$ g) $8500 \div \underline{100} = 85$ h) $\underline{34} \times 1000 = 34\,000$ *30 min*	Individual work, monitored, (helped) Written on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising Encourage Ps to use words such as multiplicant, multiplier, product, dividend, divisor, factor, quotient, in their explanations.
7	***Book 5, page 3*** Q.3 Read: *Write multiplications and divisions about the tables.* First make sure that Ps know what the headings in the tables mean. Deal with one part at a time. Set a time limit. Review with whole class. Ps come to BB to write operations. Who agrees? Who wrote a different operation? etc. Deal with all cases. Mistakes discussed and corrected *Solution:* e.g. (tables a) and b) below) T points to certain rows in the tables and Ps say the numbers in unison.	Individual work, monitored, (helped) Drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising At a good pace
Extension	Who can think of questions to ask about the numbers in the tables? (e.g. Which numbers are not divisible by 10? Which number is a multiple of 3? Which number is a prime number? What is the difference between 53 and 53 000? etc.) *36 min*	Whole class activity Extra praise for creative questions.

a)

H Th	T Th	Th	H	T	U
				5	3
			5	3	0
		5	3	0	0
	5	3	0	0	0
5	3	0	0	0	0

$53 \times 10 = 530$
$53 \times 100 = 5300$
$53 \times 1000 = 53\,000$
$530 \times 10 = 5300$
$5300 \times 10 = 53\,000$
etc.

b)

H Th	T Th	Th	H	T	U
8	0	7	0	0	0
	8	0	7	0	0
		8	0	7	0
			8	0	7

$807\,000 \div 10 = 80\,700$
$80\,700 \div 100 = 807$
$807\,000 \div 1000 = 807$
$80\,700 \div 10 = 8070$
$8070 \div 10 = 807$

Bk5

Lesson Plan 3

Activity		*Notes*

8

Book 5, page 3

Q.4 Read: *You have these number cards.* BB: $\boxed{2}\ \boxed{3}\ \boxed{4}\ \boxed{0}\ \boxed{0}\ \boxed{0}$

Use them to make, where possible, two different 6-digit numbers which are:

a) divisible by 10

b) divisible by 10, but not by 100

c) divisible by 100, but not by 10

d) not divisible by 10.

Set a time limit. Review with whole class. Ps come to BB or dictate numbers to T. Who wrote the same? Who wrote different numbers? etc. Class checks that they meet the conditions. Deal with all cases. Mistakes discussed and corrected.

Solution: e.g.

a) *divisible by 10*: (36 numbers are possible)
234 000, 243 000, . . ., 203 400, . . ., 200 340, . . .

b) *divisible by 10 but not by 100*: (18 numbers are possible)
203 040, 200 340 . . .,

c) *divisible by 100 but not by 10*: Impossible!

d) *not divisible by 10*: (24 numbers are possible)
200 304, 200 403, . . .,

Notes: Individual work, monitored, helped

Do not discuss the conditions until Ps have had the chance to try it.

Less able Ps could have number cards on desks.

More able Ps could write as many numbers as possible in their *Ex. Bks*.

Discussion on the conditions. Elicit that:

a) numbers must have units digit zero;

b) numbers must have units digit zero but tens digit <u>not</u> zero;

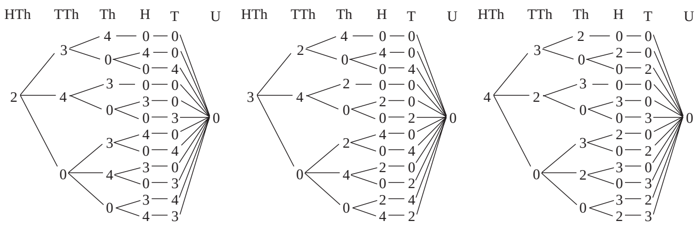
c) contradiction – as all numbers divisible by 100 are also divisible by 10!

d) units digit cannot be zero.

Extension

If Ps are interested in finding all possible numbers, allow them to continue at home. Or T could draw tree diagrams on BB with Ps' help instead of doing *Activity 9*.

e.g. for a):



Notes: Whole class activity

Ps come to BB or dictate to T.

Elicit that there are:

$3 \times 12 = \underline{36}$ possibilities

41 min

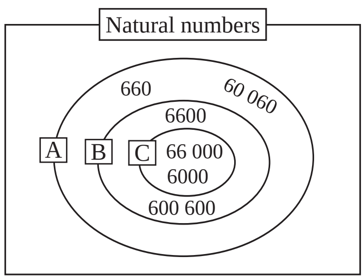
9

Sets of multiples

Let's write these numbers in the correct set in the <u>Venn</u> diagram.

Ps come to BB to underline a number and write it in the diagram, explaining reasoning. Class agrees/disagrees.

BB: 6000, 66 000, 660, 6600, 60 060, 600 600



A = {multiple of 10}

B = {multiple of 100}

C = {multiple of 1000}

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Agree that being a multiple of 10 , etc. is the same as being divisible by 10, etc.

45 min

Bk5

R: Multiplication and division by 10, 100, 1000

C: Measures: length, mass, capacity (km, m, cm, kg, g, ℓ, cl, ml)

E: tonne (t), pound (lb), ounce (oz), gallon, pint, mile,

Lesson Plan 4

Activity		*Notes*

1

Measurement

T has coloured strips of card stuck to side of BB.
e.g. *green* (12 units), *red* (6 units), *blue* (3 units), *white* (1 unit)

How many times can you place the *blue* (*white*, *red*) strips on the *green* strip? Ps come to BB to try it. (4 times, 12 times, 2 times.)

BB: e.g.

green			
blue	*blue*	*blue*	*blue*

length of $\underbrace{\text{1 green strip}}_{\text{quantity}}$ = length of 4 $\underbrace{\text{blue strips}}_{\text{unit}}$

measuring number

Measurement is always a comparison. We compare the quantity with the unit we have chosen to use. e.g.

BB: 1 *green* = 12 *white* = 2 *red* = 4 *blue*

So if we use different units of measure, we get different measuring numbers.

Notes:

Whole class activity

If possible, Ps have strips on desks (use copy master) or sets of Cuisennaire rods if Ps have them.

T introduces the vocabulary of measurement.

quantity – amount to be measured

unit – amount used to measure the quantity

measuring number – number of units needed

T explains and Ps listen.

5 min

2

Measuring

Look at this vase. What kind of measures could we do on it? (e.g. height or width, mass (weight), capacity)

a) What are the standard units that we use to measure length? (km, cm, mm) (Accept inch, foot, yard and mile too.)

Estimate the height of this vase and show me when I say. T writes a sample of Ps' different estimates on the BB.

Now let's measure it exactly. Two Ps come to front of class, one to measure it and the other to write the height on BB. (e.g. 23 cm) Whose estimate is nearest? (e.g. **A**'s) Let's give **A** a clap!

b) What are the standard units that we use to measure mass (weight)? (tonne, kg, g) [Accept tons, stones, lbs, ounces too.]

What do you think this vase weighs? Show me . . . now!

T writes a sample of Ps' estimates on BB. Let's measure the mass of the vase exactly. Two Ps come to BB to weigh the vase and write its weight on the BB. Continue as for a).

c) What is capacity? (How much liquid a container can hold.) What are the standard units of capacity? (litre, cl, ml) [Accept pint, gallon)

Show me what you think the capacity of this vase is . . now!

T writes a sample of Ps' estimates on the BB. Two Ps come to front to fill the vase with water, pour the water into a measuring jug or cylinder and write the capacity on the BB. Continue as for a).

Notes:

T has ruler, set of scales, vase, measuring jug and water at front of class.

Whole class activity

(Any suitable container can be substituted for the vase.)

Encourage Ps to make realistic estimations.

Estimates written on scrap paper or slates and shown in unison.

Comparison of estimates with real data done in good humour!

All done at a good pace.

Feedback for T

10 min

Bk5

Lesson Plan 4

Activity

Notes

3

Book 5, page 4, Q.1

Read: *Write the units of measure that you know in the correct place in the table.*

T (or P) explains the headings in the table and points out the column which shows the basic units.

Ps come to BB to choose a space and write the unit of measure, explaining its relationship to the whole unit. (e.g. 1000 m = 1 km) Class agrees/disagrees. Ps fill in the table in their *Pbs* too.

Solution:

Number of times, or the fraction of, the basic unit	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
Units of length	kilometre (km)			metre (m)		centimetre (cm)	millimetre (mm)
Units of mass	kilogram (kg)			gram (g)			
Units of capacity				litre (ℓ)		centilitre (cl)	millilitre (cl)

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

What measure of mass do you know that is not shown in the table? Elicit or tell that:

BB: 1 tonne = 1000 kg = (1000 × 1000) g = 1 000 000 g = 1 million g

Notes: Extra praise if Ps suggest tonne, otherwise T reminds class.

Extension

There are names for other units of measure that you do not need to learn but which are used in other countries or by doctors and scientists. T writes them on BB and Ps show where they would be in the table. e.g.

BB: 1 mg = 1 milligram = $\frac{1}{1000}$ g; 1 dm = 1 decimetre = $\frac{1}{10}$ m;

1 dag = 1 decagram = 10 g; 1 hl = 1 hectalitre = 100 litres;

1 kl = 1 kilolitre = 1000 litres

Elicit or tell that:

BB: kilo = 1000, hecta = 100, deca = 10

deci = $\frac{1}{10}$, centi = $\frac{1}{100}$, milli = $\frac{1}{1000}$

Notes: Whole class activity

T need not use all the units shown opposite, although the meanings of the prefixes are interesting.

If Ps know about any of the units, ask them to tell class how they know. (e.g. mg is often on medicine bottles)

Ps could write the prefixes and their meanings in *Ex. Bks* as a reminder.

14 min

4

Estimating 1

Estimate these measures and show me when I say. Remember to write the measuring number and the unit of measure! e.g.

a) the height of the pupil sitting on your left; (m or cm)

b) the weight of the pupil sitting on your right; (kg)

c) the thickness of a £1 coin; (mm)

d) the distance from your house to the school. (km or miles)

T or Ps point out Ps who have wildly over- or under-estimated!

Notes: Whole class activity

Encourage realistic estimates.

Responses written on scrap paper or slates and shown in unison on command.

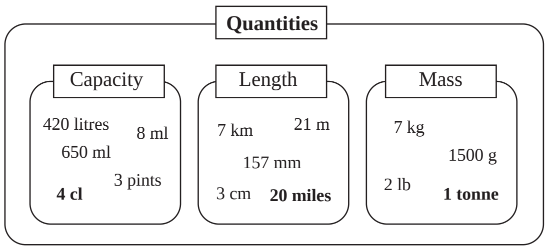
Praising, encouragement only.

In good humour!

18 min

Bk5

Lesson Plan 4

Activity		***Notes***
5	**Estimating 2** Everyone stand up! Hold your hands these distances apart when I say. a) 1 cm, 12 cm, 43 cm, 29 cm, 88 cm, 100 cm b) 1 mm, 25 mm, 100 mm, 275 mm, 1000 mm. T could have each length already prepared on strips of card and do a quick tour of class to check Ps' measures and adjust where necessary. *22 min*	Whole class activity Ps can either estimate or use rulers or metre sticks to help them. In good humour! Praising, encouragement only
6	***Book 5, page 4*** Q.2 Read: *a) Write a label for each set.* *b) Add a quantity of your own to each set.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Deal with all units used. *Solution:* e.g.  *25 min*	Individual work, monitored Drawn on BB or use enlarged copy master or OHP T notes Ps having difficulty. Agreement, self-correcting, praising Accept any valid addition to each set, including Imperial units. **Bold** numbers are added.
7	***Book 5, page 4*** Q.3 Read: *Convert the quantities.* Let's see how many of these you can do in 3 minutes! Start . . . now! . . . Stop! Review with whole class. Ps come to BB or dictate to T, explaining reasoning. (e.g. 3 km = 3 times 1000 m = <u>3000 m</u>) Class agrees/disagrees. Mistakes discussed and corrected. Who had all all 14 correct? Let's give them 3 cheers! *Solution:* a) 3 km = <u>3000</u> m b) 12 km = <u>12 000</u> m c) 5 and a half km = <u>5500</u> m d) 17 m 80 cm = <u>1780</u> cm e) 3 half metres = <u>150</u> cm f) 3 quarters of a metre = <u>75</u> cm g) 5 m = <u>5000</u> mm h) 32 m 4 cm = <u>32 040</u> mm i) 2 fifths of a metre = <u>400</u> mm j) 3000 ml = <u>3</u> litres k) 2500 ml = <u>2.5</u> litres l) 2500 cl = <u>25</u> litres m) 10 000 g = <u>10</u> kg n) 3500 g = <u>3.5</u> kg If problems, show details on BB. e.g. i) 2 fifths of a metre = 1000 mm ÷ 5 × 2 = 200 mm × 2 = <u>400 mm</u> *30 min*	Individual work, monitored, less able Ps helped Written on BB or use enlarged copy master or OHP If necessary, quickly revise relationships first. BB: 1 km = 1000 m 1 m = 100 cm = 1000 mm 1 litre = 100 cl = 1000 ml 1 kg = 1000 g Reasoning, agreement, self-correction, praising or, e.g. for n): <u>3 and a half</u> kg

Bk5		*Lesson Plan 4*
Activity		***Notes***
8	***Book 5, page 4*** Q.4 Read: *Fill in the missing items.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Mistakes discussed and corrected. Praise Ps who noticed that part f) is impossible, as metres and grams are not units of capacity! *Solution:* a) 4 litres = 4000 ml = 400 cl b) 31 kg = 31 000 g c) 70 m = 7000 cm = 70 000 mm d) 1300 cm = 13 m = 13 000 mm e) 3 000 000 g = 3000 kg = 3 tonnes f) 5000 ml ≠ $\boxed{}$ m ≠ $\boxed{}$ g *36 min*	Individual work, monitored (helped but not with last row) Written on BB or SB or OHT Reasoning, agreement, self-correction, praising Discussion on last question. Agree that it is impossible but how ask Ps how to make the statement correct. (Use the 'not equal to' sign.)
9	**Missing signs** Compare the quantities. Which is more and how much more? Ps come to BB or dictate to T. Class points our errors. T could do one and make a deliberate mistake, in the hope that Ps will point it out! BB: a) $1\text{ g} \underset{\times 1000}{\boxed{<}} 1\text{ kg}$ b) $1\text{ ml} \underset{\times 10}{\boxed{<}} 1\text{ cl} \underset{\times 10}{\boxed{<}} 1\text{ litre}$ c) $1\text{ ml} \underset{\times 1000}{\boxed{<}} 1\text{ litre}$ d) $1\text{ mm} \underset{\times 10}{\boxed{<}} 1\text{ cm} \underset{\times 100}{\boxed{<}} 1\text{ m} \underset{\times 1000}{\boxed{<}} 1\text{ km}$ *40 min*	Whole class activity Written on BB or SB or OHT Reasoning, correcting, agreement, praising Ps write completed inequalities in *Ex. Bks.*
10	**Metric and Imperial units** Most countries use the metric system based on grouping in tens, which started in France in the 1790s. In Britain, we have also changed our traditional system but in daily life we still use Imperial units (e.g. gallons, miles, ounces) as well as metric units (e.g. litres, km and grams.) Some baking recipes often give quantities in metric and Imperial units. Imperial and metric units are difficult to compare but we can make approximations. Who knows what they are? T tells it if no Ps knows. BB: e.g. 1 pound = lb ≈ 454 g (≈ half a kg) 1 ounce = 1 oz ≈ 28 g 1 gallon ≈ 4543 ml (≈ 4 and a half litres) 1 mile ≈ 1609 m (≈ 1 and 6 tenths of a km) 1 pint ≈ 568 ml (more than half a litre) Look out for Imperial units outside school and let us know where you saw them used. *45 min*	Whole class discussion T explains but involves Ps where possible. Ps could tell clas of own experiences of Imperial units. Ps write the inequalities in their *Ex. Bks*. Ongoing task

Bk5

R: Natural numbers. Mental calculation

C: Cartesian coordinate system: first quadrant

E: Compass directions. Routes on a square grid

Lesson Plan 5

Activity		*Notes*

1

Chain calculation

Listen to the operations, do the calculations in your head and show me the final result when I say.

Multiply the smallest natural number by 10, . . . add 6, . . . round to the nearest ten, . . . divide by 10, . . . subtract 1, . . . and add to 56 rounded to the nearest 100. Show me the result . . . now! (101)

P answering correctly explains each step:

'1 is the smallest natural number; $1 \times 10 = 10$; $10 + 6 = 16$;

$16 \approx 20$, to the nearest 10; $20 \div 10 = 2$; $2 - 1 = 1$; $56 \approx 100$, to the nearest 100; $100 + 1 = \underline{101}$ '

T asks some Ps who made a mistake to say what they did wrong.

If we started with 0 instead of 1, what would the result be?

Show me . . . now! (100) P who responded incorrectly goes through operations on BB with help of class.

Notes:

Whole class activity

T dictates slowly and Ps nod their heads when they have done each step.

(Ps might concentrate better with their eyes shut.)

Less able Ps may note the interim results in *Ex. Bks.*

Responses shown on scrap paper or slates in unison.

Discussion, agreement, praising

[Develops memory and concentration.]

4 min

2

Compass directions

Everyone stand up and face the BB! Think of this direction as being North and follow my instructions. Turn to face East . . . now! Turn to face West . . . now! Turn to face South . . . now. Turn to face North . . . now!

Who can write the compass directions on the BB? Class agrees/disagrees.

What kind of angle did you turn from North to East? (a right angle, or 1 quarter of a turn, or $90°$)

Discuss the other turns in the same way, showing the angle turned on BB.

A, stand up and face North. We want **A** to turn to face East. What instructions could we give? (e.g. Turn 1 right angle, or 1 quarter of a turn, or $90°$ to the right or <u>clockwise</u>.)

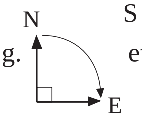
What other instructions could we give? (e.g. Turn 3 right angles, or 3 quarters of a turn, or $270°$ to the left or <u>anti-clockwise</u> .)

Notes:

Whole class activity

T notes Ps who turn the wrong way.

BB:
N
W E
S

e.g.  etc.

Accept and praise any valid form of instructions but elicit other forms too.

8 min

3

Orientation in a grid

If Ps are seated in rows and columns, number the rows and columns. (If not, choose Ps to form a grid in the middle of the class.)

T gives instructions. e.g.

- The P in column 2, row 3 put your hands on your head.
- The P in the 3rd row and 2nd column hold your ears. etc.

Elicit that it would be easier to follow the instructions if the row and column numbers were always given in the same order. Let's say the column number first, then the row number.

X, how could you describe your position in the class (grid)? **X** says, e.g. 'I am in column 2, row 4.' How could we write it mathematically? P comes to BB. (e.g. 2, 4) Class agrees/disagrees. What name do we give such a pair of numbers? (<u>coordinates</u>)

T gives other instructions using the coordinate system. e.g.

- The P at (3, 2) do a complete turn anti-clockwise.
- **Y**, tell us your coordinates.
- **Z**, what are the coordinates of **B**? etc. Class points out errors.

Notes:

Whole class activity

At a good pace and in good humour!

Class decides whether the correct P has done the actions.

Discussion, agreement

BB: (2, 4)

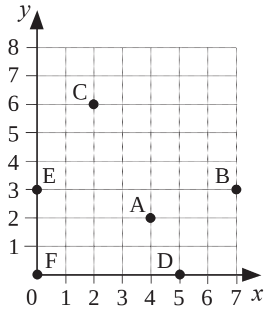
<u>Coordinates</u>

Coordinates written on BB as well as spoken.

Ps can give instructions too.

Praising, encouragement only

12 min

Bk5		*Lesson Plan 5*
Activity		***Notes***
4	**Cartesian coordinate system** T has grid and points drawn on BB. BB: Ps have blank grid on desks. Study this diagram. What can you tell us about it? (e.g. the thick horizontal line is the *x*-axis and its values show which column a point is in; the thick vertical line is the *y*-axis and its values show which row a point is in.)  a) Let's see if you can copy these points onto your grid. Set a time limit. T does a quick check of all Ps' work, correcting where necessary. Who can describe the position of point A? e.g. P_1: 'A is 4 units from the vertical line and 2 units from the horizontal line.' P_2: 'A is 2 units from the *x*-axis and 4 units from the *y*-axis.' P_3: 'The coordinates of A are (4, 2).' Well done – come and write it on the BB. (T shows it as coordinates if no P suggests it.) What does (4, 2) mean? (The 1st number is the *x*-coordinate and the 2nd number is the *y*-coordinate.) b) Write the coordinates of each point on the grid in your *Ex Bk*. Review with whole class. Ps dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. (If problems, Ps come to BB to move fingers along grid lines.) BB: A (4, 2); B (7, 3); C (2, 6); D (5, 0); E (0, 3); F (0, 0) T: We have a special name for the point which has coordinates (0, 0). It is called the origin. *18 min*	Whole class discussion to start Drawn on BB or use enlarged copy master or OHT (or use pin boards) Discussion, agreement, praising T helps with wording if necessary. Individual work, monitored, helped. Differentiation by time limit. Whole class discussion Accept any valid description but give extra praise if a P uses the coordinate system. BB: A (4, 2) Agreement, praising Individual work, monitored Reasoning, agreement, self-correcting, praising BB: Origin: (0, 0)
5	**Relay** Let's see how quick you are at finding points on a grid! P_1 says the name and coordinates of a point [e.g. K (3, 4)] and chooses P_2 to draw and label it on grid on BB. Class agrees/disagrees. Then P_2 says the name and coordinates of another point and chooses P_3 to draw it on the grid. etc. (If a P chooses the T to draw a point, T could make a mistake and hope that the class will point it out.) *25 min*	Whole class activity Drawn on BB or use enlarged copy master or OHT Agreement, correcting, praising At speed, in good humour! Extra praise if a P mentions the origin.

Bk5

Lesson Plan 6

Activity		*Notes*

6

Book 5, page 5

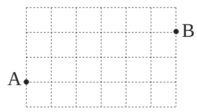
Q.1 Read: *a) How many units long is the shortest route from A to B along the grid lines?*

b) How many such routes can you find?

Notes: Individual (paired) trial in Ex. Bks.first, monitored

Notes: Grid drawn on BB or use enlarged copy master or OHP

Notes: BB:



Allow Ps to work in pairs if they wish. Set a time limit.

a) **A**, what do you think is the length of the shortest route? Who agrees? Who found a shorter route? etc.

Agree that the shortest route is <u>8 units</u> long. Ps come to BB to show some such routes on the grid.

Notes: Discussion, reasoning, demonstration, agreement, self-correcting, praising

b) **B**, how many 8-unit routes did you find? Who found more? etc. (It is very unlikely that Ps found all 28 routes, so praise the largest number found.)

Notes: If Ps did find all 28 routes, ask them to explain how they did it.

Let's check it this way.

- Elicit that the shortest routes are all 2 units up (u) and 6 units to the right (r) in any order. We could could show them like this:

  BB: u u r r r r r r, u r u r r r r r, u r r u r r r r, . . .

  Ps dictate one or two more.

  If we think of each letter as 1 step, the 2 u's can be placed among the 8 steps in different ways. Which positions could they be in? T starts and Ps continue when they understand.

  BB:
  1, 2; 1, 3; 1, 4; 1, 5; 1, 6; 1, 7; 1, 8;
  2, 3; 2, 4; 2, 5; 2, 6; 2, 7; 2, 8;
  3, 4; 3, 5; 3, 6; 3, 7; 3, 8;
  4, 5; 4, 6; 4, 7; 4, 8;
  5, 6; 5, 7; 5, 8;
  6, 7; 6, 8;
  7, 8

  Agree that there are 28 possible positions, so there must be <u>28</u> different shortest routes.

Notes: Whole class activity

Notes: T explains but involves Ps as much as possible.

Notes: There is no need to write all 28 routes using letters, just enough for Ps to get the idea.

Notes: Encourage logical listing

Notes: Ps dictate and T writes on BB.

Notes: (Ps can copy in Ex. Bks. too.)

Notes: BB: 7 + 6 + 5 + 4 + 3 + 2 + 1 = <u>28</u>

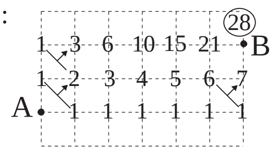
Extension

- Here is another way to check it.

  We could write the number of ways to get from A to each grid point on the shortest routes. T starts, explaining how to add the two diagonal values to get the next value (see diagram) then involves Ps once they have grasped the idea.

  Agree that there are <u>28</u> ways to reach point B from point A.

Notes: BB:



Notes: Ps come to BB or dictate to T.

Notes: Agreement, praising

30 min

7

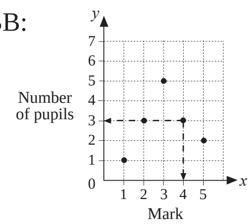
Book 5, page 5

Q.2 Read: *The graph shows the marks scored by a class of 14 pupils in a test which had 5 marks in total.*

Notes: Whole class discussion to start

Notes: Drawn on BB or use enlarged copy master or OHP

Notes: BB:



Who can explain the graph? Ps come to BB to relate the graph to the table, with T's help if necessary.

a) Read: *Complete the table.*

Set a time limit. Review with whole class. Ps come to BB or dictate to T, referring to graph if problems. Mistakes corrected.

Solution:

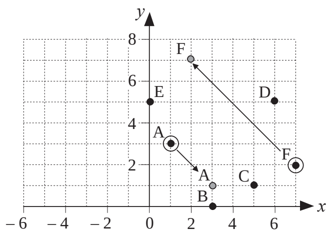
Mark	1	2	3	4	5
Number of pupils	**1**	**3**	**5**	3	**2**

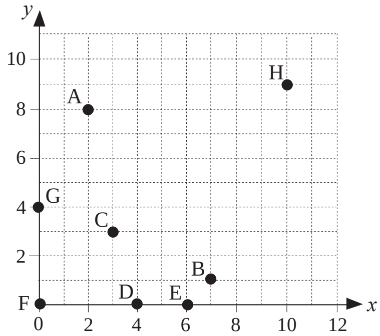
Notes: Individual work, monitored

Notes: Agreement, self-correction, praising

Bk5

Lesson Plan 6

Activity		***Notes***
7	(Continued) Deal with remaining questions one at a time. Allow Ps to explain first if they can, then class agrees/disagrees. T intervenes and explains where necessary. (Or individual trial first, then review.) b) i) *Which mark did most pupils score? This is the mode.* Elicit that the <u>mode</u> is the value that occurs most often. (<u>3</u>) ii) *How many pupils scored it?* (<u>5</u>) P shows on graph on BB.	Whole class activity BB: <u>mode</u>: most common value Discussion, reasoning, agreement, praising
	c) *List the marks of every pupil in increasing order in your exercise book.* Elicit that there should be 14 numbers in the list. Ps write in *Ex.Bks* first, then dictate results to T. Mistakes corrected. BB: 1, 2, 2, 2, 3, 3, <u>3</u>, <u>3</u>, 3, 4, 4, 4, 5, 5 Which is the middle value? Agree that there are 2 middle values: 3 and 3. What should we do? If Ps do not remember, T reminds them. BB: $(3 + 3) \div 2 = 6 \div 2 = \underline{3}$ Who remembers the name for the middle value of a set of data? (<u>median</u>) T tells it if no P does so.	Individual work, monitored Agreement, self-correction, praising Extra praise if P remembers what to do. BB: <u>median</u>: middle value
	d) *Calculate the mean in your exercise book and write it here.* What is the mean value of a set of data? (average value) How can we find the average value? If no P suggests what to do, T leads Ps through the calculation, involving them when possible. First we add up all the scores. Ps dictate to T BB: $1 + 2 + 2 + 2 + 3 + 3 + 3 + 3 + 3 + 4 + 4 + 4 + 5 + 5 = \underline{44}$ Then we divide the total by the number of pupils. BB: $44 \div 14 = 22 \div 7 = 3 + 1 \div 7 = 3 + \frac{1}{7} = \underline{3\frac{1}{7}}$ Or we could write it like this. $\frac{1+2+2+2+3+3+3+3+3+4+4+4+5+5}{14} = \frac{44}{14} = \frac{22}{7} = \underline{3\frac{1}{7}}$ Agree that the mean of the set of data is $3\frac{1}{7}$ marks.	Whole class activity Discussion, reasoning, agreement, praising BB: <u>mean</u>: average value Ps copy the calculations in *Ex. Bks*. Ps dictate what T should write. Agreement, praising T shows this notation and asks Ps to explain it. Elicit/tell that the horizontal line means 'divided by'.
	35 min	
8	***Book 5, page 5*** Q.3 Read: *There are two mistakes in this graph. Circle the incorrect points and draw them again in the correct position.* Elicit that the 1st number in each pair of coordinates is the *x*-value and the 2nd number is the *y*-value. Set a time limit. Review at BB with whole class. Ps come to BB to identify wrong points and correct them. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* A (3, 1) B (3, 0) C (5, 1) D (6, 5) E (0, 5) F (2, 7) 	Individual work, monitored Drawn on BB or use enlarged copy master or OHP Revise that: • *x*-coordinate is the distance away from the *y*-axis • *y*-coordinate is the distance away from the *x*-axis Discussion, reasoning, agreement, self-correction, praising **Extension** T draws dots in 2nd quadrant and Ps give coordinates.
	40 min	

Bk5		*Lesson Plan 5*
Activity		***Notes***
9	***Book 5, page 5*** Q.4 Read: *Mark these dots with points on the graph.* Set a time limit. Review at BB with whole class. Ps come to BB to draw dots, explaining reaoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* G (0, 4) H (10, 9)  	Individual work, monitored, helped (or whole class activity if time is short) Drawn on BB or use enlarged copy master or OHP Differentiation by time limit. (Only expect G and H from brighter Ps.) Agreement, self-correction, praising Elicit that F (0, 0) is the origin. Feedback for T

45 min

Bk5	R: Mental calculation **C: Comparing and ordering numbers. Rounding** *E: Sets. Intervals*	*Lesson Plan 6*

Activity		*Notes*
1	**Comparing heights** T calls out 8 Ps to stand in a row facing the class. The other Ps make statements about their heights then write it mathematically on BB. e.g. J is taller than B. ($J > B$); K is smaller than A. ($K < A$); P is as tall as G. ($P = G$) S is about the same as N. ($S \approx N$) K is at least as tall as P. ($K \geq P$) G is not taller than S. ($G \leq S$) etc. Class agrees/disagrees with statements. Extra praise for creativity! *5 min*	Whole class activity T could say and write first statement as a model for Ps to follow. At a good pace and in good humour! Agreement, praising
2	**Missing signs** Let's write the correct sign betwen the two quantities. Ps come to BB to write missing sign, explaining reasoning. Class agrees/disagrees. BB: 4 litres 3 ml $\boxed{<}$ 4004 ml (4003 ml < 4004 ml) 1300 g $\boxed{>}$ 1 kg 30 g (1300 g > 1030 g) 6 km 402 m $\boxed{>}$ 6040 m (6402 > 6040 m) 840 cm $\boxed{=}$ 8 m 400 mm (8400 mm = 8400 mm) 19 kg 50 g $\boxed{<}$ 19 500 g (19050 g < 19 500 g) 6 km 1400 m $\boxed{=}$ 7 km 400 m (6 km + 1 km + 400 m = 7 km 400 m) 3 hrs 20 min $\boxed{<}$ 220 min (200 min < 220 min) *9 min*	Whole class activity Written on BB or SB or OHT At a good pace Accept conversion on either side of statement. Reasoning, agreement, praising Revise relationship of units of measure where necessary. Show details of calculations if disagreement, e.g. $3 \times 60 + 20 = 180 + 20$ $= \underline{200}$ (min)
3	**Vocabulary of comparison** Say a statement using 'at least' or 'at most' about anything in your daily life. (e.g. There are at most 31 days in a month. Our football team must score at least 3 goals to go into the next round.) Analyse the meaning of each statement in depth. Class agrees/ disagrees with each statement. T gives ideas for topics if Ps have difficulty thinking of any. Class applauds clever statements. *12 min*	Whole class activity Discussion/debate about exact meaning of statements. In good humour! Praising, encouragement only!
4	**Mental calculation 1** Listen carefully, do the calculation in your head in the easiest way. Show me the answer when I say. (On scrap paper or slates) Ps who respond correctly explain reasoning. Who agrees? Who did it an easier way? Who made a mistake? What kind of mistake? etc. a) T: 7 + 8 + 3 = Show me . . . now! (18) (7 + 3) + 8 b) T: 12 + 0 + 8 = Show me . . . now! (20) (12 + 8) c) T: 7 + 1 + 3 + 9 = Show me . . . now! (20) (7 + 3) + (1 + 9) d) T: 1 + 3 + 9 + 7 = Show me . . . now! (20) Same as c)! e) T: 2 + 5 + 3 + 5 = Show me . . .now! (15) (5 + 5) + (2 + 3) f) T: 19 – 1 – 8 = Show me . . . now! (10) (18 – 8) g) T: Is 19 – (1 + 8) the same as the previous calculation? (Yes) h) 20 – 7 – 3 = Show me . . . now! (10) [20 – (7 + 3)] i) 15 – 5 – 10 = Show me . . . now! (0) [15 – (5 + 10)] *14 min*	Whole class activity At speed Responses shown in unison. Reasoning, agreement, praising Extra praise if Ps notice this. Feedback for T

Bk5

Lesson Plan 6

Activity		*Notes*

5 **Mental calculation 2**

Listen even more carefully, do the calculation in your head and show me the answer when I say (on scrap paper or slates).

Ps who respond correctly explain reasoning on BB. Who agrees? Who made a mistake? What kind of mistake? etc.

a) Which number should be added to 6 rounded to the nearest 10 to get 20? Show me . . . now! (10)

b) Subtract the smallest 2-digit number from 24 rounded to the nearest 10. What is the result? Show me . . . now! (10)

Notes:

Whole class activity

Reasoning, agreement, praising

BB: $6 \approx 10$; $10 + \underline{10} = 20$

BB: $24 \approx 20$; $20 - 10 = \underline{10}$

16 min

6 **Chain calculation**

This time, concentrate hard as this question is even more difficult!

Nod your head when you have done each step and show me the answer when I say (on scrap paper or slates).

Think of the 3rd natural number. Multiply it by 10. Take away 15 rounded to the nearest 10. How many times can you take 5 away so that zero remains? Show me . . . now! (2)

P answering correctly explains each step to class.

