Bk4

R: Natural numbers, fractions and decimals
C: Practice: addition, subtraction, multiplication, division
E: Problems

Lesson Plan *89*

Activity		*Notes*
1	**Multiplication and division** a) T asks individual Ps to recite one of the multiplication tables. Class points out errors or missed facts. e.g. P_1: 0 × 0 = 0, 0 × 1 = 0, 0 × 2 = 0, . . ., 0 × 12 = 0 P_2: 5 × 0 = 0, 5 × 1 = 5, 5 × 2 = 10, . . . , 5 × 11 = 55 P_3: 9 × 0 = 0, 9 × 1 = 9, 9 × 2 = 18, . . ., 9 × 11 = 99 etc. b) T says a multiplication or division, Ps give the result. e.g. 5 × 7, 8 × 4, 0 × 11, 9 × 9, 20 × 5, 10 × 100, etc. 56 ÷ 8, 45 ÷ 9, 24 ÷ 3, 0 ÷ 9 (= 0), 7 ÷ 1, 120 ÷ 10, 99 ÷ 11, 8 ÷ 0 (impossible), etc. c) Ps think of the multiplications or divisions and choose other Ps to give the result. *6 min*	Whole class activity T chooses the tables and Ps at random, but cover all up to 11. At speed Extra praise if Ps go beyond 11 voluntarily! At speed in order round class If a P makes a mistake, the next P must correct it. At speed. In good humour! Class points our errors or duplications.
2	***Book 4, page 89*** Q.1 Read: *Complete the multiplication table. Make sure that you know it by heart.* Set a time limit. Calculations for 2-digit numbers can be written in space beside table in *Pbs* or in *Ex. Bks*. If you finish early, close your eyes and practise the multiplication tables in your head. Review at BB with whole class. Ps dictate to T, reasoning the facts beyond 10 × 10. e.g. BB: 11 × 12 = 10 × 12 + 1 × 12 = 120 + 12 = 132 or 11 × 12 = 11 × 10 + 11 × 2 = 110 + 22 = 132 Class points out errors and Ps correct their mistakes. *Solution:*	Individual work, monitored (Less able Ps helped) Table drawn on BB or use enlarged copy master or OHP Slower Ps can finish it at home! Or T has solution already prepared and uncovers each table as it is dealt with. Reasoning, agreement, self-correction, praising Feedback for T Encourage Ps to learn by heart at home the tables that they are unsure about. **Bold** numbers are missing.

×	0	1	2	3	4	5	6	7	8	9	10	11	12	13
0	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**	13
2	0	2	4	**6**	**8**	10	12	**14**	**16**	18	**20**	**22**	24	**26**
3	**0**	**3**	6	**9**	**12**	**15**	18	**21**	**24**	27	**30**	33	**36**	**39**
4	**0**	**4**	8	12	**16**	**20**	24	28	**32**	36	40	**44**	**48**	**52**
5	0	**5**	**10**	15	20	**25**	**30**	35	40	**45**	**50**	55	**60**	**65**
6	**0**	6	**12**	**18**	24	30	**36**	**42**	48	**54**	**60**	66	**72**	78
7	0	**7**	14	21	**28**	**35**	42	49	**56**	63	70	**77**	84	**91**
8	0	**8**	**16**	24	32	**40**	**48**	**56**	**64**	**72**	80	**88**	**96**	104
9	**0**	9	18	**27**	**36**	45	**54**	**63**	72	**81**	**90**	99	**108**	**117**
10	0	**10**	**20**	30	**40**	**50**	60	70	**80**	**90**	**100**	**110**	**120**	130
11	0	**11**	22	**33**	**44**	**55**	**66**	77	**88**	**99**	110	**121**	**132**	**143**
12	**0**	12	**24**	**36**	48	**60**	72	**84**	**96**	**108**	**120**	**132**	**144**	**156**
13	0	**13**	**26**	39	**52**	65	**78**	**91**	**104**	117	**130**	**143**	**156**	**169**

Extension	T shows how to write the multiplication of 2-digit numbers vertically, explaining reasoning in detail with place-values first. Then Ps come to BB or dictate what T should write in another example. T: BB: H T U T U 1 3 × 1 2 2 6 1 3 or 1 5 6 1 3 × 1 2 2 6 1 3 0 1 5 6 Ps: H T U T U 2 5 × 1 2 5 0 2 5 or 3 0 0 2 5 × 1 2 5 0 2 5 0 3 0 0 *18 min*	Whole class activity This is just to familiarise Ps with the layout. Do not expect Ps to learn it yet. Details, e.g. 2U × 3U = 6U, 2U × 1T = 2T 1T × 3U = 3T, 1T × 1T = 1H 2U × 5U = 10U = 1T + 0U 2U × 2T = 4T, 4T + 1T = 5T 1T × 5U = 5T, 1T × 2T = 2H

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Bk4

Lesson Plan 89

Activity		*Notes*
3	**Mental addition and subtraction** T says an addition or subtraction. Ps give the result by saying the interim steps. Class points out errors. e.g. 137 + 28 = (157 + 8 = 165) 218 – 33 = (188 – 3 = 185) 1276 + 85 (= 1356 + 5 = 1361) 972 – 146 (= 872 – 46 = 832 – 6 = 826) 6230 + 1840 (= 7230 + 840 = 8030 + 40 = 8070) 3810 – 270 (= 3610 – 70 = 3540), etc. *24 min*	Whole class activity Write the more difficult operations on BB. At a good pace Allow less able Ps to write the numbers and results of each step in their *Ex. Bks* (or on scrap paper or slates). Reasoning, agreement, praising
4	**Sequences** T says the first 3 terms of a sequence and writes them on BB too. Ps continue the sequence for 3 more terms in their *Ex.Bks*. **A**, what sequence did you write? What rule did you use? Who did the same? Who used a different rule? etc. Deal with all cases. a) 8.70, 7.20, 5.70, (4.20, 2.70, 1.20) *Rule*: – 1.50 b) 0.1, 0.2, 0.4, (0.7, 1.1, 1.6) 0.1 0.2 0.3 0.4 0.5 *Rule*: Difference between terms is increasing by 0.1. or 0.1, 0.2, 0.4, (0.8, 1.6, 3.2) *Rule*: × 2 c) $5\frac{1}{4}$, 5, $4\frac{3}{4}$, ($4\frac{1}{2}$, $4\frac{1}{4}$, 4) Rule: $-\frac{1}{4}$ d) $\frac{2}{7}$, $\frac{5}{7}$, $1\frac{1}{7}$, ($1\frac{4}{7}$, 2, $2\frac{3}{7}$) *Rule:* $+\frac{3}{7}$ *30 min*	Individual work, monitored Less able Ps helped Deal with one at a time. Discussion, reasoning, agreement, self-correction, praising Accept any correctly reasoned rules and terms. **Extension** Ps give 3 more terms orally for each rule and T adds them to sequences on BB.
5	***Book 4, page 89*** Q.2 Read: *Practise addition and subtraction*. Ps may write the interim steps or do the calculations vertically in *Ex. Bks* if there is no room in *Pbs*. Set a time limit. Review orally with the whole class. Ps dictate their results, giving reasoning where relevant. Who agrees? Who did it another way? etc. Mistakes discussed and corrected. *Solution:* e.g. a) 567 + 58 = 617 + 8 = 625 b) 4400 + 3800 = 7400 + 800 = 8200 c) 603 – 240 = 403 – 40 = 363 d) 8370 – 1370 = 7000 e) 520 + 1400 – 360 = 1920 – 360 = 1620 – 60 = 1560 f) 6500 – 2700 + 4100 = 10 600 – 2700 = 8600 – 700 = 7900 g) $\frac{1}{10}+\frac{3}{10}+\frac{5}{10}-\frac{2}{10}=\frac{9}{10}-\frac{2}{10}=\frac{7}{10}$ h) 0.8 + 0.7 – 0.3 = 1.5 – 0.3 = 1.2 i) $\frac{4}{7}+\frac{6}{7}+\frac{5}{7}=\frac{15}{7}=2\frac{1}{7}$ j) 6.4 – 1.5 + 10.1 = 4.9 + 10.1 = 15 *36 min*	Individual work, monitored, helped for g) and i) Written on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising Accept any valid method which gives the correct result. Feedback for T

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Bk4		*Lesson Plan 89*
Activity		***Notes***
6	***Book 4, page 89*** Q.3 Read: *Practise multiplication*. Let's see if you can do these in 2 minutes! Start . . now! . . . Stop! Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Show as long multiplication if there are problems. *Solution:* a) 2306 × 4 = 9224 (carries: 1, 2) b) 435 × 10 = 4350 c) 1331 × 6 = 7986 (carries: 1, 1) d) 978 × 9 = 8802 (carries: 7, 7) *40 min*	Individual work, monitored (helped) Written on BB or use enlarged copy master or OHP Reasoning with place values, agreement, self-correction, praising Feedback for T
7	***Book 4, page 89*** Q.4 Read: *Practise division*. Let's see if you can do these in 2 minutes! Start . . now! . . . Stop! Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Show as long division if there are problems. Ps check each result with a multiplication on the BB. *Solution:* a) 8643 ÷ 8 = 803 (carry: 2) b) 3419 ÷ 3 = 1395 r 1 (carries: 1, 2, 1, 1) c) 7333 ÷ 7 = 476 r 1 (carries: 5, 4, 4) *Check:* a) 803 × 8 = 6424 ✔ (carry: 2) b) 1395 × 3 + 1 = 4186 ✔ c) 476 × 7 + 1 = 3333 ✔ *45 min*	Individual work, monitored (helped) Written on BB or use enlarged copy master or OHP Reasoning with place values, agreement, self-correction, praising Feedback for T

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Bk4

R: Natural numbers, fractions and decimals
C: Practice: addition, subtraction, muliplication, division
E: Equations, inequalities

Lesson Plan *90*

Activity		*Notes*
1	**Addition**	Whole class activity
	a) Let's add up the first 20 positive, even, whole numbers.	
	Ps dictate the numbers to T who writes as an addition on BB.	In unison
	BB:	
	$2 + 4 + 6 + 8 + 10 + 12 + 14 + 16 + 18 + 20 + 22 + 24 + 26 + 28 + 30 + 32 + 34 + 36 + 38 + 40 = ?$	
	Who can think of an easy way of doing it? T gives hints if Ps have no ideas. e.g.	Some Ps might have the idea of combining numbers to make addition easier.
	1) Add up the first 5 numbers: $2 + 4 + 6 + 8 + 10 = \underline{30}$	If no P has these ideas, T starts the strategy and Ps continue it when they understand.
	The next 5 numbers have the same units digits, but also 5 extra tens, so: $12 + 14 + 16 + 18 + 20 = 30 + 50 = \underline{80}$,	Discussion, reasoning, agreement, praising
	The next 5 numbers have 5 more tens so:	
	$22 + 24 + 26 + 28 + 30 = 80 + 50 = \underline{130}$	
	The final group of 5 numbers will add up to $130 + 50 = \underline{180}$	
	So total sum: $30 + 80 + 130 + 180 = 160 + 260 = \underline{420}$	
	2) Add them in pairs:	
	BB: $2 + 4 + 6 + \ldots + 36 + 38 + 40 = \overbrace{10 \times 42}^{\text{pairs}} = \underline{420}$ (42, 42, 42)	
	or $S = 2 + 4 + 6 + \ldots + 36 + 38 + 40$	Where S is the sum of the 20 numbers.
	$S = 40 + 38 + 36 + \ldots + 6 + 4 + 2$ ↓ adding	
	$2 \times S = 42 + 42 + 42 + \ldots + 42 + 42 + 42$	
	$2 \times S = 20 \times 42 = 2 \times 420 = 840$	
	$1 \times S = 10 \times 42 = \underline{420}$	Agree that $1 \times S = S$
	b) Let's add up the first 20 positive, odd, whole numbers.	
	Ps suggest how to do it. T helps where necessary.	
	BB: $1 + 3 + 5 + \ldots + 35 + 37 + 39 = \overbrace{10 \times 40}^{\text{pairs}} = \underline{400}$ (40, 40, 40)	
	or Each of these 20 numbers is 1 less than the matching number in the previous sum, so $420 - 20 = \underline{400}$	Extra praise if a P thinks of this without help.
	8 min	
2	**Fractions**	Whole class activity but individual calculation
	T asks for a fraction of 200 m. Ps show answers on scrap paper or slates.	In unison on command
	P responding correctly explains to Ps who were wrong. Mistakes discussed and corrected. Extra praise if Ps notice connections. e.g. $\frac{1}{25} = \frac{2}{50}$	Encourage mental calculation where possible but more difficult calculations can be written in *Ex. Bks*.
	a) What length is $\frac{1}{100}$ ($\frac{1}{50}, \frac{1}{20}, \frac{1}{5}, \frac{1}{10}, \frac{1}{2}, \frac{1}{25}, \frac{1}{4}$) of 200 m?	Reasoning, agreement, praising
	Answers : (2 m, 4 m, 10 m, 40 m, 20 m, 100 m, 8 m, 50 m)	Ps write details of b) on BB:
	b) What length is $\frac{30}{100}$ ($\frac{7}{50}, \frac{9}{20}, \frac{3}{10}, \frac{2}{5}, \frac{3}{2}, \frac{13}{25}, \frac{3}{4}$) of 200 m?	e.g. 200 m ÷ 100 × 30 = 2 m × 30 = <u>60 m</u>
	Answers: (60 m, 28 m, 90 m, 60 m, 80 m, 300 m, 104 m, 150 m)	
	14 min	

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Bk4

Lesson Plan 90

Activity		*Notes*

3

Problems

Listen carefully to the problem and try to solve it in your *Ex. Bks*. You can discuss it with your neighbour if you wish.

Which digit should be written instead of x in this 4-digit number so that the number is divisible by 18?

Who thinks that they know what to do? T asks several Ps what they think and asks Ps with good ideas to show solution on BB. If Ps do not know, T could start these methods and Ps continue them.

1) The factors of 18 are 1, 2, 3, 6, 9, 18, so if the number is a multiple of 18, it must be divisible by <u>all</u> the factors of 18.

Try $x = 0$: 3450 is divisible by 2, 3 and 6. It is <u>not</u> divisible by 9, so 3450 is <u>not</u> divisible by 18.

Try $x = 1$: 3451 is odd, so is not divisible by 2. Agree that $x = 3$ (5, 7 and 9) are impossible for the same reason.

Try $x = 2$: 3452 is not divisible by 3, so is <u>not</u> divisible by 18.

Try $x = 4$: 3454 is not divisible by 3. so is <u>not</u> divisible by 18.

Try $x = 6$: 3456 is divisible by 2, 3, 6 and 9, so is divisible by 18.

Check:

			1	9	2	
1	8	3	4	5	6	✔
	–	1	8			
		1	6	5		
	–	1	6	2		
				3	6	
			–	3	6	
					0	

Try $x = 8$: 3458 is not divisible by 3, so is <u>not</u> divisible by 18.

2) Show the remainders in a table:

BB:

Remainders after dividing by	3450	3451	3452	3453	3454	3455	3456	3457	3458	3459
2	0	1	0	1	0	1	0	1	0	1
3	0	1	2	0	1	2	0	1	2	0
6	0	1	2	3	4	5	0	1	2	3
9	3	4	5	6	7	8	0	1	2	3

Answer: The only digit which can replace x is 6.

20 min

Whole class activity

Individual (paired) trials first in *Ex. Bks*.

BB: $345x$

Discussion, reasoning, checking, agreement

Praise all positive contributions.

BB: $18 = 2 \times 9 = 3 \times 6$

		3	8	3	r 3
9	3	4	5	0	
		7	3	③	

	1	1	5	0	r 2
3	3	4	5	2	
		1		②	

	1	1	5	1	r 1
3	3	4	5	4	
		1		①	

	1	1	5	2	r 2
3	3	4	5	8	
		1		②	

T starts and Ps dictate to T or come to BB to complete it.

(Or T might allow Ps to use a calculator to check divisiblility.)

Agreement, praising

4

Book 4, page 90

Q.1 Read: *Practise addition*.

I will give you 2 minutes to do these additions and check them. Start . . now! . . . Stop!

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

Solution:

a)

	4	8	2	7
+	3	5	6	2
	8	3	8	9
	1			

b)

	5	0	3	7
+		6	0	6
	5	6	4	3
			1	

c)

	3	3	3	3
		3	3	3
			3	3
+				3
	3	7	0	2
		1	1	

24 min

Individual work, monitored

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Agree that in c) it is quicker to use multiplication.

Extension

Ps finished quickly can add the 3 totals.

	8	3	8	9
	5	6	4	3
+	3	7	0	2
1	7	7	3	4
	1	1	1	

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Bk4

Lesson Plan 90

Activity		*Notes*
5	***Book 4, page 90*** Q.2 Read: *Practise subtraction*. Let's see if you can do these more quickly! Start . . now! . . . Stop! Review at BB with whole class. Ps dictate to T or come to BB. Mistakes discussed and corrected. *Solution:* a) $\begin{array}{rcccc} & 7 & {}^{10}2 & 6 & 8 \\ - & 2_1 & 4 & 2 & 5 \\ \hline & 4 & 8 & 4 & 3 \end{array}$ b) $\begin{array}{rcccc} & 6 & {}^{10}0 & 4 & {}^{10}5 \\ - & {}_1 & 7 & 0_1 & 7 \\ \hline & 5 & 3 & 3 & 8 \end{array}$ c) $\begin{array}{rcccc} & 8 & {}^{10}8 & {}^{10}8 & {}^{10}8 \\ - & {}_1 & 9_1 & 9_1 & 9 \\ \hline & 7 & 8 & 8 & 9 \end{array}$ Which one could be done more quickly mentally? c) $8888 - 999 = 8888 - 1000 + 1 = 7888 + 1 = \underline{7889}$	Individual work, monitored Written on BB or use enlarged copy master or OHP Checking by an addition or another subtraction Reasoning, agreement, self-correction, praising Feedback for T (Or Ps could do Q.1 and Q.2 before reviewing them.)
	28 min	
6	***Book 4, page 90*** Q.3 Read: *Do these calculations in your Ex. Bks and write the results here*. Set a time limit. Ps do the calculations vertically and check them. Remind Ps to line up the equal place values! 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) $\begin{array}{rcccc} & 4 & 8 & 0 & 9 \\ + & 2 & 6 & 1 & 5 \\ \hline & 7 & 4 & 2 & 4 \\ & {\scriptstyle 1} & & {\scriptstyle 1} & \end{array}$ b) $\begin{array}{rcccc} & 7 & {}^{10}4 & {}^{10}2 & 9 \\ - & 5_1 & 8_1 & 4 & 2 \\ \hline & 1 & 5 & 8 & 7 \end{array}$ c) $\begin{array}{rcccc} & 3 & 5 & 8 & 2 \\ & & & 4 & 5 \\ + & & 4 & 2 & 6 \\ \hline & 4 & 0 & 5 & 3 \\ & {\scriptstyle 1} & {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$ d) $\begin{array}{rcccc} & 5 & 0 & 8 & 3 \\ + & & 2 & 0 & 5 \\ \hline & 5 & {}^{10}2 & {}^{10}8 & 8 \\ - & 1_1 & 7_1 & 9 & 3 \\ \hline & 3 & 4 & 9 & 5 \end{array}$ e) $\begin{array}{rcccc} & & 5 & 8 & 3 \\ & & & \times & 9 \\ \hline & 5 & 2 & 4 & 7 \\ & & {\scriptstyle 7} & {\scriptstyle 2} & \end{array}$ f) $\begin{array}{r\|cccc} & & 7 & 0 & 3 \text{ r } 5 \\ \hline 7 & 4 & 9 & 2 & 6 \\ & & & {\scriptstyle 2} & \textcircled{5} \end{array}$	Individual work, monitored (helped) Differentitaion by time limit. Reasoning, checking, agreement, self-correction, praising If problems, ask Ps to give reasoning in detail with place values. **Extension** What could we do with the results? e.g. • List them in order. • Calculate their sum. • Round to nearest 100, 10, etc. • Factorise them. etc.
	34 min	
7	***Book 4, page 90*** Q.4 Read: *Which numbers can be written instead of the letters?* Quickly revise order of operations. Set a time limit. Review at BB with whole class. Ps could show results on scrap paper or slates on command. Ps responding correctly explain at BB to those who were wrong. Class agrees or disagrees. Mistakes discussed and corrected. *Solution:* a) $400 \times 5 + a = 9020$ $2000 + a = 9020$ $a = 9020 - 2000$ $= \underline{7020}$ b) $8 \times (1000 - b) = 4200 + 1400$ $8 \times (1000 - b) = 5600$ $1000 - b = 5600 \div 8 = 700$ $b = 1000 - 700 = \underline{300}$ c) $120 \times 3 - 400 \div 2 \leq 200 - c$ $360 - 200 \leq 200 - c$ $160 \leq 200 - c$ $c \leq 200 - 160 = 40$ c: 40, 39, 38, . . ., →	Individual work, monitored, helped Written on BB or OHT Calculations can be done in *Ex. Bks* if no room in *Pbs*. Differentiation by time limit Reasoning, agreement, self-correction, praising Check by replacing letters in original statements with calculated values. (If c is a whole number.)

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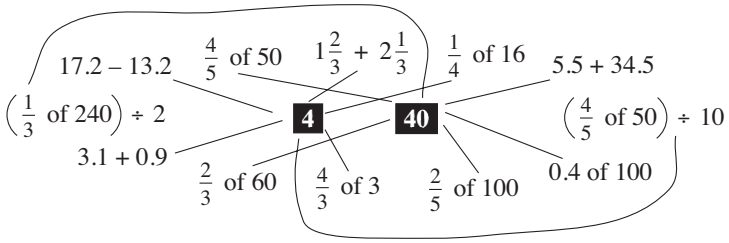
Bk4		*Lesson Plan 90*
Activity		***Notes***
7	(Continued) d) $30 \times 20 + d > 6970$ $600 + d > 6970$ $d > 6970 - 600 = \underline{6370}$ d: 6371, 6372, 6373, . . . (if d is a natural number) e) $4 \times e + 50 = 290$ $4 \times e = 290 - 50 = 240$ $e = 240 \div 4 = \underline{60}$ f) $f \div 11 \geq 5$ $f \geq 5 \times 11 = \underline{55}$ f: 55, 56, 57, . . .	(If f is a natural number.)
	40 min	
8	***Book 4, page 90, Q.5*** Read: *Join up each operation to the matching white number.* Ps come to BB to choose an operation, work out its value and draw a joining line. Class agrees/disagrees. *Solution:*  	Whole class activity (or individual work if Ps wish) Written on BB or use enlarged copy master or OHP At a good pace Calculations done at side of BB if problems or disagreement. Reasoning, agreement, praising
Extension	Ps think of other operations using fractions or decimals which will result in 4 (40).	Extra praise for creativity!
	45 min	

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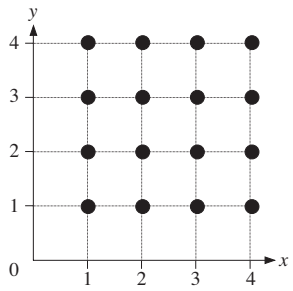
Bk4

R: Natural numbers, fractions and decimals
C: Operations
E: Problems

Lesson Plan *91*

Activity		*Notes*
1	**Factorising** a) Let's show these numbers as the product of their prime factors. BB: 26, 27, 28, 29, 30, 113 Ps come to BB to choose a number and write the multiplication (without drawing a factor tree if possible). Class agrees/disagrees. BB: $26 = 2 \times 13$, $27 = 3 \times 3 \times 3$, $28 = 2 \times 2 \times 7$, 29 is prime, $30 = 2 \times 3 \times 5$, 113 is prime (Elicit that prime numbers are not divisible by 2, 3, 5, 7 or 11) b) Let's list all the factors of these numbers. Ps come to BB to choose a number and list its factors in order, using the prime factors to help them. Class points out errors or missed factors. BB: 26: 1, 2, 13, 26; 27: 1, 3, 9, 27; 28: 1, 2, 4, 7, 14, 28; 29: 1, 29 30: 1, 2, 3, 5, 6, 10, 15, 30; 113: 1, 113	Whole class activity First elicit that a prime number has 2 factors, itself and 1. At a good pace Reasoning, agreement, praising Feedback for T
	6 min	
2	**Coordinates** Let's draw on the grid the dots which have these coordinates. Ps come to BB to point to a set of coordinates and draw the matching dot on the grid. Elicit that the LH number in the brackets is the *x*-coordinate and the RH number is the *y*-coordinate. Class points out errors. BB: A = {1, 2, 3, 4} (1, 1) (1, 2) (1, 3) (1, 4) (2, 1) (2, 2) (2, 3) (2, 4) (3, 1) (3, 2) (3, 3) (3, 4) (4, 1) (4, 2) (4, 3) (4, 4)  Elicit that from a set of 4 numbers, for each of the 4 possible *x*-coordinates, there are 4 possible y-coordinates, so there are $4 \times 4 = 16$ possible dots.	Whole class activity Grid drawn on BB or use enlarged copy master or OHP Revise *x*-axis (horizontal) and *y*-axis (vertical) and what a coordinate is if necessary. Or T just writes *Set A* on BB and Ps first dictate the possible coordinates. At a good pace Agreement, praising Discussion, agreement, praising
Extension	If we added 0 to *Set A*, how many dots would there be? ($5 \times 5 = 25$)	Elicit that 16 and 25 are square numbers. BB: 4^2 16
	10 min	
3	**Addition** How could we add up these numbers more easily? Let's call the sum *S*. BB: $2 + 6 + 18 + 54 + 162 + 486 + 1458 + 4374 + 13\,122 = S$ Ps suggest ways. e.g. using shorter vertical additions. e.g. BB: $\begin{array}{r} 162 \\ 54 \\ 18 \\ 6 \\ +\ \ 2 \\ \hline 242 \end{array}$ $\begin{array}{r} 13122 \\ 4374 \\ 1458 \\ +\ \ 486 \\ \hline 19440 \end{array}$ $\begin{array}{r} 19440 \\ +\ \ 242 \\ \hline 19682 \end{array} = S$ T shows another method.	Whole class activity Ask several Ps what they think. Praise any idea which makes the addition simpler.

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Bk4

Lesson Plan 91

Activity		*Notes*
3	(Continued) Do you notice anything about the terms in the addition? Extra praise if Ps notice that each term is 3 times the previous term We can use this fact to make the addition easier. Otherwise T shows it. BB: $(1\times)\ S = 2 + 6 + 18 + 54 + 162 + 486 + 1458 + 4374 + 13122$ $3 \times S = \quad 6 + 18 + 54 + 162 + 486 + 1458 + 4374 + 13122 + 39366$ $(2 \times S = -2 + 0 + 0 + \ldots \quad + 0 + 0 + 39366)$ Which row is bigger and by how much? Ask several Ps what they think. Agree that the bottom row is bigger because most of the numbers are the same in both additions, so subtracting them would result in 0, but although the top row has an extra 2, the bottom row has an extra 39366. Elicit that the difference between $(1 \times S)$ and $(3 \times S)$ is $(2 \times S)$ and it is equal to $39366 - 2 = 39364$. How can we work out what S is? BB: $2 \times S = 39364$ $1 \times S = 39364 \div 2$ $S = \underline{19\,682}$ $\begin{array}{r} 19682 \\ 2\overline{)39364} \\ 111 \end{array}$	Ps might notice connection after T writes the two additions as opposite. Elicit what the next term in the lower addition would be. $(13122 \times 3 = \underline{39366})$ T writes $(1\times)$ in front of upper addition after gaining agreement that $S = 1 \times S$ Once Ps have agreed on which addition is greater, show the result of the subtraction on BB (with Ps dictating the line in brackets). Reasoning, agreement, praising
	18 min	
4	***Book 4, page 91*** Q.1 Read: *Elephant drank 4 more litres of water than Rhino. Complete the table.* Quickly revise the units of capacity. 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. Who can write the rule? Who agrees? Who can write it another way? etc. Check them with values from the table. *Solution:* 32 litres | **31 litres** | (12.9 litres) **12 900 ml** | (16.3 litres) 1630 cl | **16 $\frac{3}{4}$ litres** | 36.2 litres | **14.40 litres** **28 litres** | 27 litres | 8900 ml (8.9 litres) | **1230 cl** (12.3 litres) | 12 $\frac{3}{4}$ litres | **32.2 litres** | 10.40 litres *Rule:* $E = R + 4$ (litres), $R = E - 4$ (litres), 4 litres $= E - R$	Individual work, monitored (helped) Drawn on BB or use enlarged copy master or OHP BB: 1 litre = 100 cl = 1000 ml (If class is not very able, deal with one column at a time.) Reasoning, agreement, self-correcting, praising Discussion, checking, agreement on the rule. Feedback for T
Extension	T points to a capacity and Ps give it in other units.	Whole class activity
	24 min	

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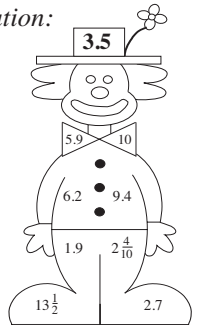
Bk4