$3 \times 10 = 30$, $15 \approx 20$, $30 - 20 = 10$, $10 - 5 - 5 = 0$

So 5 can be taken away 2 times and the answer is 2.

Notes:

Whole class activity

(Less able Ps can write the interim results on slates.)

T dictates slowly to give Ps time to think.

In unison

Reasoning, agreement, praising

[Develops memory and concentration]

20 min

7 ***Book 5, page 6***

Q.1 Read: *The base set contains the natural numbers. Set A contains numbers less than 10.*

a) List the elements of Set A.

Ps list numbers in *Pbs*, then dictate to T.

BB: $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$

P comes to BB to write them in the correct place in the Venn diagram. Class agrees/disagrees.

Read: *b) If the number of elements in Set A is n, complete this statement.*

Allow Ps time to think about it, then ask several Ps what they think and why. Agree that $n \boxed{<} 10$

Read: *c) List the elements in Set B.*

Ps list in *Pbs* as many as they can before the ellipsis.

How many elements are in *Set B*? (never-ending number, or <u>infinite</u> number)

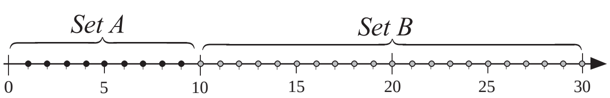
Instead of listing the elements in *Set B*, how could we describe or label it? Ps suggest different ways.

BB: B = {natural numbers not less than 10),
or {natural numbers equal to or more than 10}

If we let n be the number of elements in *Set B*, what inequality could we write? BB: $n > 10$

Let's mark the numbers in the two sets on this number line.

BB:



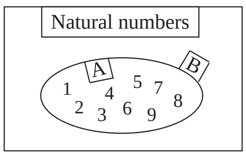
Notes:

Individual work, monitored

Diagram drawn on BB or use enlarged copy master or OHP

Agreement, self-correction, praising

BB:



Rest as whole class activity, with intervals of individual work

Elicit that the 3 dots are an <u>ellipsis</u> and stand for the numbers not shown.

Extra praise if Ps remember the term <u>infinite</u>.

Agreement, praising

Ps dictate to T or come to BB.

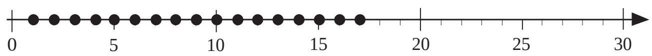
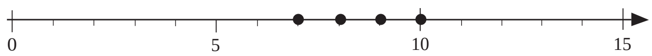
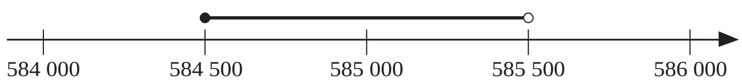
Drawn on BB or use enlarged copy master or OHP

At a good pace. Praising

26 min

Bk5

Lesson Plan 6

Activity		***Notes***
8	***Book 5, page 6***	
	Q.2 Read: *The base set is the set of natural numbers.*	Individual work, monitored, helped
	Write an inequality about x, y and z using <, >, ≤ or ≥ and show it on the number line.	Drawn on BB or use enlarged copy master or OHP
	Deal with one part at a time if class is not very able, otherwise set a time limit.	Differentiation by time limit
	Review at BB with whole class. Ps come to BB to write inequalities and mark numbers. Class agrees/disagrees or suggests another way to write the inequality. Mistakes discussed and corrected.	Reasoning, agreement, self-correction, praising
	Solution:	
	a) x is less than or equal to 17. $x \leq 17$ 	or $x < 18$ (and x is a natural number)
	b) y is less than 8. $y < 8$ 	or $y \leq 7$ (and y is a natural number)
	c) z is at least 7 and at most 10. $7 \leq z \leq 10$ 	or $z \geq 7$ and $z \leq 10$ (and z is a natural number)
	T points to each inequality in turn and Ps read it from left to right and right to left (with T's help if necessary)	In unison Praising, encourage only
	32 min	
9	***Book 5, page 6, Q.3***	
	Read: *If the population of a country, rounded to the nearest 1000, is 585 000, . . .* What does it mean?	Whole class discussion to start
	BB: 584 500 ≤ population < 585 500 	Drawn on BB or use enlarged copy master or OHP
	Ps come to BB to explain inequality and notation on number line, with T's help if necessary. Agree that the population is more than or equal to 584 500 and less than 585 500.	Discussion, reasoning, agreement, praising
	Elicit that the black (closed) dot means that the number is included and the white (open) dot means that the number is not included. The thick black line shows all possible numbers (which of course are natural numbers, as you cannot have a fraction of a person).	Revision of notation for showing inequalities on a number line.
	a) Read: *Answer this question by writing an inequality.* *The length of a room was measured as 530 cm, rounded to the nearest 10 cm. What could the actual measurement be?*	Individual work, monitored, helped
	Set a time limit. Review with whole class. Ps could show inequality on scrap paper or slates in unison on command. P responding correctly explains reasoning. Class agrees/ disagrees. Mistakes discussed and corrected	Reasoning, agreement, self-correction, praising
	Solution: 525 cm ≤ length < 535 cm	Ps give examples of what the <u>actual</u> measurement could be.

Bk5 — *Lesson Plan 6*

Activity — ***Notes***

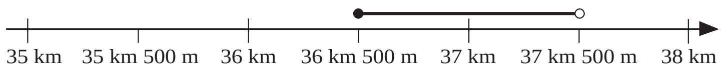
9

(Continued)

b) Read: *The distance from John's house to his work is 37 km, rounded to the nearest km. What could the actual distance be? Show it on the number line.*

Ps come to BB to write the inequality, draw 2 circles and a joining line. Class agrees/disagrees. Ps work in *Pbs* too.

Solution: 36 km 500 m ≤ distance < 37 km 500 m



Discuss the situation in real life. Why would John want to round the distance to the nearest km? (Perhaps to work out whether he has enough petrol left.) Could he find out what the actual distance was? (Yes, as milometer in his car would show the actual distance from his home to where he parks at work.)

What could the actual distance be? T asks several Ps. Class decides whether the distances are possible.

Notes:

Whole class activity

(or individual trial first if Ps wish)

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, praising

Discussion involving several Ps. Praise all contributions.

(e.g. 36 km 820 m, 37 km 2 m, 37 km 499 m 99 cm 9 mm)

38 min

10

Inequalities and rounding

What do these rounded quantities actually mean? Let's see if you can write an inequality to explain it. T says the quantity and the rounding. Ps come to BB to write and say an inequality. Class agrees/disagrees. P at board chooses Ps to give possible actual amounts. Class decides whether they are valid.

a) T: £60, to the nearest £10 (£55 ≤ amount < £65)

b) T: 960 pupils, to the nearest 10 (955 ≤ number < 965)

c) T: £6000, to the nearest £10 (£5955 ≤ amount < £6005)

d) T: 6000 kg, to the nearest 100 kg (£5950 ≤ amount < £6050)

e) T: 6000 people, to the nearest 1000 (£5500 ≤ number < £6500)

Notes:

Whole class activity

(or individual work in *Ex. Bks* then whole class review)

At a good pace

Reasoning, agreement, (self-correction), praising

If problems, show on relevant segment of the number line drawn on BB.

Feedback for T

45 min

Bk5	R: Mental calculation: rapid recall **C: Addition and subtraction. Review of Y4 work** *E: Adding several numbers*	*Lesson Plan* *7*

Activity		***Notes***
1	**Mental calculation** Listen carefully, do the calculations in your head and show me the final result when I say. Nod your heads when you have done each step. T: Round 23 to the nearest 10. . . . Add the difference between 15 and 10. . . . Muliply by 10. . . . Subtract 10 times 5. . . . Divide by 100. Show me your result . . . now! (2) P answering correctly explains each step at BB, with prompts from class. BB: 23 = 20, to nearest 10; 20 + (15 – 10) = 20 + 5 = 25; 25 × 10 = 250; 250 – 10 × 5 = 250 – 50 = 200; 200 ÷ 100 = <u>2</u> *4 min*	Whole class activity T dictates slowly to give Ps time to think. (Less able Ps may write interim results in *Ex. Bks*.) Responses shown on scrap paper or slates, or with numbers cards, in unison. Reasoning, agreement, praising
2	**Missing signs** What signs are missing from this inequality? Listen carefully! *Kate is a little bit smaller than Chris and Leslie is at least as tall as Chris.* Ps come to BB to write signs. Who agrees? Who thinks something else? etc. Once inequality is agreed, T chooses Ps to express it in different ways. *6 min*	Whole class activity Written on BB or SB or OHT BB: K $\boxed{}$ C $\boxed{}$ L Reasoning, agreement, praising (If problems, demonstrate with 3 Ps at front of class.)
3	**Calculation practice** T has operations written on BB. What are the missing numbers? BB: a) $\underbrace{25 + 10 + 25} + \boxed{40} = 100$ b) $\underbrace{43 + 20 + 17} + \boxed{10} = 90$ c) $\underbrace{43 + 17} + \underbrace{11 + 19} = \boxed{90}$ d) $\underbrace{77 - 17} + \underbrace{16 + 10 + 14} = \boxed{100}$ Deal with one at a time. Ps write missing number on slates or scrap paper and stand up when they know the answer. Show me . . . now! Some of the quickest Ps to respond correctly explain how they did the calculation. Who did it another way? Which way do you think is best? Why? etc. *10 min*	Whole class activity Written on BB or SB or OHT Encourage quick mental calculation if possible but allow Ps to calculate in *Ex. Bks* if they need to. In unison Reasoning, agreement, praising
4	**Mental practice** Listen carefully, do the calculation in your head and show me the answer when I say. a) *I added a secret number to 17, subtracted 12 from the sum and got 40. What is the secret number?* Show me . . . now! (35) Ps with correct answer come to BB to explain their reasoning. Who agrees? Who did it another way? etc. BB: e.g. $17 + \boxed{} - 12 = 40$ or $17 + \boxed{} = 40 + 12$ $(17 - 12) + \boxed{} = 40$ $17 + \boxed{} = 52$ $5 + \boxed{} = 40$ $\boxed{} = 52 - 17$ $\boxed{} = \underline{35}$ $\boxed{} = \underline{35}$ or using reverse operations: 40 + 12 – 17 = 52 – 17 = <u>35</u>	Whole class activity T repeats quesitons slowly to give Ps time to think. Encourage mental calculation but allow Ps to write solution in *Ex. Bks* if they wish. Responses written on scrap paper or slates and shown in unison. Reasoning, agreement, checking, praising Once class has agreed on correct answer, Ps check it. *Check:* 17 + <u>35</u> – 12 = 52 – 12 = 40 ✓

Bk5

Lesson Plan 7

Activity | **Notes**

4

(Continued)

b) *I subtracted 76 rounded to the nearest 10 from a secret number and the result was 20. What was the secret number?*

Show me . . . now! (100)

Ps with correct answer explain how they worked it out. Who did the same? Who did it a different way? etc.

BB: e.g. 76 ≈ 80, to nearest 10; $\square - 80 = 20$

$\square = \underline{100}$

or using reverse operation: 20 + 80 = <u>100</u>

Notes:
T repeats slowly to give Ps time to think.
In unison
Reasoning, agreement, checking, praising
T repeats any vague explanations clearly and concisely.

14 min

5

Book 5, page 7

Q.1 Read: *Write an operation for each problem and do the calculation.*

Ps read problems themselves and solve them. Set a time limit.

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Mistakes discussed and corrected.

Solutions:

a) *15 girls and 16 boys went on a trip. How many children went on the trip?*

15 + 16 = <u>31</u>

Answer: 31 children went on the trip.

b) *The school organised two trips. 27 pupils went to Dartmoor, 9 less than those who went to Exmoor. How many pupils went to Exmoor?*

27 – 9 = <u>18</u>

Answer: 18 pupils went to Exmoor.

Notes:
Individual work, monitored
Reasoning, agreement, self-correction, praising
Ask Ps to give the answers in context.
Elicit the names of the components of the addition and subtraction.
<u>Addition</u>: terms, sum
<u>Subtraction</u>: reductant, subtrahend, difference
Elicit that in an addition the terms can be interchanged, but not in a subtraction.

18 min

6

Book 5, page 7

Q.2 Read: *Do these calculations in your exercise book and write only the answers here.*

Let's see how many you can do in 5 minutes! If you can do the calculation mentally, just write the answer in your *Pbs*.

Review at BB with whole class. Ps dictate results to T or come to BB, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) 87 – 22 = <u>65</u>   b) 103 + 68 = 163 + 8 = <u>171</u>

c) 122 – 48 = 122 – 40 – 8 = 82 – 8 = <u>74</u>

d) 4013 + 482 = 4413 + 82 = 4493 + 2 = <u>4495</u>

e) 500 + 600 + 900 = 1100 + 900 = <u>2000</u>

f) 3000 – 570 = 2500 – 70 = <u>2430</u>

g) 3072 + 8318 + 686 + 1324 = <u>13 400</u>

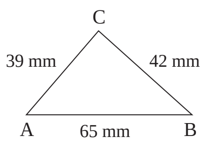
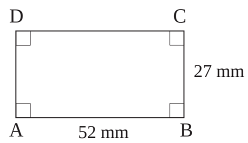
$$\begin{array}{ccccc} & 3 & 0 & 7 & 2 \\ & 8 & 3 & 1 & 8 \\ & & 6 & 8 & 6 \\ + & 1 & 3 & 2 & 4 \\ \hline 1 & 3 & 4 & 0 & 0 \\ & {\scriptstyle 1} & {\scriptstyle 2} & {\scriptstyle 2} & \end{array}$$

Notes:
Individual work, monitored, (only slow Ps helped)
Written on BB or SB or OHT
Differentiation by time limit.
Reasoning, agreement, self-correction, praising
Encourage correct use of vocabulary.
Ps who did not have time to complete all the questions do so as they are reviewed.
Agree that g) is easier if written vertically.

26 min

Bk5

Lesson Plan 7

Activity		***Notes***
7	***Book 5, page 7*** Q.3 Read: *Do these calculations in your exercise book and write only the answers here.* Try to do as many as you can in 5 minutes and watch out for things which make the calculation easier. You might not need to use your *Ex. Bk.* for all of them! Review at BB with whole class. Ps dictate results to T or come to BB, explaining reasoning in detail. Class agrees/disagrees or suggests easier (quicker) ways. Mistakes discussed and corrected. *Solution:* a) 4400 + 600 + 960 + 1040 = 5000 + 2000 = <u>7000</u> b) 2050 – 580 = 2000 – 530 = 1500 – 30 = <u>1470</u> c) 7305 + 95 + 551 + 1049 = 7400 + 1600 = <u>9000</u> d) 6000 – 3700 = 3000 – 700 = <u>2300</u> e) 2600 + 2040 + 25 + 375 = 4640 + 400 = <u>5040</u> f) 3000 – 570 = 2500 – 70 = <u>2430</u> g) 3072 + 8218 + 686 + 1324 = 13 400 – 100 = <u>13 300</u> h) 1660 – 760 = <u>900</u> *34 min*	Individual work, monitored, (only slow Ps helped) Written on BB or SB or OHT Differentiation by time limit. Reasoning, agreement, self-correction, praising Extra praise for clever groupings and notices. e.g. f) is exactly the same as f) in previous question. g) is 100 less than g) in previous question.
8	***Book 5, page 7*** Q.4 Read: *Calculate the perimeter of each polygon in your exercise book. Write the answer here.* What is a polygon? (plane shape with many straight sides) What is the perimeter? (total length of lines enclosing the shape, or distance around the edge) What does 'not drawn to scale' mean? (shapes are not similar to real shape) Elicit that a) is a triangle and b) is a rectangle. Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a)  *Not drawn to scale!* b)  a) P = (65 + 42 + 39) mm = <u>146 mm</u> b) P = 2 × (52 + 27) mm = 2 × 79 mm = <u>158 mm</u> In b) which lines are parallel (perpendicular)? *38 min*	Individual work, monitored, (helped) Drawn on BB or use enlarged copy master or OHP Quick revision of meaning of vocabulary. Elicit that in b): DC = AB and AD = BC Reasoning, agreement, self-correction, praising Whole class activity

Bk5

Lesson Plan 7

Activity		Notes

9

Book 5, page 7

Q.5 Read: *Ann has £758, Betty has £1439 and Carol has £549. How much do they have altogether?*

Estimate by rounding to the nearest £100, write the amounts in the place-value table, do the calculation and write the answer in a sentence.

Deal with one step at a time, keeping class together. Review at BB with whole class after each step. Ps come to BB or dictate to T, explaining reasoning with place value detail in addition. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

E: 800 + 1400 + 500 = 2700

	Th	H	T	U
A		7	5	8
B	1	4	3	9
C		5	4	9
Total	2	7	4	6
	1	1	2	

Answer: They have £2746 altogether.

Notes:

Individual work, monitored, (helped)

Table drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Reasoning detail: e.g.

'8U + 9U + 9U = 26U
= 2T + <u>6U</u>

I write 6 in the answer in the units column and put 2 below the tens column', etc.

42 min

10

Problem

Listen carefully to this problem and show me the answer when I say.

Andrew's family went by car to visit their relatives. When they started, the milometer showed 1284 miles. When they arrived at their relatives' house, the milometer showed 2237 miles.

How far away do Andrews' relatives live?

Show me . . . now! (953 miles)

P answering correctly comes to BB to write the operation in place-value table and explain reasoning in detail loudly and clearly. Class points out errors or missed steps. How could we check it? Another P comes to BB to write addition, again explaining reasoning with place-value detail. Class points out errors or missed steps.

T asks a P to say the answer in a sentence.

Solution:

Plan: 2237 – 1284 (miles)

C:

	Th	H	T	U
	2	$^{10}2$	$^{10}3$	7
–	1_1	2_1	8	4
	0	9	5	3

Check:

	Th	H	T	U
	1	2	8	4
+		9	5	3
	2	2	3	7
	1	1		

Answer: Andrew's relatives live 953 miles away.

Notes:

Whole class activity

Blank place-value tables already drawn on BB or SB or OHT

Ps note data and do calculation in *Ex. Bks*.

In unison

T notes Ps who answered incorrectly.

Also accept an addition with the subtrahend as the unknown number.

e.g. 4U + <u>3U</u> = 7U, etc.)

Reasoning, agreement, correcting, praising

[More time will be spent on revision of subtraction in *Lesson 9*.]

45 min

Bk5

R: Mental calculation

C: Addition and subtraction. Written procedures

E: Non-traditional method of subtraction

Lesson Plan 8

Activity		*Notes*

1

Problem

Listen carefully, note the data in your *Ex. Bks* then do the calculation.

Mum went to 3 shops. In the first shop she spent 261 p, in the second shop she spent 1523 p and in the third shop she spent 115 p. How much did she spend altogether?

Show me . . . now! (T leaves no time for Ps to calculate, so very few Ps will have an answer.) Well, I think that we could all do with some help! Let's write the calculation in a place value table.

Ps come to BB to write the amounts, then do the calculation, explaining loudly with place-value detail. Class agrees/disagrees.

Ps give answer in context.

BB:

	Th	H	T	U
		2	6	1
	1	5	2	3
+		1	1	5
	1	8	9	9
+				1
	1	9	0	0

Reasoning: e.g.

1U + 3U + 5U = $\underline{9}$U

6T + 2T + 1T = $\underline{9}$T

2H + 5H + 1H = $\underline{8}$H

1Th + 0Thu = $\underline{1}$Th

Answer: She spent 1899 p (= £18.99)

What would the total be if she spent 1 p more? Ps come to BB.

Reasoning: 9U + 1U = 10U = 1T + $\underline{0}$U

9T + 1T = 10T = 1H + $\underline{0}$T

8H + 1H = $\underline{9}$H

1Th + 0Th = $\underline{1}$Th *Answer*: 1900 p = £19

4 min

Notes:

Whole class activity

Blank place-value table drawn on BB or SB or OHT

T says the problem quickly.

In good humour! Ps will be surprised and indignant!

At a good pace

Involve several Ps.

Reasoning, agreement, praising

Class points out missed steps.

(underlined digits written in relevant column in answer)

Feedback for T

2

Addition 1

Let's add up 851 and 1527 and 615. Ps come to BB to write the numbers in a place-value table hen do the addition, explaining reasoning in detail. (Use different Ps for each number and column.) Class helps or points out missed steps.

BB:

	Th	H	T	U
		8	5	1
	1	5	2	7
+		6	1	5
	2	9	9	3
	1		1	

Reasoning: e.g.

1U + 7U + 5U = 13U = 1T + $\underline{3}$U

I write 3 in the units column and put 1 below the tens column.

1T + 5T + 2T + 1T = $\underline{9}$T, etc.

8H + 5H + 6H = 19H = 1Th + $\underline{9}$H, etc.

1Th + 1Thu = $\underline{2}$Th, etc.

7 min

Notes:

Whole class activiry

Table drawn on BB or SB or OHT

At a fast pace

Reasoning, agreement, praising

Class reads the result in unison.

Feedback for T

3

Addition 2

Let's add these numbers. BB: 871 + 1527 + 675

Ps come to BB to write numbers in place-value table and to do addition, explaining with place-value detail. Class agrees/disagrees.

BB:

	Th	H	T	U
		8	7	1
	1	5	2	7
+		6	7	5
	1	19	16	13
	3	0	7	3
	2	1	1	

Let's write it in a shorter form without the place-value headings. Ps come to BB to write and explain. T reminds Ps that the digits being carried to the next column can be written either above or below the column as a reminder.

Elicit the names of the components of addition.

10 min

Notes:

Whole class activity

Table drawn on BB or SB or OHT

At a fast pace

Reasoning, agreement, praising

BB:

$$\begin{array}{r l} \left.\begin{array}{r} 871 \\ 1527 \\ +\ 675 \end{array}\right\} & \text{terms} \\ \hline 3073 & \text{sum} \\ {\scriptstyle 2\,1\,1\ } & \end{array}$$

Bk5

Lesson Plan 8

Activity		Notes

4

Addition 3

Dizzie Domble had to add up 1987, 560, 71, 3710 and 809. This is what he wrote but he found it very difficult to do the addition. Why? (Because the corresponding place-value digits are not written in the correct columns.)

Who can write it correctly? Ps come to BB to write it again and do the calculation. Class points out errors. How can we check it? (By adding in opposite direction.) T allows shortcuts in reasoning, e.g.

7 + 1 + 9 = 17 (U); I write 7U and carry over 1T.

1 + 8 + 6 + 7 + 1 = 23 (T); I write 3T and carry over 2H. etc.

Notes:

Whole class activity

Written on BB or SB or OHT

BB:

$$\begin{array}{l} 1987 \\ \;560 \\ \quad\;\;71 \\ 3710 \\ +\;\;809 \\ \hline \\ \hline \end{array} \longrightarrow \begin{array}{r} 1987 \\ 560 \\ 71 \\ 3710 \\ +\;809 \\ \hline 7137 \\ {\scriptstyle 3\,2\,1} \end{array}$$

Reasoning agreement, praising

12 min

5

Book 5, page 8

Q.1 Read: *Estimate first by rounding to the nearest 100, then calculate.*

Set a time limit. Ps can estimate in *Ex. Bks*. if necessary. How should you check your addition? (By comparing with estimate and by adding in the opposite direction.)

Review with whole class. Ps come to BB or dicate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *E:* 800
$$\begin{array}{r} 142 \\ 313 \\ +\;441 \\ \hline 896 \end{array}$$

b) *E:* 8000
$$\begin{array}{r} 1526 \\ 3804 \\ +\;2437 \\ \hline 7767 \\ {\scriptstyle 1\;\;\;\;1\;\;} \end{array}$$

c) *E:* 4700
$$\begin{array}{r} 453 \\ 709 \\ +\;3456 \\ \hline 4618 \\ {\scriptstyle 1\,1\,1\;\;} \end{array}$$

d) *E:* 24 300
$$\begin{array}{r} 3567 \\ 34 \\ 11589 \\ +\;9078 \\ \hline 24268 \\ {\scriptstyle 1\,1\,2\,2\;\;} \end{array}$$

Notes:

Individual work, monitored (only less able Ps helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

(Or deal with one at a time if class is not very able.)

Reasoning, agreement, checking, self-correction, praising

Feedback for T

17 min

6

Book 5, page 8

Q.2 Read: *Write each addition in column form, then do the calculation.*

Set a time limit. Ps estimate mentally and write at side of grid. Remember to check your calculations!

Review with whole class. Ps come to BB or dicate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) 345 + 276 + 516 + 1018
$$\begin{array}{r} 345 \\ 276 \\ 516 \\ +\;1018 \\ \hline 2155 \\ {\scriptstyle 1\,1\,2\;} \end{array} \qquad E\text{: } 2100$$

b) 2305 + 4076 + 291 + 1000
$$\begin{array}{r} 2305 \\ 4076 \\ 291 \\ +\;1000 \\ \hline 7672 \\ {\scriptstyle 1\,1\;\;\;} \end{array} \qquad E\text{: } 7700$$

c) 5077 + 9246 + 260 + 8705
$$\begin{array}{r} 5077 \\ 9246 \\ 260 \\ +\;8705 \\ \hline 23288 \\ {\scriptstyle 1\,1\,1\;\;} \end{array} \qquad E\text{: } 2300$$

d) 1010 + 8 + 26 + 3004
$$\begin{array}{r} 1010 \\ 8 \\ 26 \\ +\;3004 \\ \hline 4048 \\ {\scriptstyle 1\;\;} \end{array} \qquad E\text{: } 4000$$

e) Seven thousand, three hundred and fifteen
+ eight hundred and ninety-one
+ three hundred + fifty-five
$$\begin{array}{r} 7315 \\ 891 \\ 300 \\ +\;55 \\ \hline 8561 \\ {\scriptstyle 1\,1\,1\;\;} \end{array} \qquad E\text{: } 8600$$

Notes:

Individual work, monitored (only less able Ps helped)

Written on BB or use enlarged copy master or OHP

Differentiaton by time limit

(Deal with one at a time if Ps are still having difficulties.)

Reasoning, agreement, checking, self-correction, praising

Feedback for T

23 min

Bk5		*Lesson Plan 8*
Activity		***Notes***
7	**Subtraction 1** Let's do these subtractions. BB: a) 9672 – 5471 b) 9672 – 5749 Ps come to BB to write the numbers in a place-value table, then do the subtractions, explaining reasoning with place-value details. T helps in b). e.g Reasoning: a) '2U – 1U = <u>1</u>U. I write 1 in the units column in the answer.' etc. b) 'I cannot take 9U away from 2U, so I add 10U to the units column in the reductant and 10U = 1T to the tens column in the subtrahend.' (Agree that adding the same amount to both numbers does not change the result.) '10U + 2U = 12U; 12U – 9U = <u>3</u>U. I write 3 in the units column in the answer. 4T + 1T = 5T; 7T – 5T = 2T. I write 2 in the tens column in the answer,' etc. BB: a) Th H T U 9 6 7 2 – 5 4 7 1 4 2 0 1 b) Th H T U 9 $^{+10}$6 7 $^{+10}$2 reductant – 5_{+1} 7 4_{+1} 9 subtrahend 3 9 2 3 difference *28 min*	Whole class activiry Tables drawn on BB or SB or OHT At a good pace Reasoning, agreement, correcting, praising T helps with correct reasoning and vocabulary. Why was part a) so easy? (Because there was no need to cross tens.)
8	**Subtraction 2** Here is another way to do subtraction. Try to undertand what I do. In each column, I subtract the bigger digit from the smaller digit and write the result. If the digit in the subtrahend is greater, then I circle the difference. (2 – 9 and 6 – 7) Then I make a correction. I replace the circled difference with the digit which completes it to make 10 and reduce the digit on its LHS by 1. You might notice that: (4000 – 100) + (30 – 7) = 3900 + 23 = <u>3923</u> Let's see if this method works for 5436 – 2477. Who would like to try it? Ps come to BB to do calculation as above, but T will need to help with the final stage (as this is the most difficult case there could be). 1 + <u>9</u> = 10, 4 + <u>6</u> = 10, but because it is on the LHS of a circled number, we must reduce it by 1, so it becomes <u>5</u>. Because the digit on the LHS of 4 is 0, we must take the 2 digits on the LHS together (i.e. 30) and reduce the 2-digit number by 1, i.e. it becomes 29. You might notice that: 3000 – 41 = 2959. Check that the answer is correct by the usual method of reverse addition. *33 min*	Whole class activity BB: 9 6 7 2 – 5 7 4 9 4 1 3 7 3 9 2 3 T points to relevant digits. Extra praise to Ps who volunteer! BB: 5 4 3 6 – 2 4 7 7 3 0 4 1 2 9 5 9 Checking, agreement, praising

Bk5		*Lesson Plan 8*

Activity		Notes

9

Book 5, page 8

Q.3 Read: *Estimate first by rounding to the nearest 100, then do the calculation.*

Set a time limit. Ps can estimate in *Ex. Bks*. if necessary. How should you check your subtraction? (By comparing with estimate and doing reverse addition.)

Review with whole class. Ps come to BB or dicate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *E:* 100 b) *E:* 3800 c) *E:* 72 000 d) *E:* 7000

$\begin{array}{rrrr} & 5 & 6 & 7 \\ - & 4 & 5 & 6 \\ \hline & 1 & 1 & 1 \end{array}$ $\begin{array}{rrrrr} & 4 & {}^{10}4 & 5 & {}^{10}3 \\ - & {}_1 & 7 & 0_1 & 9 \\ \hline & 3 & 7 & 4 & 4 \end{array}$ $\begin{array}{rrrrrr} & 7 & 5 & {}^{10}0 & {}^{10}3 & 8 \\ - & & 2_1 & 8_1 & 9 & 0 \\ \hline & 7 & 2 & 1 & 4 & 8 \end{array}$ $\begin{array}{rrrrrr} & 1 & 3 & {}^{10}0 & {}^{10}6 & 7 \\ - & & 6_1 & 0_1 & 9 & 4 \\ \hline & & 6 & 9 & 7 & 3 \end{array}$

39 min

Notes:

Individual work, monitored (only less able Ps helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

(Or deal with one at a time if Ps are having difficulty.)

Reasoning, agreement, checking, self-correction, praising

Feedback for T

10

Book 5, page 8

Q.4 Read: *Write each subtraction in column form, then do the calculation.*

Set a time limit. Ps can estimate in *Ex. Bks*. if necessary. Remember to check your answers!

Review with whole class. Ps come to BB or dicate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) 5678 – 2451 b) 8636 – 3452 c) the difference between 8675 and 3456

$\begin{array}{rrrrr} & 5 & 6 & 7 & 8 \\ - & 2 & 4 & 5 & 1 \\ \hline & 3 & 2 & 2 & 7 \end{array}$ $\begin{array}{rrrrr} & 8 & 6 & {}^{10}3 & 6 \\ - & 3 & 4_1 & 5 & 2 \\ \hline & 5 & 1 & 8 & 4 \end{array}$ $\begin{array}{rrrrr} & 8 & 6 & 7 & {}^{10}5 \\ - & 3 & 4 & 5_1 & 6 \\ \hline & 5 & 2 & 1 & 9 \end{array}$

Extension

Ps could try some of the subtractions from Q.3 and Q.4 using the method introduced in *Activity 8*.

45 min

Notes:

Individual work, monitored (only less able Ps helped)

Written on BB or use enlarged copy master or OHP

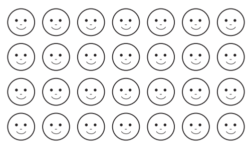
Differentiation by time limit

(Deal with one at a time if Ps are still having difficulties.)

Reasoning, agreement, checking, self-correction, praising

Feedback for T

Bk5	R: Mental calculation **C: Multiplication of natural numbers. Multiplication tables** *E: Square numbers*	*Lesson Plan* *9*

Activity		*Notes*
1	**Calculations** Choose the sums among these operations. Ps come to BB or dictate to T. (Some Ps might think only c) as it has been calculated.) BB: a) 18 142 + 436 b) 8142 – 641 c) 8165 + 432 = 8597 d) 9172 – 172 = 9000 e) 7131 + 69 (No need to do calculations) Agree that a), c) and e) are sums, and b) and d) are differences. *3 min*	Whole class activity Written on BB or SB or OHT Agreement, praising Ps identify by ticking or underlining. Review the names of the components of addition and subtraction.
2	**Operations** Which operation would you choose to answer this question? *Tom spent £25 each day during his fortnight's holiday. How much had he spent after 12 days?* BB: a) 25 + 12 = 37 b) 25 × 12 = 300 c) 25 – 12 = 13 d) 25 ÷ 12 e) 12 × 25 = 300 f) 12 – 25 Ps come to BB to circle the appropriate operations. [b) and e)] T writes b) again in centre of BB and sticks flash cards at side of BB. Ps come to front of class to choose a card and stick beside appropriate number. e.g. BB: $\overbrace{25 \times 12}^{\boxed{\text{factors}}} = \overbrace{300}^{\boxed{\text{product}}}$ $\boxed{\text{multiplicand}}$ $\boxed{\text{multiplier}}$ Agree that multiplier and multiplicand are interchangeable. *6 min*	Whole class activity Written on BB or SB or OHT Flash cards already prepared. At a good pace Extra praise if Ps offer results for d) and f). BB: $25 \div 12 = 2\frac{1}{12}$ $12 - 25 = -13$ Agreement, praising Revision of names of components of multiplication.
3	***Book 5, page 9*** Q.1 Read: *The pupils in a class are sitting in this formation. How many pupils are in the class?* *Write it as an addition and a multiplication in two ways.* Set a time limit. Review with whole class. Ps come to BB to write operations, referring to diagram. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* 7 + 7 + 7 + 7 = 4 × 7 = <u>28</u> 4 + 4 + 4 + 4 + 4 + 4 + 4 = 7 × 4 = <u>28</u> Read: *Complete this sentence.* Show me the missing word . . . now! (<u>factors</u>, or accept <u>terms</u>) After agreement, Ps complete sentence in *Pbs*. *The <u>factors</u> of a multiplication are inter-changeable.* *10 min*	Individual work, monitored Drawn on BB or use enlarged copy master or OHP BB:  Discussion, reasoning, agreement, self-correcting, praising In unison, on slates/scrap paper Agreement, praising Ps read sentence aloud.
4	**Multiplication and addition** T says a multiplication. What does it really mean? Ps come to BB or dictate to T. e.g. a) T: '8 times 0' BB: 8 × 0 = 0 + 0 + 0 + 0 + 0 + 0 + 0 + 0 = <u>0</u> b) T: '8 times 1' BB: 8 × 1 = 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 = <u>8</u> c) T: '0 times 8' BB: 0 × 8 = 8 × 0 = <u>0</u> d) T: '1 times '8 BB: 1 × 8 = 8 × 1 = <u>8</u> *14 min*	Whole class activity Ps suggest meanings. At a good pace Agreement, praising

Bk5

Lesson Plan 9

Activity | ***Notes***

5

Problem

Listen to the problem and tell me which plan is correct.