Lesson Plan 91

Activity		*Notes*
5	***Book 4, page 91*** Q.2 Read: *Solve these problems in your exercise book.* Deal with one at a time or set a time limit. Ps read problems themselves and solve them. Review with whole class. Ps could show results on scrap paper or slates on command. Ps responding correctly explain at BB to those who were wrong. Mistakes discussed and corrected. *Solution:* *a) Liz has £5.60 and Sandra has £4.90. Who has more and how much more?* *Plan:* £5.60 – £4.90 *C*: £5.60 − £4.90 = £0.70 or 560 p − 490 p = 70 p *Answer:* Liz has 70 p more than Sandra. *b) Ben and Danny have £70 altogether. Ben has £6.80 more than Danny. How much does each boy have?* (The most logical method is given below but accept any other correct method.) First take off Ben's extra £6.80, then each boy will have half of the money that is left. *Plan*: (£70 – £6.80) ÷ 2 = £63.20 ÷ 2 = £31.60 D: £31.60; B: £31.60 + £6.80 = £38.40 *Answer*: Danny has £31.60 and Ben has £38.40. *30 min*	Individual work, monitored b) helped (or done with the whole class) Reasoning, agreement, self-correcting, praising BB: £5.60 > £4.90 (Another method is to halve the £70, then D will have £35 – half of £6.80 and B will have £35 + £3.40) BB: Ben / Danny £6.80 } £70 *Check*: £31.60 − £38.40 = £70.00 ✔
6	***Book 4, page 91*** Q.3 Read: *Use the numbers in the clown to write subtractions. The difference should be the number in his hat.* Let's see who is quickest to write all the possible subtractions! Start . . . now! . . . Stop! T notes those finished first. Review at BB with the whole class. Ps come to BB or dictate to T. Class points out errors. Mistakes and omissions corrected. **A**, tell us how you did it so quickly! (strategy: subtract 3.5 from all the numbers greater than 3.5, but 10 has no suitable subtrahend on the clown) *Solution:*  $13\frac{1}{2} - 10 = 3\frac{1}{2} = 3.5$ $9.4 - 5.9 = 3.5$ $6.2 - 2.7 = 3.5$ $5.9 - 2\frac{4}{10} = 5.9 - 2.4 = 3.5$ *35 min*	Individual work, monitored Clown drawn on BB or use enlarged copy master or OHP (Could be a competition with a prize for the winner!) Reasoning, agreement, self-correction, praising

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Bk4

Lesson Plan 91

Activity		*Notes*
7	***Book 4, page 91, Q.4***	Whole class activity
	Read: *A bee flies steadily at 0.20 m per second. Complete the table.*	(or individual work in completing the table)
	*W*ho can tell me what 0.20 of a metre is in cm? T asks several Ps what they think. Agree that:	Table drawn on BB or use enlarged copy master or OHP
	BB 0.20 of 1 m $= \frac{20}{100}$ of 1 m $= \frac{20}{100}$ of 100 cm $=$ 20 cm	
	Show me the actual distance on your rulers . . now!	In unison
	This is how far the bee flies every second. Now let's complete the table to show how far the bee has flown after several seconds.	At a good pace.
	Ps come to BB to choose a column and write the distance in metres, explaining reasoning. Class agrees/disagrees. Ps complete table in *Pbs* too.	Reasoning,agreement, praising
	Read: *Write the rule.*	
	Ps come to BB to write the rule in different ways (with T's help if necessary.). Class checks each rule with values from table.	Agreement, checking, praising
	Solution:	

Time (seconds)	1	2	3	4	5	0	10	100	**12**	**8**
Distance (m)	0.20	**0.40**	**0.60**	**0.80**	**1**	**0**	**2**	**20**	2.40	1.6

Bold numbers are missing.

Rule: $D = T \div 5$, $T = D \times 5$, $5 = T \div D$, $\frac{1}{5} = D \div T$

Extension	T has a graph of distance against time prepared. Ps explain (or plot) the points using the data in the table.	Whole class activity

40 min

8	***Book 4, page 91***	Individual work, monitored, helped
	Q.5 Read: *1 kg of oranges costs £2.08. Complete the table to show the cost of several kg.*	Table drawn on BB or use enlarged copy master or OHP
	Make sure that Ps understand what each row in the table means. 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.	Reasoning,agreement, praising
	Who can write the rule for the table? Who agrees? Who can write it in a different way? etc. Class checks with values from table.	Extra praise if Ps notice connections between the columns to make calculations easier, e.g. $4 = 2 \times 2$, $6 = 2 \times 3$, etc.
	Solution:	

Quantity of (in kg)	1	2	3	4	5	6	7	8	9	10	$2\frac{1}{2}$
Price (in p)	**208**	416	624	832	1040	1248	1456	1664	1872	2080	520
Price (in £)	**2.08**	4.16	6.24	8.32	10.40	12.48	14.56	16.64	18.72	20.80	5.20

Whole class discussion on the rule.

[It is probably easier to deal with the rule in pence.]

Reasoning, checking, agreement, praising

Rule: $P = 2.08 \times Q$ (in £s) $\quad Q = P \div 208$ (in pence)

$P = 208 \times Q$ (in pence) $\quad 208 = P \div Q$ (in pence)

45 min

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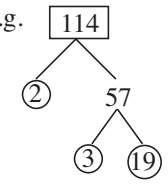
Bk4

R: Natural numbers, fractions and decimals
C: Operations
E: Problems

Lesson Plan 92

Activity		*Notes*
1	**Factorising** a) Let's show these numbers as the product of their prime factors). BB: 31, 32, 33, 34, 35, 114 Ps come to BB to choose a number and write the multiplication (drawing a factor tree where needed). Class agrees/disagrees. BB: 31 is prime, $32 = 2 \times 2 \times 2 \times 2 \times 2$ $33 = 3 \times 11$, $34 = 2 \times 17$, $35 = 5 \times 7$ $114 = 2 \times 3 \times 19$ b) Let's list all the factors of these numbers. Ps come to BB to choose a number and list its factors in order, using the prime factors to help them. Class points out errors or missed factors. BB: 31: 1, 31; 32: 1, 2, 4, 8, 16, 32; 33: 1, 3, 11, 33; 34: 1, 2, 17, 34; 35: 1, 5, 7, 35; 114: 1, 2, 3, 6, 19, 38, 57, 114 *6 min*	Whole class activity At a good pace Reasoning, agreement, praising BB: e.g.  Ps could join up the factor pairs. Feedback for T
2

Bk4

Lesson Plan 92

Activity		*Notes*
3	***Book 4, page 92*** Q.1 Read: *Do these calculations in your exercise book.* Set a time limit. Review at BB with whole class. T or P reads the questions and Ps show results on scrap paper or slates on command. Ps answering correctly explain at BB to those who were wrong. Mistakes discussed and corrected. *Solution:* e.g. a) *What number is the difference between 5 sixths and 3 sixths?* BB: $\frac{5}{6} - \frac{3}{6} = \frac{2}{6} = \frac{1}{3}$ b) *What number is 4.6 more than 3.9?* BB: $3.9 + 4.6 = \underline{8.5}$ c) *What number is 3520 less than 6770?* BB: 6770 − 3520 = 3250 (3250) d) *What number is 7 times 826?* BB: 826 × 7 = 5782 (14) (5782) e) *What number is one sixth of 3828?* BB: 6 ⟌ 3828 = 638 (24) (638) f) *What number is 4 ninths of 4788?* BB: 9 ⟌ 4788 = 532 (21); 532 × 4 = 2128 (1) (2128) *19 min*	Individual work, monitored, helped Or Ps dictate results to T and class agrees/disagrees. Show calculations on BB if problems or disagreement. Reasoning, agreement, self-correction, praising Accept and valid method of calculation which gives the correct result. Feedback for T
4	***Book 4, page 92*** Q.2 Let's see how many of these additions (subtractions) you can do in 3 minutes! Start . . . now! . . . Stop! Review with whole class. Ps come to BB or dictate results, explaining reasoning with place-value details. Mistakes discussed and corrected. *Solution:* a) 16.01 + 5.6 + 3.30 = 19.87 b) 13.9 + 0.7 + 5.82 = 19.72 c) 0.87 + 2.30 + 20.3 = 23.47 d) 19.4 + 6.00 + 62.08 = 70.02 e) 9.43 − 6.12 = 3.31 f) 8.47 − 3.46 = 5.01 g) 7 10 3.5 − 4 1 8.2 = 2.53 h) 17 10 5.6 − 6 1 8 = 10.76 *27 min*	Individual work, monitored (helped) Written on BB or use enlarged copy master or OHP (Or T has solutions already prepared and uncovers each as it is dealt with, or Ps finished early write solutions on BB.) Deal with one row at a time. Reasoning, agreeement, self-correction, praising T points to a sum and Ps say the decimal as a fraction. e.g. $10.76 = 10\frac{76}{100}$

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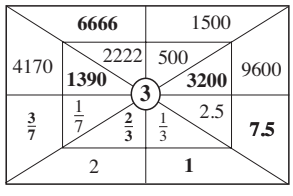
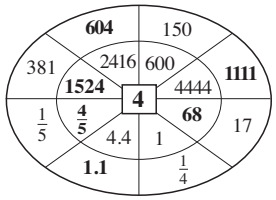
Bk4

Lesson Plan 92

Activity		*Notes*
5	***Book 4, page 92*** Q.3 Read: *Solve the problems in your exercise book*. Deal with one at a time and set a time limit. Ps read problems themselves and solve them. Review with whole class. Ps come to BB to show solutions, explaining reasoning. Who agrees? Who did it another way? etc. Deal with all cases. Mistakes discussed and corrected. *Solution:* *a) Sarah cut 2.17 m from a piece of ribbon 6 m 24 cm long. How much ribbon did she have left?* *Plan:* 6 m 24 cm – 2.17 m *E:* 6 m – 2 m = 4 m *C*: $\begin{array}{r} 6.^{10}2\,4 \\ -\ 2.1_1\,7 \\ \hline 4.0\,7 \end{array}$ (m) or $\begin{array}{r} 6\ ^{10}2\,4 \\ -\ 2\ 1_1\,7 \\ \hline 4\ 0\ 7 \end{array}$ (cm) or $\begin{array}{r} 6\text{ m }24\text{ cm} \\ -\ 2\text{ m }17\text{ cm} \\ \hline 4\text{ m }\ 7\text{ cm} \end{array}$ *Answer:* She had 4.07 metres of ribbon left. *b) Jim bought 6 litres of paint. He used 2.78 litres to paint the fence and 1 litre 25 cl to paint the gate. How much paint did he have left?* *Plan*: 6 litres – (2.78 litres + 1 litre 25 cl) *E:* 6 – (3 + 1) = 6 – 4 = 2 (litres) *C:* $\begin{array}{r} 2.7\,8 \\ +\ 1.2\,5 \\ \hline 4.0\,3 \\ {\scriptstyle 1\ \ 1} \end{array}$ (litres) $\begin{array}{r} 6.^{10}0^{10}0 \\ -\ 4_1.0_1\,3 \\ \hline 1.9\,7 \end{array}$ (litres) *Answer*: He had 1.27 litres of paint left. *33 min*	Individual work, monitored, helped T could ask Ps what they should do first. (Change the lengths to the same unit.) Discussion, reasoning, agreement, self-correction, praising or, e.g. *Plan:* 600 cl – 278 cl – 125 cl *E:* 600 – 300 – 100 = 200 (cl) $\begin{array}{r} 6^{10}0^{10}0 \\ -\ 2_1\,7_1\,8 \\ \hline 3\,2\,2 \end{array}$ (cl) $\begin{array}{r} 3^{10}2^{10}2 \\ -\ 1_1\,2_1\,5 \\ \hline 1\,9\,7 \end{array}$ (cl)
6	***Book 4, page 92*** Q.4 Read: *Work out the rule and fill in the missing numbers*. Deal with one part at a time. Set a time limit. Review at BB with whole class. Agree on one form of the rule. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a)  *Rule:* Inner number multiplied by 3 = outer number. b)  *Rule:* Inner number divided by 4 = outer number *39 min*	Individual work, monitored, helped (or whole class activity) Drawn on BB or use enlarged copy master or OHP Discussion on the rule, reasoning, agreement, self-correcting, praising or *Rules:* a) Outer number = 3 × inner number b) Outer number = 1 quarter of inner number **Bold** numbers are missing

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Bk4		*Lesson Plan 92*
Activity		***Notes***
7	***Book 4, page 92 Q.4*** Read: *Fill in the missing numbers*. T (P) reads LHS of equation. Ps show RHS on scrap paper or slates on command. Ps answering correctly explain to those who were wrong. *Solution:* a) 3 m 20 cm = 3.20 m b) 4530 cl = 45.30 litres c) 7.30 m = 7 m 30 cm d) 2.15 litres = 2 litres 15 cl e) $5\frac{1}{2}$ kg = 5500 g f) $\frac{3}{7}$ of a week = 3 days	Whole class activity (or individual work if Ps prefer, reviewed with whole class) (Quick revision of units of measure at start if needed.) Responses given in unison. Reasoning, agreement, praising
Extension	T or Ps think of other quantities for class to exchange the units. e.g. • What is 2 thirds of 1 hour in minutes? (40 minutes) • What is 3 quarters of a day in hours? (18 hours) • What part of a minute is 12 seconds? ($\frac{1}{5}$ or 0.2 min.) etc.	Whole class activity Praising for clever questions and correct answers. Show details of calculations on BB if problems. e.g. 60 ÷ 3 × 2 = 20 × 2 = 40 (min)
	45 min	

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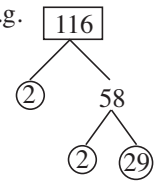
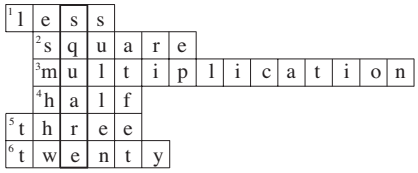
Bk4

R: Natural numbers, fractions and decimals
C: Natural numbers up to 10 000
E: Natural numbers up to 20 000

Lesson Plan *93*

Activity		*Notes*
1	**Factorising** a) Let's <u>factorise</u> these numbers (i.e. show them as the product of their <u>prime</u> factors). BB: 36, 37, 38, 39, 40, 115 and 116 Ps come to BB to choose a number and write the multiplication (drawing a factor tree where needed). Class agrees/disagrees. BB: $36 = 2 \times 2 \times 3 \times 3$, 37 is prime, $38 = 2 \times 19$, $39 = 3 \times 13$, $40 = 2 \times 2 \times 2 \times 5$, $115 = 5 \times 23$, $116 = 2 \times 2 \times 29$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list its factors in order, using the prime factors to help them. Class points out errors or missed factors. BB: 36: 1, 2, 3, 4, 6, 9, 12, 18, 36; 37: 1, 37; 38: 1, 2, 19, 38; 39: 1, 3, 13, 39; 40: 1, 2, 4, 5, 8, 10, 20, 40; 115: 1, 5, 23, 115; 116: 1, 2, 4, 29, 58, 116	Whole class activity At a good pace Reasoning, agreement, praising BB: e.g.  Ps may use a calculator. Feedback for T
	7 min	
2	**Puzzle** Study this puzzle. What do you think we have to do? Ps explain if they can, with T's help. Elicit or tell that the 3 dots are called an <u>ellipsis</u> and stand for the word which is missing. Let's see if we can work out the clues and find what the vertical word is! Ps come to BB to fill in the rows. Class agrees/disagrees. BB: **Horizontal Clues** **1** 5 is . . . than 8. **4** 7 is . . . of 14. **2** Every . . . is a rectangle. **5** $15 \div 5 =$ . . . **3** 17×81 is a . . . **6** $100 \div 5 =$ . . .  What can you tell me about a square? (e.g. plane shape, polygon, quadrilateral, 4 equal sides, 4 right angles, opposite sides parallel, adjacent sides perpendicular, convex, symmetrical, 4 lines of symmetry, 2 equal diagonals which halve each other)	Whole class activity Drawn on BB or use enlarged copy master or OHP BB: <u>ellipsis</u> . . . (Or Ps have a copy of puzzle on desks and solve it individually if they wish.) At a good pace Reasoning, agreement, praising Involve as many Ps as possible. Praise all positive contributions. Extra praise if Ps mention <u>square numbers</u> or that <u>square units</u> are used to measure area.
	12 min	
3	**Missing numbers** Let's find out which numbers x stands for in these statements. Ps come to BB to write solutions, explaining reasoning (with T 's or other Ps' help if necessary) Class points out errors. Let's show the solutions on the number line. Ps show possible numbers on class number line or on diagrams drawn by T on BB. BB: a) $2 \times x + 6 = 26$ $2 \times x = 20$ $x = \underline{10}$ 	Whole class activity Written/drawn on BB or OHP Reasoning, checking, agreement, praising Only one number is possible.

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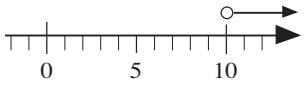
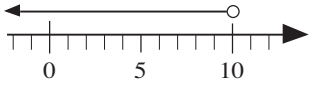
Bk4

Lesson Plan 93

Activity		*Notes*
3	(Continued) b) $2 \times x + 6 > 26$ $2 \times x > 20$ $x > \underline{10}$  Possible numbers: x: 11, 12, . . . but also, e.g. $11\frac{1}{4}$, $13\frac{1}{2}$, 58.9, etc. c) $2 \times x + 6 < 26$ $2 \times x < 20$ $x < \underline{10}$  Possible numbers: x: 9, 8, . . ., 1, 0, – 1, – 2, . . . but also 9.9, 0.1, $3\frac{1}{2}$, etc. *18 min*	Discuss how to show an inequality on the number line. Remind Ps or elicit that: • *white* (open) circle means that the number is not included; • *black* (closed) circle means that the number is included. • arrowhead is used to indicate all the numbers to the right (left) of it along the number line.
4	**2-digit numbers** Let's find 2-digit numbers which have: a) *the tens digit 2 more than the units digit*. Ps dictate to T or come to BB to write the numbers. Class agrees/ disagrees, pointing out missed numbers. BB: 20, 31, 42, 53, 64, 75, 86, 97 b) *the units digit 2 more than the tens digit*. Ps dictate to T or come to BB to write the numbers. Class agrees/ disagrees, pointing out missed numbers. BB: 13, 24, 35, 46, 57, 68, 79 *22 min*	Whole class activity At a good pace Agreement, praising
5	**Problem** Listen carefully and think how you would solve this problem. *Tony made 3 model planes and Freddie made 5 model planes. They sold them for £40 and the buyer paid the same price for each plane.* *How should the boys share the money they have made in a fair way?* **X**, come and show us what you think we should do. Who agrees? Who thought of another way? etc. Check that the 2 amounts total £40. BB: e.g T: 3 planes, F: 5 planes T + F: 3 + 5 = 8 (planes) → £40 If each plane is the same price: 1 plane → £40 ÷ 8 = £5 So T: 3 × £5 = <u>£15</u>, F: 5 × £5 = <u>£25</u> *Answer:* Tom should get £15 and Frank should get £25. *26 min*	Whole class activity (or individual work in *Ex. Bks* and results shown on scrap paper or slates on command) Discussion, reasoning, agreement, praising or T: ☐☐☐ F: ☐☐☐☐☐ } £40 T: $\frac{3}{8}$ of £40 = <u>£15</u> F: $\frac{5}{8}$ of £40 = <u>£25</u>

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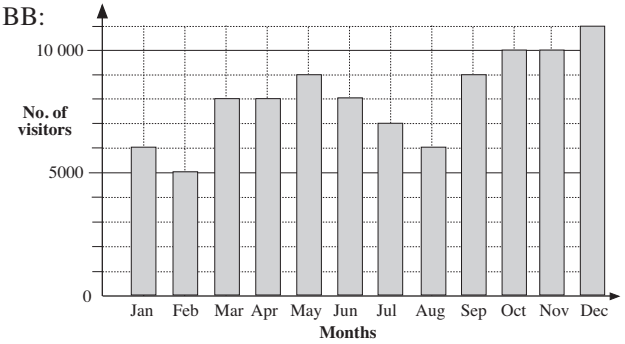
Bk4

Lesson Plan 93

Activity		*Notes*
6	***Book 4, page 93***	Whole class discussion to start
	Q.1 Read: *An art gallery put on an exhibition of paintings by a famous artist. The graph shows the number of visitors (rounded to the neares 1000) each month for a year.*	Relate to a local art exhibition if possible and mention various famous artists.
	Who has been to an art exhibition? Tell us about it. (T tells about own such visits if no P has been to one.)	Ps tell of own experiences or what they know about art and artists.
	BB: 	Graph drawn on BB or use enlarged copy master or OHP
	Who can explain the graph? (Each month is shown by a shaded rectangle. Its height shows how many visitors there were in that month. The horizontal grid lines show every thousand visitors.)	Involve several Ps. Praise all positive contributions.
	a) Read: *Write the data in the table.* Do the first column with the whole class, then Ps complete table in *Pbs*. Set a time limit. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes corrected. BB:	Individual work, monitored, (helped) Reasoning, agreement, self-correcting praising

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Visitors	6000	5000	8000	8000	9000	8000	7000	6000	9000	10 000	10 000	11 000

	T (P) reads questions b) to e) and Ps show answers on scrap paper or slates on command. Deal with one at a time. Ps responding correctly explain at BB to Ps who were wrong.	Whole class activity (or individual work in *Pbs*, reviewed with whole class)
	Solution:	In unison
	b) In which month were there fewest visitors? (February)	Ps explain by referring to relevant rectangles in graph and saying the number of visitors.
	c) In which month were there most visitors? (December)	
	d) In which months did 8000 people visit the exhibition? (March, April and June)	Reasoning, agreement, praising
	e) In which month did more than 9000 people visit it? (October, November and December)	
Extension	Who can explain the data? (e.g. Fewer people in February because the weather was bad; more people at the end of the year because they had heard it was good, more publicity; last chance to see it in December; etc.)	Involve several Ps. Extra praise for clever contributions.

31 min

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Bk4

Lesson Plan 93

Activity

7

Book 4, page 93

Q.2 Read: *Write these numbers in the place-value table.*

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.

Let's say the numbers in decreasing order.

Solution:

a) Nine thousand, four hundred and seventy-four

b) $6 \times 1000 + 8 \times 10 + 5 \times 1$

c) 10 thousands + 3 hundreds + 47

d) $1 \times 10\,000 + 4 \times 1000 + 3 \times 10 + 9 \times 1$

e) 14 thousands + 670

TTh	Th	H	T	U
	9	4	7	4
	6	0	8	5
1	0	3	4	7
1	4	0	3	9
1	4	6	7	0

35 min

Notes

Individual work, monitored (helped)

Reasoning, agreement, self-correction, praising

T chooses Ps at random.

Extension

Calculate the sum of all the numbers. (54 615)

8

Book 4, page 93

Q.3 Read: *Do these calculations in your Ex. Bks.*

Quickly revise order of operations. Set a time limit. Ps do necessary calculations in *Ex. Bks* (or calculate mentally and write interim result above operation sign).

Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Only write full details of calculations on BB if there are problems or disagreements.

Solution:

a) $1970 + 1000 \overset{100}{\div} 10 = \underline{2070}$

b) $8740 - 500 \overset{2500}{\times} 5 = \underline{6240}$

c) $600 \overset{3600}{\times} 6 + 5120 = \underline{8720}$

d) $2700 \overset{300}{\div} 9 + 8880 = \underline{9180}$

e) $(6000 + 450) \overset{6450}{\div} 3 = \underline{2150}$

f) $3200 \div (10\,000 \overset{320}{-} 9680) = \underline{10}$

g) $7500 \overset{15\,000}{\times} 2 + 5000 = 20\,000$

h) $(18\,000 \overset{12\,000}{-} 6000) \div 4 = \underline{3000}$

41 min

Individual work, monitored helped

Differentiation by time limit

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

Feedback for T

9

Fractions of quantities

T writes an addition on BB and chooses 2 Ps to come to BB to do calculation using different units of measure. Class points out errors. Draw a diagram to show the addition of the fractional parts.

a) Calculate in metres or mm:

BB: $8\frac{1}{4}\text{ m} + 3\frac{1}{2}\text{ m} = [11 + \frac{1}{4} + \frac{2}{4} = 11 + \frac{3}{4} = \underline{11\frac{3}{4}}\text{ (m)}]$

(8250 mm + 3500 mm = $\underline{11\,750\text{ mm}}$)

b) Calculate in tonnes or kg:

BB: $5\frac{2}{5}\text{ t} + 6\frac{1}{10}\text{ t} = [11 + \frac{4}{10} + \frac{1}{10} = 11 + \frac{5}{10} = \underline{11\frac{1}{2}}\text{ (t)}]$

(5400 kg + 6100 kg = $\underline{11\,500\text{ kg}}$)

c) Calculate in litres or ml: (Agree on smallest multiple of 5 and 2.)

BB: $3\frac{3}{5}\ \ell + 2\frac{1}{2}\ \ell = [5 + \frac{6}{10} + \frac{5}{10} = 5 + \frac{11}{10} = \underline{6\frac{1}{10}}\ (\ell)]$

(3600 ml + 2500 ml = $\underline{6100\text{ ml}}$)

45 min

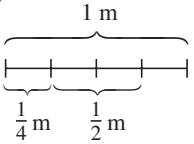
Whole class activity

At a good pace

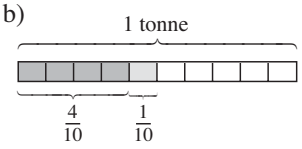
Reasoning, agreement, praising

BB:

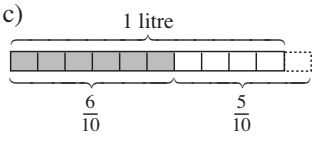
a)



b)



c)



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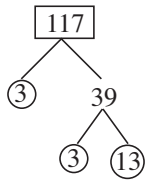
Bk4

R: Multiples and factors
C: Numbers up to 10 000. Rounding
E: Numbers up to 20 000

Lesson Plan *94*

Activity		*Notes*
1	**Factorising** a) Let's factorise these numbers (i.e. show them as the product of their prime factors). BB: 41, 42, 43, 44, 45, 117 Ps come to BB to choose a number and write the multiplication (drawing a factor tree where needed). Class agrees/disagrees. BB: 41 is prime, $42 = 2 \times 3 \times 7$, 43 is prime, $44 = 2 \times 2 \times 11$, $45 = 3 \times 3 \times 5$, $117 = 3 \times 3 \times 13$ b) Let's list all the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 41: 1, 41; 42: 1, 2, 3, 6, 7, 14, 21, 42; 43: 1, 43; 44: 1, 2, 4, 11, 22, 44; 45: 1, 3, 5, 9, 15, 45; 117: 1, 3, 9, 13, 39, 117 *7 min*	Whole class activity At a good pace Reasoning, agreement, praising BB:  Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
2	**Puzzles** Let's fill in the numbers missing from these tables. Listen carefully to the rule for each puzzle. Ps come to BB to fill in numbers, explaining reasoning. Class points out errors. T: The numbers are: a) increasing or decreasing by the same amount in each row or column. BB: b) the result of multiplying or dividing the adjacent number by the same amount in each row or column. What do you notice about b)? (The numbers along each diagonal form a sequence.) *14 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP Ps decide where to start and how to continue. T intervenes only if necessary. Discussion, reasoning, agreement, praising **Bold** numbers are given. [Ps might notice 1, 6, 36, 216 (× 6) but might not notice 8, 12, 18, 27 (× 1.5)]
3	**Rounding** T has numbers written on BB: 348, 551, 4835, 7204, 15 555 Let's round each number to the nearest 10 (100, 1000). Ps come to BB to write approximations, explaining reasoning. Class agrees/disagrees. BB: *19 min*	Whole class activity At a good pace Agreement, praising Reasoning: e.g. '348 is approximately equal to 350 to the nearest 10, because 48 is nearer 50 than 40' Agree that 5 (50, 500) round up to next 10 (100, 1000). Feedback for T

13	15	17	19	**21**
10	**16**	22	28	34
7	17	**27**	37	47
4	18	32	46	60
1	19	37	55	73

27	54	108	216
9	18	**36**	72
3	**6**	12	24
1	**2**	4	**8**

To nearest 10	To nearest 100	To nearest 1000
$348 \approx 350$	$348 \approx 300$	$348 \approx 0$
$551 \approx 550$	$551 \approx 600$	$551 \approx 1000$
$4835 \approx 4840$	$4835 \approx 4800$	$4835 \approx 5000$
$7204 \approx 7200$	$7204 \approx 7200$	$7204 \approx 7000$
$15\,555 \approx 15\,560$	$15\,555 \approx 15\,600$	$15\,555 \approx 16\,000$