There are 7 toys in each box. Each toy costs £10. How much do 9 boxes of toys cost?

BB: a) $(7 \times 10) \times 9 = 630$

b) $(7 \times 9) \times 10 = 7 \times (10 \times 9)$

c) $7 \times (9 \times 10) =$

Ask several Ps what they think and why. Agree that c) could be used to get the correct answer but does not really match the question; b) is a statement, not a plan, and does not solve the problem, so a) is correct.

Notes: Whole class activity. Written on BB or SB or OHT. Reasoning, agreement, praising. Ps complete c). Agree that the factors of a 3-term multiplication can be grouped in any order without changing the product.

18 min

6

Book 5, page 9

Q.2 Read: *A farmer planted 10 rows of peach trees and 3 rows of cherry trees in his orchard. He planted 7 trees in each row. How many trees did he plant altogether?*

Write different plans for calculating the answer.

Set a time limit. Review at BB with whole class. Ps dictate plans to T or come to BB, explaining reasoning by referring to diagram. Class decides whether the explanation matches the plan. Deal with all cases. Mistakes discussed and corrected.

Solution: e.g.

a) $(10 + 3) \times 7 = 13 \times 7 = \underline{91}$ (trees),

[Reasoning: 13 trees in each column and 7 columns]

b) $10 \times 7 + 3 \times 7 = 70 + 21 = \underline{91}$ (trees)

[Reasoning: 10 peach trees in each of 7 columns and 3 cherry trees in each of 7 columns.]

c) $7 \times (10 + 3) = 7 \times 13 = \underline{91}$ (trees)

[Reasoning: 7 trees in each row and (10 + 3) rows.]

d) $7 \times 10 + 7 \times 3 = 70 + 21 = \underline{91}$ (trees)

[Reasoning: 10 rows of 7 peach trees and 3 rows of 7 cherry trees.]

Notes: Individual work, monitored, helped. Drawn on BB or use enlarged copy master or OHP. Reasoning, agreement, self-correction, praising. Agree that the reasonings for a) and c), and b) and d) are interchangable. Feedback for T

23 min

7

Multiplication table

T has incomplete table on BB or SB or OHT.

BB:

×	0	1	2	3	4	5	6	7	8	9	10
0	0		0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0		6		12	15					30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12		24	30					60
7	0	7	14		28	35					70
8	0		16		32	40					80
9		9	18		36	45					90
10	0	10	20	30	40	50	60	70	80	90	100

a) T (P) points to an empty square at random and chooses a P to dictate the missing number. Continue until table is complete.

b) T points to a row or column and class says the facts in unison.

c) T asks each P a multiplication fact. Ps who are wrong stand up, and during rest of Ps' turns, T comes back to them at random with the same, or another, question until they get one correct.

Notes: Whole class activity. Drawn on BB or use enlarged copy master or OHP. All activities at speed, and in good humour! Class points out errors. Or some only girls (boys). In order round class. In good humour, praising only

28 min

Bk5

Lesson Plan 9

Activity		***Notes***

8

Book 5, page 9

Q.3 Read: *Complete the multiplication table.*

Let's see if you can complete it in 4 minutes! Necessary calculations (for 11 and 12) can be done at side of table in *Pbs* or in *Ex. Bks.* Start . . . now! . . . Stop!

Review at BB with whole class. Ps dictate rows (columns) to T, or T has solution already prepared and uncovers each row (column) as it is dealt with. Mistakes corrected.

Ps show details of reasoning for 11 and 12 times tables.

e.g. $5 \times 11 = 50 + 5 = \underline{55}$; $11 \times 12 = 120 + 12 = \underline{132}$

Solution:

Bold numbers were missing.

×	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**
1	0	1	**2**	3	**4**	**5**	6	7	8	9	**10**	**11**	12
2	0	2	**4**	6	**8**	**10**	**12**	**14**	**16**	**18**	**20**	22	**24**
3	0	3	**6**	9	**12**	**15**	18	21	24	27	**30**	**33**	**36**
4	0	**4**	**8**	12	**16**	**20**	**24**	**28**	**32**	**36**	**40**	**44**	**48**
5	0	**5**	**10**	15	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**
6	0	6	**12**	18	**24**	**25**	36	42	48	54	**60**	**66**	**72**
7	0	7	**14**	21	**28**	**25**	42	49	56	63	**70**	**77**	**84**
8	0	8	**16**	24	**32**	**25**	48	56	64	72	**80**	**88**	**96**
9	0	9	**18**	27	**36**	**25**	54	63	72	81	**90**	**99**	**81**
10	0	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**110**	**120**
11	**0**	11	**22**	**33**	**44**	**55**	**66**	**77**	**88**	**99**	**110**	**121**	132
12	**0**	**12**	24	**36**	**48**	**60**	**72**	**84**	**96**	108	**120**	**132**	**144**

If you do not know the multiplication tables up to 10×10, learn them at home every night this week. It is very important that you know them all! I will test you again on Friday!

35 min

Notes:

Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Encourage Ps to complete columns and rows to 10×10 first.

Quick checking and correcting .

Reasoning, agreement, self-correction, praising

Ps who did not have time, complete rows and columns for 11 and 12 as they are dealt with.

Stand up if you finished the table with no mistakes!

Let's give them a clap!

9

Mental practice

Let's see how clever you are at multiplying in your head!
T says a multiplications. Ps give result, in steps if necessary.

e.g. 9×8 (= 72); 7×6 (= 42); 8×6 (= 48), 10×12 (= 120); etc.

12×5 (= 50 + 10 = 60); 5×11 (= 50 + 5 = 55);

45×5 (= 200 + 25 = 225);

75×4 (= 280 + 20 = 300) or (= 150×2 = 300);

2×78 (= 140 + 16 = 156) or (= 160 – 4 = 156);

670×2 (= 1200 + 140 = 1340) etc.

40 min

Notes:

Whole class activity

At speed.

T chooses Ps at random.

Class points out errors.

Differentiation by question

Extra praise for clever methods of calculation

Show details on BB where necessary.

10

Book 5, page 9

Q.4 Read: *Do these multiplications in a clever way in your exercise book.*

Set a time limit. Review with whole class. Ps dictate results and explain how they did the calculation. Who did the same? Who did it another way? Who made a mistake? What was it? etc.

Solution:

a) $3 \times 4 \times 25 = 3 \times 100 = \underline{300}$

b) $5 \times 63 \times 20 = 100 \times 63 = \underline{6300}$ c) $63 \times 77 \times 0 = \underline{0}$

d) $1 \times 2 \times 4 \times 8 = 8 \times 8 = \underline{64}$

e) $1 \times 2 \times 3 \times 4 \times 5 \times 6 = 60 \times 12 = 600 + 120 = \underline{720}$

f) $5 \times 2 \times 7 \times 2 \times 7 \times 5 = 100 \times 49 = \underline{4900}$

g) $2 \times 8 \times 125 \times 4 = 8 \times 4 \times 250 = 8 \times 1000 = \underline{8000}$

45 min

Notes:

Individual work, monitored

Differentiation by time limit.

Reasoning, agreement, self-correction, praising

Extra praise for clever groupings – rest of class writes them in *Ex. Bks*. as a reminder.

Feedback for T

Bk5

R: Mental calculation

C: Review: Multiplication of whole numbers. Mental strategies

E: Multiplication of sum and difference. Square numbers.

Lesson Plan
10

Activity | ***Notes***

1

True or False?

I will say a sentence and you must tell me if it is true or false. Clap your hands once if it is true and put your hands on your head if it is false.

a) The terms of a sum are inter-changeable. Show me . . . now! (T)
b) The terms of a difference are inter-changeable. " (F)
c) At least three terms of a sum can be grouped. " (T)
d) The factors of a product are inter-changeable. " (T)
e) At least 3 factors of a product can be grouped. " (T)
f) The dividend and divisor of a division are inter-changeable. (F)

4 min

Notes: Whole class activity

(Or Ps can choose other actions beforehand.)

Responses given in unison.

At speed, in good humour!

Ps reason with an example or counter example, e.g.

b) $40 - 10 \neq 10 - 40$

e) $(3 \times 4) \times 5 = 3 \times (4 \times 5)$

f) $20 \div 2 \neq 2 \div 20$

2

Components of multiplication

Let's join up the matching words and numbers. Ps come to BB to draw joining lines. Class agrees/disagrees.

BB:

multiplier factor

$125 \times 8 = 1000$

product multiplicand

6 min

Notes: Whole class activity

Written on BB (or operation written on BB and words on flash cards stuck to BB)

Agree that multiplicand and muliplier can also be the other way round.

Agreement, praising

3

Multiplication 1

I did this mulitplication in different ways. Which way do you think is best and why? T gives Ps a minute to think about it then points to each operation in turn and asks who chose it and why (or why not). Class decides whether reasoning is valid.

BB:

a) $12 \times 25 = 10 \times 25 + 2 \times 25 = 250 + 50 = 300$

b) $12 \times 25 = 2 \times 12 + 5 \times 12 = 24 + 60 = 84$ (wrong)

c) $12 \times 25 = 5 \times 12 + 20 \times 12 = 60 + 240 = 300$

d) $12 \times 25 = 20 \times 12 + 5 \times 12 = 240 + 60 = 300$

} same calculations in different order

8 min

Notes: Whole class activity

Written on BB or SB or OHT

(or Ps could show letter on scrap paper or slates in unison)

Discussion, reasoning, agreement, praising

Extra praise if Ps notice that the '2' in b) should be '20'

It is likely that a) will be the most popular choice, as it has the easiest multiplications.

4

Multiplication 2

Let's see if you can think of clever ways to do the multiplications. Ps come to BB to write calculations, explaining loudly and clearly. Who agrees? Who can think of another way to do it? etc. If Ps cannot think of other ways, T could write one and ask Ps whether it is correct or not.

BB: e.g.

a) $8 \times 12 = (8 \times 10 + 8 \times 2 = 80 + 16 = \underline{96})$

b) $78 \times 2 = (70 \times 2 + 8 \times 2 = 140 + 16 = \underline{156})$

c) $36 \times 4 = (120 + 24 = 144)$ or $(72 \times 2 = \underline{144})$

d) $7 \times 16 = (70 + 42 = 112)$ or $(7 \times 8 \times 2 = 56 \times 2 = \underline{112})$

e) $100 \times 6 \times 8 = (600 \times 8 = \underline{4800})$ or $(100 \times 48 = \underline{4800})$

f) $41 \times 19 = (41 \times 20 - 41 \times 1 = 820 - 41 = 800 - 21 = \underline{779})$

Agree that <u>all</u> methods above are acceptable and correct, but Ps might find some easier (quicker) than others; others are just a matter of choice.

12 min

Notes: Whole class activity

Discussion, reasoning, agreement, praising

e.g. T might write:

a) 8×12
$= 10 \times 12 - 2 \times 12$
$= 120 - 24 = \underline{96}$

b) 78×2
$= 80 \times 2 - 2 \times 2$
$= 160 - 4 = \underline{156}$

f) 41×19
$= 40 \times 19 + 1 \times 19$
$= 760 + 19 = \underline{779}$

Bk5		*Lesson Plan 10*

Activity		*Notes*

5

Chain calculation

Listen carefully, do the calculations in your head and show me the final result when I say. Nod your head when you have done each step.

I added 44 to 7 times 8. . . . then divided it by 10, . . . then subtracted the fourth natural number, . . . then multiplied it by 12 . . .

How much did I add to this number to get the smallest 3-digit number?

Show me . . . now! (28) (on scrap paper or slates)

Ps answering correctly explain steps at BB to rest of class.

BB: $7 \times 8 + 44 = 56 + 44 = 100$; $100 \div 10 = 10$; $10 - 4 = 6$;
$6 \times 12 = 72$; $100 - 72 = \underline{28}$

Who could write it as one operation? Ps come to BB or dictate to T. Class and T help where necessary.

BB: $[\,\underbrace{(\underbrace{7 \times 8}_{56} + 44)}_{100} \div 10 - 4] \times 12 + \boxed{28} = 100$ (with 10 under $\div 10$, 6 under $-4]$, 72 under $\times 12$)

Notes: Whole class activity

T pauses after each step to give Ps time to calculate.

Less able Ps may write interim results in *Ex. Bks* or on slates.

In unison

Reasoning, agreement, praising

(Or Ps could stand up when they know the answer and each whispers the result in T's ear.)

Agreement, praising

16 min

6

Book 5, page 10

Q.1 Read: *Do these calculations in a clever way.*

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Who did the same? Who did it a different way? etc. Class points out errors. Mistakes discussed and corrected.

T could show a way not suggested by Ps and ask if it is correct. T could make a deliberate mistake and hope that Ps will notice it!

Solution: e.g.

a) $47 \times 6 = 40 \times 6 + 7 \times 6 = 240 + 42 = \underline{282}$

b) $31 \times 19 = 31 \times 20 - 31 = 620 - 31 = \underline{589}$

c) $82 \times 13 = 82 \times 10 + (80 \times 3 + 2 \times 3) = 820 + 246 = \underline{1066}$

d) $69 \times 20 = 70 \times 20 - 20 = 1400 - 20 = \underline{1380}$

e) $50 \times 4 \times 7 = 100 \times 2 \times 7 = 100 \times 14 = \underline{1400}$

Notes: Individual work, monitored, (less able Ps helped)

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

Extra praise for <u>very</u> clever calculations.

Feedback for T

21 min

7

Book 5, page 10

Q.2 Read: *Write plans and do the calculations.*

Elicit the meaning of <u>average</u> speed. (As if the train travelled at the same speed all the time.) Set a time limit. Ps read problem themselves and solve it. Ps use *Ex. Bks.* if they need more space.

Review with whole class. Ps come to BB to write plans and do calculations, explaining reasoning. Who agrees? Who did it a different way? etc. Who made a mistake? What was it? etc.

T chooses Ps to give answer in a sentence.

Solution:

An intercity express train is travelling at an average speed of 110 km per hour. A local train is travelling at an average speed of 70 km per hour. Both trains take 7 hours to complete their journeys.

a) What distance do the two trains travel altogether?

BB: $(110 + 70) \times 7 = 180 \times 7 = 700 + 560 = \underline{1260}$ (km)

b) How much further does the intercity express train travel?

BB: $(110 - 70) \times 7 = 40 \times 7 = \underline{280}$ (km)

Notes: Individual work, monitored, helped

(Ps finished early could be asked to write a different plan for each part in their *Ex. Bks*. but there is no need to do the calculation.)

Reasoning, agreement, self-correction, praising.

or

a) $110 \times 7 + 70 \times 7$
$= 770 + 490$
$= \underline{1260}$ (km)

b) $110 \times 7 - 70 \times 7$
$= 770 - 490$
$= \underline{280}$ (km)

27 min

Bk5		*Lesson Plan 10*

Activity / ***Notes***

8

Book 5, page 10

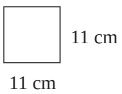
Q.3 Read: *Calculate the perimeter and area of these polygons. (They are not drawn to scale.)*

Elicit that 'not drawn to scale' means that the diagrams are rough sketches and have not been measured.

Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

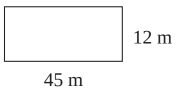
What other name could we give to both polygons? (quadrilaterals, rectangles.) Elicit that a square is a regular rectangle.

Solution:

a) 

$P = 4 \times 11$ cm $=$ 44 cm

$A = 11$ cm $\times$ 11 cm $=$ 121 cm^2

b) 

$P = 2 \times (45 + 12) = 90 + 24 = \underline{114\,(\text{m})}$

$A = 45$ m $\times$ 12 m

$= 45$ m $\times$ 10 m + 45 m $\times$ 2 m

$= 450$ m^2 + 90 m^2

$= \underline{540\text{ m}^2}$

Notes:

Individual work, monitored, (less able Ps helped)

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correcting, praising

Feedback for T

Show details if necessary:

$11 \times 11 = 11 \times 10 + 11$

$= 110 + 11 = \underline{121\ (\text{cm}^2)}$

T reminds Ps of notation for 'cm squares' and 'm squares' if Ps have forgotten.

33 min

9

Book 5, page 10

Q.4 Read: *In this table, row a shows the length of a side of different squares and row A shows the area of the same squares. Complete the table and write the rule.*

Set a time limit. (Or T could do 1 column with whole class first.)

Review at BB with whole class. Ps come to BB to choose a column and complete it, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected.

X, come and write the rule. Who agrees? Who thinks something else? etc. Elicit or tell that $a \times a = a^2$ (read as 'a squared'). i.e. it is the area of a square with sides a units.

The numbers in row A, (1, 4, 9, 16, 25, . . .) are called square numbers, as they are the result of multiplying a number by itself.

Solution:

a	1	2	3	4	**5**	**6**	7	8	9	**10**	11	12	**13**
A	1	4	9	**16**	25	36	**49**	**64**	**81**	100	**121**	**144**	169

Rule: $A = a \times a \ (= a^2)$

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correcting, praising

Ps might guess 13 in row a, as the numbers are consequential, but ask them to confirm with a multiplication:

BB: 13×13

$= 13 \times 10 + 13 \times 3$

$= 130 + 39 = \underline{169}$ ✓

BB: square numbers

e.g. $\underline{1} = 1 \times 1 \ (= 1^2)$

$\underline{4} = 2 \times 2 \ (= 2^2)$, etc.

40 min

10

Plans

T says a problem. Ps write a plan to solve it and show on command.

a) *If a pencil costs 73 p, how much do 51 pencils cost?* (73 p $\times$ 51)

b) *What does 1 kg of tomatoes cost if 6 kg cost 204 p?* (204 p $\div$ 6)

c) *If it usually takes Tim 6 hours to dig over his vegetable plot, how long will it take if two friends help him?*

(6 hours $\div$ 3) (assuming that the 3 boys dig at the same rate!)

d) *If it takes 40 minutes for a candle to burn down, how long would it take 15 candles to burn down?* (40 min – if all lit at once)

Notes:

Whole class activity

Ps need not do calculations.

Plans written on scrap paper or slates and shown in unison on command.

Discussion, reasoning, agreement, praising

d) (40 min $\times$ 15) if a candle is lit and allowed to burn out before the next is lit.

45 min

Bk5

R: Multiplication of sum and difference. Revision of Y4 work

C: Multiplication: written procedures: HTU $\times$ U, TU $\times$ TU

E: HTU $\times$ TU, HTU $\times$ HTU: long multiplication

Lesson Plan 11

Activity		*Notes*

1

Secret number

I thought of a number, added 2 to it, then multiplied the sum by 4 and the result was 28. What was the number I first thought of?

Which of these plans shows what I did? T points to each in turn. Ps say whether it is correct or not and why. Class agrees/disagrees.

BB: a) $x + 2 \times 4 = 28$ b) $x \times 4 + 2 \times 4 = 28$

c) $(x + 2) \times 4 = 28$ d) $x + (4 \times 2) = 28$

Elicit that a) and d) are wrong and b) or c) could be used to work out the secret number. Ps come to BB to show each method of solution.

BB: b) $x \times 4 + 2 \times 4 = 28$
$x \times 4 + 8 = 28$
$x \times 4 = 20$
$\underline{x = 5}$

d) $(x + 2) \times 4 = 28$
$x + 2 = 7$
$\underline{x = 5}$

Could we work it out without using x? (Yes – use inverse operations.)

BB: $28 \div 4 - 2 = 7 - 2 = \underline{5}$

Notes:

Whole class activity

T repeats slowly.

Plans written on BB or SB or OHT

Reasoning, agreement, praising

At a good pace, ith T's help if necessary

T asks several Ps to say which method they prefer and why.

Check:

$(\underline{5} + 2) \times 4 = 7 \times 4 = 28$ ✓

5 min

2

Flow charts

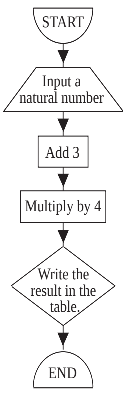
Let's follow the 3 flow charts and note the results in the tables.

Deal with one chart at a time. Ps read the instructions in chorus.
Then Ps come to BB to choose a number (n) in top row of table, explain what happens as it is put through the flow chart and write the final number in bottom row of table. Class agrees/disagrees.

Who can write the rule mathematically? Check with values from table.

BB:

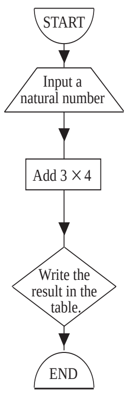
a)



n	1	2	3	4	5	6
Output	**16**	**20**	**24**	**28**	**32**	**36**

Output $= (n + 3) \times 4$

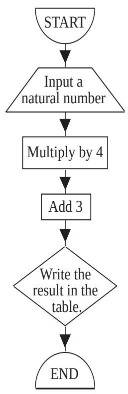
b)



n	1	2	3	4	5	6
Output	**13**	**14**	**15**	**16**	**17**	**18**

Output $= n + 3 \times 4$

c)



n	1	2	3	4	5	6
Output	**7**	**11**	**15**	**19**	**23**	**27**

Output $= n \times 4 + 3$

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

10 min

Bk5

Lesson Plan 11

Activity | ***Notes***

3

Book 5, page 11

Q.1 Read: *Pete and Sue bought 5 bottles of juice and took back 5 empty bottles.*

One bottle of juice cost 86 p but they got 6 p back for every empty bottle they returned.

Pete and Sue calculated how much they spent in different ways. Show how they did it.

Individual work, monitored, helped

Set a time limit. Review with whole class. Ps come to BB to write an explain the two different methods of calculation. Class agrees/disagrees. Mistakes discussed and corrected. e.g.

Solution:

Pete: $(86 - 6) \times 5 = 80 \times 5 = 400$ (p) = <u>£4</u>

Sue: $86 \times 5 - 6 \times 5 = 430 - 30 = 400$ (p) = <u>£4</u>

Discussion, reasoning, agreement, self-correction, praising

Ps who only found one method write other method in *Pbs* when reviewed.

Extension

Let's complete this sentence. Ps dictate to T or come to BB. Class agrees/disagrees.

BB: A difference can be multiplied by a number if we multiply the $\boxed{\text{reductant}}$ and the $\boxed{\text{subtrahend}}$ by that number, then subtract the two products.

Already prepared on BB or SB or OHT

T asks several Ps what they think before Ps come to BB to write missing words.

Ps read sentence in unison.

15 min

4

Multiplication by 1-digit number

Let's multiply 286 by 4 in 3 different ways. Ps come to BB to complete the calculations, explaining reasoning with place-value detail. Class points out errors. Ps copy the 3 types of calculation in *Ex. Bks*.

Whole class activity

Written on BB or SB or OHT

At a good pace

BB: a) $286 \times 4 = [\,(200 + 80 + 6) \times 4 = 800 + 320 + 24 = \underline{1144}]$

b)

	Th	H	T	U	
		2	8	6	× 4
			2	4	
		3	2	0	
+		8	0	0	
	1	1	4	4	

Remind Ps to write zeros to mark the place values.

c)

Th	H	T	U	
	2	8	6	× 4
1	1	4	4	
	3	2		

Detail: e.g.

'4U × 6U = 24U = 2T + <u>4</u>U;

I write 4 in the units column answer and 2 below the tens column.

4U × 8T = 32T;

32T + 2T = 34T = 3H + <u>4</u>T; etc.

Reasoning (with T's help if necessary), agreement, praising

T notes Ps having difficulty in order to give them extra help in individual work.

20 min

Bk5

Lesson Plan 11

Activity		*Notes*

5

Multiplication by 2-digit number

Let's multiply 37 by 42 in different ways. Ps come to BB to or dictate to T, explaining reasoning. Class points out errors. T suggests those not dealt with by Ps. Ps could copy all methods in *Ex. Bks*.

BB:

a) $37 \times 42 = (37 \times 40 + 37 \times 2 = 30 \times 40 + 7 \times 40 + 37 \times 2$
$= 1200 + 280 + 74 = \underline{1554})$

b)

	Th	H	T	U
			3	7
			1	4
			6	0
		2	8	0
+	1	2	0	0
	1	5	5	4
		1		

$\times$

T	U
4	2

Details: e.g.

$2 \times 7 = \underline{14}$ (or $2U \times 7U = 14U$)

$2 \times 30 = \underline{60}$ (or $2U \times 3T = 6T$)

$40 \times 7 = \underline{280}$ (or $4T \times 7U = 28T$)

$40 \times 30 = \underline{1200}$ (or $4T \times 3T = 12H$)

Then add the products.

c)

	Th	H	T	U
			3	7
			7	4
+	1	4	8	0
	1	5	5	4
		1		

$\times$

T	U
4	2

Details: e.g.

$2U \times 7U = 14U = 1T + \underline{4}U$;
I write 4 in units column and carry 1T.

$2U \times 3T = 6T$, $6T + 1T = \underline{7}T$;
I write 7 in tens column.

$4T \times 7U = 28T = 2H + 8T$;
I write 8 in tens column and carry 2H;

$4T \times 3T = \underline{12H}$, $12H + 2H = 14H$,
$14H = \underline{1}Th + \underline{4}H$;

I write 4 in hundreds column and 1 in thousands column.

Then I add the products.
$4U + 0U = \underline{4}U$; etc.

d) T (or P) shows shorter form on BB:

			3	7
		$\times$	4	2
			7	4
+	1	4	8	0
	1	5	5	4
	1			

25 min

Notes:

Whole class activity

Ps suggest the different methods which could be used.

T helps Ps to explain reasoning with place values.

T repeats reasoning clearly where necessary.

T shows any methods not suggested by Ps.

(or 'I keep 1T in my head')

Remind Ps about also writing 0U for 80 to mark the place value.

In d) T starts and Ps continue when they understand.

Praising, encouragement only!

6

Book 5, page 11

Q.2 Read: *Calculate 327×6 in the place-value tables in two different ways.*

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T with place-value details. Class agrees/ disagrees. Mistakes discussed and corrected.

Solution:

Th	H	T	U	
	3	2	7	$\times$ 6
		4	2	
	1	2	0	
1	8	0	0	
1	9	6	2	

Th	H	T	U	
	3	2	7	$\times$ 6
1	9	6	2	
	1	4		

30 min

Notes:

Individual work, monitored, (helped)

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Quicker Ps could be asked to write a 3rd method too.

(e.g. horizontal calculation)

Bk5

Lesson Plan 11

Activity		Notes

7

Book 5, page 11

Q.3 Read: *Calculate 43×23 in the place-value tables in different ways.*

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning with place-value details. Class agrees/disagrees. Mistakes discussed/corrected.

Solution:

a)

	H	T	U	
	8	6	0	← 43 × 20
+	1	2	9	← 43 × 3
	9	8	9	← 43 × 23

b)

	H	T	U		T	U
		4	3	×	2	3
			9	← 3 × 3		
	1	2	0	← 40 × 3		
		6	0	← 3 × 20		
+	8	0	0	← 40 × 20		
	9	8	9			

c)

	H	T	U		T	U
		4	3	×	2	3
	1	2	9	← 43 × 3		
+	8	6	0	← 43 × 20		
	9	8	9			

Does it matter which way round we do the multiplication?
(No, as the terms in a multiplication are inter-changeable.)

Let's do the multiplication both ways without using place-value headings. Who would like to try it? Two Ps come to BB to write long multiplications, with T's (other Ps') help if necessary.

BB:

		4	3
	×	2	3
	1	2	9
+	8	6	0
	9	8	9

		2	3
	×	4	3
		6	9
+	9	2	0
	9	8	9

Notes:

Individual work, monitored, (helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correction, praising

Whole class activity

At a good pace

Discussion, reasoning, agreement, praising

35 min

8

Book 5, page 11

Q.4 Read: *Calculate these products in any way you wish.*

Elicit that there are 4 × 5 = <u>20</u> calculations.

Do them in your head if you can and look out for easy ways.
Let's see how many you can do in 3 minutes! Start . . . now! . . . Stop!

Review with the whole class. Ps dictate solutions to T, explaining reasoning. Class agrees/disagrees or suggests easier calculations. Ps mark, correct and evaluate own work.

Who had all 20 correct? Let's give them 3 cheers!

Who made 1 (2, 3) mistakes? What were your mistakes?
Who did the same? Who does not understand their mistakes? etc.

Solution:

a) 70 × 4 = <u>280</u>
75 × 4 = <u>300</u>
75 × 6 = <u>450</u>
75 × 8 = <u>600</u>
80 × 8 = <u>640</u>

b) 82 × 10 = <u>820</u>
82 × 9 = <u>738</u>
82 × 5 = <u>410</u>
82 × 50 = <u>4100</u>
82 × 500 = <u>41 000</u>

c) 68 × 100 = <u>6800</u>
68 × 99 = <u>6732</u>
68 × 90 = <u>6120</u>
68 × 9 = <u>612</u>
68 × 900 = <u>61 200</u>

d) 25 × 8 = <u>200</u>
250 × 8 = <u>2000</u>
25 × 80 = <u>2000</u>
25 × 800 = <u>20 000</u>
25 × 160 = <u>4000</u>

Notes:

Individual work, monitored (helped)

If Ps need extra space, they can use *Ex. Bks.* or slates.

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

If disagreement, show details of calculation on BB. e.g.

75 × 4 = 70 × 4 + 5 × 4
= 280 + 20 = <u>300</u>

Extra praise for clever notices, e.g.

75 × 8 = 75 × 4 × 2
= 300 × 2 = <u>600</u>

68 × 99 = 68 × 100 – 68
= 6800 – 68
= <u>6732</u>

68 × 90 = 6800 – 680
= 6200 – 80
= <u>6120</u> etc.

45 min

Bk5

R: Mental calculation. Multiplication and division tables

C: Multiples and factors of natural numbers

E: Graphs

Lesson Plan 12

Activity		***Notes***

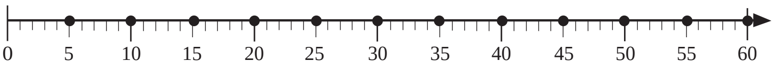
1

Multiples

A clock is set to chime on every 5th minute. Will it chime 60 minutes later? Who thinks it will? Who thinks it won't?

Let's check by marking the chimes with dots on this number line. Ps come to BB or dictate numbers to T.

BB:



Agree that the clock will chime on the 60th minute.

What do you notice about these marked numbers? (multiples of 5)

T: We get the multiples of 5 if we multiply 5 by 0 and the natural numbers.

Ps recite 5 times table and T points to relevant marks on number line.

Ps: $0 \times 5 = \underline{0}$, $1 \times 5 = \underline{5}$, $2 \times 5 = \underline{10}$, . . . , $12 \times 5 = \underline{60}$

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

Agreement, praising

In unison, at speed

Praising

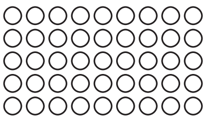
5 min

2

Multiples and factors

T has 45 counters or card circles stuck at random on BB. Let's put the counters in equal rows in different ways. Who could tell me one way to do it? e.g. P suggests 5 rows of 9. Who can think of different operations to write about it? Ps dictate and T writes on BB.

BB:



$9 + 9 + 9 + 9 + 9 = 45$

$5 \times 9 = 45$

$45 - 9 - 9 - 9 - 9 - 9 = 0$

$45 \div 5 = 9$

What other patterns can you make with equal rows? Ps dictate the number of rows and how many counters are in each row. T writes in order on BB. Ps write as multiplications in *Ex. Bks* too.

BB:

1 row of 45:	$1 \times 45 = 45$	
3 rows of 15:	$3 \times 15 = 45$	(as $15 + 15 + 15 = 45$)
(5 rows of 9:	$5 \times 9 = 45$)	(already shown above)
9 rows of 5:	$9 \times 5 = 45$	Elicit that: $9 \times 5 = 5 \times 9$, etc.
15 rows of 3:	$15 \times 3 = 45$	
45 rows of 1:	$45 \times 1 = 45$	

T: We say, e.g., that 15 is a factor of 45 and 45 is a multiple of 15.

We could also say that 45 is divisible by 15, i.e. 15 divides exactly into 45, with no remainder.

Let's list all the factors of 45. Ps dictate to T. Who can join up the factor pairs? Ps come to BB to draw joining lines. Class checks that the pairs multiply to make 45. Are there any more factors of 45? (No)

Notes: Whole class activity

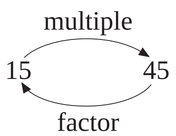
Ps could have counters on desks too and work in pairs first to try out different arrangements and note them.

Agreement, praising

Involve several Ps.

Agreement, praising

BB:



1, 3, 5, 9, 15, 45

10 min

Bk5

Lesson Plan 12

Activity		*Notes*

3

Factors 1

What is a prime factor? (A factor which is a prime number.) Elicit that a prime number is a number with only two factors, itself and 1. Ps suggest some and class decides whether they are prime numbers.

Who remembers how to find the prime factors of a number? P comes to BB to draw factor tree with T's help; if nobody remembers, T starts and Ps continue when they understand. Let's write 60 as the product of its prime factors. Ps dictate to T. Ps copy diagram and multiplication in *Ex. Bks*.

Let's use the prime factors to list <u>all</u> the factors of 60. Ps come to BB or dictate to T. Class agrees/disagrees. Ps write factors in *Ex. Bks* too, joining up the factor pairs.

BB:

<u>Factors of 60</u>: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

Let's complete these sentences. Ps come to BB or dictate to T. Class agrees/disagrees. Then class reads out all the sentences in unison.

BB:

a) 60 has $\boxed{12}$ factors.

b) $\boxed{1}$ is a factor of every natural number.

c) Every positive whole number is divisible by $\boxed{\text{itself and 1}}$.

d) Zero has only one $\boxed{\text{multiple}}$, zero.

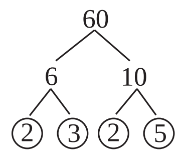
e) Every positive whole number has an infinite number of $\boxed{\text{multiples}}$.

Notes:

Whole class activity

Discussion, agreement, praising

BB: <u>Prime factors</u>



$60 = 2 \times 2 \times 3 \times 5$

At a good pace

Agreement, praising

Written on BB or SB or OHT

Agreement, praising

T gives hints if Ps do not know a word.

Agreement, praising

15 min

4

Book 5, page 12

Q.1 Read: *a) Complete the table to show how 24 flowers can be arranged in equal bunches.*

b) List the factors of 24.

Set a time limit. (Less able Ps could have 24 counters on desks.)

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a)

Flowers per bunch	1	2	3	4	**6**	**8**	12	**24**
Number of bunches	24	12	**8**	**6**	4	3	**2**	1

b) The factors of 24 are: 1, 2, 3, 4, 6, 8, 12, 24

Who can write a rule for the table? Who agrees? Who can write it a different way? etc.

Notes:

Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

BB: $F \times B = 24$

$F = 24 \div B$

$B = 24 \div F$

20 min

Bk5

Lesson Plan 12

Activity		Notes

5

Factors 2

a) I have written all the natural numbers up to 24 in both rows in this table. Let's score out the numbers which should not be there.

Ps come to BB or dictate to T, explaining reasoning. e.g. '2 is a factor of 18 and 24 as they are both even numbers.' Class agrees/ disagrees.

BB:

Factors of 18	1	2	3	~~4~~	~~5~~	6	~~7~~	~~8~~	9	~~10~~	~~11~~	~~12~~	~~13~~	~~14~~	~~15~~	~~16~~	~~17~~	18	~~19~~	~~20~~	~~21~~	~~22~~	~~23~~	~~24~~
Factors of 24	1	2	3	4	~~5~~	6	~~7~~	8	~~9~~	~~10~~	~~11~~	12	~~13~~	~~14~~	~~15~~	~~16~~	~~17~~	~~18~~	~~19~~	~~20~~	~~21~~	~~22~~	~~23~~	24

Notes: Whole class activity

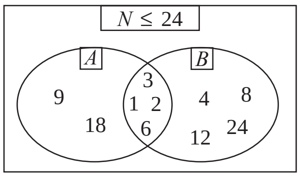
Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

b) Study this Venn diagram. What labels could we give to sets A and B? Ask several Ps what they think. Class agrees/disagrees.

BB:



Elicit:

A = {Factors of 18}

B = {Factors of 24}

Notes: Discussion on meaning of diagram. Elicit:

- that the base set contains the natural numbers less than or equal to 24.
- numbers outside sets A and B but inside the base set.

(5, 7, 10, 11, 13, 14, 15, . .)

Extension

- Which part of the diagram is common to both A and B, i.e. it shows the numbers which are factors of 18 <u>and also</u> of 24?

  P comes to BB point to it. We say that this is the <u>intersection</u> of A and B and write it mathematically like this.

  BB: $A \cap B = \{1, 2, 3, 6\}$

  It is read as 'the <u>intersection</u> of A and B'

- Which parts of the diagram show Set A and Set B combined, i.e. the numbers which are either factors of 18 <u>or</u> factors of 24?

  P comes to BB to point to them. We say that this is the <u>union</u> of A and B and write it mathematically like this.

  BB: $A \cup B = \{1, 2, 3, 4, 6, 8, 9, 12, 18, 24\}$

  It is read as 'the <u>union</u> of A and B'

Notes: Whole class discussion

T explains, referring to the diagram and table and involving Ps whenever possible.

Do not expect Ps to learn the symbols, just to become familiar with them.

25 min

6

Book 5, page 12

Q.2 a) Read: *Continue drawing the dots.*

y is a factor of x and x ≤ 30.

Who can explain the graph? Ps come to BB to explain (with T's help) using the dots already given.

e.g. P points to 4 on the *x*-axis and shows that the factors of 4 are 1, 2 and 4.

Deal with 5 numbers at a time if necessary, or set a time limit.

Review at BB with whole class. Ps come to BB or dictate to T where the dots should be drawn (or T has solution already prepared and uncovers each column as it is dealt with.) Mistakes and omissions corrected.

Notes: Whole class discussion to start, then individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement, self-correction, praising

Bk5

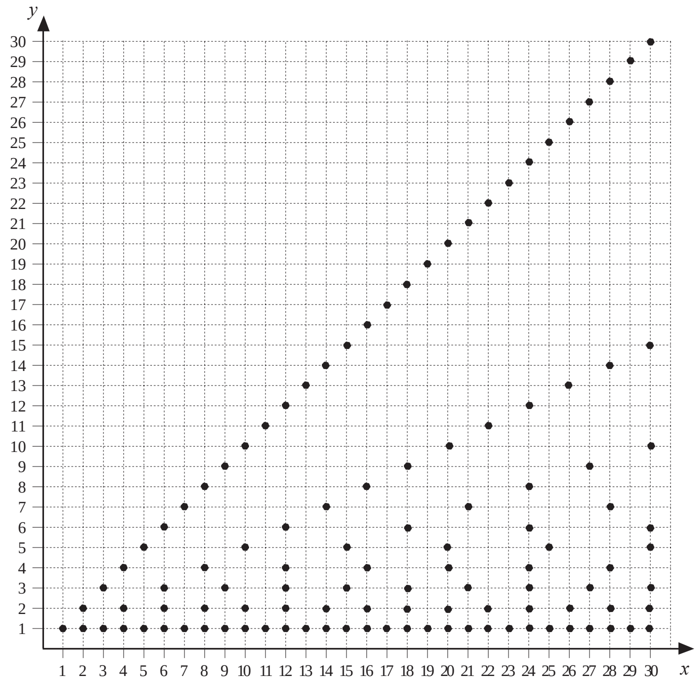
Lesson Plan 12

Activity		***Notes***

6

(Continued)

Solution:



T might ask Ps what they notice about the dots on the graph.

(they form straight lines; dots on each line are the same distance apart; dots become fewer as numbers increase)

Praise all positive contributions.

b) Read: *Complete these statements.*

Deal with one question at a time if necessary or set a time limit. Review with whole class. Ps dictate to T. Class agreesdisagrees. Mistakes discussed and corrected.

Solution:

i) x is a multiple of y

ii) A = {has exactly two factors}

= {2, 3, 5, 7, 11, 13, 17, 19, 23, 29} (i.e. prime numbers)

iii) B = {has an odd number of factors} = {1, 4, 9, 16, 25}

(i.e. square numbers)

iv) C = {has only one factor} = {1}

If there was a set D containing numbers which had a factor which was itself, how many elements would be in set D? (30, as any natural number is exactly divisible by itself, i.e. the base set)

Individual work, monitored, (or whole class activity)

Checking on graph, agreement, self-correcting, praising

Extra praise if Ps notice the types of numbers in A and B without prompting from T.

T asks several Ps what they think and why.

35 min

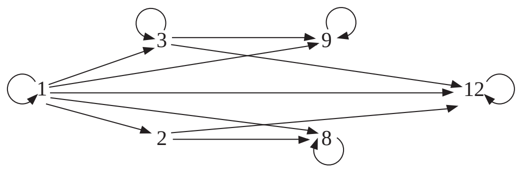
7

Book 5, page 12

Q.3 Read: *The arrows point towards the multiples.*
Continue drawing the arrows.

Set a time limit. Review at BB with whole class. Ps come to BB to draw arrows. Class agrees/disagrees or points out missed arrows. Who drew all the arrows? Who missed some? Which ones did you misss? etc.

Solution:



Individual work, monitored, (helped)

Drawn on BB or SB or OHT

Discussion, reasoning, agreement, self-correction, evaluation, praising

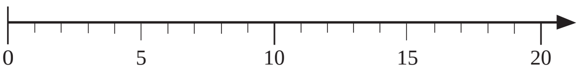
40 min

Bk5

Lesson Plan 12

Activity		*Notes*
8	**Multiples** Let's mark the multiples of 2 in *green*, the multiples of 4 in *blue* and the multiples of 8 in *red*. Ps come to BB to draw dots above (below, on) number line. Class points out errors.	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Agreement, praising

BB:



The base set in this Venn diagram contains the integers from 0 to 20 and there are 3 named sets. Which letters should go in which set? Ps come to BB to write letters, explaining reasoning. Class agrees/ disagrees.

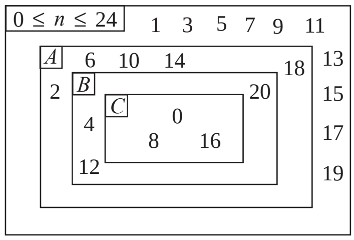
Notes: Discussion, reasoning, agreement, praising

Now let's write all the integers in the correct set. Ps come to BB one after the other to write a number and explain why they chose a particular set. Class agrees/disagrees.

Notes: At a good pace. T helps with wording of reasoning.
Praising, encouragement only!

BB:

A = {multiples of 2}
B = {multiples of 4}
C = {multiples of 8}
↑
(Already given)



Notes: Feedback for T

45 min

Bk5	R: Review of Y4. Mental calculation. Odd and even numbers **C: Division of natural numbers. Practice in division tables** *E: Test of divisibility by 2, 4, 5, 10 or 100*	*Lesson Plan 13*

Activity		***Notes***
1	**Factors 1** What do you think this table shows? (the factor pairs of 96) Which factors are missing? Ps suggest numbers and explain reasoning. Class agrees/disagrees. (6 and 16) BB: 96 | 1, 2, 3, 4, (6), 8 / 96, 48, 32, 24, (16), 12 Let's list the factors of 96 in increasing order. Ps come to BB or dictate to T. Elicit that 96 has <u>12</u> factors among the natural numbers. BB: Factors of 96: 1, 2, 3, 4, <u>6</u>, 8, 12, <u>16</u>, 24, 32, 48, 96 *4 min*	Whole class activity Drawn on BB or SB or OHT Reasoning: e.g. 2 and 3 are factors, but $2 \times 3 = 6$, so 6 must also be a factor. $6 \times \underline{16} = 96$, so 16 is a factor too. Agreement, praising
2	**Multiples 1** I started to write the multiples of a natural number in increasing order. Which numbers do you think are covered up? Ps dictate to T and T uncovers them to confirm. BB: $\boxed{0}$, 7, $\boxed{14}$, 21, 28, $\boxed{35}$, 42, $\boxed{49}$, . . . Elicit that they are natural multiples of <u>7</u>. Who can tell me other multiples of 7? Class agrees/disagrees. *7 min*	Whole class activity Written on BB or SB or OHT and numbers covered by card Agreement, praising Accept any mulitple of 7. They need not be in order.
3	**Problem** Jim had this problem to solve for homework. *Along the route of a 44 km road race there are marker boards at every 4 km. How many marker boards are on the route if the first is at 4 km and the last is at the finish?* Jim wrote this plan. BB: $4 \times \boxed{(11)} = 44$ Is he correct? What is the missing number? (11) Who agrees? Which name card matches the missing number? (<u>multiplier</u> or <u>factor</u>) Which name cards match the other two numbers? (<u>multiplicand</u> and <u>product</u>) How did you work out the missing number? (by dividing 44 by 4) So what other plan could Jim have used? Ps dictate to T or come to BB. BB: $\underset{\boxed{\text{dividend}}}{44} \div \underset{\boxed{\text{divisor}}}{4} = \underset{\boxed{\text{quotient}}}{11}$ Let's fit the name cards to the matching numbers in the division. *11 min*	Whole class activity T has flash cards stuck to side of BB: multiplicand, multiplier, factor, product, dividend, divisor, quotient T repeats problem slowly and asks P to repeat in own words. Discussion, reasoning, agreement, praising Match the components of the multiplication to the components of the division. e.g. the <u>product</u> (44) in the multiplication becomes the <u>dividend</u> in the division, etc. Agreement, praising
4	**Missing numbers** Ps come to BB to fill in missing numbers, explaining reasoning. Class agrees/disagrees. T asks Ps to use the names of the components to explain their reasoning. e.g. a): 'the quotient = the dividend divided by the divisor.' etc. Elicit that d) is the odd one out as there is a <u>remainder</u>. BB: a) $88 \div 11 = \boxed{}$ b) $\boxed{} \div 12 = 8$ c) $\boxed{} \div 20 = 15$ d) $93 \div 6 = 15$, r $\boxed{}$ *16 min*	Whole class activity Written on BB or SB or OHT Discussion, reasoning, agreement, praising T helps with the names of the components if necessary. Ps check with multiplications.

Bk5		*Lesson Plan 13*

Activity		***Notes***

5

Finding mistakes

I wrote these divisions in a hurry and have made some mistakes.

Can you find the mistakes and correct them? T points to each in turn and Ps say whether it is correct or not. If incorrect, P comes to BB to correct it. Class agrees/disagrees.

BB:
- a) $142 \div 14 = 10$, r 2 ✓
- b) $91 \div 8 = 11$, r ~~4~~ 3 ✗
- c) $78 \div 7 = 11$, r 1 ✓
- d) $83 \div 9 = 9$, r ~~3~~ 2 ✗
- e) $121 \div 11 =$ ~~10~~ 11 ✗
- e) $97 \div 9 = 10$, r 7 ✓

Notes: Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, checking with multiplication, e.g. in a):

$10 \times 14 + 2 = 140 + 2 = \underline{142}$

Agreement, praising

25 min

6

Book 5, page 13

Q.1 Read: *Fill in the missing numbers. If there is a remainder, write it beside the box.*

Set a time limit. Ps check mentally with multiplication.

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:
- a) $73 \div 7 = \underline{10, \text{r } 3}$
- b) $83 \div 10 = \underline{8, \text{r } 3}$
- c) $96 \div 16 = \underline{6}$
- d) $144 \div \underline{14} = 10$, r 4
- e) $121 \div 10 = \underline{12, \text{r } 1}$
- f) $66 \div 11 = \underline{6}$

Notes: Individual work, montored (helped)

Written on BB or SB or OHT

Differentiation by time limit

Reasoning, agreement, self-correcting, praising

Feedback for T

30 min

7

Book 5, page 13

Q.2 Read: *Write these numbers in the correct set.*

Elicit that a number can be in more than one set. Set a time limit.

Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution: 15 30 41 77 80 92 104 150 300

a)	Divisible by 2	30 80 92 104 150 300
b)	Multiple of 4	80 92 104 300
c)	Divisible by 5	15 30 80 150 300
d)	Multiple of 10	30 80 150 300
e)	Divisible by 25	150 300
f)	Multiple of 100	300

Elicit that:
- a) contains the <u>even</u> numbers; a number is even if the units digit is even; even digits are 0, 2, 4, 6, 8.
- b) contains numbers which are also in set a); if a number is divisible by 4, it is also divisible by 2, as $4 = 2 \times 2$.
- c) numbers divisible by 5 have units digit 0 or 5.
- d) multiples of 10 have units digit 0.
- e) numbers divisible by 25 are also divisible by 5, i.e. have units digit 5 or 0, as $25 = 5 \times 5$.
- f) multiples of 100 have 0 as units and tens digits.

Notes: Individual work, monitored (helped)

Differentiation by time limit

(Ask quicker Ps to insert other numbers in each set.)

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

At a good pace

Whole class discussion on general properties of numbers in each set.

Involve several Ps.

Elicit or tell that a natural number is divisible by 4 (25, 100) if the last 2 digits are divisible by 4 (25, 100) .

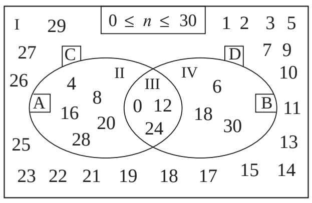
Ask Ps to explain why.

[Hundreds are multiples of 4 (25, 100) so need not be taken into account.]

36 min

Bk5

Lesson Plan 13

Activity		***Notes***
8	***Book 5, page 13**, **Q.3***	
	Read: *Fill in the Venn diagram by following the flow chart.*	Whole class activity to start
	Ps come to BB to point out which diagram is which.	Drawn on BB or use enlarged copy master or OHP
	Read: T*he base set contains the integers from 0 to 30.*	
	What is an integer? (a whole number) Let's list the base set. Ps dictate to T, who writes numbers on BB:	BB: <u>integer</u>: a whole number
	BB: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30	At speed
	Deal with 0, 1, 2, 3, in turn. Ps come to BB to follow the flow chart, reading each step/question and answering it, then finally writing number in correct place in Venn digram. Class points out errors.	Involve several Ps. Agreement, praising
	If Ps understand what to do, rest of numbers can be done as individual work under a time limit. Otherwise continue as whole class activity, with Ps working in *Pbs* at the same time.	Individual work, monitored, helped (Once Ps understand the properties of the numbers in each area, they will not need the flow chart to help them.)
	Elicit that numbers in area: • I are not divisible by either 4 or 6; • II are divisible by 4 but not by 6; • III are divisible by both 4 and 6; • IV are divisible by 6 but not by 4.  	Agreement, (self-correction), praising
	Read: *What do the labels in each set mean?*	Whole class discussion
	Ask several Ps what they think and why. Class decides on correct labels. T writes them on BB and Ps in *Pbs*.	Agreement, praising
	Solution: A = {multiple of 4} or {divisible by 4} B = {multiple of 6} or {divisible by 6} C = {Not a multiple of 4} or { Not divisible by 4} D = {Not a multiple of 6} or {Not divisible by 6}	Ps suggest other numbers for each set and class checks that they are correct.

45 min

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Bk5

R: Mental calculation

C: Review: Multiplication and division; division of sum/difference

E: Word problems. The role of 0 and 1

Lesson Plan 14

Activity		*Notes*

1

Missing numbers

Let's complete the operations. Ps come to BB to fill in numbers, explaining reasoning. Class agrees/disagrees. Ask Ps to explain their reasoning using the names of the components too. e.g. in:

a) 'product = multiplier times multiplicand' (or 'factor times factor'),

b) 'multiplicand = product divided by multiplier', etc.

BB:

a) $7 \times 8 = \underline{56}$	b) $\underline{11} \times 9 = 99$	c) $13 \times \underline{5} = 65$
d) $81 \times \underline{1} = 81$	e) $15 \times \underline{0} = 0$	f) $65 \div 5 = \underline{13}$
g) $\underline{81} \div 9 = 9$	h) $72 \div \underline{9} = 8$	i) $0 \div 7 = \underline{0}$
j) $21 \div \underline{1} = 21$		

T elicits (or tells if Ps cannot explain it) that:

- zero times any number is zero; BB: $0 \times n = n \times 0 = 0$
- 1 times any number is the number itself. BB: $1 \times n = n \times 1 = n$
- zero divided by any number (apart from zero) is zero.
  BB: $0 \div n = 0$, as $0 \times n = 0$ (as long as $n \neq 0$)
- any number divided by 1 is the number itself BB: $n \div 1 = n$
- it does not make sense to divide a number by zero,
  e.g. suppose that: BB: $6 \div 0 = 4$, then 4×0 should equal 6,
  but any number multiplied by 0 is $\underline{0}$, so dividing by 0 is impossible.

  Note that in the case of $0 \div 0$, if we suppose that:

  BB: $0 \div 0 = 0$, then $0 \times 0 = 0$ ✓
  $0 \div 0 = 4$, then $4 \times 0 = 0$ ✓
  $0 \div 0 = 1$, then $1 \times 0 = 0$, ✓ etc.

  In fact, the result could be any number, so $0 \div 0$ is not used in mathematics, as it is meaningless.

Notes:

Whole class activity

Written on BB or SB or OHT

At a good pace

Discussion on how to calculate the missing number

Reasoning, checking, agreement, praising

Missing numbers are underlined.

T directs discussion and leads Ps through reasoning using examples or counter examples to final conclusions.

as $n \times 1 = n$

7 min

2

Problem 1

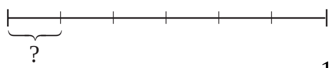
Listen carefully, draw a diagram to help you, write a plan and do the calculation. Show me the answer when I say.

A 15 m length of string was cut into 6 equal pieces. How long was each piece?

If you have an answer, show me . . . now! (2 m 50 cm, or $2\frac{1}{2}$ metres)

Ps answering correctly come to BB to explain reasoning. Who agrees? Who did it another way? etc. Mistakes discussed and corrected.

e.g. BB: 15 m = 1500 cm



Plan: $15 \text{ m} \div 6 = 15 \text{ m} \div 2 \div 3 = 7\frac{1}{2} \text{ m} \div 3 = 2\frac{1}{2} \text{ m}$,

or $15 \text{ m} \div 6 = 15 \text{ m} \div 3 \div 2 = 5 \text{ m} \div 2 = 2\frac{1}{2} \text{ m}$,

or $15 \text{ m} \div 6 = 1500 \text{ cm} \div 6 = 1200 \text{ cm} \div 6 + 300 \text{ cm} \div 6$
$= 200 \text{ cm} + 50 \text{ cm} = \underline{2 \text{ m } 50 \text{ cm}}$

Notes:

Individual trial first in *Ex. Bks*, monitored

Responses written on scrap paper or slates and shown in unison.

Discussion, reasoning, agreement, self-correction, praising

Or T might show:

BB:

1 sixth of 15 m $= \frac{15}{6} = \frac{5}{2}$

$= 2\frac{1}{2}$ (m)

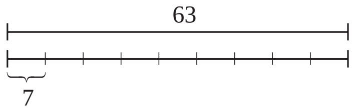
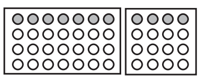
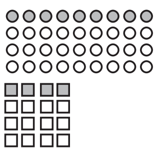
How many cuts were made?

(5 cuts $\rightarrow$ 6 pieces)

12 min

Bk5

Lesson Plan 14

Activity		Notes
3	**Problem 2** Listen carefully, draw a diagram, write a plan, then do the calculation. Remember to check your answer. Show me the answer when I say. *Into how many equal parts did we divide 63 sweets if each part contained 7 sweets?* If you have an answer, show me . . . now! (9 parts) Ps answering correctly come to BB to explain reasoning. Who agrees? Who did it another way? etc. (T might have to help with the diagram if no P can think of a model.) Mistakes discussed and corrected. e.g. BB:  e.g. How many times can we measure 7 mm along a 63 mm line? *Plan:* 63 sweets ÷ 7 sweets = <u>9</u> (times) or $\boxed{9}$ × 7 = 63 *Answer:* We divided the sweets into 9 equal parts.	Individual trial first in *Ex. Bks*, monitored Responses written on scrap paper or slates and shown in unison. Discussion, reasoning, agreement, self-correction, praising Ps could draw a line 63 mm long in *Ex Bks* and measure 7 mm sections. Agree that there are 9 such sections. T chooses a P to say the answer in a sentence.
	17 min	
4	**Problem 3** Listen carefully, note the data, draw a diagram to help you and write 2 different plans which will solve the problem. *Four children were given 2 bags of oranges. In the first bag there were 28 oranges and in the second bag there were 16 oranges.* *If the oranges were shared out equally, how many oranges did each child receive?* Set a time limit. Review with whole class. Who can show us one plan? Who agrees? Who can show another plan? Deal with all cases. Ps decide whether plans are valid and then do the calculations. e.g. BB:  *Plan:* (28 + 16) ÷ 4 = 44 ÷ 4 = <u>11</u> or: 28 ÷ 4 + 16 ÷ 4 = 7 + 4 = <u>11</u> *Answer:* Each child received 11 oranges. What are the two methods we can use to divide a sum? 1) Calculate the sum first, then divide it. 2) Divide each term of the sum first, then add the quotients.	Individual trial first in *Ex. Bks*, monitored T repeats slowly to give Ps time to think and write. First T helps P to draw diagram. Discussion, reasoning, agreement, self-correction, praising 1 child's oranges are coloured. T chooses a P to say answer in a sentence. T repeats in clearer way if necessary. Agreement, praising
	21 min	
5	**Problem 4** Listen carefully, note the data, draw a diagram to help you and write 2 different plans which will solve the problem. *The same 4 children were given a packet containing16 pieces of chewing gum and a box containing 36 chocolates.* *If they shared everything out equally, how many more chocolates than pieces of chewing gum did each child receive?* Set a time limit. Review with whole class. Who can show us one plan? Who agrees? Who can show another plan? Deal with all cases. Ps decide whether plans are valid and then do the calculations. e.g. BB:  *Plan:* (36 – 16) ÷ 4 = 20 ÷ 4 = <u>5</u> or: 36 ÷ 4 – 16 ÷ 4 = 9 – 4 = <u>5</u> *Answer:* Each child received 5 more chocolates than pieces of chewing gum.	Individual trial first in *Ex. Bks*, monitored T repeats slowly to give Ps time to think and write. First T helps P to draw diagram. Discussion, reasoning, agreement, self-correction, praising 1 child's sweets are coloured.. T chooses a P to say answer in a sentence.

Bk5

Lesson Plan 14

Activity		*Notes*

5

(Continued)

What are the two methods we can use to divide a difference?

1) Calculate the difference first, then divide it.
2) Divide the reductant and subrahend first, then subtract the quotients.

Notes: T repeats in clearer way if necessary.

Agreement, praising

25 min

6

Book 5, page 14

Q.1 Read: *Solve the equations.*

Ps write missing numbers in boxes. Set a time limit, or deal with one part at a time if class is unsure.

Review with the whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Elicit that in c), there is no such number as *z*, as zero times any number results in zero and 8 ÷ 0 makes no sense.

Solution:

a) $\boxed{x} \times 7 = 63$, $x = \boxed{9}$ $\quad$ $\begin{tikzcd} \boxed{9} \arrow[r, bend left, "\times 7"] & \boxed{63} \arrow[l, bend left, "\div 7"] \end{tikzcd}$

b) $\boxed{y} \times 5 = 0$, $y = \boxed{0}$ $\quad$ $\begin{tikzcd} \boxed{0} \arrow[r, bend left, "\times 5"] & \boxed{0} \arrow[l, bend left, "\div 5"] \end{tikzcd}$

c) $\boxed{z} \times 0 \neq 8$, $z \neq \boxed{\times}$ $\quad$ $\begin{tikzcd} \boxed{\times} \arrow[r, bend left, "\times 0"] & \boxed{8} \arrow[l, bend left, "?"] \end{tikzcd}$

d) $\boxed{u} \times 143 = 143$, $u = \boxed{1}$ $\quad$ $\begin{tikzcd} \boxed{1} \arrow[r, bend left, "\times 143"] & \boxed{143} \arrow[l, bend left, "\div 143"] \end{tikzcd}$

Notes: Individual work, monitored, (helped)

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, checking, self-correction, praising

Feedback for T

Extension

Who can solve this equation? BB: $v \times 0 = 0$

$v = ?$

Ask several Ps what they think and why. Agree that *v* can be any number, so the reverse operation, 0 ÷ 0, is meaningless.

Notes: Whole class activity (or extra question for Ps who finish early)

Agreement, praising

30 min

7

Book 5, page 14

Q.2 Read: *Fill in the missing numbers. Compare the results in each row.*

Set a time limit or deal with one row at a time if Ps are unsure.

Review with the whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Ps point out equivalent operations.

BB: e.g. $(12 + 10) \times 5 = 12 \times 5 + 10 \times 5$, etc.

Review order of operations. (Operations inside brackets first, then multiplication and division, then addition and subtraction.)

Solution:

a) $(12 \overset{22}{+} 10) \times 5 = \boxed{110}$ $\quad$ $12 + 10 \overset{50}{\times} 5 = \boxed{62}$ $\quad$ $12 \overset{60}{\times} 5 + 10 \overset{50}{\times} 5 = \boxed{110}$

b) $32 \overset{96}{\times} 3 - 12 \overset{36}{\times} 3 = \boxed{60}$ $\quad$ $(32 \overset{20}{-} 12) \times 3 = \boxed{60}$ $\quad$ $32 - 12 \overset{36}{\times} 3 = \boxed{-4}$

c) $72 \overset{9}{\div} 8 + 24 \overset{3}{\div} 8 = \boxed{12}$ $\quad$ $(72 \overset{96}{+} 24) \div 8 = \boxed{12}$ $\quad$ $72 + 24 \overset{3}{\div} 8 = \boxed{75}$

d) $(32 \overset{20}{-} 12) \div 4 = \boxed{5}$ $\quad$ $32 \overset{8}{\div} 4 - 12 \overset{3}{\div} 4 = \boxed{5}$ $\quad$ $32 - 12 \overset{3}{\div} 4 = \boxed{29}$

e) $(42 \overset{32}{-} 10) + 5 = \boxed{37}$ $\quad$ $42 \overset{32}{-} 10 + 5 = \boxed{37}$ $\quad$ $42 - (10 \overset{15}{+} 5) = \boxed{27}$

f) $(10 \overset{80}{\times} 8) \times (25 \overset{200}{\times} 8) = \boxed{16\,000}$ $\quad$ $(10 \overset{250}{\times} 25) \times 8 = \boxed{2000}$ $\quad$ $10 \times 25 \overset{200}{\times} 8 = \boxed{2000}$

g) $42 \times 12 \overset{4}{\div} 3 = \boxed{168}$ $\quad$ $(42 \overset{3.5}{\div} 12) \times 3 = \boxed{10.5}$ $\quad$ $42 \times (12 \overset{4}{\div} 3) = \boxed{168}$

Notes: Individual work, monitored, helped (or whole class activity if time is short)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correction, praising

Feedback for T

Show details of calculations if problems: e.g.

BB: $250 \times 8 = 1600 + 400$

$= 2000$

$42 \div 12 = 7 \div 2 = 3.5$ or $3\frac{1}{2}$

(as reducing dividend and divisor by the same number of times does not change the result.)

35 min

Bk5

Lesson Plan 14

Activity		***Notes***

8

Book 5, page 14

Q.3 Read: *In November, a family spent £780 on heating and £1320 on food.*

How much did the family spend on average on heating and food each day during that month?

Set a time limit. Ps work in *Ex. Bks* if they need more room.

Review with the whole class. Ps could show result on scrap paper or slates in unison on command. P answering correctly comes to BB to explain reasoning. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected.

Solution:

Plan: (£780 + £1320) ÷ 30 = £2100 ÷ 30 = £210 ÷ 3 = <u>£70</u>

or £780 ÷ 30 + £1320 ÷ 30 = £78 ÷ 3 + £132 ÷ 3

= £26 + £44 = <u>£70</u>

Answer: The family spent £70 on average each day.

Notes:

Individual work, monitored, (helped)

Elicit meaning of 'on average'. (As if they spent the same each day.)

Discussion, reasoning, agreement, self-correction, praising

Or Ps use vertical calculation:

$$\begin{array}{r} 780 \\ +\,1320 \\ \hline 2100 \\ {\scriptstyle 1\,1} \end{array} \qquad \begin{array}{r} 70 \\ 30\overline{)\,2100} \end{array}$$

Feedback for T

40 min

9

Book 5, page 14

Q.4 a) Read: *Complete the diagram, then write a plan.*

Do the calculation and check the result.

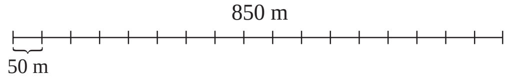
Read the question youselves and solve it in your *Pbs*. I will give you 2 minutes! Show me the answer when I say.

Along an 850 m route a marker was placed at each 50 m. How many markers were needed?

Show me . . . now! (18, but some Ps might have answered 17)

P with correct answer comes to BB to show solution, explaining reasoning. Class agrees/disagrees. Mistakes discusssed and corrected

Solution:



Plan: 850 m ÷ 50 m = 85 m ÷ 5 m

= <u>17</u> (times)

C: $\begin{array}{r} 17 \\ 5\overline{)\,85} \\ 3 \end{array}$

But there is a marker at the beginning of the route too, so we need 17 + 1 = <u>18</u> markers altogether.

Answer: 18 markers were needed.

b) Think about this question carefully and picture it in your head. Show me the answer when I say.

Read: *How much time is needed to boil 16 eggs if it takes 4 minutes to boil one egg?*

Show me . . . now! (4 minutes)

P with correct answer explains reasoning. (All 16 eggs can be put in one large pan, so all would boil for 4 minutes at the same time.)

Notes:

Individual trial, monitored

(or whole class activity if time is short)

Diagram drawn on BB or SB or OHT. Elicit that diagram show the markers at the start and end of the route.

In unison, on scrap paper or slates

Reasoning, agreement, self-correcting, praising

Or:

85 ÷ 5 = 50 ÷ 5 + 35 ÷ 5

= 10 + 7 = <u>17</u>

Extra praise for Ps who thought of this themselves.

Whole class activity

T repeats slowly to give Ps time to think.

In unison

Reasoning, agreement, praising. Class applauds Ps who were correct!

45 min

Bk5	R: Mental calculation. **C: Division of natural numbers. Division by 1-digit numbers** *E: Estimation. Short form of vertical division*	*Lesson Plan* *15*

Activity | ***Notes***

1

Problem 1

Listen carefully and do the calculations in your *Ex. Bks.*

We picked 91 chrysanthemums and tied them in bunches of:

BB: a) 2 b) 4 c) 5 d) 10

Which type of bunch meant that there were flowers left over?

T asks several Ps what they think and why. (All of them will have flowers left over.) Ps dictate the calculations and T writes on BB.

BB: a) $91 \div 2 = 45$, r 1 b) $91 \div 4 = 22$, r 3
c) $91 \div 5 = 18$, r 1 d) $91 \div 10 = 9$, r 1

Could we have answered the question without doing the calculations?

(Yes, because:

- 91 is an odd number, so there will be a remainder if it is divided by 2, 4 or 10, which are even numbers;
- 91 does not have units digit 0 or 5, so it is not exactly divisible by 5.)

Notes: Whole class activity, but initial individual calculation in *Ex. Bks*.

Reasoning, agreement, praising

Extra praise if Ps think of this without hints from T.

4 min

2

Divisibility

Circle the numbers which are divisible by 2, 4 and 5 at the same time.

BB: 20 30 40 25 32 100 0

Ps come to BB to draw circles, explaining reasoning. Class agrees/ disagrees. Elicit that 0 is divisible by any positive whole number.

Notes: Whole class activity

Written on BB or SB or OHT

Reasoning, agreement, praising

6 min

3

Odd one out

Which number does not match the others?

BB: 10 201 30 120 70 90

Show me what you think . . . now! (201)

T asks Ps with different answers for their reasoning. Class agrees that 201 does not match the other numbers, as it is not divisible by 10.

Notes: Whole class activity

Written on BB or SB or OHT

In unison, on scrap paper or slates

Agreeement, praising

8 min

4

Problem 2

Listen carefully and think how you would solve the problem.

If 9 kg of bananas cost £9 90 p, how much do 10 kg cost?

A, what do you think we should do . Who agrees? Who would do it another way? etc. Ps come to BB to show reasoning. e.g.