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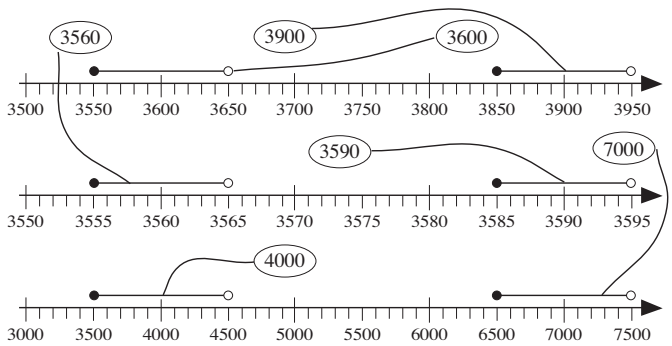
Bk4		*Lesson Plan 94*
Activity		***Notes***
4	***Book 4, page 94*** Q.1 Read: *Round each number to the nearest 10, 100 and 1000. Follow the example.* T asks Ps to explain the given row in the table. Let's see if you can do the other rows in 5 minutes! Start . . . now! . . . Stop! Review with whole class. Ps come to BB or dicatate to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* *25 min*	Individual work, monitored, (helped) Drawn on BB or use enlarged copy master or OHP Differentiation by time limit Reasoning, agreement, self-correction, praising Reiterate that numbers cannot be rounded up twice! e.g. 9046 ≈ 9050, to nearest 10 but 9046 ≈ 9000, to nearest 100 (not 9100) as 46 is nearer 0 than 100
5	***Book 4, page 94*** Q.2 Read: *The numbers marked on the number lines have been rounded to the nearest 10, 100 or 1000. Join them up to the correct rounded number.* First ask Ps to explain the meaning of the circles and horizontal lines above the number lines. (*Black* circle means that the number is included, *white* circle means that it is not included.) Set a time limit. (If Ps are struggling, stop them and continue as a whole class activity.) Review at BB with whole class. Ps come to BB to draw joining lines, saying all the numbers which have been rounded to their chosen number and whether they have been rounded to the nearest 10 or 100 or 1000. Class agrees.disagrees. Mistakes discussed and corrected. *Solution:*  *31 min*	Individual trial, monitored, helped (or whole class activity if class is not very able) Drawn on BB or use enlarged copy master or OHP Discussion on notation first Differentiation by time limit Discussion, reasoning, agreement, self-correction, praising Ps: (if only natural numbers) '3550 to 3649 ≈ 3600 (to the nearest 100)' '3850 to 3949 ≈ 3900 (to the nearest 100)' '3555 to 3564 ≈ 3560 (to the nearest 10)' '3585 to 3594 ≈ 3590 (to the nearest 10)' '3500 to 4499 ≈ 4000 (to the nearest 1000)' '6500 to 7499 ≈ 7000 (to the nearest 1000)'

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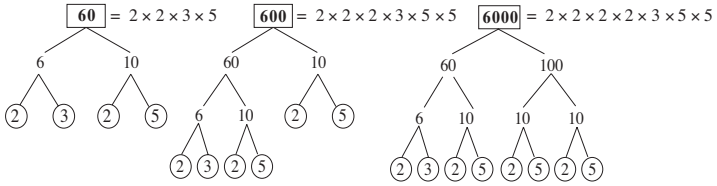
Bk4

Lesson Plan 94

Activity		*Notes*
6	***Book 4, page 94*** Q.3 Read: *Complete the diagrams to show each number's prime factors.* Set a time limit. Ps complete diagrams in *Pbs* (or draw in *Ex. Bks.* if they need more space) and then write the numbers as a product of their prime factors. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*  	Individual work, monitored, helped Drawn on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising Ps could use a calculator to check the multiplications.
	36 min	
7	***Book 4, page 94*** Q.4 Read: *List in your exercise books all the natural factors of these numbers.* *Write the factors in pairs, horizontally (as shown below) or vertically.* Deal with one at a time. Set a time limit. Ps use the prime factors from Q.3 to help them. T might allow Ps to use calculators. Review at BB with whole class. Ps dictate factors to T. Class points out errors or missed factors. In c), there are so many factors that it is better to show the factor pairs vertically in a table, as below. Elicit that all the factors of 60 are also factors of 600 and all the factors of 600 are also factors of 6000. *Solution:* a) 60: **1, 2**, 3, 4, 5, 6, 10, 12, 15, 20, **30, 60** b) 600: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 600, 300, 200, 150, 120, 100, 75, 60, 50, 40, 30, 25 c) 6000:	Individual trial first, monitored, helped Or a) and b) as individual work and c) as whole class activity Table for c) drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising

1	**2**	3	4	5	6	8	10	12	15
6000	**3000**	2000	1500	1200	1000	750	600	500	400

16	20	24	25	30	40	48	50	60	75
375	300	250	240	200	150	125	120	100	80

(**Bold** numbers are given.)

To Ts only

a) **60** $= 2^2 \times 3^1 \times 5^1$
Number of factors:
$(2 + 1) \times (1 + 1) \times (1 + 1)$
$= 3 \times 2 \times 2 = \underline{12}$

b) **600** $= 2^3 \times 3^1 \times 5^2$
Number of factors:
$(3 + 1) \times (1 + 1) \times (2 + 1)$
$= 4 \times 2 \times 3 = \underline{24}$

c) **6000** $= 2^4 \times 3^1 \times 5^3$
Number of factors:
$(4 + 1) \times (1 + 1) \times (3 + 1)$
$= 5 \times 2 \times 4 = \underline{40}$

45 min

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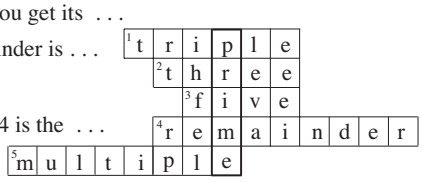
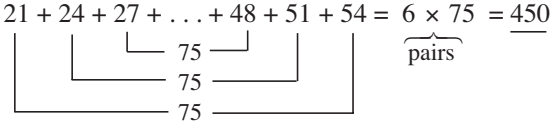
Bk4	R: Natural numbers, fractions and decimals **C: Natural numbers up to 10 000** *E: Natural numbers up to 20 000. Divisibility*	*Lesson Plan* *95*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 46, 47, 48, 49, 50, 118 Ps come to BB to choose a number and write the multiplication (drawing a factor tree where needed). Class agrees/disagrees. BB: $46 = 2 \times 23$, 47 is prime, $48 = 2 \times 2 \times 2 \times 2 \times 3$, $49 = 7 \times 7$ (square number), $50 = 2 \times 5 \times 5$, $118 = 2 \times 59$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 46: 1, 2, 23, 46; 47: 1, 47; 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48; 49: 1, 7, 49; 50: 1, 2, 5, 10, 25, 50; 118: 1, 2, 59, 118	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
	7 min	
2	**Puzzle** Let's see if we can work out the clues in this puzzle and find what the hidden word is! Ps come to BB to fill in the rows or dictate to T. Class agrees/disagrees.. BB: **Horizontal Clues** **1** If you multiply a number by 3, you get its . . . **2** If you divided 18 by 5, the remainder is . . . **3** 200 divided by 40 equals . . . **4** 312 divided by 7 equals 44, and 4 is the . . . **5** 24 is a . . . of 3.  What is a prime number? (A number which has only 2 different factors, itself and 1.) Tell me the prime numbers in increasing order up to 55. Class points out errors or missed prime factors. Agree that 1 is <u>not</u> a prime number because it has only one factor, 1. Ps: '2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53'	Whole class activity Drawn on BB or use enlarged copy master or OHP (Or Ps have a copy of puzzle on desks and solve it individually if they wish.) At a good pace Reasoning, agreement, praising Discussion, agreement. praising T chooses Ps at random At speed Praising, encouragment only
	11 min	
3	**Addition** Let's calculate these sums. a) $21 + 24 + 27 + 30 + 33 + 36 + 39 + 42 + 45 + 48 + 51 + 54 = ?$ What do you notice about the numbers? (Increasing by 3 each time.) Which quick method can we use if the numbers are the same distance apart? If Ps remember the method, let them explain it. If not, T reminds Ps of the strategy and helps Ps to complete it. BB:  	Whole class activity Written on BB or SB or OHT Discussion, reasoning, agreement, praising

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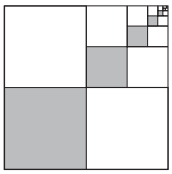
Bk4

Lesson Plan 95

Activity		***Notes***
3	(Continued) b) $1+2+4+8+16+32+64+128+256+512+1024+2048+4096 = ?$ What do you notice about the numbers? (Each number is twice the previous number.) Can we use the method in a)? (No, it only works if the difference between each pair of numbers is the same. Let's use the method of comparing the sum with twice the sum. What letter shall we call the sum? (S) T starts and Ps continue when they remember or understand the method. BB: $1 \times S = \boxed{1} + 2 + 4 + 8 + \ldots + 2048 + 4096$ $2 \times S = 2 + 4 + 8 + \ldots + 2048 + 4096 + \boxed{8192}$ $1 \times S = -1 + 0 + 0 + 0 + \ldots + 0 + 0 + 8192$ $= 8192 - 1 = 8191$ $S = \underline{8191}$	Discussion, reasoning, agreement, praising Extra praise if Ps make the suggestion without help from T. Subtract $1 \times S$ from $2 \times S$ Elicit that the ellipsis (. . .) stands for the numbers not shown Agree that $1 \times S = S$
Extension	Or we could think of it like this. $\underline{1} = 1 = 2 - 1 = 2 \times \underline{1} - 1$ $1 + \underline{2} = 3 = 4 - 1 = 2 \times \underline{2} - 1$ $1 + 2 + \underline{4} = 7 = 8 - 1 = 2 \times \underline{4} - 1$ $1 + 2 + 4 + \underline{8} = 15 = 16 - 1 = 2 \times \underline{8} - 1$ $1 + 2 + 4 + 8 + \underline{16} = 31 = 32 - 1 = 2 \times \underline{16} - 1$ . . . $1 + 2 + 4 + \ldots + \underline{4096} = 2 \times \underline{4096} - 1 = 8192 - 1 = \underline{8191}$	Give Ps time to think about it and look for the connections, otherwise T explains.
	c) Study this diagram. What can you tell me about it? (The whole has been divided into 4 equal parts, then one of the quarters has been divided into 4 equal parts, and so on) If we continue the drawing and shading for an endless (<u>infinite</u>) number of times, what part of the square will be shaded? Ask several Ps what they think. If no P is close, T shows by highlighting the 'L' shapes in the diagram (1 square shaded out of 3 equal squares) that the shaded area is getting closer and closer to <u>1 third</u> of the whole. Who thinks that the sum of this endless (infinite) addition <u>is</u> 1 third? Who thinks that the sum of this endless addition is always less than 1 third and never actually reaches 1 third? Ask Ps to explain the reason for their choice. Agree that the latter is strictly correct but that the part shaded will get <u>so</u> close to 1 third that we can think of the sum of the shaded parts as being 1 third. We can show it like this. Let S be the sum of the shaded parts. BB: $1 \times S = \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \ldots$ $4 \times S = 1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \ldots$ If we subtract $1 \times S$ from $4 \times S$ we get: $3 \times S = 1 + 0 + 0 + 0 + \ldots = 1$ So $S = 1 \div 3 = \frac{1}{3}$	c) BB:  Drawn on BB or use enlarged copy master or OHP (or T builds it up gradually) BB: $\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \ldots = \frac{1}{3}$ or $\frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \ldots \rightarrow \frac{1}{3}$ Both views are acceptable. T starts and then involve Ps as they remember or understand. Agreement, praising

20 min

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Bk4

Lesson Plan 95

Activity		*Notes*
4	***Book 4, page 95*** Q.1 Read: *Write these numbers as digits. Colour the even numbers. Tick the numbers which are divisible by 3.* Ps can check divisibility in their *Ex. Bks*. 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) 5 thousands + 7 hundreds + 6 units = 5706 (C ✔) b) 6 thousands + 8 tens = 6080 (C) c) 3 thousands + 4 hundreds + 9 tens + 1 unit = 3491 d) 16 hundreds + 2 tens = 1620 (C ✔) e) 13 thousands + 7 hundreds + 11 tens = 13711	Individual work, monitored, helped Written on BB or SB or OHT Agreement, self-correction, praising
Extension	• How can we tell mentally whether or not a number is divisible by 2? (Even numbers are divisible by 2, i.e. the units digit must be even.) • How can we tell mentally whether or not a number is divisible by 3? e.g. 5706 = 3000 + 2700 + 6 (all multiples of 3, so ✔) 6080 = 6000 + 60 + 18 + 2 (2 not a multiple of 3) 3491 = 3000 + 300 + 180 + 9 + 1 (1 not a multiple of 3) 1620 = 1500 + 120 (both multiples of 3, so ✔) 13 810 = 12 000 + 1800 + 9 + 1 (1 not a multiple of 3)	Whole class discussion Involve several Ps T gives hints if necessary. Reasoning, agreement, praising
	26 min	
5	***Book 4, page 95*** Q.2 Read: *Add 1, 10, 100 and 1000 to the numbers in the table.* Set a time limit. Review at BB with whole class. Ps dictate to T or come to BB. Mistakes discussed and corrected. *Solution:*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Agreement, self-correction, praising **Extension** T points to each number in LH column and Ps say whether it is divisible by 3. (None are)

Number	+ 1	+ 10	+ 100	+ 1000
5999	6000	6009	6099	6999
6899	6900	6909	6999	7899
4099	4100	4109	4199	5099
7009	7010	7019	7109	8009

	30 min	
6	***Book 4, page 95*** Q.3 Read: *Do the calculations in the easiest order. Circle the numbers which are exactly divisible by 100.* Ps calculate mentally but write the interim steps. Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Who agrees? Who did it a different way? etc. Deal with all cases. Mistakes discussed and corrected. *Solution:* a) $1720 + \overline{470 + 280 + 530} = 2000 + 1000 = \underline{3000}$ b) $3 \times \overline{5 \times 70 \times 20} = 210 \times 100 = \underline{21\,000}$ c) $\overline{7100 + 730 + 900} + 170 = 8000 + 900 = 8900$ d) $\overline{2 \times 7 \times 50} \times 9 = 100 \times 63 = 6300$	Individual work, monitored, helped Written on BB or SB or OHT Agree that operations in each part are either all addition or all multiplication, so can be done in any order. Accept any order which gives correct result but extra praise for the simplest. Reasoning, agreement, self-correcting, praising
	35 min	

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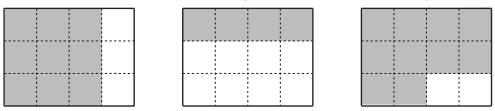
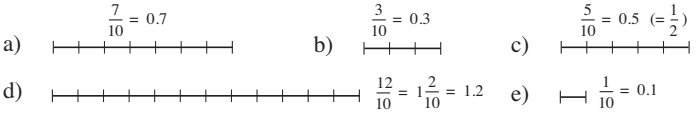
Bk4