BB: 9 kg of bananas $\rightarrow$ £9 90 p
1 kg of bananas $\rightarrow$ £1 10 p
10 kg of banans $\rightarrow$ £10 100 p = £11

or Cost of 10 kg of bananas = (£9 90 p $\div$ 9) $\times$ 10
= £1 10 p $\times$ 10 = £10 + 100 p = £11

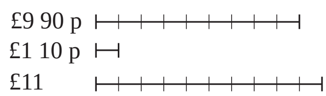
Notes: Whole class activity

Ps suggest methods of solution.

Reasoning, agreement, praising

If no P uses it, T might show:

BB:



13 min

Bk5

Lesson Plan 15

Activity		*Notes*

5

Written procedures

a) Let's estimate the quotient of 98 ÷ 4.

T asks several Ps how they would do it. Accept and praise all valid answers accompanied by correct reasoning. e.g.

P_1: About 20, as 20 × 4 = 80

P_2: Less than 30, as 30 × 4 = 120

P_3: A little less than 25, as 25 × 4 = 100

P_4: 98 ≈ 100 (to nearest 10), so 98 ÷ 4 ≈ 100 ÷ 4 = 25

b) Divide 98 by 4 in your *Ex. Bks*. using a horizontal calculation and show me the answer when I say. Show me . . . now! (24, r 2)
B, come and show your calculation on the BB. Who can check it? Class agrees/disagrees.

BB: e.g. 98 ÷ 4 = 80 ÷ 4 + 18 ÷ 4 = 20 + 4, r 2 = <u>24, r 2</u>

Check: 24 × 4 + 2 = 96 + 2 = 98 ✓

c) Let's write the calculation in column form as a long division.
T starts on BB and Ps continue, reasoning in a loud voice with place value detail. Class points out errors. Ps write in *Ex. Bks*. too.

BB:

	2	4	r 2
4	9	8	
–	8		
	1	8	
–	1	6	
		2	

Details: e.g.

'9T ÷ 4 = <u>2</u>T, and 1T remains
Check: 2T × 4 = 8T, 9T – 8T = 1T.
I add the 1T remaining to the 8U:
1T + 8U = 18U.

18U ÷ 4 = <u>4</u>U, and 2U remain.
Check: 4U times 4 = 16U, 18U – 16U = 2U
I circle the 2U to show that it is the remainder.'

Who can show it as a short division? P comes to BB to write division and explain reasoning with place-value detail. Class agrees/disagrees.

BB:

	2	4	r 2
4	9	8	
	1	2	

Details: e.g.

'9T ÷ 4 = <u>2</u>T, and 1T remains
1T + 8U = 18U.

18U ÷ 4 = <u>4</u>U, and 2U remain.
I circle the 2U to show that it is the remainder.'

Notes:

Whole class activity

BB: 98 ÷ 4

Reasoning, agreement, praising

Individual work, monitored

In unison, on scrap paper or slates

Reasoning, agreement, praising

If Ps remembers what to do, allow them to show class.

T intervenes only where necessary.

Reasoning can take different forms, according to the preference of T and Ps.

e.g. 4 is contained in 9 <u>two</u> times', etc.

Reasoning, agreement, praising

T helps with wording of reasoning.

Praising

18 min

6

Written procedures

Write this division in your *Ex. Bk*. and solve it in any way you wish.

BB: 113 ÷ 4 =

X, come and show us how you did the calculation. Who did the same? Who did it a different way? etc. Ps who used different methods come to BB to explain reasoning. Class points out errors. What do you think about this method? Is it correct? T shows methods not used by Ps.

BB: e.g. 113 ÷ 4 = 100 ÷ 4 + 13 ÷ 4 = 25 + 3, r 1 = <u>28, r 1</u>

		2	8	r 1
4	1	1	3	
–		8		
		3	3	
	–	3	2	
			1	

		2	8	r 1
4	1	1	3	
		3	1	

Subtracting known multiples

4	1	1	3			
–		8	0	2	0	
		3	3			
	–	3	2		8	
			1	2	8	r 1

Check:

	2	8
	×	4
1	1	2
+		1
1	1	3

Notes:

Individual trial, monitored, then whole class discussion

Reasoning with place-value detail, agreement, self-correction, praising

(Ps could write the methods they did not use in *Ex.Bks*.)

Or using approximation:
100 ÷ 4 = <u>25</u>,
12 ÷ 4 = <u>3</u> and 16 ÷ 4 = <u>4</u>
25 + 3 < 113 ÷ 4 < 25 + 4
28 < 113 ÷ 4 < 29

Ps say whether methods shown by T are correct.

27 min

Bk5

Lesson Plan 15

Activity		Notes

7

Book 5, page 15

Q.1 Read: *Do the calculations (in your Ex. Bk. if you need more space) and write the results.*

Set a time limit. Ps calculate mentally if they can, or use any correct form of calculation. Encourage Ps to check results mentally with multiplications.

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Mistakes discussed and corrected.

Solution:

a) 36 ÷ 6 = <u>6</u> b) 38 ÷ 19 = <u>2</u> c) 480 ÷ 40 = <u>12</u>

d) 490 ÷ 7 = <u>70</u> e) 51 ÷ 7 = <u>7, r 2</u>

f) 38 ÷ 6 = <u>6, r 2</u> g) 420 ÷ 40 = <u>10, r 20</u>

h) 490 ÷ 80 = <u>6, r 10</u>

Notes: Individual work monitored

Written on BB or SB or OHT

Differentiation by time limit.

Reasoning, agreement, self-correction, praising

Feedback for T

31 min

8

Book 5, page 15

Q.2 Read: *Do the calculations and check the results.*

Set a time limit. Ps can use long or short division.

Review at BB with whole class. Ps come to BB to show calculation and explain reasoning loudly with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a)

	2	9	r 2
3	8	9	
–	6		
	2	9	
	2	7	
		2	

89 = $\boxed{29 \times 3 + 2}$

b)

	2	2	r 1
4	8	9	
–	8		
	0	9	
	–	8	
		1	

89 = $\boxed{22 \times 4 + 1}$

c)

	1	7	r 4
5	8	9	
–	5		
	3	9	
–	3	5	
		4	

89 = $\boxed{17 \times 5 + 4}$

d)

	1	4	r 5
6	8	9	
–	6		
	2	9	
–	2	4	
		5	

89 = $\boxed{14 \times 6 + 5}$

Notes: Individual work monitored, helped

Written on BB or use enlarged copy master or OHT

Differentiation by time limit

Discussion, reasoning, agreement, self-correcting, praising

35 min

9

Book 5, page 15

Q.3 Read: *Do the calculations and check the results.*

Set a time limit. Ps can use any method they like. Ps check with multiplications (and additions where there are remainders).

Review at BB with whole class. Ps come to BB to show calculations and explain reasoning. Class points out errrors. Mistakes discussed and corrected.

If all Ps used long division, choose one or two Ps to do, e.g. d) and e), on BB using short division (or another method of their choice, e.g. subtracting known multiples or horizontal division).

Solution:

a)

	1	3	r 5
7	9	6	
–	7		
	2	6	
–	2	1	
		5	

13 × 7 = 91
91 + 5 = 96

b)

	1	2
8	9	6
–	8	
	1	6
–	1	6
		0

12 × 8 = 96

c)

		7	9	r 1
2	1	5	9	
–	1	4		
		1	9	
	–	1	8	
			1	

79 × 2 = 158
158 + 1 = 159

d)

	1	6	3	r 2
3	4	9	1	
–	3			
	1	9		
–	1	8		
		1	1	
		–	9	
			2	

163 × 3 = 489
489 + 2 = 491

e)

		5	4	r 5
9	4	9	1	
–	4	5		
		4	1	
	–	3	6	
			5	

54 × 9 = 486
486 + 5 = 491

Notes: Individual work monitored, helped

Written on BB or use enlarged copy master or OHT

Differentiation by time limit

Discussion, reasoning, agreement, self-correcting, praising

If problems, ask Ps to reason with place-value details.

Feedback for T

40 min

Bk5		*Lesson Plan 15*

Activity | ***Notes***

10

Book 5, page 15

Q.4 Read: *Write a plan, do the calculation and check the result.*
Write the answer as a sentence.

Set a time limit. Ps read problem themselves and solve it. (If class is unsure, deal with one part at a time.)

Notes: Individual work, monitored, helped

(Or discuss plan first, then Ps calculate individually)

Review with whole class. Ps could show results on scrap paper or slates in unison on command. Ps answering correctly explain solution on BB. Who agrees? Who did it another way? etc. Mistakes discussed and corrected.

Notes: Reasoning, agreement, self-correction, praising

Solution: e.g.

A baker needs 7 kg of flour to make 175 rolls.

a) How many rolls can be made with 1 kg of flour?

Plan: 7 kg $\rightarrow$ 175 rolls
1 kg $\rightarrow$ 175 $\div$ 7 rolls

C:
$$\begin{array}{r|l} & 25 \\ \hline 7 & 175 \\ & \ \ 3 \end{array}$$

Answer: 25 rolls can be made with 1 kg of flour.

Notes: Deal with all methods of division used by Ps.

or, e.g.,

$175 \div 7 = 140 \div 7 + 35 \div 7$
$= 20 + 5 = \underline{25}$

b) How much flour is needed to make 1 roll?

Plan: 25 rolls $\rightarrow$ 1 kg = 1000 g
1 roll $\rightarrow$ 1000 g $\div$ 25 = 200 g $\div$ 5 = $\underline{40\text{ g}}$

Answer: 40 g of flour are needed to make 1 roll.

Notes: or T might show:

BB:
$$\begin{array}{r|r} & 40 \\ \hline 25 & 1000 \\ & -100 \\ \hline & 00 \\ & -0 \\ \hline & 0 \end{array}$$

45 min

Bk5	R: Mental calculation **C: Division of natural numbers. Written procedures** *E: Word problems. Differentiation. 2-digit (3-digit) divisor*	*Lesson Plan* *16*

Activity | ***Notes***

1

Mental practice 1.

Listen carefully, do the calculation in your head and show me the answer when I say.

a) *I have a piece of string 15 cm long. How many 3 cm pieces can I cut from it?*

Show me . . . now! (5)

P answering correctly explains to Ps who were wrong.

BB: 15 cm ÷ 3 cm = <u>5</u> (times), as <u>5</u> × 3 cm = 15 cm

b) *I have a piece of wood 150 cm long. How many 30 cm pieces can I cut from it?*

Show me . . . now! (5)

P answering correctly explains to Ps who were wrong.

BB: 150 cm ÷ 30 cm = <u>5</u> (times), as <u>5</u> × 30 cm = 150 cm

c) *I draw a line segment 1500 mm long. How many times can I measure 300 mm sections along it?*

Show me . . . now! (5)

P answering correctly explains to Ps who were wrong.

BB: 1500 cm ÷ 300 cm = <u>5</u> (times), as <u>5</u> × 300 cm = 1500 cm

What do you notice about the results? (all are the same) Why?
Elicit that if the <u>dividend</u> and <u>divisor</u> are increased or reduced by the same number of times, the <u>quotient</u> does not change.

Notes: Whole class activity

Ps show reponses on scrap paper or slates in unison.

Reasoning, checking, agreement, praising

Reasoning, agreement, praising

Extra praise if Ps notice the relationships without hint from T.

4 min

2

Mental Practice 2

T says a division. Ps say results and check with reverse operations if problems. Class points out errors. e.g.

27 ÷ 3 = (9); 270 ÷ 30 = (9); 2700 ÷ 300 = (9); 27 000 ÷ 3000 = (9)

29 ÷ 3 = (9, r 2); 290 ÷ 30 = (9, r 20); 2900 ÷ 300 = (9, r 200);

2940 ÷ 300 = (9, r 240) *Check*: 9 × 300 + 240 = 2700 + 240 = 2940

etc. Ps can think of divisions too!

Notes: Whole class activity

At speed round class.

Questions differentiated according to ability of Ps.

Reasoning, agreement, praising

In good humour!

8 min

3

Problem 1

Listen carefully and think of a plan to solve this problem.

14 pupils earned £37 60 p altogether for picking up rubbish in the school playing fields. How much would they each get if they shared the money equally?

First let's write a plan. Ps come to BB or dictate to T. Who agrees? Who would write another plan? etc. Class agrees on the plan to use.

BB: *Plan:* £37 60 p ÷ 14

How could we work out the answer? Ps come to BB to do calculations, explaining reasoning with place-value detail. Who agrees? Who would do it another way? etc. If Ps suggest halving the dividend and divisor first (resulting in remainder 4 p), ask them also to do the division by 14 (giving remainder 8 p), and vice versa. Why are the remainders different? (dividend and quotient were halved, so remainder has also been halved.) Which remainder is correct? (8 p) What should we do with the remainder? Agree that 8 p cannot be shared equally among 14 pupils, so it should be left unshared (or buy a tube of sweets or strip of liquorice, . . .)

Notes: Whole class activity

T repeats slowly to give Ps time to think.

Reasoning, agreement, praising

Reasoning, agreement, checking, praising

Make sure that both types of calculation (1880 ÷ 7 and 3760 ÷ 14) are shown on BB.

Discussion about remainder.

Involve several Ps.

Extra praise for good ideas!

Bk5

Lesson Plan 16

Activity		Notes

3

(Continued)

BB: e.g. reducing dividend and divisor by 2 times:

£37 60 p ÷ 14 = 3760 p ÷ 14
= 1880 p ÷ 7
= (1400 p + 420 p + 60 p) ÷ 7
= 200 p + 60 p + 8 p, r 4 p
= 268 p, r 4 p   or
= £2 68 p, r 4 p

or

		2	6	8	r 4
7	1	8	8	0	
–	1	4			
		4	8		
	–	4	2		
			6	0	
			5	6	
				4	

Notes: or

		2	6	8	r 4
7	1	8	8	0	
		4	6	4	

Reducing <u>dividend</u> and <u>divisor</u> by the same number of times does not change the <u>quotient</u> – but what about the <u>remainder</u>?

BUT dividing by 14:

BB:
e.g.

			2	6	8	r 8
1	4	3	7	6	0	
	–	2	8			
			9	6		
		–	8	4		
			1	2	0	
		–	1	1	2	
					8	

or by using known multiples:

1	4	3	7	6	0				
	–	1	4	0	0	1	0	0	
		2	3	6	0				
	–	1	4	0	0	1	0	0	
			9	6	0				
		–	7	0	0		5	0	
			2	6	0				
		–	1	4	0		1	0	
			1	2	0				
		–		7	0			5	
				5	0				
			–	4	2			3	
					8	2	6	8	r 8

BB: 268 p = £2 68 p (or £2.68)

Notes: If Ps do not know which remainder is correct, T suggests checking with reverse operations

BB: *Check:*

		2	6	8
		×	1	4
	1	0	7	2
+	2	6	8	0
	3	7	5	2
+				8
	3	7	6	0 ✓

So if you reduce the dividend and divisor by the same number of times to make a calculation easier, remember that the <u>remainder</u> will also be reduced by that number of times!

Answer: They would each get £2 68 p and 8 p would remain unshared.

Notes: After discussion on what should be done with the 8p, T asks Ps to say the answer in a sentence.

15 min

4

Book 5, page 16

Q.1 Read: *Do the divisions in column form and check them.*

Elicit that checking will be done by writing a muliplication.
Set a time limit

Review with whole class. Ps come to BB to show calculations, explaining reasoning, then choose another P to check it. Class agrees/disagrees. Mistakes discussed and corrected.

Extension

T could ask Ps finished quickly to divide 123 by 13 in *Ex. Bks.* using any method they wish.

Solution:

a) 123 ÷ 9

		1	3	r 6
9	1	2	3	
–		9		
		3	3	
		2	7	
			6	

	1	3
	×	9
1	1	7

117 + 6 = 123 ✓

b) 123 ÷ 10

			1	2	r 3
1	0	1	2	3	
	–	1	0		
			2	3	
		–	2	0	
				3	

	1	2
×	1	0
1	2	0

120 + 3 = 123 ✓

c) 123 ÷ 11

			1	1	r 2
1	1	1	2	3	
	–	1	1		
			1	3	
		–	1	1	
				2	

	1	1
×	1	1
1	2	1

121 + 2 = 123 ✓

d) 123 ÷ 12

			1	0	r 3
1	2	1	2	3	
	–	1	2		
			0	3	

	1	0
×	1	2
1	2	0

120 + 3 = 123 ✓

Ps who did extension show solutions at BB. e.g. as opposite, or allow trial and error – but extra praise for Ps who noticed that in a): 123 = 9 × <u>13</u> + 6, so in e): 123 = 13 × <u>9</u> + 6

Notes:

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correcting, praising

Accept long or short division, but insist on Ps at BB reasoning loudly and in detail.

T helps with wording or repeats Ps' reasoning more clearly when necessary.

BB: e) 123 ÷ 13

				9	r 6
1	3	1	2	3	
	–	1	1	7	
				6	

		9
×	1	3
1	1	7

117 + 6 = 123 ✓

20 min

Bk5

Lesson Plan 16

Activity		*Notes*

5

Problem 2

Listen carefully, note the data in your *Ex. Bks*. and thnk how you would work out the answer.

Each sheet in a book weighs 3 g and the book has 160 pages. If its cover weighs 20 g altogether, what does the whole book weigh?

T asks one or two Ps what they think. Ps come to BB or dictate what T should write, explaining reasoning. Who agrees? Who would do it another way? etc. (T asks Ps to think again if no P realises that there are 2 pages on each sheet of paper.)

BB: 1 sheet → 2 pages, so number of sheets: 160 ÷ 2 = <u>80</u>

Plan: 80 × 3 g + 20 g = 240 g + 20 g = <u>260 g</u>

Check: 260 g – 20 g = 240 g; 240 g ÷ 3 g = 80 (sheets) ✓

Answer: The book weighs 260 g.

Notes:

Whole class activity

(Or individual trial first if Ps wish. In this case, ask Ps to show results on scrap paper or slates in unison on command.

If there are several answers of 500 g, ask a P with incorrect answer and a P with correct answer to show solutions on BB. Then class decides which is correct.)

Reasoning, agreement, checking, praising

23 min

6

Problem 3

Listen carefully, solve the problem in your *Ex. Bks*. and show me the answer when I say.

If Steve ran 400 m in 5 minutes, how far had he run after 180 seconds?

Show me . . . now! (240 m)

P answering correctly explains reasoning at BB. Class agrees/ disagrees. Mistakes discussed and corrected. If P did not use direct proportion, T shows it and asks Ps who did not use this method to copy the solution in *Ex. Bks*.

BB: 180 seconds = 3 minutes

5 minutes → 400 m

1 minute → 400 m ÷ 5 (= 80 m)

3 minutes → 400 m ÷ 5 × 3 = 80 m × 3 = <u>240 m</u>

Answer: After 180 seconds Steve had run 240 m.

Notes:

Individual work, monitored

T repeats slowly to give Ps time to think and calculate.

In unison, on scrap paper or slates

Reasoning, agreement, self-corection, praising

Discussion on <u>average</u> speed, i.e. we are assuming that Steve ran at the same speed all the time. Extra praise for a P who mentions this without prompting from T..

27 min

7

Written exercise

Divide 346 by 7 in your *Ex. Bks* using any division method you like. Set a time limit. Remind Ps to check their answers.

If you have a result, show me it . . now! (49, r 3)

Ps answering correctly explain methods of solution at BB. Who agrees? Who used a different method? Deal with all cases. (T could have some calculations already prepared in case all Ps used the same method and asks Ps whether they are correct . Also, T could have made a deliberate mistake for Ps to point out and correct.) e.g.

BB: 346 ÷ 7 = (280 + 42 + 24) ÷ 7 = 40 + 6 + 3, r 3 = <u>49, r 3</u>

		4	9	r 3
7	3	4	6	
–	2	8		
		6	6	
	–	6	3	
			3	

		4	9	r 3
7	3	4	6	
		6	3	

7	3	4	6			
–	2	8	0	4	0	
		6	6			
	–	6	3		9	
			3	4	9	r 3

Check:

	4	9
	×	7
3	4	3
+		3
3	4	6

T points to each method in turn and asks Ps who likes it best and why.

Notes:

Individual work, monitored

BB: 346 ÷ 7

In unison, on scrap paper or slates

Reasoning, agreement, self-corection, praising

Feedback for T

(Why not?)

30 min

Bk5		*Lesson Plan 16*

Activity

8

Book 5, page 16

Q.2 Read: *Do the divisions and check them.*

Set a time limit. Ps may use long or short division.

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning in detail. Class agrees/disagreees. Mistakes discussed and corrected.

Solution:

a)
$$\begin{array}{r} 166 \text{ r } 2 \\ 6\,)\,998 \\ -6 \\ 39 \\ -36 \\ 38 \\ -36 \\ 2 \end{array} \qquad \begin{array}{r} 166 \\ \times\ 6 \\ \hline 996 \end{array}$$
996 + 2 = 998

b)
$$\begin{array}{r} 166 \text{ r } 3 \\ 6\,)\,999 \\ -6 \\ 39 \\ -36 \\ 39 \\ -36 \\ 3 \end{array} \qquad \begin{array}{r} 166 \\ \times\ 6 \\ \hline 996 \end{array}$$
996 + 3 = 999

c)
$$\begin{array}{r} 166 \text{ r } 4 \\ 6\,)\,1000 \\ -6 \\ 40 \\ -36 \\ 40 \\ -36 \\ 4 \end{array} \qquad \begin{array}{r} 166 \\ \times\ 6 \\ \hline 996 \end{array}$$
996 + 4 = 1000

d)
$$\begin{array}{r} 166 \text{ r } 5 \\ 6\,)\,1001 \\ -6 \\ 40 \\ -36 \\ 41 \\ -36 \\ 5 \end{array} \qquad \begin{array}{r} 166 \\ \times\ 6 \\ \hline 996 \end{array}$$
996 + 5 = 1001

e)
$$\begin{array}{r} 167 \\ 6\,)\,1002 \\ -6 \\ 40 \\ -36 \\ 42 \\ -42 \\ \hline 0 \end{array} \qquad \begin{array}{r} 167 \\ \times\ 6 \\ \hline 1002 \\ 4\ 4 \end{array}$$

35 min

Notes

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Discussion, reasoning, agreement, self-correction, praising

BUT extra praise if Ps noticed that they only needed to do the calculation in a) in full! (The divisor is the same and the dividend increases by 1 each time, so the quotient stays the same and the remainder increases by 1 until e), when there is enough for another group of 6.)

9

Book 5, page 16

Q.3 Read: *Do the divisions in any order you wish as quickly as you can in your exercise books. Write only the results here.*

Set a time limit of 3 minutes. Ps use the division method they think is quickest. Remind Ps to check their results.

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagreees or suggests a quicker way to calculate. Mistakes discussed and corrected.

Solution:

a) 983 ÷ 8 = <u>122, r 7</u> b) 878 ÷ 9 = <u>97, r 5</u>

c) 789 ÷ 10 = <u>78, r 9</u> d) 576 ÷ 70 = <u>8, r 16</u>

e) 576 ÷ 27 = <u>21, r 9</u> f) 12121 ÷ 11 = <u>1101, r 10</u>

Extension

Set extra questions if Ps finish early. e.g.

g) 9830 ÷ 80 = <u>122, r 70</u> h) 7890 ÷ 100 = <u>78, r 90</u>

N.B. If a P suggests dividing by 9 first in e), show it on BB.

e) 576 ÷ 27 = 64 ÷ 3, but 64 ÷ 3 = 21, <u>r 1</u>

So 576 ÷ 27 = 21, r (1 × 9) = 21, r 9

As the dividend and divisor were reduced by 9, the remainder was also reduced by 9, so it must be changed back to its original magnitude.

40 min

Notes

Individual work, monitored

Written on BB or SB or OHT

Differentiation by time limit.

Reasoning, checking, agreement, self-correcting, praising

If problems or disagreement, Ps show calculation in detail on BB, including check. e.g.

a)
$$\begin{array}{r} 122 \\ 8\,)\,983 \\ 1\ 2\ 7 \end{array}$$

or T could show an even quicker way which could be done directly in *Pbs*:

983 ÷ 8 = 122, r 7
1 2 7

f) 12121 ÷ 11

= (11 000 + 1100 + 21) ÷ 11

= 1000 + 100 + 1, r 10

= <u>1101, r 10</u>

Bk5

Lesson Plan 16

Activity		***Notes***

10

Book 5, page 16

Q.4 Read: *In your exercise book, wrtie a plan, do the calculation and check the result. Write the answer in a sentence here.*

Set a time limit. Ps read questions themselves and solve in any way they wish.

Review with whole class. Ps could show results on scrap paper or slates in unison on command. P answering correctly comes to BB to show solution, explaining reasoning. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected.

Solution:

a) *If I divided up my pocket money so that I had the same amount for 6 days, I would have 142 p each day and 3 p would be left over.*

How much would remain if I divided up my pocket money equally over 7 days?

BB: e.g.

Pocket money: 142 p × 6 + 3 p = 852 p + 3 p = <u>855 p</u>

Over 7 days: 855 p ÷ 7 = <u>122 p, r 1 p</u>

Answer: I would have 122 p (= £1.22) each day and I would have 1 p left over.

b) *I bought a length of material for £48 60 p.*
If it cost £1 80 p per metre, how many metres did I buy?

Plan: £48 60 p ÷ £1 80 p = 4860 p ÷ 180 p

C: 4860 ÷ 180 = 486 ÷ 18 = 243 ÷ 9 = <u>27</u>

(or = 81 ÷ 3 = <u>27</u>)

Answer: I bought 27 metres of material.

Individual work, monitored, helped

(or whole class activity if time is short)

Differentiaion by time limit

If done as individual work, expect only part a) from majority of class and part b) only from the most able Ps.

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

BB: e.g.

1	4	2
	×	6
8	5	2
2	1	

	1	2	2	r 1
7	8	5	5	
	1	1	1	

BB: e.g.

		2	7
9	2	4	3
		6	

or T might show:

					2	7
1	8	0	4	8	6	0
		–	3	6	0	
			1	2	6	0
		–	1	2	6	0
						0

45 min

Bk5	R: Mental calculation **C: Integers: positive and negative numbers** *E: Opposite quantities*	*Lesson Plan 17*

Activity / ***Notes***

1

Problems

Listen carefully to the problem and think how you would solve it.

T reads the problem and Ps suggest plans first. Class agrees on which plan to use and Ps come to BB to do calculations, or dictate to T, explaining reasoning. Class agrees/disagrees or suggests easier methods. Check with reverse operation.

Notes: Whole class activity

Discussion, reasoning, checking, agreement, praising

Extra praise for clever calculations, but accept any correct form.

a) *Alice has 35 times more money than her brother Ben. If Alice has £2030, how much money does Ben have?*

Plan: A = 35 × B, so B = A ÷ 35, i.e. B = £2030 ÷ 35

C: e.g. £2030 ÷ 35 = £4060 ÷ 70 = £406 ÷ 7 = £58

$$\begin{array}{r|l} & 58 \\ \hline 7 & 406 \\ & \;\;5 \end{array}$$

Answer: Ben has £58.

Check:

$$\begin{array}{r} 58 \\ \times\ 35 \\ \hline 290 \\ +\ 1740 \\ \hline 2030 \ ✓ \\ 1\ 1\ \ \end{array}$$

b) *I divided a number by 72 and the result was 39, remainder 21. Which number did I divide?*

Plan: $\square$ ÷ 72 = 39, r 21

so $\square$ = 39 × 72 + 21

= 2808 + 21 = 2829

C:

$$\begin{array}{r} 39 \\ \times\ 72 \\ \hline 78 \\ +\ 2730 \\ \hline 2808 \\ 1\ \ \ \ \end{array}$$

Answer: The number that I divided was 2829.

Check:

$$\begin{array}{r|l} & \ \ 39 \text{ r } 21 ✓ \\ \hline 72 & 2829 \\ & -216 \\ \hline & \ \ \ 669 \\ & \ -648 \\ \hline & \ \ \ \ \ 21 \end{array}$$

5 min

2

Converting units of time

Listen carefully to my question, work out the answer in your *Ex. Bks* and show me the result when I say. P answering correctly comes to BB to explain solution. Class agrees/disagrees or suggests an easier method of calculation.

Notes: Individual work in *Ex. Bks.* monitored

a) *How many days are 10 080 minutes?*

Show me . . . now! (7 days)

Notes: In unison, on scrap paper or slates

BB: e.g. 60 min. = 1 hour, 24 hours = 1 day

10080 min ÷ 60 min = 1008 min ÷ 6 min

= 168 (hours)

$$\begin{array}{r|l} & \ \ 168 \\ \hline 6 & 1008 \\ & \ \ \ 4\ 4 \end{array}$$

168 hours ÷ 24 hours = 21 hours ÷ 3 hours = 7 (days)

Answer: 10 080 minutes are 7 days.

Notes: Reasoning, agreement, self-correction, praising

Accept any correct methods.

b) *It rained for 1050 seconds. For how many minutes did it rain?*

Show me . . . now! (17 and a half minutes))

BB: e.g. 60 sec. = 1 minute

1050 sec ÷ 60 sec = 17 (min), r 30 sec

$$\begin{array}{r|l} & \ \ \ 17 \text{ r } 30 \\ \hline 60 & 1050 \\ & -60 \\ \hline & \ \ 450 \\ & -420 \\ \hline & \ \ \ \ 30 \end{array}$$

Answer: It rained for 17 and a half minutes.

Notes: If Ps suggest reducing 1050 and 60 by 10 times to make the calculation easier:

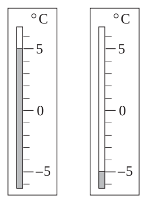
BB: 105 ÷ 6 = 17, r 3

but 1050 ÷ 60 = 17, r 30

10 min

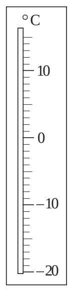
Bk5

Lesson Plan 17

Activity		*Notes*
3	**Negative quantities** a) Which do you like best: a hot summer's day on the beach or a freezing winter's day playing in the snow? Who prefers the summer (winter)? T asks some Ps the reason for their choice. Who could tell me a summer (winter) temperature in degrees Celsius? T writes suggested temperatures on BB. (e.g. $25\,°C$, $-5\,°C$) Which temperature is greater (less) than $0\,°C$? Which temperature is positive (negative)? Elicit that, e.g. $+25\,°C$ is the same as $25\,°C$. b) Who can think of another context when we would use negative values? e.g. cash and debt, or above and below <u>sea level</u> (0 m). Ask Ps to give examples of positive and negative numbers in these contexts. e.g. • If you have saved £5 and owe no money, then you have £5 <u>in cash</u> and your <u>balance</u> is + £5, but if you have no money and borrow £5 from a friend, then you are £5 <u>in debt</u> and your balance is – £5. • The top of a hill could be 300 m <u>above</u> sea level (i.e. + 300 m); the bottom of a lake could be 20 m <u>below</u> sea level, i.e. – 20 m) *14 min*	Whole class activity Involve several Ps. (Some Ps might like both equally!) Agreement, praising BB: $+25\,°C$ $-5\,°C$ positive negative T gives hints if Ps cnnnot think of any. Discussion on valid contexts and revision of terms used. T notes Ps' knowledge of concepts and familiarity with relevant words.
4	**Temperature** If possible, T has model thermometer to show to class and/or diagram of thermometers on BB. Which units do we use to measure temperature? (degrees Celsius) If a P suggests degrees Fahrenheit, elicit/tell that degrees Fahrenheit is a unit of measure from the <u>Imperial</u> system of measures (such as feet and inches, pounds and ounces, etc.) Degrees Celsius is a unit from the <u>metric</u> system, i.e. a system based on tens. Sometimes temperatures are given in both $°C$ <u>and</u> $°F$ (e.g. in newspapers). If Ps are interested, T could show the relationship between them. BB: $°F = °C \times 9 \div 5 + 32$ $°C = (°F - 32) \times 5 \div 9$ Who knows the freezing (boiling) point of water? T tells class if no P knows them and writes on BB. ($0\,°C$, $100\,°C$) Discuss what happens when water freezes (boils). In Vienna, a city in Austria, one winter's day at noon, the thermometer showed 5 degrees <u>above</u> freezing. Who can show it on the model (diagram)? P comes to BB to set (mark) the temprerature. Class agrees/disagrees. At midnight that day, the thermometer showed 5 degrees <u>below</u> freezing. Another P comes to BB to show 2nd temperature. Class agrees/disagrees. Let's write an operation about each of the the two temperatures. Ps come to BB or dictate to T. Class agrees/disagrees. We say that these temperatures are <u>opposite</u> values. The opposite of + 5 is – 5 and the opposite of – 5 is + 5. Let's see if you understand. T says negative or positive temperatures or numbers and Ps say the opposite values. *18 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP (Ps could have copies on desks too.) BB: <u>Metric system</u> $°C$: <u>degrees Celsius</u> [<u>Imperial system</u> $°F$: <u>degrees Fahrenheit</u>] <u>Freezing point</u> of water: $0\,°C$ <u>Boiling point</u> of water: $100\,°C$ BB:  $+5\,°C$ $-5\,°C$ $0\,°C + 5\,°C = +5\,°C$ (positive) $0\,°C - 5\,°C = -5\,°C$ (negative) Agreement, praising Show on number line too. At speed. T chooses Ps at random. Praising

Bk5

Lesson Plan 17

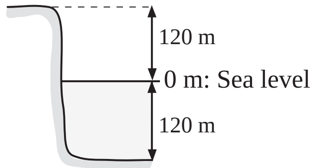
Activity		*Notes*
5	**Positive and negative numbers** a) Let's underline the numbers which could be summer temperatures in degrees Celsius. Ps come to BB or dictate to T. Class agrees/ disagrees. BB: – 7, <u>+ 29</u>, – 1, 0, <u>+ 31</u>, – 12, <u>24</u> Elicit or tell that positive numbers are generally written <u>without</u> the '+' sign, so 24 really means '+ 24', i.e. 24 units greater than 0. b) Let's compare the different heights of places in a city against the <u>street level</u>, 0 metres, and join up the place names to the matching quantities. Ps come to BB to draw joining lines. Class agrees/ disagrees. BB: + 840 m – 4 m – 10 m + 7 m basement of a house, underground station, mountain, 3rd floor flat c) Let's circle the cash and draw a box around the debts. Ps come to BB, explaining reasoning. Class agrees/ disagrees. Discuss the case of £0. Agree that it is neither cash nor debt, i.e. neither positive nor negative. BB: $\boxed{– £12}$ £170 £0 $\boxed{– £100}$ +£19	Whole class activity Written on BB or SB or OHT At a good pace Discussion, agreement, praising T could show class a metre stick to give Ps an idea of the heights (depths) in real life. Ask Ps to think of a context for each amount. e.g. 'I had £10 in my piggy bank, then I spent £10 on Christmas presents, so I have no money left.'
	23 min	
6	***Book 5, page 17*** Q.1 Read: *Use the thermometer diagram to help you work out how the temperatures change.* Set a time limit. Ps point to first temperature on diagram, then move finger up or down by required amount. Review with whole class. Ps come to BB or dictate to T, explaining reasoning and showing movement on diagram on BB. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) The temperature is $-3\,°C$, then i) it rises by $2\,°C$: $\rightarrow$ $-1\,°C$ ii) it rises by $3\,°C$: $\rightarrow$ $0\,°C$ iii) it rises by $10\,°C$: $\rightarrow$ $7\,°C$ iv) it falls by $2\,°C$: $\rightarrow$ $-5\,°C$ b) The temperature is $3\,°C$, then i) it falls by $2\,°C$: $\rightarrow$ $1\,°C$ ii) it falls by $3\,°C$: $\rightarrow$ $0\,°C$ iii) it falls by $10\,°C$: $\rightarrow$ $-7\,°C$	Individual work, monitored, helped Drawn on BB: or use enlarged copy master or OHP  Differentiation by time limit Reasoning, agreeement, self-correcting, praising Feedback for T
	27 min	

Bk5

Lesson Plan 17

Activity		*Notes*
7	**Opposite quantities** Let's fill in the missing quantities. Ps come to BB to explain the diagram and write the missing values. Class agrees/disagrees.	Whole class activity Drawn on BB or use enlarged copy master or OHP

BB:

a) 

Cliff top: + 120 m

Sea bottom: – 120 m

Notes: Reasoning by referring to diagram, agreement, praising

Elicit that:

- The opposite of – 120 is 120.
- The opposite of + 120 is – 120.

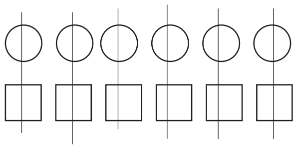
We can write this:

BB: – (– 120) = <u>+ 120</u>
– (+ 120) = <u>– 120</u>

Notes: T explains on diagram and Ps copy in *Ex. Bks.*

b) A circle means + £1, or £1 in cash, and a square means – £1, or £1 in debt. What are the missing amounts?

Ps come to BB to count and fill in amounts. Class agrees that:

BB: 

+ £6

– £6

+ £6 + (– £6) = £0

(as £1 cash + £1 debt cancel each other out)

Notes: T writes on BB and explains on diagram:
– (+ 6) = – 6
– (– 6) = + 6
Ps copy in *Ex. Bks.*

30 min

8

Book 5, page 17

Q.2 Read: *Write each person's balance as one amount of money.*

Set a time limit or deal with one part at a time.

Review with whole class. Ps could show balances on scrap paper or slates on command. Ps answering correctly come to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) Mike has £18 in cash and is £12 in debt. (*Balance*: + £6)
b) Nick has £12 in cash and is £18 in debt. (*Balance*: – £6)
c) Luke has £16 in cash and is £16 in debt. (Balance: £0)

Notes: Individual work, monitored, helped
Drawn on BB or use enlarged copy master or OHP
Reasoning, agreement, self-correction, praising
T writes on BB:
18 + (– 12) = <u>6</u>
12 + (– 18) = <u>– 6</u>
16 + (– 16) = <u>0</u>

Extension

If my balance was + £7, how much cash and debt could I have?

Ask several Ps for suggestions. Agree that many answers are possible (e.g. £10 in cash and £3 in debt, £20 in cash and £13 in debt, no debts and £7 in cash, etc.).

Notes: Whole class activity
If disagreement, model with ◯ s and □ s on BB .
Praising, encouragement only

35 min

Bk5

Lesson Plan 17

Activity | ***Notes***

9

Book 5, page 17

Q.3 Read: *a) Mark the opposite numbers of this set on the number line.*

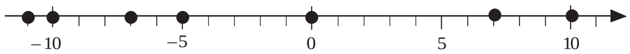
b) Write in the boxes the opposite values of the numbers given.

Set a time limit. Review at BB with whole class. Ps come to BB to mark the numbers (or stick dots on class number line) and fill in the missing numbers. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

$\{ -7, 10, 0, 11, -10, 5, 7 \}$

a)



b) i) $-(+7) = \underline{-7}$ ii) $-(-3) = \underline{+3}$ iii) $-(0) = \underline{0}$

So the opposite numbers to these are:

i) 7 ii) – 3 iii) 0

T: We say that – 1, – 2, – 3, etc. are the *negative whole numbers*. The negative whole numbers, zero and the natural numbers are called the *integers*.

Notes:

Individual work, monitored, helped

Number line drawn on BB or use enlarged copy master or OHP (or use class number line)

Differentiation by time limit.

Reasoning, agreement, self-correction, praising

Elicit that the opposite of zero is itself.

T reminds Ps that the '+' sign can be missed out, e.g.

+ 15 = 15, + 23 = 23, etc.

40 min

10

Book 5, page 17, Q.4

Which words are missing from these sentences? Ps come to BB to complete each sentence. Class agrees/disagrees. Once there is agreement, Ps complete sentence in *Pbs* too or write in *Ex. Bks.* Then Ps read the sentence aloud in unison.

a) 1, 2, 3, 4, 5, . . . are positive whole numbers or natural numbers.

b) – 1, – 2, – 3, . . . are negative whole numbers.

c) 0 is neither *positive* nor *negative*.

d) We call . . . – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, . . . *whole* numbers or *integers*.

I will say a word and you must tell me whether you think it matches the plus or minus sign.

T: e.g. 'debt' (–); 'high tide' (+); 'hot water' (+); cash (+), below sea level (–), Before Christ, i.e. BC (–), ice (–), boiling water (+); After Christ , i.e. AD (+); sea level (zero, i.e. not positive and not negative)

(Ps could think of words too!)

Notes:

Whole class activity

Sentences written on BB or SB or OHT, with boxes or ellipses for missing words.

N.B. Only a) and b) are in *Pbs*.

At a good pace

Agreement, praising

Class points out incorrect spelling.

T chooses Ps at random. Ps give reason for their choice. Who agrees? Who thinks the opposite? Why? etc.

(Or Ps could write '+' or '–' on slates and show in unison.)

45 min

Bk5	R: Mental calculation **C: Ordering whole numbers. Comparison. Sequences** *E: Subtracting larger from smaller natural numbers*	*Lesson Plan* *18*

Activity

Notes

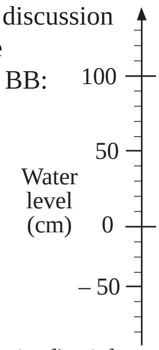
1

Problems

T talks about the water level of rivers and how it rises and falls depending on how much rain has fallen or how much sunshine there has been. (Ps might tell of own experiences of floods and droughts.)

We measure how much water is in the river by comparing with a certain level, usually marked with 0. If it is above the zero mark, the water level is positive and if it is below the zero mark, the water level is negative. (Demonstrate with a vertical number line drawn on BB or use enlarged copy master or OHP.)

Notes: Whole class discussion to clarify the context. BB:



Listen carefully, note the data and work out the answer to the problem in your *Ex. Bks*. You can discuss it with your neighbour if you wish.

Notes: Individual (paired) trial, monitored

a) *On the 7th of May the water level in a river was 120 cm. There was no rain and the water level fell by 40 cm each week until the 11th of June. What was the water level on the 11th of June?*

Notes: T repeats slowly to give Ps time to discuss and calculate.

If you have an answer, show me . . . now! (– 80 m)

Notes: In unison, on scrap paper or slates

Ps answering correctly explain solution on BB. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected. If no P had correct answer, T helps class to solve it together.

Notes: Discussion, reasoning, agreement, self-correction, praising

e.g. List the weeks and show the level after each week:

BB: 7 May, 14 May, 21 May, 28 May, 4 June, 11 June (5 weeks)
+ 120 cm, + 80 cm, + 40 cm, 0 cm, – 40 cm, <u>– 80 cm</u>

Or by calculation:

BB: 120 cm – 40 cm – 40 cm – 40 cm – 40 cm – 40 cm
= 120 cm – (5 × 40 cm) = 120 cm – 200 cm = <u>– 80 cm</u>

Notes: T directs Ps thorugh either of these methods not suggested by Ps.

Answer: The water level on 11 June was – 80 cm.

Notes: T chooses a P to say the answer in a sentence.

b) *On the 1st of July the water level was at – 60 cm. Then it rose 30 m each week for 5 weeks.*
What was the water level at the end of the 5th week and what date was it?

Notes: Whole class activity (or individual trial first if Ps wish)

Let's solve it using a table. T draws table on BB. Ps dictate what T should write. (e.g. weekly dates in top row and water level in bottom row).

Notes: T gives the idea, then intervenes only if ncessary.

BB:

1 July	8 July	15 July	22 July	29 July	5 August
– 60 cm	– 30 cm	0 cm	30 cm	60 cm	90 cm

Notes: Ps come to BB to complete the table.

Who could write an operation about it? P comes to BB or dictates to T. Who agrees? Who could write it another way? etc.

Notes: Reasoning, agreement, praising

Plan: – 60 cm + 30 cm + 30 cm + 30 cm + 30 cm
= – 60 cm + (5 × 30 cm) = – 60 cm + 150 cm = <u>90 cm</u>

Notes: Show calculation on vertical scale to confirm.

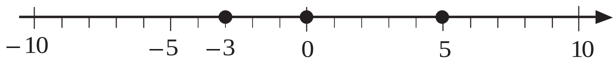
Answer: The water level at the end of the 5th week was 90 cm and the date was the 5 August.

Notes: Ps say answer in a sentence.

5 min

Bk5

Lesson Plan 18

Activity		*Notes*
2	**Cash and debt** Let's draw a circle to mean 1 unit in cash, i.e. + 1, and a square to mean 1 unit in debt, i.e. – 1. (T demonstrates on BB.) Draw cash and debt shapes in your *Ex. Bks*. so that they equal my balance. Write an addition about it too. After each part, T chooses Ps to show their solutions on BB. (Some might be incorrect, in which case class corrects them.)	Individual or paired work in *Ex. Bks* , monitored, but whole class review. BB: ○ □ + 1 – 1 Agreement, self-correction, praising
	a) T: 0 e.g. ○ ○ ○ / □ □ □ 3 + (– 3) = 0 or 6 + (– 6) = 0 or 0 + 0 = 0, etc. Elicit that <u>any</u> two <u>opposite</u> numbers are possible. b) T: + 5 e.g. ○ ○ ○ ○ ○ ○ ○ / □ □ + 7 + (– 2) = + 5 or 7 + (– 2) = 5, etc. Agree that + 7 = 7, so the positive sign can be left out. c) T: – 3 e.g. ○ ○ ○ / □ □ □ □ □ □ + 3 + (– 6) = – 3 or 3 + (– 6) = – 3 or just □ □ □ – 3 + 0 = – 3, etc.	Some Ps show solutions on BB using cash and debt symbols, but other Ps give their examples simply by stating the additions. or + 5 + 0 = + 5 or 2 + – 5 = – 3, etc.
	How many different ways are possible to show each balance? (Agree that the number of ways is never-ending or <u>infinite</u>.)	BB: <u>infinite</u> (endless)
	Let's mark the three balances on the number line. Ps come to BB to draw dots. Let's compare them. Who can write an inequality about them? BB:  e.g. – 3 < 0, 0 < 5, – 3 < 5, 5 > – 3, – 3 < 0 < 5 *10 min*	Whole class acivity Drawn on BB or SB or OHT or Ps stick dots on class number line. Ps come to BB, or dictate to T. Agreement, praising
3	**Types of numbers** What name describes all these numbers? (whole numbers, or <u>integers</u>) BB: – 10, + 16, – 107, 0, 1765, – 2001, + 9400	Whole class activity to start Written on BB or SB or OHT
	Write them in increasing order in your *Ex. Bks*. P finished first comes to BB to order them and Ps agree/disagree or correct own list. BB: – 2001 < – 107 < – 10 < 0 < + 16 < 1765 < + 9400	Individual work, monitored Agreement, correcting, praising
	Which are negative numbers? (– 2001, – 107, – 10) Which are natural numbers? (16, 1765, 9400)	Whole class activity Ps dictate numbers.
	Let's complete these sentences. Ps come to BB to write missing words. Class agrees/disagrees. Class reads the completed sentence in unison. BB: 1. Any <u>negative</u> number is less than 0. 2. Zero is <u>less</u> than any positive number. 3. Any negative number is <u>less</u> than any positive number. *15 min*	Written on BB or SB or OHT, with boxes or ellipses instead of underlined words. Agreement, praising Elicit that zero is neither positive nor negative.

Bk5		*Lesson Plan 18*
Activity		***Notes***
4	**Sequences** Let's write the terms missing from the sequence and continue it. Ps come to BB ot dictate to T, explaining the rule they used. Class agrees/disagrees. BB: *Rule*: a) – 5, – 2, + 1, $\boxed{+\,4}$, + 7, $\boxed{+\,10}$, . . . (+ 3) b) 92, $\boxed{80}$, 68, 56, $\boxed{44}$, 32, 20, $\boxed{8}$, – 4, – 16, . . . (– 12) c) – 125, – 100, $\boxed{-\,75}$, – 50, – 25, $\boxed{0}$, 25, . . . (+ 25) (or *Rule*: – (– 25), as subtracting a negative number makes the result less negative, which is the same as adding a positive number.) *20 min*	Whole class activity Written on BB or SB or OHT (or terms covered by card instead of boxes being drawn; T could make a deliberate mistake for Ps to correct.) At a good pace T decides how many terms to continue for. Discussion, agreement, on the rule. BB: – (– 25) = + 25
5	**Missing numbers** Which integers can be put in the boxes? Ps come to BB to fill in numbers. Class checks that they make the statement true. Who can think of other numbers which are possible? If disagreement, check on class number line. BB: (– 8) > △ ; △ ∧ □ ; □ < (+5) e.g. (– 8) > △ –11 ; △ ∧ □ ; $\boxed{-2}$ < (+5) *24 min*	Whole class activity Drawn on BB or SB or OHT At good pace Agreement, praising Agree that many different solutions are possible.
6	***Book 5, page 18*** Q.1 Ps read instructions themselves. Set a time limit or deal with one part at a time if class is not very able. Review at BB with whole class. Ps dictate terms to a P at BB who marks with appropriate colour on number line. Class agrees/disagrees. Mistakes corrected. *Solution:* *a) Mark the terms of this sequence in red on the number line. The first term is – 8. The following terms are 3 more than the previous term.* – 8, – 5, – 2, 1, 4, 7, 10, . . . *b) Mark the terms of this sequence in blue. The first term is + 10. The following terms are 4 less than the previous term.* + 10, + 6, + 2, – 2, – 6, – 10, . . . *c) Mark the numbers exactly divisible by 3 in green.* – 12, – 9, – 6, – 3, 0, 3, 6, 9, 12, . . . (i.e. multiples of 3)	Individual work, monitored, (less able helped) Number line drawn on BB or use enlarged copy master or OHP Differentiation by time limit Agreement, self-correction, praising [Practice in moving along the number line from negative to positive and vice versa]
Extension	Find pairs of <u>opposite</u> numbers marked on the number line. (e.g. – 10, + 10; – 2, + 2; etc.) *30 min*	Whole class activity or extra work for quicker Ps.

Bk5

Lesson Plan 18

Activity | **Notes**

7

Book 5, page 18

Q.2 Read: *From this set:*

a) list the numbers less than – 1,

b) list the numbers not more than 1,

c) list the numbers more than or equal to – 7,

d) list the pairs of opposite numbers.

What would be a good strategy before you start? (Write the numbers in increasing order.) Set a time limit.

Review with whole class. Ps dictate to T who writes on BB. Mistakes/omissions corrected. Elicit an inequality for a), b), c).

Solution:

Ordered base set:

{– 12, – 8, – 7, – 3, – 1, 0, 1, 6, 7, 10, 12, 14}

a) $n < -1$: {– 12, – 8, – 7, – 3}

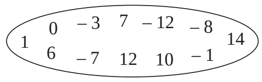
b) $n \leq 1$: {– 12, – 8, – 7, – 3, – 1, 0, 1}

c) $n \geq -7$ {– 7, – 3, – 1, 0, 1, 0, 6, 7, 10, 12, 14}

d) opposite pairs: {– 12, 12; – 7, 7; – 1, 1)

Notes: Individual work, monitored, helped

Base set written on BB:



Extra praise if a P thinks of this without hint from T.

Differentiation by time limit

Agreement, self-correction, praising

If problems or disagreement, check on class number line.

Extension

1. Which numbers are in a) AND c)? { 7, – 3}
   [i.e. have the properties of set a) and also those of set c)]
2. Which numbers are in a) OR b)?
   {– 12, – 8, – 7, – 3, – 1, 0, 1}
   [i.e. have the property of either a) or b)]

Notes: Whole class activity, or extra work for quicker Ps.

35 min

8

Book 5, page 18

Q.3 Read: *The base set is:*

U = {– 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5}

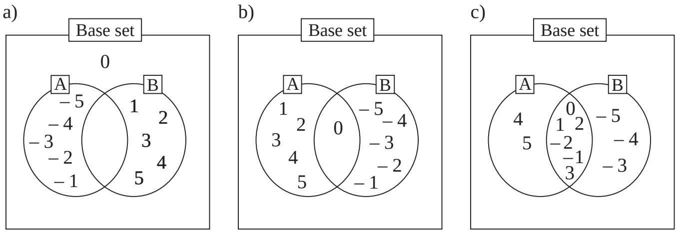
Write the numbers in the Venn diagrams.

Set a time limit. Ps finished first write solution on diagram on BB (out of sight of rest of class).

Review at BB with whole class. Ps show the completed solution. Class checks against own solution and agrees/disagrees, correcting own work or pointing out errors on BB.

Solution: U = {– 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, 4, 5}

a) b) c)



a) A = {negative numbers} B = {positive numbers}

b) A = {at least zero} B = {at most zero}

c) A = {more than – 3} B = {less than 4}

a) Why is there no element in the <u>intersection</u> of A and B? (Impossible for a number to be both positive <u>and</u> negative)

b) T points to an area of a set and asks Ps to describe the elements. e.g. 1, 2, 3, 4, 5 are 'A NOT B'; 0 is 'A AND B'.

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(or T has solutions already prepared and uncovers each part as it is dealt with)

Discussion, reasoning, agreement, self-correction, praising

Check on class number line if problems or disagreement.

Feedback for T

Extra discussion on each diagram. (e.g. as below, or Ps think of questions to ask)

c) Who can write an inequality about the numbers in the intersection of A and B?
   $(-3 < n < 4)$

40 min

Bk5		*Lesson Plan 18*
Activity		***Notes***
9	***Book 5, page 18*** Q.4 Read: *Put the numbers marked in order.* Set a time limit. Warn Ps to look carefully at the inequality signs to determine whether increasing or decreasing order is required. Review with whole class. Ps dictate to T. Class agrees/disagrees. Mistakes corrected. *Solution:* a) $-8 < -6 < -3 < -1 < 0 < 2 < 6$ (increasing) b) $6 > 2 > 0 > -1 > -3 > -6 > -8$ (decreasing)	Individual work, monitored Agreement, self-correction, praising
Extension (for whole class)	Let's fill in the numbers missing from these statements. Ps come to BB or dictate to T. Class agrees/disagrees. Elicit that, e.g., $6 = +6$. BB: i) 6 is more than 0 by $\boxed{6}$ $\quad 6-0 = \boxed{6}$ $\quad \boxed{6}+0 = 6$ ii) -6 is less than $\boxed{0}$ by 6 $\quad -6-0 = \boxed{-6}$ $\quad \boxed{-6}+0 = \boxed{-6}$ iii) $+6$ is more than $+2$ by $\boxed{4}$ $\quad +6-(+2) = \boxed{+4}$ $\quad \boxed{4}+2 = 6$ iv) 6 is more than -3 by $\boxed{9}$ $\quad 6-(-3) = \boxed{9}$ $\quad \boxed{9}+(-3) = 6$ v) -3 is more than -8 by $\boxed{5}$ $\quad -3-(-8) = \boxed{5}$ $\quad \boxed{5}+(-8) = -3$ vi) 2 is less than 6 by $\boxed{4}$ $\quad 2-(+6) = \boxed{-4}$ $\quad \boxed{-4}+6 = 2$ vii) -3 is less than $+2$ by $\boxed{5}$ $\quad -3-(+2) = \boxed{-5}$ $\quad \boxed{-5}+2 = -3$	Whole class activity (or individual work in *Ex. Bks* after first 2 or 3 if Ps understand, reviewed with whole class) Written on BB or use enlarged copy master or OHP At a good pace Agreement, (self-correction), praising Demonstrate on class number line, or check with cash and debt model (◯ and ☐) if problems or disagreement.

45 min

Bk5

R: Mental calculation

C: Practice: order, comparison, opposite integers, sequences

E: Inequalities. Absolute value. Rule games

Lesson Plan 19

Activity | ***Notes***

1

Sequence competition

I will say the first 3 terms of a sequence. When I tell you to start, write as many terms as you can in 1 minute in your *Ex. Bk*. When I tell you to stop, stand up and we will review the terms round the class. You must sit down when you have made a mistake or have not reached that term. The pupil left standing will be the winner!

a) T: 45, 35, 25, Start . . . now! . . . . . Stop!

Ps: (15, 5, – 5, – 15, – 25, – 35, – 45, – 55, – 65, – 75, – 85, – 95, – 105, – 115, – 125, – 135, – 145, . . .) *Rule*: – 10

b) T: – 42, – 39, – 36, Start . . . now! . . . . . Stop!

Ps (– 33, – 30, – 27, – 24, – 21, – 18, – 15, – 12, – 9, – 6, – 3, 0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, . . .) *Rule*: + 3

Notes:

Individual work in *Ex. Bks*.

Make sure that all Ps understand what to do.

Agreement, praising

In good humour!

P left standing states all the terms he/she has written, then gives the rule.

Class applauds the winner(s).

5 min

2

Comparison relay

T says two values. P_1 says which is more and how many more and chooses P_2 to write the inequality on BB. P_2 says two more values to P_3. P_3 says which is more and how many more and chooses P_4 to write the inequality on BB, and so on. e.g.

T: '– 2 and + 3'	P_1: '3 is 5 more than – 2'	P_2: $3 \underset{5}{>} -2$
P_2: '3 and + 7'	P_3: '7 is 4 more than 3'	P_4: $7 \underset{4}{>} 3$
P_4: '– 7 and – 2'	P_5: '– 7 is 5 less than – 2'	P_6: $-7 \underset{5}{<} -2$, etc.

Check some examples in context. e.g. – 7 °C is colder than – 2 °C.

Notes:

Whole class activity

At speed

In good humour!

Agreement, praising

Other Ps watch the class number line and point out errors or incorrect notation.

Feedback for T

10 min

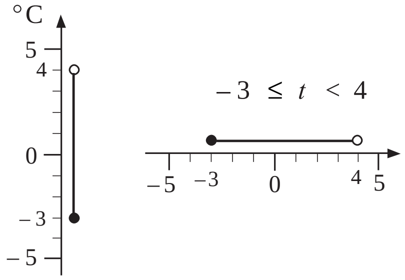
3

Problems

Listen carefully, study the number line and thermometer scale and think about how you would write the answer. Ps come to BB to draw lines and circles on the scales and to write an inequality. (T reminds Ps about notation if necessary.) Class agrees/disagrees. Ps write correct inequality in *Ex. Bks*.

a) The temprerature is colder than + 4 °C but is not colder than – 3 °C. What could the temperature be? Let's call the possible temperatures *t* (in °C)

BB: e.g.



Similarly for:

b) The temperature is higher than – 4 °C but lower than – 1 °C. $(-4 < t < -1)$

c) It is not warmer than + 3 °C but warmer than – 2 °C. $(-2 < t \le +3)$

d) It is at least – 4 °C but at most – 1 °C. $(-4 \le t \le -1)$

Notes:

Whole class activity

Drawn on BB or SB or OHT

If possible, Ps have number lines and thermometer scales on desks too.

Reasoning, demonstrating, agreement, praising

(Or Ps could write inequality on scrap paper or slates first and show in unison on command. Ps responding correctly come to BB to mark on vertical and horizontal number lines.)

15 min

Bk5		*Lesson Plan 19*
Activity		***Notes***
4	**Opposite values** T says a number, P_1 says its opposite. Then P_1 says a number to P_2, and so on. Class points out errors. e.g. T: – 7, P_1: 7 (or + 7); P_1: 12, P_2: – 12; etc. *17 min*	Whole class activity At speed, in order round class. In good humour! Praising, encouragement only
5	**Distance from zero** I will say a number. You must tell me how many units it is from zero. e.g. T: '– 7', P_1: '7 units from 0'; T: '+ 4', P_2: '4 units from 0', etc. [Preparation for <u>absolute</u> value, i.e. numerical value, ignoring + or –] *20 min*	Whole class activity At speed, in order round class. Class points out errors. In good humour. Praising
6	**Written exercise** Use the number line to help you work out the answers to my questions. Write only the answers in your *Ex. Bk*. Review with whole class. Ps dictate answers. Class agrees/disagrees. If problems or disagreement, show on number line or use the cash and debt model. How many units apart are: a) 5 and + 7 (2) b) – 5 and + 7 (12) c) + 7 and – 5 (12) d) – 5 and 0 (5) e) + 5 and 0 (5) f) 0 and – 5 (5) g) – 5 and + 5? (10) h) Which number is 8 units away from + 2? (10, or – 6) i) Which number is 7 units away from 0? (– 7, or + 7) j) If you start at + 5 and move 3 units at a time for 6 steps in the negative direction, on which number do you land? (– 13) k) If you start at – 7 and move 4 units at a time for 3 steps in the positive direction, on which number do you land? (5) *25 min*	Individual work in *Ex. Bks,* monitored T walks round class reading the questions. Ps may use number lines to help them. Reasoning, agreement, self-correction, praising Show details on BB if necessary. e.g. j) $5 - 3 - 3 - 3 - 3 - 3 - 3$ $= 5 - (6 \times 3) = 5 - 18$ $= \underline{-13}$ k) $-7 + 4 + 4 + 4$ $= -7 + (3 \times 4)$ $= -7 + 12 = \underline{+5}$
7	***Book 5, page 19*** Q.1 Read: *Work out the rule and complete the table.* *Write the rule in different ways.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Check the rule with values from table. *Solution:* *Rule:* $c = a + b$ $a = c - b$ $b = c - a$ T points to a column and asks Ps to explain it using the cash and debt model. e.g. 3rd column from left: 'I have £2 in cash but am £6 in debt, so my balance is – £4.' *30 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Feedback for T Whole class activity Class decides whether context is valid.

a	2	–1	2	5	–3	**7**	4	0	7	–4	**6**
b	5	– 4	– 6	0	3	1	**–7**	– 8	**–7**	11	– 4
c	7	– 5	– 4	**5**	**0**	8	– 3	**– 8**	0	**7**	2

Bk5

Lesson Plan 19

Activity		*Notes*

8

***Book 5, page** 19, Q.2*

Read: *Use this counting strip to help you work out the sums and differences.*

What do you notice about the counting strip? (The numbers in the bottom row are 2 more than the numbers in the top row.)

T asks Ps to imagine 2 number lines one above the other, but with the top number strip labelled above the line, rather than below it. Then imagine the top number line moving 2 units to the left. (Or T demonstrates with 2 pre-pared strips of card).

How will this help us to do the calculations? (Elicit that:

- if a number in the top row is subtracted from the number directly below it, the result is 2;
- if a number in the bottom row is subtracted from the number directly above it, the result is – 2.)

Let's do the calculations. Ps come to BB to fill in the results, saying the whole operation loudly so that the class can hear. (T helps Ps to find the operation on the the number strip if they have difficulties.) Class points out errors. Ps write correct answers in *Pbs* too.

Explain the more difficult operations using the cash and debt model.

e.g. If we are £5 in debt and we take away £3 of those debts, then we are left with only £2 of debts.

Solution:

–13	–12	–11	–10	–9	–8	–7	–6	–5	–4	–3	$\boxed{-2}$	–1	0	1	2	3	4	5	6	7	8	9	10
–11	–10	–9	–8	–7	–6	–5	–4	–3	–2	–1	$\boxed{0}$	1	2	3	4	5	6	7	8	9	10	11	12

$3 - 1 = \underline{2}$	$2 - 0 = \underline{2}$	$5 - 3 = \underline{2}$	$9 - 7 = \underline{2}$	$12 - 10 = \underline{2}$
$1 - (-1) = \underline{2}$	$0 - (-2) = \underline{2}$	$-1 - (-3) = \underline{2}$	$-2 - (-4) = \underline{2}$	$-3 - (-5) = \underline{2}$
$2 - 4 = -\underline{2}$	$3 - 5 = \underline{-2}$	$6 - 8 = \underline{-2}$	$1 - 3 = \underline{-2}$	$0 - 2 = \underline{-2}$
$-1 - 1 = \underline{-2}$	$-2 - 0 = \underline{-2}$	$-3 - (-1) = \underline{-2}$	$-5 - (-3) = \underline{-2}$	$-8 - (-6) = \underline{-2}$
$2 + 3 = \underline{5}$	$2 + 5 = \underline{7}$	$2 + 10 = \underline{12}$	$2 + (-2) = \underline{0}$	$2 + (-5) = \underline{-3}$
$-2 + 0 = \underline{-2}$	$-2 + 1 = \underline{-1}$	$-2 + 2 = \underline{0}$	$-2 + 3 = \underline{1}$	$-2 + 7 = \underline{5}$
$-2 + (-1) = \underline{-3}$	$-2 + (-2) = \underline{-4}$	$-2 + (-5) = \underline{-7}$	$-2 + (-9) = \underline{-11}$	$-2 + (-4) = \underline{-6}$

T reviews:

- If we add a positive number (or subtract a negative number), the result is more positive (or less negative), as we move to the right along the number line.
- If we subtract a positive number, (or add a negative number), the result is less positive (or more negative) as we move to the left along the number line.

35 min

Notes:

Whole class activity

(or individual trial after discussion on number strip if Ps wish)

Drawn on BB or use enlarged copy master or OHP

T gives hints if necessary.

Extra praise for Ps who explain wihtout help from T.

Reasoning, checking with reverse operation and showing on number strip or number line, agreement, praising

At a good pace

BB: $-5 - (-3) = -2$

□ □ ~~□~~ ~~□~~ ~~□~~

It is probably easier to deal with a row at a time, rather than a column at a time.

Ps work in *Pbs* too.

Have no expectations!

Praising encouragement only!

Demonstrate each movement on class number line.

Bk5

Lesson Plan 19

Activity | **Notes**

9

Book 5, page 19

Q.2 Read: *Work out the rule and complete the table.*
Fill in the word missing from the statement.

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Agree that the bottom row (z) in the table is how far apart x and y are on the number line.

Solution:

x	5	6	–2	5	–2	4	2	8	–3	3	–2	–5	6
y	5	3	0	–2	5	9	–5	–8	10	–10	–5	–2	–6
z	0	3	2	7	7	**5**	**7**	**16**	**13**	**13**	**3**	**3**	**12**

z is the $\boxed{\text{distance}}$ between x and y

Which columns contain <u>opposite</u> numbers? What do you notice about their distance apart ? (twice the numerical value)

T points to a column and asks Ps to write an inequality about it.

(e.g. $5 \underset{7}{>} -2$, $-2 \underset{7}{<} 5$; $-5 \underset{7}{<} 2$; $6 \underset{12}{>} -6$)

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

Whole class activity

Agreement, praising

40 min

10

Book 5, page 19

Q.3 Read: *Solve the inequalities if the solutions are integer numbers.*

What are integer numbers? (whole numbers) Set a time limit.

Review at BB with whole class. Ps come to BB to say and show the relevant numbers on number line. Class agrees/ disagrees . Mistakes discussed and corrected.

Extra discussion and demonstration might be needed on d) and e).

In e), elicit that – 3 ≤ ☆ ≤ 2 shows the numbers which are <u>not</u> possible. [i.e. – 3, – 2, – 1, 0, 1, 2 are <u>not</u> elements of set e)]

Solution:

a) □ ≥ – 5   □: – 5, – 4, – 3, – 2, – 1, 0, 1, 2, 3, . . .

b) △ < 3   △: 2, 1, 0, – 1, – 2, – 3, – 4, . . .

c) – 5 < ◠ < 2   ◠: – 4, – 3, – 2, – 1, 0, 1

d) – 7 < ⌶ and ⌶ < – 1   ⌶: – 6, – 5, – 4, – 3, – 2

e) 2 < ☆ or ☆ < – 3   ☆: 3, 4, 5, 6, . . . or – 4, – 5, – 6, . . .

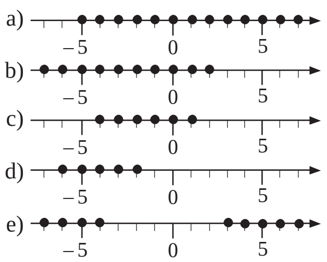
Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Do d) and e) with the whole class if Ps are not very able.

BB:



45 min

Bk5

R: Mental calculation

C: Order and comparison. Opposite numbers

E: Cartesian coordinate system (4 quadrants). Absolute value

Lesson Plan 20

Activity | ***Notes***

1

Competition

T divides the class into 3 teams, A, B and C, roughly equal in ability.

Each team has a designated part of the BB, or a flip chart or SB or large sheet of paper pinned to the wall, on which to write their descriptions (if possible, hidden from the other two teams).

Let's see which team can write the most different forms of -3. I will allow you 3 minutes. Start . . . now! . . . Stop!

T reviews each team's descriptions. Class points out errors or duplications. Team with most different correct descriptions is the winner. In the case of equal totals, the class chooses the team with the most creative descriptions as the winner.

5 min

Notes: Whole class activity

In good humour! e.g.

$-3+0$, $5-8$, $3\times(-1)$, $-1+(-2)$, $(-9)\div 3$, $0-3$, $-9+6$, $-12-(-9)$, half of -6, opposite of 3, opposite of the opposite of -3, etc.

Extra praise for creativity

Class gives winner 3 cheers!

2

Integers

a) Write these integers in increasing order in your *Ex. Bks*.

BB: -12 11 $+7$ 0 3 -5 5 -7

Review quickly. T writes what Ps dictate. Mistakes corrected.