Lesson Plan 95

Activity		*Notes*
7	***Book 4, page 95*** Q.4 Read: *Each rectangle is 1 unit. Colour:* *a) 3 quarters, b) 1 third, c) 5 sixths.* Set a time limit. Ps colour the parts and write an addition. Review at BB with whole class. Ps come to BB or dictate to T. Agree that the number of grid squares coloured is important but that their position can vary. Read: *How much did you colour altogether?* Ps could show the result on scrap paper or slates on command. Ps responding correctly explain at BB to those who were wrong. Mistakes discussed and corrected. *Solution:* a) $\frac{3}{4}$ b) $\frac{1}{3}$ c) $\frac{5}{6}$  Part coloured: $\frac{3}{4}+\frac{1}{3}+\frac{5}{6}=\frac{9}{12}+\frac{4}{12}+\frac{10}{12}=\frac{23}{12}=1\frac{11}{12}$	Individual work, monitored, (helped) Drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correcting, praising (Or addition done with the whole class. Ps agree that denominators should be changed to twelfths, as 12 is the smallest common multiple of 4, 3 and 6; and multiplying the numerator and denominator of a fraction by the same amount does not change its value.) Reasoning, agreement, self-correcting, praising
	40 min	
8	***Book 4, page 95*** Q.5 Read: *The line segment is 1 unit long. Write the lengths of these line segments as a fraction and as a decimal.* Elicit that the unit has been divided into 10 equal parts, so each part is 1 tenth. Set a time limit. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*  Read: *What is the total length of the 5 line segments?* Show me . . . now! $(2\frac{8}{10}$ or $2\frac{4}{5}$ or $2.8)$ Ps responding incorrectly do addition on BB with help of class. BB: $\frac{7}{10}+\frac{3}{10}+\frac{5}{10}+1\frac{2}{10}+\frac{1}{10}=1+\frac{18}{10}=2\frac{8}{10}=2\frac{4}{5}$ (units) or $0.7+0.3+0.5+1.2+0.1=\underline{2.8}$ (units)	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correcting, praising Addition done mentally or in *Ex. Bks* Responses shown on scrap paper or slates in unison. Reasoning, agreement, self-correction, praising Feedback for T
	45 min	

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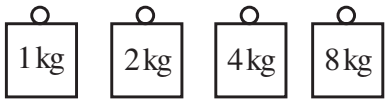
Bk4	R: Operations **C: Natural numbers up to 10 000** *E: Natural numbers up to 20 000. Problems*	*Lesson Plan* *96*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 51, 52, 53, 54, 55, 119 Ps come to BB to choose a number and write the multiplication (drawing a factor tree if needed). Class agrees/disagrees. BB: $51 = 3 \times 17$, $52 = 2 \times 2 \times 13$, 53 is prime, $54 = 2 \times 3 \times 3 \times 3$, $55 = 5 \times 11$, $119 = 7 \times 17$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 51: 1, 3, 17, 51; 52: 1, 2, 4, 13, 26, 52; 53: 1, 53; 54: 1, 2, 3, 6, 9, 18, 27, 54; 55: 1, 5, 11, 55; 119: 1, 7, 17, 119	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
	7 min	
2	**Problem 1** How many kg could we measure with this set of weights? BB:  Ps dictate the numbers and T writes on BB. Encourage logical listing. *Possible weights (in kg):* 1, 2, 3 (2 + 1), 4, 5 (4 + 1), 6 (4 + 2), 7 (1 + 2 + 4), 8, 9 (8 + 1), 10 (8 + 2), 11 (8 + 2 + 1), 12 (8 + 4), 13 (8 + 4 + 1), 14 (8 + 4 + 2), 15 (8 + 4 + 2 + 1)	Whole class activity Drawn on BB or SB or OHT (or show real weights if possible) At a good pace Agreement, praising
	12 min	
3	**Problem 2** Listen carefully and try to solve the problem by drawing diagrams in your *Ex. Bks*. (or even better by rearranging straws on desks). *The length of the perimeter of a triangle is 11 cm and the length of each side is a whole cm. How long can the three sides be?* Give Ps time to try it out (in pairs if they wish). **A**, what do you think? Who agrees? Who knows another set of lengths? etc. BB: 1 cm, 5 cm, 5 cm; or 2 cm, 4 cm, 5 cm; or 3 cm, 4 cm, 4 cm; or 3 cm, 3 cm, 5 cm Ps might think of lengths which add up to 11 cm but <u>cannot</u> make a triangle, e.g. 1 cm, 4 cm, 6 cm; or 2 cm, 3 cm, 6 cm. In such cases, ask them to draw (make) the triangle on the BB. Impossible!	Individual (or paired) trial Ps have rulers (and if possible straws and scissors) on desks. Ps cut straws to the required lengths: 1 cm, 2 cm, 3 cm, 4 cm, 5 cm (or T has them already prepared) Reasoning, agreement, checking, praising (A good example of theory not working in practice!) In good humour!
	16 min	
4	**Roman numerals** What is the greatest and the smallest possible number you could make using all these Roman numerals once? Ps come to BB or dictate to T. BB: a) X, V, L, I (LXVI = 66 XLIV = 44) b) C, M, D, X, I (MDCXI = 1611 MCDIX = 1409)	Whole class activity Revise meaning and order of Roman numerals if necessary. Reasoning, agreement, praising Feedback for T
	20 min	

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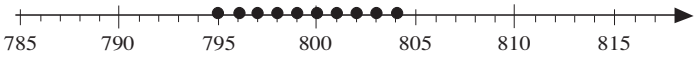
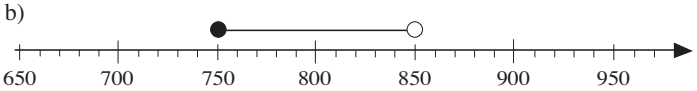
Bk4

Lesson Plan 96

Activity		*Notes*
5	***Book 4, page 96*** Q.1 Read: *Write the next 10, 100 and 1000 less than and greater than the numbers.* Make sure that Ps understand the task. Set a time limit. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. Show on relevant segment of number line drawn on BB if problems or disagreement. Which of the tens (hundreds, thousands) is closer? Ps come to BB to underline the relevant number. Class agrees/disagrees. *Solution:*	Individual work, monitored (helped) Written on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising Ps underline relevant numbers in *Pbs* too. Feedback for T

	3572		**10 324**	
	less than	greater than	less than	greater than
Tens	3570	3580	10 320	10 330
Hundreds	3500	3600	10 300	10 400
Thousands	3000	4000	10 000	11 000

25 min

6	***Book 4, page 96*** Q.2 Read: *a) Mark the natural numbers which round to 800 as the nearest whole ten.* *b) Mark the natural numbers which round to 800 as the nearest whole hundred.* Talk about the notation Ps could use. (Dots on line in a) as individual numbers can be identified; segment notation in b) as not all possible numbers are identified individually, or use very tiny dots.) Set a time limit or deal with one at a time. Review with whole class. Ps come to BB to show and say the possible numbers. Class agrees/disagrees. Mistakes discussed and corrected. Show and revise meaning of segment notation if no P has used it. [*white* (open) circle means that number is not included, *black* (closed) circle means that it is included]. *Solution:* a)  795, 796, 797, 798, 799, 800, 801, 802, 803, 804 b)  750, 751, 752, . . ., 848, 849	Individual work, monitored (helped) Number lines drawn on BB or use enlarged copy master or OHP Discussion on notation Reasoning, agreement, self-correction, praising Allow Ps to explain if they can. (10 natural numbers) (100 natural numbers)

30 min

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Bk4

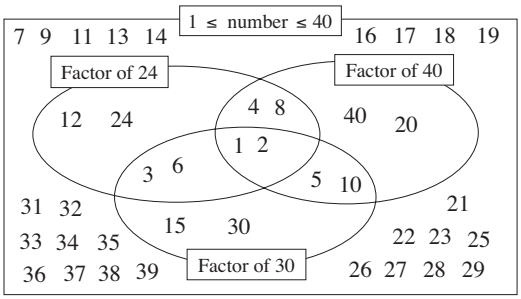
Lesson Plan 96

Activity		*Notes*
7	***Book 4, page 96*** Q.3 Read: *Fill in the table as far as you can.* Let's see how much of the table you can complete in 3 minutes! Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning for RH column with T's help. Class agrees/disagrees. If no P has completed the table, do the rest with the whole class. Reasoning: e.g 'The number of 4-digit numbers is $9 \times 10 \times 10 \times 10 = 9 \times 1000 = \underline{9000}$ because for each of the 9 possible thousands digits (1 to 9), there are 10 possible hundreds digits (0 to 9), and for each of the 10 possible hundreds digits there are 10 possible tens digits, and for each of the 10 possible tens digits there are 10 possible units digits.' *Solution:*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Differentiation by time limit. (Do not expect majority of class to do beyond 4-digits.) Reasoning, agreement, self-correction, praising Extra praise for Ps who completed the rows for 5 and 6-digit numbers.

Numbers	Smallest	Largest	How many?
2-digits	10	99	90
3-digits	100	999	900
4-digits	1000	9999	9000
5-digits	10 000	99 999	90 000
6-digits	100 000	999 999	900 000

35 min

8	***Book 4, page 96*** Q.4 Read: *Write the natural numbers from 1 to 40 in the correct set.* T points to each of the different areas in the diagram and chooses a P to explain it. Set a time limit. Ps finished first write solution on BB (or T has solution already prepared). Review with whole class. Ps come to BB to point to (or write) relevant numbers. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*	Individual work, monitored, helped (or whole class activity if time is short) Drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising Feedback for T



40 min

9	***Book 4, page 96, Q.5*** Read: *Write the Arabic numbers in Roman numerals and the Roman numerals in Arabic numbers.* Ps come to BB to write the numbers or numerals, explaining their reasoning.. Class agrees/disagrees. Ps can work in *Pbs* too. *Solution:* a) LXXI (71) b) MCXI (1111) c) 244 (CCXLIV) d) 2017 (MMXVII) e) 69 (LXIX) f) MMDCC (2700)	Whole class activity (or individual work if Ps wish) Written on BB or SB or OHT Revise meaning of order if necessary. e.g. BB: LXX = 50 + 20 = <u>70</u> 40 = 50 – 10 = <u>XL</u> Reasoning, agreement, praising

45 min

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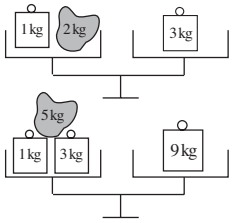
Bk4	R: Numbers, operations **C: Problems in context** *E: Problems*	*Lesson Plan* *97*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 56, 57, 58, 59, 60, 120, 121 Ps come to BB to choose a number and write the multiplication (drawing a factor tree if needed). Class agrees/disagrees. BB: $56 = 2 \times 2 \times 2 \times 7$, $57 = 3 \times 19$, $58 = 2 \times 29$, 59 is prime, $60 = 2 \times 2 \times 3 \times 5$, $120 = 2 \times 2 \times 2 \times 3 \times 5$, $121 = 11 \times 11$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 56: 1, 2, 4, 7, 8, 14, 28, 56; 57: 1, 3, 19, 57; 58: 1, 2, 29, 58 59: 1, 59; 120: 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120; 121: 1, 11, 121 etc. *8 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
2	**Problem 1** Listen carefully, think about the problem and make notes in your *Ex. Bks.* if you need to. Show me the answer when I say. *If two cats can catch 2 mice in 2 hours, how many mice can 4 cats catch in 4 hours?* Show me the answer . . . now! (8 mice) P answering correctly explains at BB to Ps who were wrong. BB: If 2 cats in 2 hours → 2 mice then 4 cats in 2 hours → 4 mice 4 cats in 4 hours → <u>8 mice</u> i.e. Twice the number of cats in twice the time will catch $2 \times 2 = 4$ times the number of mice; 2 mice $\times$ 4 = <u>8 mice</u> *12 min*	Whole class activity T repeats slowly to give Ps time to think. On scrap paper or slates in unison (Some Ps might have given the answer as 4 mice!) Discussion, reasoning, agreement, praising
3	**Problem 2** How many kg could we measure with this set of weights and balance scales? (T has real balance and weights if possible for demonstration.) BB: Ps dictate the amounts and T writes on BB. Encourage logical listing. If Ps decide that, e.g. 2 kg can't be weighed, ask them to think again. T might need to show the strategy for weighing 2 kg, but then Ps might understand and deal with other 'difficult' weights by themselves. *Possible weights (in kg):* 1, 2 (3 – 1), 3, 4 (3 + 1), 5 [9 – (3 + 1] 6 (9 – 3), 7 (9 + 1 – 3), 8 (9 – 1), 9, 10 (9 + 1), 11 (9 + 3 – 1), 12 (9 + 3), 13 (9 + 3 + 1), *17 min*	Whole class activity Give Ps time to think about it. Extra praise if Ps think of putting a weight on the same side of the scales as the object being weighed. e.g. BB: (or show on real scales) 2 kg: 3 kg – 1 kg  5 kg: 9 kg – (3 kg + 1 kg)

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Bk4		*Lesson Plan 97*
Activity		***Notes***
4	**Problem 3** Listen carefully and think how you would solve this problem *When Charlie puts his marbles in rows of 2 or rows of 3 or rows of 4, there is always 1 marble left over. What is the least number of marbles that Charlie could have?* Ps make suggestions and say what they can deduce about the number of marbles. e.g. • If he can put the marbles in rows of 4, and there is one marble over, he must have at least 5 marbles. • If he has 1 more than a multiple of 2, the number must be odd. • Multiples of 4 are also multiples of 2. ⊡ The number must be 1 more than a multiple of (2) 3 and 4. BB: Multiples of (2), 3 and 4: 12, 24, 36, 48, . . . (Ps dictate) Possible numbers: 13, 25, 37, 49, . . . (13 is the least) *Answer:* The least number of marbles that Charlie could have is 13. *20 min*	Whole class activity T repeats slowly to give Ps time to think and discuss with their neighbours. (Or Ps could show solution on scrap paper or slates on command.) Praise all contributions. Teacher intervenes or gives hints only if necessary. Discussion, reasoning, agreement, checking, praising *Check:* $13 = 6 \times 2 + 1$ $13 = 4 \times 3 + 1$ $13 = 3 \times 4 + 1$
5	***Book 4, page 97*** Q.1 Read: *Do the calculations in your exercise book. Write only the results here.* Set a time limit or deal with one at a time. Ps can use any method of calculation. Review with whole class. Ps come to BB to write operation and result. Class agrees/ disagrees. Mistakes discussed and corrected. *Solution:* a) *Which number is 1530 less than 4390?* BB: 4390 – 1530 = 2860 b) *Which number is added to 4850 to make 10 000?* BB: 10 000 – 4850 =5150 c) *Which number is 4 times 534?* BB: 4 × 534 = 2136 d) *Which number is a quarter of 5340?* BB: 5340 ÷ 4 = 1335 e) *Which number is the sum of 347 and 2430?* BB: 347 + 2430 = 2777 f) *Which number is the quotient of 5400 and 9?* BB: 5400 ÷ 9 = 600 *25 min*	Individual work, monitored, helped Reasoning, agreement, self-correcting, praising Write details of calculation on BB too if there are problems or disagreeements. e.g. b) $\begin{array}{r} 1\,0\,\overset{10}{0}\,\overset{10}{0}\,0 \\ -\ \ 4_1 8_1 5\,0 \\ \hline 5\,1\,5\,0 \\ \hline \end{array}$