BB: $-12 < -7 < -5 < 0 < 3 < 5 < 7 < 11$

b) Find pairs of these numbers which are 23 (12, 10, 14) units away from each other. Ps dictate to T. Class agrees/ disagrees. If problems or disagreement, P shows then on class number line.

BB: 23 units: -12, 11

12 units: -7, 5; -5, 7; -12, 0;

10 units: -7, 3; -5, 5;

14 units: -7, 7

c) Which pairs of numbers are an equal distance from 0?
Ps come to BB or dictate to T. Class agrees/disagrees.
What do we call such pairs of numbers? (opposite numbers)
Who can tell me other pairs of opposite numbers?

10 min

Notes: Individual work

Written on BB or SB or OHT

Agreement, self-correcting, praising

Whole class activity

Agreement, praising

BB: opposite numbers

-7, 7; -5, 5;

Agreement, praising

3

Book 5, page 20

Q.1 Read: *Work out the rule and complete the table.*
Write the rule in different ways.

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Agree that a and b are opposite numbers and that if they are added, the result is always 0.

Solution:

a	-5	3	-2	6	-1	**8**	0	**-3**	11	-44
b	5	-3	2	**-6**	**1**	-8	**0**	3	**-11**	**44**

b = opposite of a a = opposite of b $a+b=0$

15 min

Notes: Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

T shows that if:

a is positive, then $b = -a$ and $a+(-a) = a-a = \underline{0}$

a is negative, then $b = a$ and $-a+a = \underline{0}$

Bk5		*Lesson Plan 20*
Activity		***Notes***
4	***Book 5, page 20*** Q.2 Read: *Work out the rule and complete the table.* *Fill in the words missing from the statement.* Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. (Accept, e.g. – 4 in 2nd column from right, but as the numbers are increasing along the top row, + 4 follows the pattern.) *Solution:*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Accept any valid rule reasoned correctly.

x	– 7	– 6	– 5	**– 4**	**– 3**	– 2	**– 1**	0	1	2	3	**4**	5
y	7	6	**5**	4	3	**2**	1	**0**	1	2	**3**	4	**5**

y is the $\boxed{\textbf{distance}}$ of x from $\boxed{\textbf{0}}$

Extension	We call the distance of a number from zero its <u>absolute value</u>. e.g The absolute value of – 7 is 7, and we write it like this. The absolute value of 0 is 0, and we write it like this. The absolute value of + 4 is 4, and we write it like this. Remember that if there is no sign in front of a number, then the number is postive, so BB: $\lvert -7\rvert = +7$, $\lvert 4\rvert = 4$, $\lvert 4\rvert = +4$ are all correct. What is the absolute value of – 2 (+ 5, 20)? Ps come to BB to write and say the equation. Class agrees/disagrees. BB: $\lvert -2\rvert = 2$, $\lvert +5\rvert = 5$, $\lvert 20\rvert = 20$ *20 min*	Whole class activity BB: <u>absolute value</u> $\lvert -7\rvert = 7$ $\lvert 0\rvert = 0$ $\lvert +4\rvert = 4$ T explains and Ps listem Ps copy notation above in *Ex. Bks*. No expectations! Praising, encouragement only Check on number line.
5	**True or false?** Study this set of numbers. I will say a statement and you must decide whether it is true or false. If you think it is true clap you hands once, and if you think it is false put your hands on your head when I say. BB: A = { – 1, + 9, – 5, – 14, 12, + 1, 6, – 8, 0 } a) *There are numbers in the set which are the same distance from 0.* (T) (– 1 and 1 are 1 unit from 0.) BB: $\lvert -1\rvert = \lvert +1\rvert = 1$ b) *The number which is furthest from 0 is the smallest in the set.* (T) (– 14 is furthest from zero, with <u>absolute value</u> 14, and it is the smallest number.) c) *There are exactly two numbers in the set which are equal to their distance from zero.* (F) (All positive numbers and 0 are equal to their distance from 0, i.e to their <u>absolute value,</u> and there are 5 such numbers in the set, not 2.) d) *The difference between the greatest and smallest numbers is 26.* (T) (Greatest number: 12, smallest: – 14, so distance between them is <u>26</u>.) Confirm on class number line. *25 min*	Whole class activity (or other pre-agreed actions for quick response in unison) Ask Ps with different responses to explain with examples or counter examples. Reasoning, agreement, praising BB: $\lvert -14\rvert = 14$ Encourage Ps to use the term 'absolute value'. BB: $+9 = \lvert 9\rvert$, $12 = \lvert 12\rvert$, $+1 = \lvert 1\rvert$, $6 = \lvert 6\rvert$, $0 = \lvert 0\rvert$ T writes as subtraction on BB: $12 - (-14) = 12 + 14 = \underline{26}$

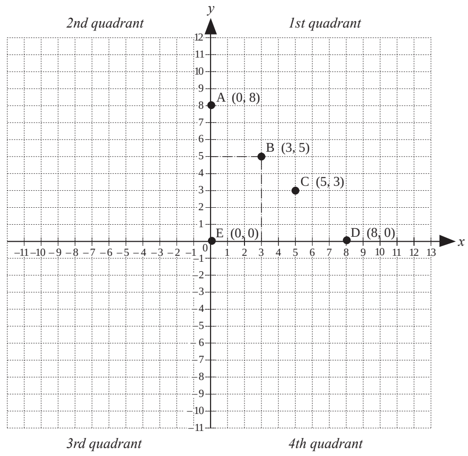
Bk5		*Lesson Plan 20*
Activity		***Notes***
6	**True or false?** Ps have scrap paper or slates on desk, with 'T' written on one side and 'F' on the other. T says a statement and Ps show whether they think it is true or false by holding up side with appropriate letter facing the T. a) *A positive number is always greater than a negative number.* (T) (All positive numbers are greater than 0 and all negative numbers are less than zero.) b) *If we compare two negative numbers, the number with the smaller absolute value is the smaller number.* (F) (e.g. -2 and -7: $\lvert -2 \rvert = 2 < 7 = \lvert -7 \rvert$, but $-2 \nless -7$) *30 min*	Whole class activitry Responses shown in unison on command. Ps with different responses give reasoning, using examples or counter examples. b) the <u>counter example</u> is true, i.e. the number with the greater absolute value is the smaller number.
7	***Book 5, page 20*** Q.3 Read: *Decide whether the statement is true or false and write a tick or a cross in the box.* Set a time limit. Ps read questions themselves and complete the boxes. Review with whole class. T chooses a P to read the statement and Ps stand up if they ticked the box. T chooses Ps standing up to explain the reason for their choice. Who agrees? Who has a different reason? Who disagrees? Why? etc. Class decides on correct answer. *Solution:* a) *Any integer number is greater than its opposite number.* (F) (counter examples: $0 \ngtr 0$, $-3 \ngtr 3$) b) *There is a number which is greater than its opposite number.* (T) (e.g.: $7 > -7$) c) *There is a number which is as far from 5 as it is from the opposite of 5.* (T) (0 is 5 units from 5 and also 5 units from -5) d) *The greater of two negative numbers is the number closer to zero.* (T) (e.g. -5 is 5 units from 0, -3 is 3 units from 0, and $-5 < -3$) *35 min*	Individual work, monitored Discussion, reasoning, agreement, self-correction, praising Agree that to prove a statement is false, only one counter example needs to be given. Feedback for T No counter example is possible.
8	***Book 5, page 20*** Q.4 a) Read: *Plot these points on the graph.* What are the two numbers beside each letter called? (<u>coordinates</u>) What do they mean? (1st number is the *x*-coordinate, i.e. the distance of the point from the *y*-axis; 2nd number is the *y*-coordinate, i.e the distance of the point from the *x*-axis.) Who can show us how the position of the dot for B was found? Two Ps come to BB, one to point to 3 on the *x*-axis with RH and the other to point to 5 on the *y*-axis with LH, then they move fingers along the grid lines until they meet. Let's seee if you can draw the other points on the graph in your *Pbs*. Set a time limit. Review with whole class. Ps come to BB to draw points, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Elicit that E (0, 0) is the <u>origin</u>.	Whole class discussion to start – revision of coordinate system. Drawn on BB or use enlarged copy master or OHP Allow Ps to explain if they can, with T's help where necessary. Demonstration, agreement, praising If Ps are still unsure, do point A with whole class also, or continue as whole class activity, with Ps working at BB and rest of class in *Pbs*.

Lesson Plan 20

Activity | **Notes**

8 (Continued)

Solution:



b) Read: *Plot all the points which are 5 units from the y-axis and 3 units from the x-axis.*

Allow 2 minutes to think about it and draw points in *Pbs*, then review with whole class. **A**, come and show us such a point. Who agrees? Who found another one? etc.

(If Ps found only the point C (5, 3) already drawn in the 1st quadrant, T gives hints about the other quadrants. Give extra praise to Ps who found the other 3 points too.)

Agree that 4 such points are possible.

Solution:

1st quadrant: (5, 3)   2nd quadrant: (– 5, 3)

3rd quadrant: (– 5, – 3)   4th quadrant: (5, – 3)

Notes: Individual trial first, monitored, then whole class review

Discussion, reasoning, agreement, self-correction, praising

Discuss the meaning of <u>quadrant</u> (1 quarter of a circle, or 1 quarter of a complete turn)

c) Read: *Plot all the points which are 3 units from the y-axis and 5 units from the x-axis.*

Allow another 2 minutes for Ps to find the points. Review with whole class. Ps come to BB to draw points. Class agrees/ disagrees. (Most Ps will probably have found 4 points this time.) Mistakes/omissions corrected.

Solution:

1st quadrant: (3, 5)   2nd quadrant: (– 3, 5)

3rd quadrant: (– 3, – 5)   4th quadrant: (3, – 5)

Notes: Individual work, monitored, helped

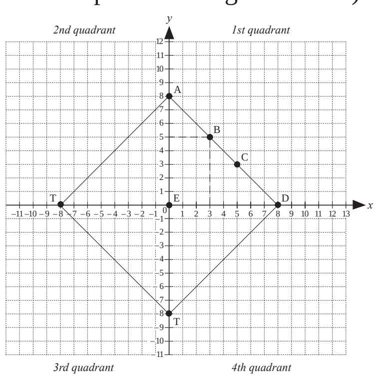
Reasoning, agreement, self-correction, praising

Extension

Mark on your graph the point R (– 8, 0) and the point T (0, – 8), then join up the points A, D, R and T.

What do you notice? (A, D, R and T are the vertices of a square; E is its centre and the side AD passes through B and C.)

BB:



Notes: Individual work, monitored

Discussion, agreement, praising

Or the extension could be set as homework and reviewed in the next lesson.

45 min

Bk5	R: Mental calculation C: **Fractions: forms and meaning** *E: Fractions on the number line. Fractions more than 1*	*Lesson Plan* *21*

Activity | ***Notes***

1

Number strips

T has 10-unit strip of coloured (e.g. *orange*) card stuck in centre of BB and 3-unit (e.g. *blue*) and 2-unit (e.g. *pink*) strips stuck to side of BB.

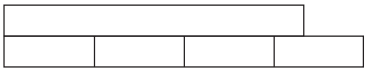
Notes: Whole class activity

Cut from coloured card or use copy master, enlarged, cut out and coloured.

If possible, Ps manipulate number strips on desk too

(or Ps and T use Cuisennaire rods if class has them)

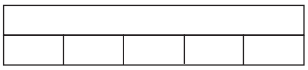
a) Let's pave the *orange* strip with the *blue* strips. P comes to BB to stick *blue* strips below the *orange* strip. Agree that more than 3 but less than 4 *blue* strips are needed. Who can write it as an inequality?

BB: 

3 *blue* < 1 *orange* < 4 *blue*

Notes: Agreement, praising

b) Let's pave the *orange* strip with the *pink* strips. P comes to BB to stick *pink* strips below the *orange* strip. Agree that exactly 5 *pink* strips are needed. Who can write an equation about it? Who can write it another way?

BB: 

1 *orange* strip = 5 *pink* strips

or 1 *pink* strip = 1 fifth of an *orange* strip

If Ps have used words only, elicit that: 1 fifth = $\frac{1}{5}$

4 min

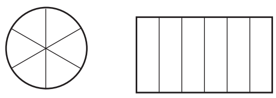
2

Fractions of a whole

Peter and Paul are twins. On their 10th birthday, their Mum baked two cakes, a chocolate cake and a walnut cake. Peter and Paul invited 4 friends for tea, so their Mum cut each cake into 6 equal slices.

Notes: Whole class activity

Drawn on BB or SB or OHT

BB: chocolate cake  walnut cake

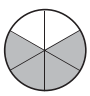
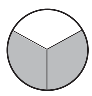
a) If each of the 6 boys ate one slice of the chocolate cake, what part of the cake did the guests eat? T asks several Ps what they think.

A, come and colour the fraction and write an addition about it. Who agrees? Who can write the fraction in another way? etc.

Notes: Or Ps could show answers to questions on slates or scrap paper in unison on command.

Agrteement, praising

Extra praise for P who suggest 2 thirds. Ask them to amend the diagram to show it.

BB:  $\frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{4}{6} = \frac{2}{3}$ 

4 sixths = 2 thirds

Elicit the names of the components of a fraction and their meaning:

<u>denominator</u> – the number of equal parts the whole unit has been divided into;

<u>numerator</u> – how many of those equal parts have been taken;

<u>fraction line</u> – separates the numerator from the denominator and means 'divided by'

Notes: BB:

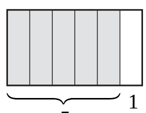
numerator $\rightarrow$ $\frac{2}{3}$ $\leftarrow$ fraction line

denominator $\rightarrow$

b) One of the guests did not like walnut cake so he did not have a slice.

i) What part of the cake did the other boys eat? (5 sixths)

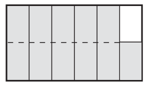
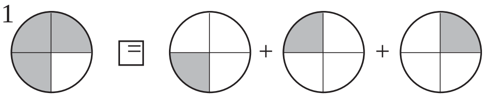
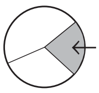
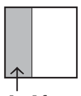
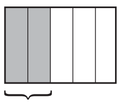
ii) What part was left? (1 sixth)

Notes: BB: 

$\frac{5}{6}$ $\frac{1}{6}$

Bk5

Lesson Plan 26

Activity		**Notes**
2	(Continued) c) After the boys had gone home, Mum ate half of the remaining slice. How much of the cake did Mum eat? T asks several Ps what they think and chooses a P to write it on BB. BB: 1 half of 1 sixth = 1 twelfth = $\frac{1}{12}$ d) What part of the cake was eaten altogether? Let's write an addition about it. Ps come to BB or dictate to T. BB: $\frac{5}{6} + \frac{1}{12} = \frac{10}{12} + \frac{1}{12} = \frac{11}{12}$ What part of the walnut cake was left? $\left(\frac{1}{12}\right)$ *10 min*	P comes to BB to draw dotted line to divide the cake into twelfths BB:  Reasoning, agreement, praising Ps copy diagram and write the addition in *Ex. Bks*. Feedback for T
3	**Comparison** Study the two sides of the statement and think what the missing sign could be. P comes to BB to write it. Class agrees/disagrees. Who could write an equation about each side? Ps come to BB to write equations and explain reasoning. Who could write it another way? BB: 1  LHS: $\frac{3}{4}$ of 1 unit $= (1 \div 4) \times 3 = 3 \times \frac{1}{4}$ RHS: $\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} = \frac{1}{4}$ of 3 units $= 3 \div 4$ *15 min*	Whole class activity Drawn on BB or SB or OHT Agreement, praising Discussion, reasoning, agreement, praising T explains the different ways a fraction could be interpreted if Ps do not suggest them. Ps copy diagram and equations in *Ex. Bks.*
4	**Find the mistakes** Study these diagrams. What is wrong with them? Ps come to BB to explain reasoning, referring to appropriate diagram. Who agrees? Who thinks something else? etc. BB: a)  1 third b)  1 half c)  2 sixths a) The shaded part is <u>not</u> 1 third as the circle has been divided into 3 parts which are <u>not equal</u>. b) The shaded part is <u>not</u> 1 half, as the rectangle has been divided into 2 parts which are <u>not equal</u>. c) The rectangle has been divided into <u>5</u> equal parts, so each part is 1 fifth, not 1 sixth, and the part shaded is 2 fifths. T stresses that the denominator of a fraction shows how many <u>equal</u> parts a unit has been divided into. *20 min*	Whole class activity Drawn on BB or SB or OHT Reasoning, agreement, praising

Bk5

Lesson Plan 21

Activity		Notes

5

Comparing fractions with 1

Write these fractions with numbers in your *Ex Bk*.

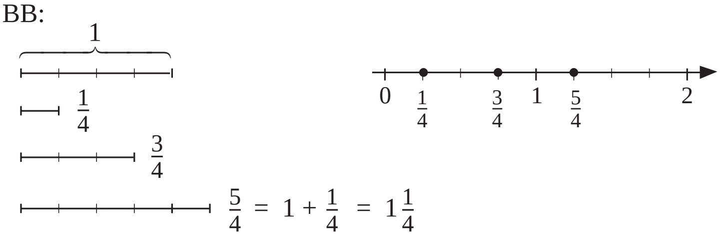
a) T dictates: one quarter, three quarters, five quarters

Review quickly at BB. Ps comes to BB to write them, explaining exactly what they mean. Class agrees/disagrees.

BB: $\frac{1}{4}$, $\frac{3}{4}$, $\frac{5}{4}$

Let's show them as separate line segements, then mark the fractions on the number line. Ps come to BB to draw and mark fractions. Class agrees/disagrees. Rest of Ps copy in *Ex. Bks*.

BB:



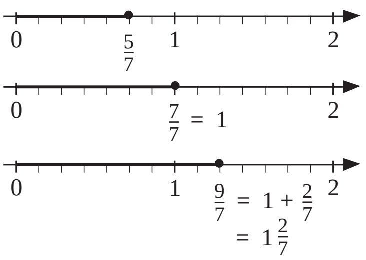
b) T dictates: five sevenths, seven sevenths, nine sevenths

Review quickly with whole class. Ps come to BB, explaining exactly what they mean. Class agrees/disagrees.

BB: $\frac{1}{7}$, $\frac{7}{7}$, $\frac{9}{7}$

Let's draw 3 number lines from 0 to 2 and mark these fractions on them. T works at BB and Ps work in *Ex. Bks*.

BB:



Agree that: $\frac{5}{7} < 1$, $\frac{7}{7} = 1$, $\frac{9}{7} > 1$

T reviews:

- A positive fraction is less than 1 if the numerator is <u>less</u> than the denominator.
- A positive fraction equals 1 if the numerator <u>equals</u> the denominator.
- A positive fraction is more than 1 if the numerator is <u>more</u> than the denominator.

Notes:

Individual work in *Ex. Bks.* then whole class discussion

Agreement, self-correction, praising

T starts diagrams and Ps continue them.

Agreement, praising

T and Ps use rulers to draw lines and to measure distance apart of 'ticks'.

Extra praise if Ps remember the names <u>vulgar fraction</u> (top-heavy fraction), and <u>mixed number</u> (whole number plus a fraction)

Individual work, monitored

Agreement, self-correction, praising

Discuss how long the lines should be (e.g. 14 cm) and how far apart the ticks should be. (e.g. 2 cm)

T points to each fraction and asks Ps to compare it with 1. Ps dictate the inequalities.

T chooses Ps to give examples of each type. Class agrees/ disagrees.

Agree that such a fraction is a <u>vulgar</u> fraction and can be changed into a <u>mixed number</u>.

25 min

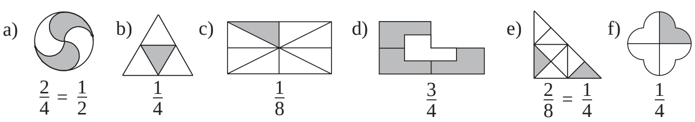
6

Book 5, page 21

Q.1 Read: *What part of the shapes are shaded?*

Set a time limit. Review at BB with whole class. Ps come to BB to write fractions, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected. Extra praise if Ps point out <u>equivalent</u> fractions.

Solution:



Notes:

Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

What does 3 quarters mean?

$$\frac{3}{4} = 3 \times \frac{1}{4} = 1 \div 4 \times 3$$

$$= \frac{1}{4} + \frac{1}{4} + \frac{1}{4}$$

28 min

Bk5

Lesson Plan 26

Activity		***Notes***

7

Book 5, page 21

Q.2 Read: *Colour the given fraction of each shape.*

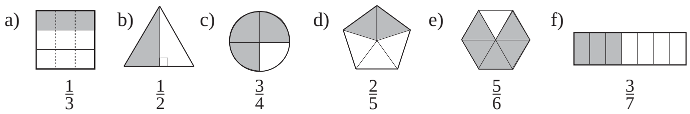
What are the names of these shapes? (square, acute-angled triangle, circle, regular pentagon, regular hexagon, rectangle)

Set a time limit. Review at BB with whole class. Ps come to BB to colour the fractions, explaining reasoning in detail. e.g.

a) 'I divide the unit into 3 equal parts and colour 1 of the parts.'

Class points out errrors. Mistakes discussed and corrected.

Solution:



Notes:

Individual work, monitored, (helped)

Drawn on BB o use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Feedback for T

Elicit that the line dividing the equilateral triangle in half is <u>perpendicular</u> to the horizontal side.

32 min

8

Book 5, page 21

Q.3 Read: *a) Draw lines which are: i)* $\dfrac{1}{6}$ *ii)* $\dfrac{5}{6}$ *iii)* $\dfrac{7}{6}$

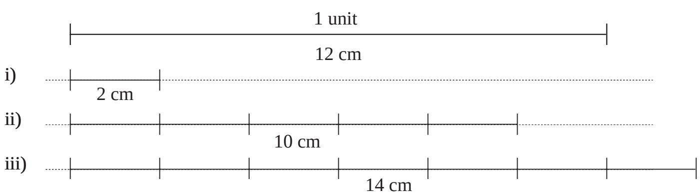
of the length of this 12 cm line segment.

b) Write their lengths below the lines.

Remind Ps to draw short vertical lines to mark the beginning and end of their line segments. Ps use rulers to measure and draw.

Set a time limit. Ps finished first come to BB to draw lines on BB with BB ruler. Review with whole class. Ps come to BB to write an operation for each line, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected

Solution:



Which fraction is greater than 1? Who could write it as a mixed number?

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit

Necessary calculations done in *Ex. Bks.*

Reasoning, agreement, self-correction, praising

BB:

i) 12 cm $\div$ 6 = <u>2 cm</u>

ii) 12 cm $\div$ 6 $\times$ 5
= 2 cm $\times$ 5 = <u>10 cm</u>

iii) 12 cm $\div$ 6 $\times$ 7
= 2 cm $\times$ 7 = <u>14 cm</u>

BB: $\dfrac{7}{6} = 1\dfrac{1}{6}$

37 min

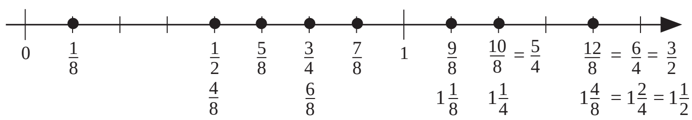
9

Book 5, page 21

Q.4 Read: *Mark the positions of these fractions on the number line.*

Set a time limit. Review with whole class. Ps come to BB to mark the fractions, explaining reasoning. Class agrees/ disagrees. Mistakes discussed and corrected

Solution:



Review meaning of the numerators and denominators.
Discuss different forms of the same fraction (<u>equivalent</u> fractions) and how the value of a fraction does not change if both numerator and denominator are multiplied or divided by the same amount.

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Extra praise if Ps point out equivalent fractions or <u>mixed numbers</u> without prompting from T.

Elicit other forms too, e.g.

$\dfrac{1}{2} = \dfrac{5}{10}$; $\dfrac{1}{8} = \dfrac{2}{16}$, etc.

42 min

Bk5		*Lesson Plan 21*
Activity		***Notes***

10

Book 5, page 21

Q.5 Read: *Which would give you more chocolate?*

Allow Ps a minute to colour diagrams and write answer in *Pbs.*

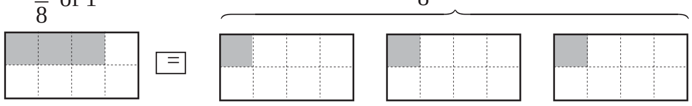
Review with whole class. Raise your left hand if you think there is more chocolate in the LHS fraction and your right hand if you think there is more chocolate in the RHS fraction.

Show me . . . now! (Accept no hands or both hands raised.)

P comes to BB to explain reasoning. Class agrees that both amounts are the same. What sign could we write between them? Ps shout out in unison. (=)

Solution:

$\frac{3}{8}$ of 1 $\qquad$ $\frac{1}{8}$ of 3



Notes:

Individual work, monitored

Drawn on BB or SB or OHT

In unison

T teases Ps who raise only one hand!

Reasoning, agreement, self-correction, praising

BB: $\frac{3}{8}$ of 1 $=$ $\frac{1}{8}$ of 3

i.e. $\frac{1}{8}$ of 3 $=$ $\frac{3}{8}$

45 min

Bk5

R: Mental calculation

C: Fractions. Division and fractions

E: Equivalent (equal) fractions

Lesson Plan 27

Activity		*Notes*

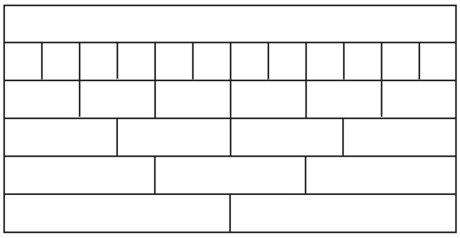
1

Number strips

T has a 12-unit strip stuck to middle of BB and 1-unit, 2-unit, 3-unit, 4-unit and 6-unit strips stuck to sides of BB. Each type of strip should be in a different colour.

This long *green* strip is 1 unit. Let's pave the unit with each of the other colours of strips. After each row, T asks: How many strips have you used? What part of the whole unit is each strip? Who can write a multiplication about it? Ps come to BB or dictate to T. Class agrees/ disagrees.

BB:



1 unit

$\frac{1}{12} \times 12$

$\frac{1}{6} \times 6$

$\frac{1}{4} \times 4$

$\frac{1}{3} \times 3$

$\frac{1}{2} \times 2$

Notes: Whole class activity. Cut from coloured card or use copy master, enlarged, cut out and coloured. If possible, Ps manipulatie number strips on desk too (or Ps and T use Cuisennaire rods if class has them). At a good pace. Reasoning, agreement, praising

Let's list the equal fractions. T starts and Ps continue by coming to BB or dictating to T. What do you notice about them? (Numerator and denominator have been reduced (increased) by the same number of times.) Ps choose pairs of equal fractions and say what has been done to the numerator and denominator. Class agrees/ disagrees.

e.g. $1 = \frac{12}{12} = \frac{6}{6} = \frac{4}{4} = \frac{3}{3} = \frac{2}{2}$ $\qquad \frac{1}{2} = \frac{6}{12} \overset{\div 3}{\underset{\div 3}{=}} \frac{3}{6} = \frac{2}{4}$

$\frac{1}{3} = \frac{4}{12} = \frac{2}{6}$ $\qquad \frac{1}{3} \overset{\times 2}{\underset{\times 2}{=}} \frac{4}{12} = \frac{2}{6}$ $\qquad \frac{1}{6} = \frac{2}{12}$

T summarises:

- If we <u>multiply</u> the numerator and denominator by the same positive whole number, the value of the fraction does not change.
- If we <u>divide</u> the numerator and denominator by the same positive whole number, the value of the fraction does not change.

We say that we are <u>simplifying</u> the fraction when we <u>reduce</u> the numerator and denominator by the same amount.

e.g. if I asked you to <u>simplify</u> 3 sixths, what would you do? (Divide numerator and denominator by 3 to give 1 half.)

Who can tell me other forms of $\frac{1}{2}$ ($\frac{4}{12}$, $\frac{1}{6}$)?

Notes: Discussion, reasoning, agreement, praising. Ps draw arrows and write operations above and below them. What name do we give to equal fractions? BB: <u>equivalent fractions</u> different forms of a fraction. Ps repeat in unison. BB: <u>Simplify</u> $\frac{3}{6}$. P writes: $\frac{3}{6} = \frac{1}{2}$. T chooses Ps at random.

8 min

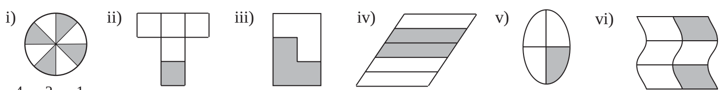
2

Fractions of a whole shape

a) What part of each shape is shaded? Simplify the fraction if you can. Ps come to BB to write and say the fractions, explaining reasoning. Class agrees/disagrees. Who can tell me <u>equivalent</u> fractions to those shown? Ps say fraction and also how they got it from the original.

(e.g. 2 fifths = 6 fifteenths : num. and den. × 3)

BB:



i) $\frac{4}{8} = \frac{2}{4} = \frac{1}{2}$ ii) $\frac{1}{5}$ iii) $\frac{1}{2}$ iv) $\frac{2}{5}$ v) $\frac{1}{4}$ vi) $\frac{2}{6} = \frac{1}{3}$

Notes: Whole class activity. Drawn on BB or use enlarged copy master or OHP. Reasoning, agreement, praising. T helps with reasoning: e.g.
i) 'The circle has been divided into 8 equal parts, so each part is 1 eighth and 4 eighths are shaded.'

Bk5

Lesson Plan 22

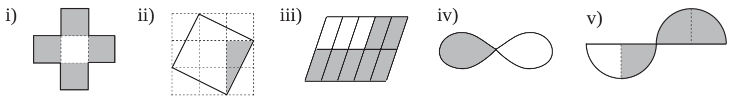
Activity		*Notes*

2

(Continued)

b) Let's shade the given parts of the unit shapes. Ps come to BB to colour the shapes, explaining reasoning and simplifying fractions where necessary. Class agrees/disagrees.

BB:



$\frac{4}{5}$ $\quad \frac{1}{5}$ $\quad \frac{7}{10}$ $\quad \frac{1}{2}$ $\quad \frac{3}{4}$

Extension

Shade 1 quarter of shapes i), ii), and iii) and iv).
Ps come to BB to suggest how to divide up the shapes into 4 equal parts. Class agrees/disagrees or suggests alternative way.

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Discussion, reasoning, agreement, praising

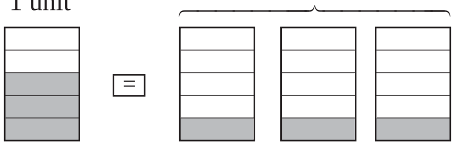
13 min

3

Missing items

Let's fill in the missing numbers and signs. Ps come to BB to complete diagram, explaining reasoning. Class agrees/disagrees.

BB: 1 unit $\quad$ 3 units



Part shaded: $\boxed{\frac{3}{5}}$ of 1 unit $\quad \boxed{\frac{1}{5}}$ of 3 units

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, praising

T writes on BB and Ps write in *Ex. Bks:*

BB: $\frac{3}{5}$ of 1 $=$ $\frac{1}{5}$ of 3 $=$ $\frac{3}{5}$

16 min

4

Fractions of line segments

I have divided this line segment, AB, into 4 equal parts. C, D and E are the dividing points. Draw this in your you *Ex. Bks*. What length should we make AB? (e.g. 4 cm, or 12 mm, or any multiple of 4, to make the dividing up easier)

BB:

What part of AB is AC? (AC is 1 quarter of AB) We can write it like this. T writes on BB and Ps write in *Ex. Bks*. Continue for other parts of AB, with Ps dictating what T should write.

BB: $\frac{AC}{AB} = \frac{1}{4}$; $\quad \frac{AE}{AB} = \frac{3}{4}$; $\quad \frac{DE}{AB} = \frac{1}{4}$; $\quad \frac{CE}{AB} = \frac{2}{4} = \frac{1}{2}$;

$\frac{AB}{AB} = \frac{4}{4} = \frac{1}{1} = 1$

If we drew a line twice as long as AE, what part of AB would it be?

Let's write it in the same way as the others. T starts and Ps dictate what T should write when they understand. Elicit that 1 and a half equals 2 times 3 quarters. Ps copy into *Ex. Bks*.

BB: $\frac{2 \times AE}{AB} = \frac{2 \times 3}{4} = \frac{6}{4} = \frac{3}{2} = 1\frac{1}{2}$ $\left(= 2 \times \frac{3}{4}\right)$

Notes: Whole class activity but individual drawing/writing

Drawn on BB or SB or OHT

Extra praise if Ps mention multiples of 4.

Ps measure and draw line with rulers.

Discussion, reasoning, agreement, praising

T reads out each equation and Ps repeat in unison. e.g. 'AC divided by AB equals 1 quarter'

What does the equation mean? (AC is 1 quarter of AB)

or T: 'The ratio of AC to AB is 1 quarter.'

(Do not expect Ps to learn this notation yet, but just to become familiar with it.)

21 min

Bk5

Lesson Plan 22

Activity		Notes

5 **Comparison with 1**

Study these fractions. Let's circle the fractions which are greater than 1 and write each as a <u>mixed number</u>. What is a mixed number?
(a number containing a whole number and a fraction)

Ps come to BB to circle a fraction and rewrite it, explaining reasoning. Class points out errors. Elicit that fractions greater than one have a numerator greater than the denominator.

BB: $\frac{2}{3}$, $\frac{4}{5}$, $\frac{9}{2}$, $\frac{3}{8}$, $\frac{11}{37}$, $\frac{18}{14}$, $\frac{33}{33}$, $\frac{35}{33}$, $\frac{8}{8}$, $\frac{5}{4}$

$4\frac{1}{2}$ $\quad 1\frac{4}{14} = 1\frac{2}{7}$ $\quad 1\frac{2}{33}$ $\quad 1\frac{1}{4}$

We have circled the numbers more than 1, but what could you say about the other numbers? (numbers are not more than 1, or less than or equal to 1). Ps point out numbers equal to 1.

T summarises:

- If the numerator is <u>less than</u> the denominator, a positive fraction is <u>less than</u> 1.
- If the numerator is <u>equal to</u> the denominator, a positive fraction is <u>equal to</u> 1.
- If the numerator is <u>greater than</u> the denominator, a positive fraction is <u>greater than</u> 1.

Notes:

Whole class activity

Written on BB or SB or OHT

Discussion, reasoning, agreement, praising

Extra praise if Ps simplify fractions without prompting from T.

T asks one or two Ps what they think and why.