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Bk4

Lesson Plan 97

Activity		*Notes*
6	***Book 4, page 97*** Q.2 Read: *Do the calculations in your exercise book. Write only the results here.* Deal with one at a time. Ps read question themselves and solve it. (Ps could show result on scrap paper or slates on command.) Ps answering correctly explain at BB. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) *Add up the natural numbers which are not less than 1375 and not more than 1378.* BB: $1375 \le \square \le 1378$ $\square$: 1375, 1376, 1377, 1378 $1375 + 1376 + 1377 + 1378 = \underline{5506}$ b) Multiply the natural numbers which are greater than or equal to 8 and less than 12. BB: $8 \le \square < 12$ $\square$: 8, 9, 10, 11 $8 \times 9 \times 10 \times 11 = 80 \times 99 = 8000 - 80 = \underline{7920}$	Individual work, monitored, helped Ask Ps to write an inequality abut the relevant numbers first. Reasoning, agreement, self-correcting, praising BB: 1 3 7 5 1 3 7 6 1 3 7 7 + 1 3 7 8 5 5 0 6 1 3 2 or, e.g. 9 9 0 × 8 7 9 2 0 7
	30 min	
7	***Book 4, page 97*** Q.3 a) Read: *List the natural numbers which round to 4250 to the nearest ten and* *i) are even numbers ii) have only even digits.* Set a time limit. Review at BB with whole class. Ps dictate to T or come to BB. Class agrees/disagrees. Mistakes corrected. *Solution*: i) Even numbers: 4246, 4248, 4250, 4252, 4254 ii) Even digits: 4246, 4248 b) Read: *In your Ex. Bk list the natural numbers which round to 7600 to the nearest hundred and* *i) have only odd digits* *ii) have the digit 1 in the tens column* Set a time limit. Review at BB with whole class. Ps dictate to T or come to BB. Class agrees/disagrees. Mistakes corrected. *Solution*: i) Odd digits: 7551, 7553, 7555, 7557, 7559, 7571, 7573, 7575, 7577, 7579, 7591, 7593, 7595, 7597, 7599 ii) 1T: 7610, 7611, 7612, 7613, 7614, 7615, 7616, 7617, 7618, 7619	Individual work, monitored, (helped) Ps first write list of numbers which round to 4250 in *Ex Bks*. Reasoning, agreement, self-correction, praising Individual work, monitored, helped (or whole class activity) Ps first list numbers which round to 7600 using ellipses to save time. e.g. 7550, 7551, 7552, . . ., 7599, 7600, 7601, 7601, . . ., 7649 Reasoning, agreement, self-correction, praising
	36 min	

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Bk4		*Lesson Plan 97*
Activity		***Notes***
8	***Book 4, page 97, Q.4*** Read: *We have two iron pipes, each 6 m 40 cm long. Then we weld a 1 m length of pipe to one of them and an 80 cm length of pipe to the other.* *How much longer will one pipe be than the other?* Who can tell me what you do if you weld metal? T explains if no P knows. I will give you 2 minutes to work out the answer in your *Ex. Bks*. Show me the answer . . . now! (20 cm) P who answered correctly comes to BB to explain solution. Who agrees? Who did it another way? etc. *Solution:* Both pipes are the same length at the start, so the difference after lengthening is the difference between the extensions: BB: 1 m – 80 cm = 100 cm – 80 cm = $\underset{20\text{ cm}}{\underline{20\text{ cm}}}$ or 1 m > 80 cm *Answer:* One pipe is 20 cm longer than the other pipe. *40 min*	Whole class activity but individual calculation Discussion about the context. (T could show a picture if possible.) In unison Reasoning, agreement, self-correction, praising (or 7 m 40 cm > 7 m 20 cm) 20 cm but the extra work isn't necessary!
9	***Book 4, page 97*** Q.5 Read: *Solve the problem in your exercise book. Write only the answer here.* Set a time limit. Ps read problem themselves and solve it. Review with whole class. Ps could show results on scrap paper or slates on command. Ps answering corretly explain at BB to those who were wrong. Who did the same? Who did it another way? etc. Mistakes discussed and corrected. *Solution:* *When they were born, Peter weighed 2800 g and Jill weighed 3 kg 50 g.* *a) Who was heavier at birth and by how much?* BB: Jill: 3kg 250 g > Peter: 2800 g Difference: 3250 g – 2800 g = $\underset{450\text{ g}}{\underline{450\text{ g}}}$ *Answer:* Jill was heavier at birth by 450 g. *b) Within a month, both babies had put on 400 g in weight. Which baby was heavier now and by how much?* Both babies were heavier by the same amount, so the difference remains the same as in a). *Answer:* Jill was heavier after 1 month by 450 g. *45 min*	Individual work, monitored (helped) Reasoning, agreement, self-correction, praising Feedback for T Jill Peter or 3 kg 250 g > 2 kg 800 g 450 g Jill Peter or 3 kg 650 g > 3 kg 200 g 450 g but the extra work isn't necessary!

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Bk4	R: Numbers. Operations **C: Word problems** *E: Tables and graphs*	*Lesson Plan* *98*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 61, 62, 63, 64, 65, 122 Ps come to BB to choose a number and write the multiplication (drawing a factor tree if needed). Class agrees/disagrees. BB: 61 is prime, $62 = 2 \times 31$, $63 = 3 \times 3 \times 7$, $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$, $65 = 5 \times 13$, $122 = 2 \times 61$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 61: 1, 61; 62: 1, 2, 31, 62; 63: 1, 3, 7, 9, 21, 63 64: 1, 2, 4, 8, 16, 32, 64; 65: 1, 5, 13, 65 122: 1, 2, 61, 122	Whole class activity At a good pace Reasoning, agreement, praising (Prime numbers are not divisible by 2, 3, 5, 7 or 11) Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
	7 min	
2	**Problem 1** Which natural number is made up of 22 hundreds, 22 tens and 22 units? Allow Ps time to think about it and work it out on slates or scrap paper or in *Ex. Bks*. Show me . . . now! (2442) P who answered correctly comes to BB to explain (or if no P answered correctly, T gives hints). BB: 22H = 2200 22T = 220 22U = 22 Number is 2442	Individual trial first In unison Discussion, reasoning, agreement, praising Feedback for T
	10 min	
3	**Problem 2** Listen carefully and note the data in your *Ex. Bks*. Think about how we could solve the problem. Talk about it with other Ps if you wish. I*n a class, two pupils were asked how many classmates they had.* *Alice said, "Among my classmates, there are 4 times more girls than boys."* *Bob said, "Among my classmates, there are 5 times more girls than boys."* *How can you explain it? How many pupils are in this class?* T asks several Ps what they think and gives hints if Ps have no ideas. Ps might notice that: • Alice and Bob are not including themselves in their descriptions of their classmates. • Without Alice, the number of girls must be a multiple of 4. • Without Bob, the number of girls must be a multiple of 5.	Whole class activity T repeats slowly to give Ps time to think and discuss. Discussion, agreement on the main 'catch' to the question Praise any positive contribution. Extra praise if Ps think of these points by themselves!

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Bk4

Lesson Plan 98

Activity		*Notes*
3	(Continued) Let's try out the possible numbers. T draws a table with help of Ps. BB: e.g.	Or T could have table already prepared with labels in LH column. As Ps to explain the labels, then Ps come to BB to write the factors of 4 in top row and complete the other rows. At a good pace. Discussion, agreement, checking, praising

Trials of possible numbers

If	G – 1	4	8	12	16	20	24	28	32
then	G	5	9	13	17	21	25	29	33
	B	1	2	3	4	5	6	7	8
	B – 1	0	1	2	3	4	5	6	7

(factors of 4)
(including Alice)
(G – 1) ÷ 4
(without Bob)

Agree that the number of girls without Alice must be a multiple of 4 and the number of girls with Alice must be a multiple of 5. In which column is this true? Ps come to BB to point and T highlights it. Class agrees/disagrees. Lets' check it.

Check:

Alice said: Girls without A = 4 × Boys : 24 = 4 × 6 ✔

Bob said: Girls = 5 × Boys without Bob : 25 = 5 × 5 ✔

So number of pupils in the class = G + B = 25 + 6 = 31

Answer: There are 31 pupils in the class altogether, 25 girls and 6 boys.

Or accept any other valid methods of solution suggested by Ps (including trial and error)

16 min

4	**Problem 3** Listen carefully to this problem, picture the story in your head and try to explain it. *The King of Wonderland was very fond of pancakes. One day he was feeling very hungry so he ordered 17 pancakes for his tea.* *The royal chef was able to cook 5 pancakes in a minute and kept them warm in front of the fire, but while his back was turned and he is concentrating on cooking the next batch of pancakes, 4 of the first batch disappeared. If this kept happening, how long did it take the chef to make the 17 pancakes for the King?* What do you think was happening to the pancakes? (e.g. 4 birds fly in and take a pancake each.) How could we solve the problem? T gives hints if necessary. *Solution:* e.g. After every minute, the chef has made 5 pancakes but 4 of them have disappeared, so only 1 is left for the King. After 12 minutes, there are 12 pancakes left for the King. Then the chef makes another 5 pancakes and serves them all immediately before any of them can disappear. i.e. 12 + 5 = 17 (pancakes.) Or T could show it in a table: e.g. BB:	Whole class activity T repeats slowly and Ps repeat in own words (with T's help) Ps note the data in *Ex. Bks*. Involve several Ps. Praise creative theories on what happened to the pancakes! In good humour! T helps Ps to explain their reasoning if they have the idea but find it difficult to express. T could have table already prepared.

After these minutes	1	2	3	4	5	6	7	8	9	10	11	12	(13)
New pancakes made	5	5	5	5	5	5	5	5	5	5	5	5	5
Pancakes still there	1	2	3	4	5	6	7	8	9	10	11	12	(17)

Answer: It took the chef 13 minutes to make the pancakes for the King.

Agreement, praising

20 min

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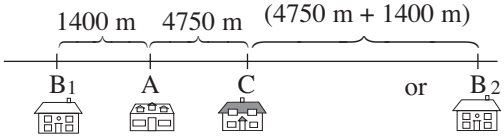
Bk4

Lesson Plan 98

Activity		*Notes*
5	***Book 4, page 98, Q.1*** Read: *Carol's house is 4750 m from Alice's house. This is 1400 m closer than it is from Ben's house. How far can Ben's house be from Alice's house?* T could have houses cut out for Carol, Alice and Ben and stuck to side of BB. Ps come to BB to arrange them and draw a diagram, writing the information given in the question. Where could Ben's house be? Where else could it be? How can we work out the distances? Ps come to BB to write calculations. Class points out errors. Who can give the answer in a sentence? *Solution:* Bob's house can be in 2 positions, to the left of Alice's house (B_1) or to the right of Carol's house (B_2). BB:  B_1 to A: $\underline{1400\text{ m}}$ or B_2 to A: $4750\text{ m} + (4750\text{ m} + 1400\text{ m}) = 4750\text{ m} + 6150\text{ m}$ $= \underline{10\,900\text{ m}}$ *Answer:* Ben's house could be 1400 m or 10 900 m from Alice's house. *25 min*	Whole class activity (or individual work if Ps wish) Diagram drawn on BB (or use houses enlarged from copy master and cut out) Discussion, reasoning, agreement, praising T intervenes only if necessary.
6	***Book 4, page 98*** Q.2 Read: *Staff in a garden cetre grew 7253 daffodils and 5126 tulips. They delivered 3707 daffodils and 1598 tulips to the supermarket.* *Which type of flower did they keep more of to sell in the garden centre and how many more?* Set a time limit. Review with whole class. Ps come to BB to show solution, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* *Plan:* D kept: 7253 – 5126 T kept: 5126 – 1598 *C:* Daffodils: $7253 - 5126 = 2127$ Tulips: $5612 - 3598 = 2014$ Daffodils: $3546 - 3528 = 18$ Tulips *Answer:* They kept 18 more daffodils. *30 min*	Individual work, monitored (helped) Or Ps could write an inequality on scrap paper or slates and show in unison on command. e.g. $D \underset{18}{>} T$ Reasoning, agreement, self-correction, praising or D T Grown: $7253 \underset{2127}{>} 5126$ Delivered: $3707 \underset{2109}{>} 1598$ Kept: $2127 - 2109 = \underline{18}$ (D)

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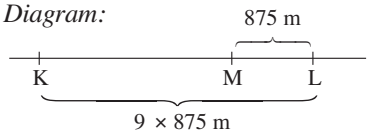
Bk4

Lesson Plan 98

Activity		*Notes*
7	***Book 4, page 98*** Q.3 Read: *Monica lives 875 m away from Leslie. Kate lives 9 times further away from Leslie than Monica does. How far away from Leslie does Kate live?* Draw a diagram first and note the distance you know. Do the calculation and write the answer in your *Ex. Bks*. Review with whole class. Ps come to BB to explain solution. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* *Diagram:*  *Plan:* 9 × 875 m *C:* 8 7 5 × 9 7 8 7 5 6 4 *Answer:* Kate lives 7875 m away from Leslie. *34 min*	Individual work, monitored, helped Discussion, reasoning, agreement, self-correction, praising Agree that this time it does not matter whether Kate lives to the right or left of Leslie, as the distance will be the same for both directions.
8	***Book 4, page 98*** Q.4 Read: *Barry cycled at an average speed of 6 m per second along a 4860 m route.* *On his return journey, he cycled at an average speed of 4 m per second.* *How much time did it take Barry altogether to cycle there and back?* Who can tell us what <u>average speed</u> means? (Barry no doubt cycled faster over some parts of the route and slower over other parts, e.g. uphill or around bends, but the average speed is as if he had cycled at the same speed all the time; the fast parts and the slow parts cancel each other out.) Set a time limit. Review with whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly explains at BB to Ps who were wrong. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* Outward time: 4860 m ÷ 6 m = 810 (times) → 810 seconds Return time: 4860 m ÷ 4 m = 1215 (times) → 1215 seconds Total time: 810 + 1215 = <u>2025</u> (seconds) (= 33 min. 45 sec.) *Answer:* Barry took 33 minutes and 45 seconds to cycle there and back. *38 min*	Individual work, monitored, helped Discussion. Ps might remember the concept from previous problems. Reasoning, agreement, self-correction, praising Show details of calculations on BB if problems. e.g. 1 2 1 5 4 4 8 6 0 2 3 3 r 45 6 0 2 0 2 5 – 1 8 0 2 2 5 – 1 8 0 4 5

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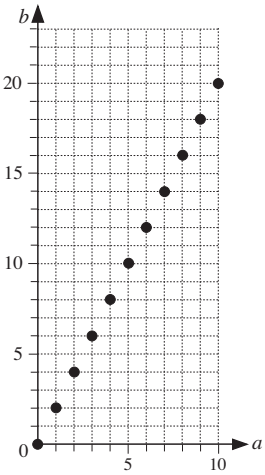
Bk4

Lesson Plan 98

Activity		*Notes*
9	***Book 4, page 98*** Q.5 Read: *Fill in the tables using the rules given. Show the data as dots on the graphs.* Deal with one part at a time. Ps complete the table first. Review at BB with whole class. Ps come to BB to fill in missing numbers in table or dictate to T. Class agrees/disagrees. Mistakes corrected. Who can explain what the graph means? (Horizontal axis shows the a numbers and vertical axis shows the b numbers. There are grid lines at every 1.) Let's draw dots to show the data on the graph. Ps come to BB to point to b number with left hand and a number with right hand (or Ps could come to BB in pairs) and then move their fingers along the grid lines till they meet. Ps draw the dot and say its coordinates. (e.g. $a = 1$ and $b = 2$) Class points out errors. *Solution:*	Individual work in completing the tables, monitored, then whole class activity in drawing the dots (or all as individual work if Ps wish) Drawn on BB or use enlarged copy master or OHP Initial discussion about the graph. (Ps might point out that usually the horizontal axis is labelled x and the vertical axis is labelled y.) Discussion, reasoning, self-correction, praising Ps can draw dots in *Pbs* too.