BB: $\frac{33}{33} = \frac{8}{8} = 1$

T says first part of sentence and class completes it in unison.

25 min

6 ***Book 5, page 22***

Q.1 Read: *a Use a ruler to draw the rquired parts of this 10 cm line segment.*

b) Mark the fractions on the number line.

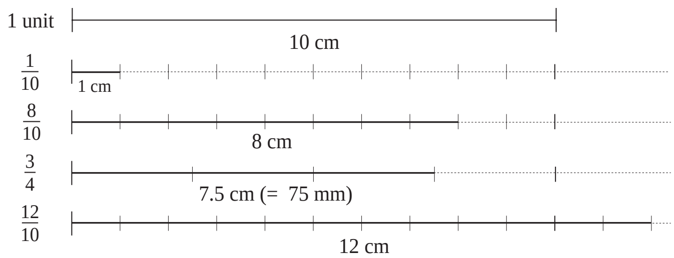
Set a time limit. Ps either calculate the length required, then draw it, or divide up the line segment into equal parts and draw over the required number of parts. Set a time limit.

Review with whole class. Ps come to BB to show solution, using BB ruler (and/or dictating length of required part in cm). Class agrees/disagrees. Mistakes discussed and corrected.

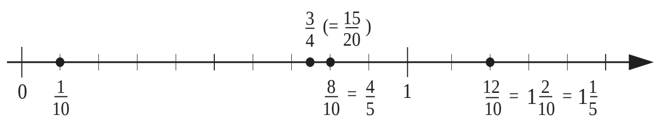
When Ps mark fractions on number line, ask them to simplify where relevant. Discuss how to find the position of 3 quarters. (halfway between 7 tenths and 8 tenths, or divide the line into twentieths and draw a dot at 15 twentieths.)

Solution:

a)



b)



Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit

Discussion, reasoning, agreement, self-correction, praising

Show details of calculations:

BB:

$\frac{1}{10}$ of 10 cm $=$ 10 cm $\div$ 10 $=$ <u>1 cm</u>

$\frac{8}{10}$ of 10 cm $=$ 10 cm $\div$ 10 $\times$ 8 $=$ <u>8 cm</u>

$\frac{3}{4}$ of 10 cm $=$ 10 cm $\div$ 4 $\times$ 3 $=$ 2.5 cm $\times$ 3 $=$ <u>7.5 cm</u>

$\frac{12}{10}$ of 10 cm $=$ 10 cm $\div$ 10 $\times$ 12 $=$ <u>12 cm</u>

Feedback for T

30 min

Bk5

Lesson Plan 22

Activity		Notes

7

Book 5, page 22

Q.2 Read: *Colour:* *a) 1 tenth of the square in red,*
b) 30 hundredths of the square in blue,
c) 2 fifths of the square in yellow,
d) 13 hundredths of the square in green.
What part is not coloured?

What can you tell me about the large square? (e.g. It has been divided into $10 \times 10 = 100$ equal grid squares; each grid square is 1 hundredth of the large square; each row or column, i.e. 10 grid squares, is 1 tenth of the large square.)

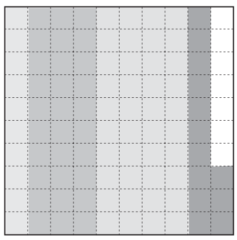
Set a time limit. Ps colour as required and complete fractions.

Review with whole class. Ps come to BB or dictate number of grid squares in each colour, explaining reasoning. Class agrees/ disagrees.

What part is not coloured? Show me . . . now! ($\frac{7}{100}$)

Ps answering correctly explain how they got their answer. Who did the same? Who did it another way? If a P used a calculation, ask him/her to show it on BB, otherwise T shows it, with Ps' help.

Solution:



$\frac{1}{10} = \frac{\mathbf{10}}{100}$

$\frac{2}{5} = \frac{\mathbf{4}}{10} = \frac{\mathbf{40}}{100}$

BB: Part not coloured:

$$1 - \left(\frac{10}{100} + \frac{30}{100} + \frac{40}{100} + \frac{13}{100}\right) = 1 - \frac{93}{100} = \frac{7}{100}$$

35 min

Notes:

Individual work, monitored (helped)

Grid drawn on BB or use enlarged copy master or OHP

Initial whole class discussion on large square.

Praise all valid comments.

Differentiation by time limit

Discussion, reasoning, agreement, self-correction, praising

In unison (on slates or scrap paper)

(Most Ps will probably have counted the *white* grid squares but this deserves praise too.)

Compare other fractions with hundredths. e.g.

$\frac{1}{10} = \frac{10}{100}$; $\frac{1}{5} = \frac{20}{100}$;

$\frac{1}{2} = \frac{50}{100}$; $\frac{1}{4} = \frac{25}{100}$;

$\frac{1}{20} = \frac{5}{100}$; $\frac{1}{25} = \frac{4}{100}$

(numerator and denominator multiplied by the same number)

8

Book 5, page 22

Q.3 Read: *In your exercise book, calculate these parts of a 72 cm line segment and write the lengths in the boxes.*

How can we work out what 1 sixth of the line is? (Divide 72 cm by 6) If class is not very able, deal with one part at a time, otherwise set a time limit.

Review with whole class. Ps come to BB or dictate calculations to T, explaining reasoning. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected.

Solution:

a) $\frac{2}{6}$ of 72 cm $= 72 \text{ cm} \div 6 \times 2 = 12 \text{ cm} \times 2 = \underline{24 \text{ cm}}$

b) $\frac{5}{6}$ of 72 cm $= 72 \text{ cm} \div 6 \times 5 = 12 \text{ cm} \times 5 = \underline{60 \text{ cm}}$

c) $\frac{9}{6}$ of 72 cm $= 72 \text{ cm} \div 6 \times 9 = 12 \text{ cm} \times 9 = \underline{108 \text{ cm}}$

40 min

Notes:

Individual work, monitored, helped

Differentiation by time limit

Discussion, reasoning, agreement, self-correction, praising

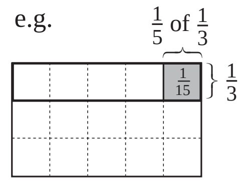
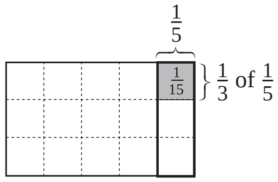
Or

a) $\frac{2}{6} = \frac{1}{3}$, $72 \text{ cm} \div 3 = \underline{24 \text{ cm}}$

c) $\frac{9}{6} = \frac{3}{2} = 1\frac{1}{2}$

$72 \text{ cm} + 72 \text{ cm} \div 2 = 72 \text{ cm} + 36 \text{ cm} = \underline{108 \text{ cm}}$

Bk5		*Lesson Plan 22*

Activity		*Notes*
9	***Book 5, page 22, Q.4*** Read: *Write an operation for each part. Give the answer as a fraction or a whole number.* T (P) reads each part and Ps come to BB to write operation and answer, explaining reasoning. Class agrees/disagrees. If problems, show on diagram drawn on BB. *Solution:* a) One seventh of three units: $3 \div 7 = \dfrac{3}{7}$ b) The ratio of 3 to 10: $3 \div 10 = \dfrac{3}{10}$ c) $\dfrac{3}{4}$ of 100: $100 \div 4 \times 3 = 25 \times 3 = \underline{75}$ d) The ratio of 15 to 8: $15 \div 8 = \dfrac{15}{8} = 1\dfrac{7}{8}$ e) 1 fifth of 1 third of 1 unit: $1 \div 3 \div 5 = \dfrac{1}{3} \div 5 = \dfrac{5}{15} \div 5 = \dfrac{1}{15}$ f) 1 third of 1 fifth of 1 unit: $1 \div 5 \div 3 = \dfrac{1}{5} \div 3 = \dfrac{3}{15} \div 3 = \dfrac{1}{15}$ g) 32 divided by 100: $32 \div 100 = \dfrac{32}{100} = \dfrac{16}{50} = \dfrac{8}{25}$	Whole class activity (or individual trial first if Ps wish) Written on BB or SB or OHT At a good pace Discussion, reasoning, agreement, (self-correction), praising T guides Ps thinking if they are stuck. BB: e.g. e)  f) 

45 min

Bk5

R: Fractions. Mental calculation
C: Decimals: interpretation and construction
E: Quantities and decimals

Lesson Plan 23

Activity		*Notes*

1

Fractions in tens

T has rectangle drawn (stuck) on BB and Ps have copies on desks too. Elicit that the rectangle has been divided into 10 equal parts.

T gives instructions. Ps come to BB and rest of class work in *Ex. Bks*.

a) Colour $\frac{1}{10}$ of its area in *yellow.* b) Draw dots in $\frac{1}{5}$ of its area.

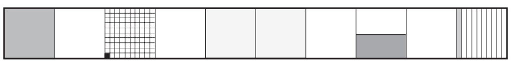
c) Colour $\frac{1}{20}$ of its area in *blue*. d) Colour $\frac{1}{100}$ of its area in *red*.

e) Colour $\frac{1}{1000}$ of its area in *black*.

(Ps might have difficulty with this, so discuss at BB first before Ps colour sheets.)

BB: e.g.

a) e) b) c) d)



$\frac{1}{10}$ $\frac{1}{1000}$ $\frac{1}{5} = \frac{2}{10}$ $\frac{1}{20}$ $\frac{1}{100}$

Notes: Whole class activity but individual work at same time

Drawn on BB or use enlarged copy master or OHP

Elicit that:

b) $\frac{1}{5} = \frac{2}{10}$

c) $\frac{1}{20} = \frac{5}{100} = \frac{1\text{ half}}{10}$

d) $\frac{1}{100} = \frac{1}{10}$ of $\frac{1}{10}$

e) $\frac{1}{1000} = \frac{1}{10}$ of $\frac{1}{100}$

$= \frac{1}{10}$ of $\frac{1}{10}$ of $\frac{1}{10}$

5 min

2

Missing numbers.

Let's fill in the numbers missing from the boxes. Ps come to BB to write numbers, explaining reasoning. Class points out errors and reads each completed equation aloud in unison. T helps Ps with reasoning of last 3 rows.

BB:

1 m = $\boxed{100}$ cm   1 m = $\boxed{1000}$ mm   1 km = $\boxed{1000}$ m   1 cm = $\boxed{10}$ mm

1 cm = $\boxed{\frac{1}{100}}$ m   1 mm = $\boxed{\frac{1}{1000}}$ m   1 m = $\boxed{\frac{1}{1000}}$ km   1 mm = $\boxed{\frac{1}{10}}$ cm

1 kg = $\boxed{1000}$ g   1 litre = $\boxed{100}$ cl   1 litre = $\boxed{1000}$ ml   1 cl = $\boxed{10}$ ml

1 g = $\boxed{\frac{1}{1000}}$ kg   1 cl = $\boxed{\frac{1}{100}}$ litre   1 ml = $\boxed{\frac{1}{1000}}$ litre   1 ml = $\boxed{\frac{1}{10}}$ cl

1 cm^2 = $\boxed{100}$ mm^2 1 m^2 = $\boxed{10\,000}$ cm^2 1 m^2 = $\boxed{1\,000\,000}$ mm^2

1 mm^2 = $\boxed{\frac{1}{100}}$ cm^2 1 cm^2 = $\boxed{\frac{1}{10\,000}}$ m^2 1 mm^2 = $\boxed{\frac{1}{1\,000\,000}}$ m^2

1 km^2 = $\boxed{1\,000\,000}$ m^2 1 m^2 = $\boxed{\frac{1}{1\,000\,000}}$ km^2

Notes: Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

BB: 1 000 000 = 1 million

$\frac{1}{1\,000\,000}$ = 1 millionth

Ps copy above in *Ex. Bks*.

Elicit that 1 million (millionth) has 6 zeros .

10 min

3

Place-value 1

The length of a line segment is 76 mm. Let's complete the sentences.

Ps come to BB to fill in the numbers and explain the statements. Class agrees/disagrees. Class reads completed statements in unison, with T's help.

BB: 76 mm   a) If the unit is 1 cm, the length is:

$$\boxed{7\text{ cm } 6\text{ mm}} = \left(7 + \frac{6}{10}\right)\text{ cm} = \underline{7.6\text{ cm}}$$

b) If the unit is 1 m, the length is:

$$\boxed{0}\text{ m }\boxed{07}\text{ cm }\boxed{6}\text{ mm} = \left(0 + \frac{0}{10} + \frac{7}{100} + \frac{6}{1000}\right)\text{ m}$$

$$= \left(0 + \frac{76}{1000}\right)\text{ m} = \underline{0.076\text{ m}}$$

Notes: Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

i.e. 7 whole cm + 6 tenths of a cm

T helps with reasoning of b).

i.e. 0 whole metres and 76 thousandths of a metre

Bk5		*Lesson Plan 23*

Activity		***Notes***
3	(Continued) Let's show the lengths in a place-value table. Ps come to BB to write 76 mm (7.6 cm, 0.076 m) in correct place in table, explaining reasoning. Class agrees/disagrees. Elicit that the thick vertical line in the table separates the whole units from the parts of a unit and so does the decimal point in a decimal number.	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, praising

BB:

. . .	Thousands	Hundreds	Tens	Units	tenths	hundredths	thousandths	. . .	
			7	6					mm
				7	6				cm
				0	0	7	6		m
		3	2	5					cl
				3	2	5			litres

Let's do the same with another unit of measure. Who can write 325 cl in the table? Who can write it in the table in litres? Who can write it as a mixed number? Who can write it as a decimal? Ps come to BB one after the other to complete rows in table and write the amount in different forms, explaining reasoning.

Elicit that 3.25 litres means 3 whole litres and 25 hundredths of a litre.

Notes: BB: 325 cl = 3 litres + 25 cl

$$= \left(3 + \frac{25}{100}\right) \text{ litres}$$

$$= \underline{3.25 \text{ litres}}$$

Extension

T tells class that in several European countries, they use units that we do not use in this country. T writes them on BB and asks Ps what they think they mean. Where would we write them in the table?

BB: decimetre (dm)	(1 tenth or 0.1 of a metre)
decilitre (dl)	(1 tenth or 0.1 of a litre)
dekagram (dag)	(10 grams), etc.

Notes: BB: e.g.
76 mm = 7.6 cm = 0.76 dm
325 cl = 32.5 dl = 3.25 litres
325 g = 32.5 dag
(Some Ps might remember these units from Y4.)

15 min

4 **Place-value 2**

Let's read the numbers I have written in this table; T chooses Ps to read each number. (Accept 3704 and 3 hundredths but ask who can read it another way, i.e. as a decimal.) Who could write the numbers on the BB? Who agrees? Ps write numbers in *Ex. Bks* too.

Notes: Whole class activity
Drawn on BB or use enlarged copy master or OHP
Read as:
'three thousand, seven hundred and four point zero three'
'one thousand and fifth-three point one two' (not 'twelve'!)
Elicit that the decimal point separates the whole number from the part of a number.

BB:

	1000	100	10	1	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$		
. . .	Thousands	Hundreds	Tens	Units	tenths	hundredths	thousandths	. . .	
	3	7	0	4	0	3			3704.03
	1	0	5	3	1	2			1053.12

Let's show what each number really means. T starts and Ps continue.

BB: $3 \times 1000 + 7 \times 100 + 0 \times 10 + 4 \times 1 + 0 \times \frac{1}{10} + 3 \times \frac{1}{100}$

$= \underline{3704.03}$

$1 \times 1000 + 0 \times 100 + 5 \times 10 + 3 \times 1 + 1 \times \frac{1}{10} + 2 \times \frac{1}{100}$

$= \underline{1053.12}$

Notes: Ps come to BB or dictate to T. Agreement, praising

T (or P) dictates other numbers and Ps come to BB to write in table. Class points out errors. T points to certain digits and Ps say their place value and real value. (e.g. the digit '5' above has place-value 5T and real value 50)

Notes: Agreement, (correcting), praising

20 min

Bk5

Lesson Plan 23

Activity

5

Book 5, page 23

Q.1 Read: *Write the decimal numbers in the place-value table, then write the numbers as the sum of a whole number and a fraction.*

Elicit what the letters above each column mean. Do first number with whole class first if necessary, then set a time limit.

Review with whole class. Ps rcome to BB in pairs, one to write in table and the other to write the addition on RHS. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

		Th	H	T	U	t	h	th	
a)	16.07			1	6	0	7		$16+\frac{7}{100} = 16\frac{7}{100}$
b)	518.26		5	1	8	2	6		$518+\frac{26}{100} = 518\frac{26}{100} = 518\frac{13}{50}$
c)	1001.108	1	0	0	1	1	0	8	$1001+\frac{108}{1000} = 1001\frac{108}{1000} = 1001\frac{27}{250}$
d)	0.058				0	0	5	8	$0+\frac{58}{1000} = \frac{58}{1000} = \frac{29}{500}$

25 min

Notes

Individual work, monitored (helped)

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Extra praise if Ps simplify fractions without prompting from T.

T chooses Ps to read the numbers aloud.

Praising, encouragement only.

6

Book 5, page 23

Q.2 Read: *Write these numbers as decimals. Do necessary calculations in your exercise book.*

Set a time limit. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. If problems or disagreement, show in place-value table.

Solutions:

a) $\frac{35}{10} = 3.5$ b) $\frac{7}{100} = 0.07$ c) $\frac{1003}{100} = 10.03$

d) $\frac{1003}{10} = 100.3$ e) $\frac{89}{10} = 8.9$ f) $83+\frac{7}{10} = 83.7$

g) $\frac{3}{100} = 0.03$ h) $\frac{68}{100} = 0.68$

i) $\frac{527}{100} = 5.27$ j) $1+\frac{1}{2} = 1+\frac{5}{10} = 1.5$

k) $15+\frac{2}{5} = 15+\frac{4}{10} = 15.4$ l) $\frac{1}{4} = \frac{25}{100} = 0.25$

m) $\frac{6}{20} = \frac{3}{10} = 0.3$ n) $143+\frac{17}{50} = 143+\frac{34}{100} = 143.34$

o) $2\frac{3}{4} = 2\frac{75}{100} = 2.75$

30 min

Notes

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correction, praising

T points to, e.g. d) and f).

What kind of fractions are these? [d) vulgar fraction, as greater than 1;
f) mixed number, i.e. a whole number + a fraction]

Elicit or tell that the fraction line means 'divided by'.

e.g $\frac{35}{10} = 35 \div 10 = 3.5$

T shows:

		T	U	t
			3.	5
1	0	3	5.	0
				5

Bk5

Lesson Plan 28

Activity		***Notes***

7

Book 5, page 23

Q.3 Read: *Write these decimals as fractions.*

Set a time limit. Encourage Ps to simplify fractions if they can.

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. If problems or disagreement, show details in place-value table or on BB.

Solutions:

a) $3.01 = 3\frac{1}{100}$ b) $0.07 = \frac{7}{100}$ c) $103.9 = 103\frac{9}{10}$

d) $0.20 = \frac{20}{100} = \frac{2}{10} = \frac{1}{5}$ e) $20.8 = 20\frac{8}{10} = 20\frac{4}{5}$

f) $101.101 = 101\frac{101}{1000}$ g) $30.3 = 30\frac{3}{10}$

h) $1614.85 = 1614\frac{85}{100} = 1614\frac{17}{20}$

Notes:

Individual work, monitored helped

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

Details: e.g.

$3.01 = 3 + \frac{0}{10} + \frac{1}{100}$

$= 3 + \frac{1}{100} = 3\frac{1}{100}$

If Ps do not simplify, T asks whether the numerator and denominator can be reduced.

35 min

8

Find the mistakes

I asked four Ps in Y4 to say these numbers, then I wrote down what they said. Were they correct? What do you think?

T chooses Ps come to BB to say whether a number is correct or to mark the mistakes. Class agrees/disagrees.

BB:

hundredths

a) 72.07 Seventy-two whole units and 7 <u>tenths</u> of a unit ✗

b) 1472.1 One thousand, four hundred and seventy two point one ✓

c) 804.007 Eight hundred and four whole units and 7 <u>hundredths</u> ✗

thousandths

d) 803.007 Eight hundred and three point <u>seven</u> ✗

zero zero seven

Notes:

Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

Show details on BB if Ps disagree or are unsure, e.g

d) 803.007 =

$803 + \frac{0}{10} + \frac{0}{100} + \frac{7}{1000}$

37 min

9

Book 5, page 23

Q.4 Read: *Express these measures as decimals.*

Quick review of revision of relationships first if necessary.
Set a time limit. Ps can do calculations in *Ex. Bks.*

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. If problems or disagreement, show details on BB.

Solution:

a) 1 cm = <u>0.01</u> m b) 3 m 5 cm = <u>3.05</u> m

c) 10 g = <u>0.01</u> kg d) 2 m 12 mm = <u>201.2</u> cm = <u>2.012</u> m

e) 58 litres 18 cl = <u>58.18</u> litres f) 28 kg 300 g = <u>28.3</u> kg

g) 3 hours 6 minutes = $(3 + \frac{6}{60} = 3 + \frac{1}{10} = \underline{3.1})$ hours

Extension

Extra question written on BB for quick Ps.

h) 36 hours = $(1\frac{12}{24} = 1\frac{1}{2} = 1\frac{5}{10} = \underline{1.5})$ days

Notes:

Individual work, monitored, helped

(or whole class activity if time is short)

Written on BB or SB or OHT

Differentiation by time limit

Reasoning, agreement, praising

Details: e.g.

58 litres 18 cl

$= 58$ litres $+ \frac{18}{100}$ of a litre

$=$ <u>58.18</u> litres

42 min

Bk5		*Lesson Plan 23*
Activity		***Notes***
10	***Book 5, page 23, Q.5*** Read: *Express these amounts as:* *a) decimals, b) pounds and pence.* T chooses a P to come to front of class and be the teacher. P reads the amount, e.g. 'What is £23 31 p in pounds? Show me . . . now!' P reading the question says which response is correct and why. Mistakes discussed and written correctly in *Pbs*. Use a different P for each question. *Solution:* a) i) £2.31 p = <u>£2.31</u> ii) 1810 p = <u>£18.10</u> iii) £61 50 p = <u>£61.50</u> (not £61.5)* iv) 44 999 p = <u>£449.99</u> b) i) £18.04 = <u>£18 4 p</u> ii) 6549 p = <u>£65 49 p</u> * T reminds class that it is usual to write £s using 2 decimal digits to show the hundredths (i.e. the pence). *45 min*	Whole class activity (or individual work if Ps wish) In unison, on scrap paper or slates In good humour! Reasoning, agreement, praising Elicit that: BB: £1 = 100 p; 1 p = £$\frac{1}{100}$ = £0.01

Bk5	R: Fractions. Mental calculation **C: Decimals. Number line. (Simplification, expansion)** *E: Equivalence between decimal and fraction forms*	*Lesson Plan 24*

Activity | | **Notes**

1

Reading and writing decimals

a) T says some decimal numbers. Ps come to BB to write them in place-value table. Class points out errors. (e.g. 40.2, 182.07, 2300.012, etc.)

(T could ask a P to say a number and T could write it incorrectly in the table in the hope that Ps will notice and correct the mistake. Extra praising if they do.)

BB:

TTh	Th	H	T	U	t	h	th

b) T has some decimal numbers already written in place-value table. T chooses individual Ps to read some, some read by whole class, some by only boys (girls). Class points out errors.

Ps could write own numbers and choose other Ps to read them.

T points to certain digits and asks Ps to give their place value and real value.

BB:

TTh	Th	H	T	U	t	h	th
		1	4	1	0	7	
	1	8	0	2	2	4	1
1	2	0	0	7	6	1	
			7	0	5	1	0
	8	0	4	0	7		

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement, praising

In good humour!

Ask Ps to explain the meaning of certain digits, especially those on RHS of decimal point.

Agree that, e.g.

$70.510 = 70.51$

$= 70\,\frac{51}{100} = 70\,\frac{510}{1000}$

Praising, encouragement only.

5 min

2

Quantities as decimals

Let's express these quantities as decimals. Ps come to BB to fill in missing decimals, explaining reasoning. Class points out errors. Accept end zeros in decimal parts but elicit that they are not needed. Show on place-value table and/or as fractions if problems or disagreement.

BB:

a) 7 litres 7 cl = $\boxed{7.07}$ litres b) 81 m 30 cm = $\boxed{81.3(0)}$ m

c) 6 km 70 m = $\boxed{6.07(0)}$ km d) 7 m 520 mm = $\boxed{7.52(0)}$ m

e) 8 kg 17 g = $\boxed{8.017}$ kg f) 38 kg 600 g = $\boxed{38.6(00)}$ kg

g) 6 h 12 min = $\boxed{6.2}$ h h) 2 h 48 min = $\boxed{2.8}$ h

Notes: Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

Details: e.g.

7 cl = ($\frac{7}{100}$ = 0.07) litres

12 min = ($\frac{12}{60} = \frac{2}{10}$ = 0.2) h

10 min

3

Conversion of units of measure

Think of other ways to write these quantities. Ps come to BB or dictate to T, explaining reasoning.. Class agrees/disagrees or suggests a different way. Accept any valid form, including decimals and fractions.

BB: e.g.

a) 685 cl = (6 litres 85 cl) b) 850.6 kg = (850 kg 600 g)

c) 40.05 ℓ = (40 ℓ 5 cl) d) 4.2 m = (4 m 20 cm = 4 m 200 mm)

e) 5.02 ℓ = (5 ℓ 2 cl = 5 ℓ 20 ml) f) 6.4 km = (6 km 400 m)

g) £120.50 = (£120 50 p) h) £3.70 = (£3 70 p = 370 p)

Notes: Whole class activity

Written on BB or SB or OHT

At a good pace

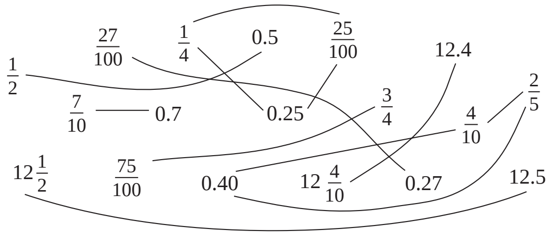
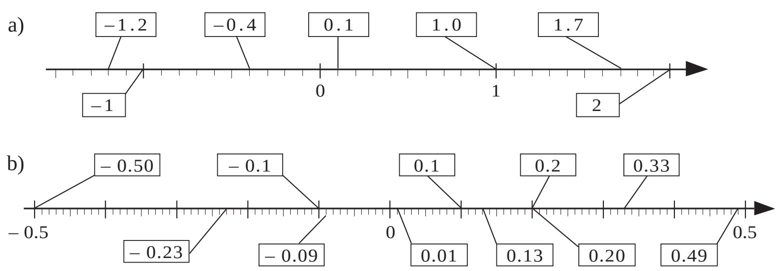
Reasoning, agreement, praising

Elicit that when dealing with money, it is usual to write <u>two</u> decimal digits, writing 0 in the hundredths column when necessary to show the pence.

15 min

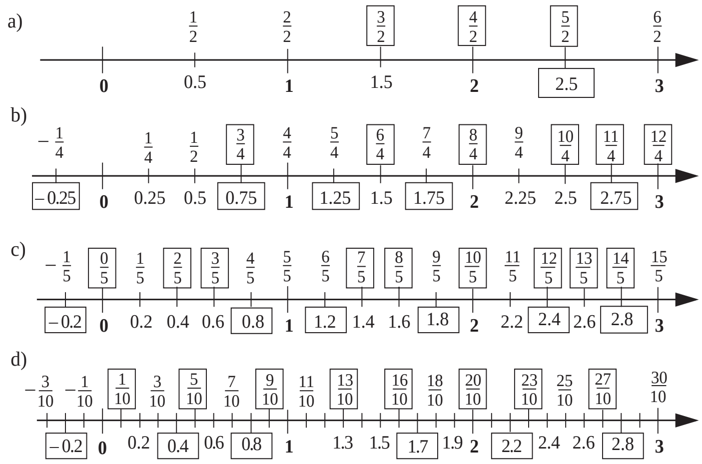
Bk5

Lesson Plan 24

Activity		***Notes***
4	**Addition and subtraction of decimals** Let's calculate these quantities. What should we do first? (Change the quantities to the same form.) Ps come to BB to rewrite the quantities, then do the calculation. Class agrees/disagrees. Who can think of another way to do it? Who can think of a context for the calculation? Class decides whether or not it is valid. BB: e.g. a) 6 kg 420 g + 5.10 kg = (6 kg 420 g + 5 kg 100 g = 11 kg 520 g) or = (6.420 kg + 5.100 kg = 11.520 kg) or = (6.42 kg + 5.10 kg = 11.52 kg) b) $4\frac{1}{2}$ m + 5 m 42 cm – 1.20 m = (4.50 m + 5.42 m – 1.20 m = 9.92 m – 1.20 m = <u>8.72 m</u>), etc. c) 4 litres 6 cl – 4.20 litres = (4.06 litres – 4.20 litres = – 0.14 litres) (Agree that it is impossible to make up a context for this, as the calculation and result makes no sense in real life!) d) 5.91 km + 6 litres 90 cl = ($\neq$) (Agree that it is impossible to add different types of measures!) *18 min*	Whole class activity Written on BB or SB or OHT At a good pace Reasoning, agreement, praising Accept any valid calculation T points out that, e.g. 6.420 = 6.42 5.10 = 5.1 1.20 = 1.2, etc. so end zero is superfluous. (or Ps write $\neq$) In good humour! Extra praise for Ps who notice the impossibilities. Stress the importance of visualising real-life contexts.
5	**Equal values** Let's join up the equal numbers Ps come to BB to draw joining lines and explain reasoning. Class agrees/disagrees. BB:  Which is the greatest (smallest) number? (12.5, 0.25) Ask Ps to show where some of the numbers would be on the class number line. *22 min*	Whole class activity Written (stuck) on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, praising (Positions need only be appoimate.)
6	**Number line** Let's join the numbers to the corresponding points on the number lines. Ps come to BB to draw joining lines, explaining reasoning. T helps with reading and findng the positions of negative decimals. BB:  *26 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP If possible, Ps have copies of number lines on desks too. Elicit that number line: a) has ticks at every tenth; b) has ticks at every hundredth At a good pace Reasoning, agreement, praising

Bk5

Lesson Plan 24

Activity		Notes
7	***Book 5, page 24*** Q.1 Read: *Fill in the missing numbers.* Deal with one number line at a time or set a time limit. Warn Ps to be careful in part d) as the missing fractions and decimals do not correspond. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*  *32 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP (Less able Ps could have enlarged copies too.) Discussion, reasoning, agreement, self-correction, praising **Extension** Ps find equal numbers. e.g. $\frac{1}{2} = 0.5 = \frac{2}{4} = \frac{5}{10}$ $\frac{1}{5} = \frac{2}{10} = 0.2$ $\frac{3}{2} = 1\frac{1}{2} = 1.5 = \frac{6}{4}$ $= 1\frac{2}{4} = \frac{15}{10}$, etc.
8	***Book 5, page 24*** Q.2 Read: *Write the decimals as fractions with denominator 100. Fill in the missing signs.* Set a time limit. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) $0.6\ \boxed{>}\ 0.06$ $\frac{\boxed{60}}{100}\ \boxed{>}\ \frac{\boxed{6}}{100}$ b) $0.7\ \boxed{=}\ 0.70$ $\frac{\boxed{70}}{100}\ \boxed{=}\ \frac{\boxed{70}}{100}$ c) $0.12\ \boxed{>}\ 0.1$ $\frac{\boxed{12}}{100}\ \boxed{>}\ \frac{\boxed{10}}{100}$ d) $1.03\ \boxed{<}\ 1.04$ $\frac{\boxed{103}}{100}\ \boxed{<}\ \frac{\boxed{104}}{100}$ or $1\frac{3}{100} < 1\frac{4}{100}$ e) $0.04\ \boxed{<}\ 0.3$ $\frac{\boxed{4}}{100}\ \boxed{<}\ \frac{\boxed{30}}{100}$ f) $2.3\ \boxed{>}\ 2.29$ $\frac{\boxed{230}}{100}\ \boxed{>}\ \frac{\boxed{229}}{100}$ or $2\frac{30}{100} > 2\frac{29}{100}$ *36 min*	Individual work, monitored, helped Written on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Elicit: e.g. a) $0.6 = \frac{6}{10} = \frac{60}{100}$ c) $0.1 = \frac{1}{10} = \frac{10}{100}$, etc. and mixed numbers in d) and f), as shown.

Bk5		*Lesson Plan 24*
Activity		***Notes***
9	***Book 5, page 24*** Q.3 Read: *Write three numbers which are between each given pair.* Ps can use *Ex. Bks* if they need more room. Set a time limit. Review with whole class. Ps dictate to T. Who agrees? Who wrote another number? Deal with all cases. Correct numbers confirmed and invalid numbers shown to be wrong on class number line. Mistakes corrected. *Solution:* (many numbers are possible) e.g. a) 5.3 < <u>5.37</u> < <u>5.4</u> < <u>5.49</u> < 5.5 b) 0.6 < <u>0.62</u> < <u>0.65</u> < <u>0.68</u> < 0.7 c) 1.9 < <u>1.92</u> < <u>1.96</u> < <u>1.99</u> < 2 d) 1.5 < <u>1.501</u> < <u>1.505</u> < <u>1.507</u> < 1.51 T points to a number and Ps give it as a fraction or mixed number. *40 min*	Individual work, monitored, part d) helped Written on BB or SB or OHT Discussion, demonstration, agreement, self-correction, praising Extra praise if Ps wrote 3 digits after the decimal point in a) to c). e.g. 5.3 < <u>5.333</u> and a round of applause for Ps who wrote 4 decimal digits in d). Feedback for T
10 **Extension**	***Book 5, page 24, Q.4*** Read: *Write the numbers in increasing order.* Ps dictate to T who writes on BB. Class points out errors Ps write in *Pbs* at same time. Show on relevant segement of number line roughly drawn on BB if problems or disagreement. BB: a) 0.2 < 0.202 < 2.002 < 2.02 < 2.22 < 20.02 < 20.2 < 202.2 b) – 10.1 < – 1.11 < – 1.1 < – 1.01 < – 1 < 0.001 < 0.1 < 1.11 T points to a number and Ps give it as a fraction or mixed number. T points to two numbers in each part and Ps say how many units apart they are on the number line. *45 min*	Whole class activity (or individual trial first, monitored, helped) Written on BB or SB or OHT Reasoning, agreement (self-correction) praising At speed, in good humour! e.g. 2.02 and 20.2 (18.18) – 1.1 and 0.1 (1.2)