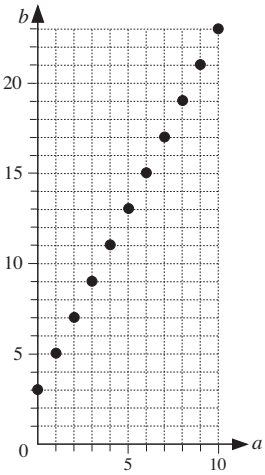
a) $b = 2 \times a$

a	b
0	0
1	2
2	4
3	6
4	8
5	10
6	12
7	14
8	16
9	18
10	20



b) $b = 2 \times a + 3$

a	b
0	3
1	5
2	7
3	9
4	11
5	13
6	15
7	17
8	19
9	21
10	23



Extension	Is it possible to have a fraction or a decimal for a or b? (Yes, e.g. in a): $a = 0.5$ and $b = 1$, etc.) Where would they be on the graph? Ps come out to BB to show it. Agree that the dots in the graphs above show only the <u>whole</u> number values for a and b. If we use all the possible fractions and decimals how could we show them? (Join up all the dots.) What do you notice about the two graphs? (Straight lines; parallel to each other; the line in b) has the same slope (or is at the same angle) as in a) but is 3 units higher on the b axis)	Whole class discussion Involve several Ps. T (or P) joins up the dots using a BB ruler. Extra praise if a P notices any of these.

45 min

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Bk4	R: Numbers. Calculations **C: Measures. Fractional parts** *E: Problems*	*Lesson Plan* *99*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 66, 67, 68, 69, 70, 123 Ps come to BB to choose a number and write the multiplication (drawing a factor tree if needed). Class agrees/disagrees. BB: $66 = 2 \times 3 \times 11$, 67 is prime, $68 = 2 \times 2 \times 17$, $69 = 3 \times 23$, $70 = 2 \times 5 \times 7$, $123 = 3 \times 41$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB to choose a number and list the factor pairs in order, using the prime factors to help them. Class points out errors or missed factors. BB: 66: 1, 2, 3, 6, 11, 22, 33, 66; 67: 1, 67; 68: 1, 2, 4, 17, 34, 68; 69: 1, 3, 23, 69; 70: 1, 2, 5, 7, 10, 14, 35, 70; 123: 1, 3, 41, 123 *7 min*	Whole class activity At a good pace Reasoning, agreement, praising (Prime numbers are not divisible by 2, 3, 5, 7 or 11) Ps may use a calculator. Ps could join up the factor pairs. Feedback for T
2	**Problem 1** Listen carefully to the problem, do the calculation in your *Ex. Bks* and show me the answer when I say. *A clock chimes the number of hours on the hour. For example, it chimes 3 times at 3 o'clock. How many chimes would it make from 7.30 am to 7.30 pm?* Show me . . . now! (78) P who answered correctly comes to BB to explain. Who agrees? Who did it another way? etc. Mistakes discussed. *Solution:* e.g. The first time it chimes will be at 8.00 am and the last time it chimes will be at 7.00 pm, so number of chimes is: BB: $8 + 9 + 10 + 11 + 12 + 1 + 2 + 3 + 4 + 5 + 6 + 7 = \underline{78}$ *Answer*: The clock will chime 78 times between 7.30 am and 7.30 pm. *10 min*	Whole class activity T repeats slowly to give Ps time to think and calculate. In unison. Reasoning, agreement, praising Ps suggest easy ways to do the addition or check with a calculator.
3	**Problem 2** Let's find the smallest positive integer which has the sum of its digits equal to 30. (Elicit that an <u>integer</u> is a whole number.) Ps come to BB to write possible numbers. Class checks that the digits add up to 30 and decides whether there are smaller possible numbers. If after several trials, Ps have not thought of a strategy, T gives hints. Elicit that the smallest number possible must have as few digits as possible, so the digits themselves must be as big as possible to reach 30 more quickly. What is the greatest possible digit? (9) Let's start with 9 in the units column and then write 9 in the tens column, etc. until we have reached 30. (Or elicit that $30 \div 9 = 3$, r 3) Agree that the number is <u>3999</u>. *14 min*	Whole class activity (or individual or paired trial first if Ps wish) BB: <u>integer</u>: whole number Discussion, reasoning, agreement, praising Extra praise if Ps think of the strategy without hints from T.

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Bk4

Lesson Plan 99

Activity		*Notes*
4	**Fractions** BB: 2, 5, 4, 1, 10, 20, 15, 16, $2\frac{1}{2}$ What part of 20 are these numbers? T points to a number and says, e.g. 'What part of 20 is 2?' Ps write fraction on slates but keep them hidden. T chooses a P to answer orally, e.g. '2 is 1 tenth of 20'. Class agrees/disagrees by showing the fraction written on their slates. Repeat for the other numbers. *Ps:* 2 is $\frac{1}{10}$ of 20; 5 is $\frac{1}{4}$ of 20; 4 is $\frac{1}{5}$ of 20; 1 is $\frac{1}{20}$ of 20; 10 is $\frac{1}{2}$ of 20; 20 is $\frac{20}{20}$ of 20, or 1 whole 20; 15 is $\frac{3}{4}$ of 20; 16 is $\frac{4}{5}$ of 20; $2\frac{1}{2}$ is $\frac{1}{8}$ of 20 (as $2\frac{1}{2}$ is half of 5) *20 min*	Whole class activity At a good pace Accept the fraction in steps, e.g. 2 = $\frac{2}{20}$ of 20 = $\frac{1}{10}$ of 20 Responses shown in unison on command. If P answering question is wrong, another P explains correct reasoning. Agreement/correcting, praising In good humour!
5	***Book 4, page 99*** Q.1 Read: *Which is more? How many more? Write the missing signs and differences.* Ps can do necessary calculations on scrap paper or in *Ex. Bks*. Warn Ps to be careful about the order! Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Ask Ps to show details of calculations on BB if problems or disagreement. *Solution:* a) $26 \times 27 \overset{702}{>} 20 \times 20 \overset{442}{+} 6 \times 7$ b) $35 \times 18 \overset{630}{=} 35 \times 10 \overset{260}{+} 35 \times 8 \overset{630}{-} 0$ c) $47 \times 24 \overset{1128}{>} 40 \times 24 \overset{967}{+} 7 \overset{161}{+} 1888$ d) $59 \times 32 \overset{1888}{=} 60 \times 32 \overset{1888}{-} 32 \overset{0}{+} 0$ *25 min*	Individual work, monitored, helped Written on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising Extra praise if Ps did not need to do the calculations in b) and c) to answer the question! Details on BB: e.g. $26 \times 27 = 26 \times 20 + 26 \times 7$ $= 520 + 182 = \underline{702}$ or T might show or elicit: (Similarly for the other multiplications by 2-digit nos.) $\begin{array}{r} 26 \\ \times\ 27 \\ \hline 182 \quad (\times 7) \\ +\ 520 \quad (\times 20) \\ \hline 702 \end{array}$
6	***Book 4, page 99*** Q.2 Read: *Fill in the missing numbers.* Elicit that there are $3 \times 6 = 18$ questions. Let's see how many of them you can do in 3 minutes! Start . . . now! . . . Stop! Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discusssed and corrected. Who had them all correct? Who did not finish them all? etc. *Solution:* a) 1 litre = 100 cl; 4 litres = 400 cl; 7 litres = 700 cl b) 1 m = 1000 mm; 4 m = 4000 mm; 7 m = 7000 mm c) 1 kg = 1000 g; 4 kg = 4000 g; 7 kg = 7000 g d) 100 cl = 1 litre; 300 cl = 3 litres; 800 cl = 8 litres e) 1000 mm = 1 m; 3000 mm = 3 m; 300 mm = 0.3 m f) 1000 g = 1 kg; 8000 g = 8 kg; 800 g = 0.8 kg *30 min*	Individual work, monitored, helped Written on BB or use enlarged copy master or OHP Differentiation by time limit Agreement, self-correction, praising BB: 300 mm = $\frac{300}{1000}$ m = $\frac{3}{10}$ m = 0.3 m 800 g = $\frac{800}{1000}$ kg = $\frac{8}{10}$ kg = 0.8 kg

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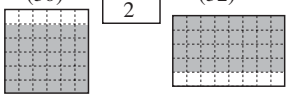
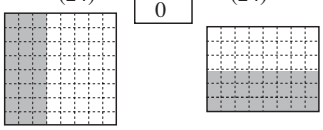
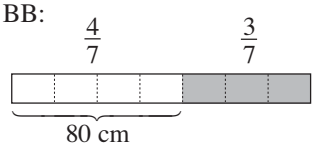
Bk4

Lesson Plan 99

Activity		*Notes*
7	***Book 4, page 99*** Q.3 Read: *Fill in the missing numbers.* Ps can do necessary calculations in *Ex. Bks*. Set a time limit. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrrected. *Solution:* a) $\frac{1}{5}$ m = 20 cm, $\frac{3}{5}$ = 60 cm, $\frac{6}{5}$ m = 120 cm b) 0.1 m = 100 mm, 0.6 m = 600 mm, 1.5 m = 1500 mm c) $\frac{1}{4}$ kg = 250 g, $\frac{2}{4}$ kg = 500 g, $\frac{3}{4}$ kg = 750 g d) 0.1 kg = 100 g, 0.5 kg = 500 g, 1.4 kg = 1400 g *35 min*	Individual work, monitored, helped Written on BB or use enlarged copy master or OHP Differentiation by time limit Reasoning, agreement, self-correction, praising Feedback for T **Extension** T points to a fraction and Ps say it as a decimal, and vice versa.
8	***Book 4, page 99*** Q.4 Read: *Which is more? How many more?* *Fill in the missing signs and differences.* Deal with one part at a time. Ps colour the correct part of each rectangle, then fill in the missing signs and numbers. Review at BB with whole class. Ps come to BB to model the fractions and write the missing items, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) $\frac{5}{6}$ of 36 (30) < 2 $\frac{4}{5}$ of 40 (32)  b) $\frac{3}{8}$ of 64 (24) = 0 $\frac{3}{6}$ of 48 (24)  *40 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising Or by calculation: BB: a) $\frac{5}{6}$ of 36 = 36 ÷ 6 × 5 = 6 × 5 = 30 $\frac{4}{5}$ of 40 = 40 ÷ 5 × 4 = 8 × 4 = 32 etc.
9	***Book 4, page 99*** Q.5 Read: *Three sevenths of a piece of ribbon was cut off and 80 cm of ribbon was left.* *a) What length of ribbon was cut off?* *b) What length was the original ribbon?* Ps use the diagram to help them and do necessary calculations in *Ex. Bks*. Set a time limit. Review at BB with whole class. Ps could show answers on scrap paper or slates on command. Ps responding correctly show solution on BB. Mistakes discussed and corrected. *Solution:* a) Part cut off: $\frac{3}{7}$, Part remaining: $1 - \frac{3}{7} = \frac{4}{7}$ 4 sevenths → 80 cm 1 seventh → 80 cm ÷ 4 = 20 cm 3 sevenths → 20 cm × 3 = 60 cm *Answer:* 60 cm of ribbon was cut off. *45 min*	Individual work, monitored, helped BB:  Discussion, reasoning, agreement, self-correction, praising b) Whole ribbon: $\frac{7}{7}$ 7 sevenths → 20 cm × 7 = 140 cm *Answer*: The original ribbon was 140 cm long.

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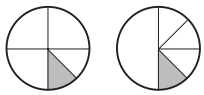
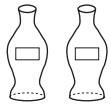
Bk4	R: Numbers and calculations **C: Measures. Time** *E: Fractional parts. Problems*	*Lesson Plan* *100*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 71, 72, 73, 74, 75, 124 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: 71 is prime, $72 = 2 \times 2 \times 2 \times 3 \times 3$, 73 is prime, $74 = 2 \times 37$, $75 = 3 \times 5 \times 5$, $124 = 2 \times 2 \times 31$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 71: 1, 71; 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72; 73: 1, 73; 74: 1, 2, 37, 74; 75: 1, 3, 5, 15, 25, 75; 124: 1, 2, 4, 31, 62, 124 *7 min*	Whole class activity At a good pace Reasoning, agreement, praising *Check:* Prime numbers are <u>not</u> divisible by 2, 3, 5, 7, 11) Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** a) *What part is half of a quarter?* Show me . . . now! $(\frac{1}{8})$ Who can model it for us? Ps come to BB to draw a diagram (or use coloured multilink cubes, etc.) explaining reasoning. Class agrees/disagrees. b) *What part is a quarter of a half?* Show me . . . now! $(\frac{1}{8})$ Ps model it as above. Agree that: BB: $\frac{1}{4}$ of $\frac{1}{2} = \frac{1}{2}$ of $\frac{1}{4} = \frac{1}{8}$ *10 min*	Whole class activity Responses written on scrap paper or slates and shown in unison. Reasoning, agreement, praising BB:  $\frac{1}{8} = \frac{1}{8}$
3	**Problem 2** a) *We have these two empty bottles, both equal in shape and size.* *We want to mark on their labels where half their capacity will be. How could we do it if we only have some water and a pencil?* Think about it and discuss it with your neighbours for a minute. Who has an idea? Who agrees? Who thought of doing something else? etc. e.g. We fill one of the bottles, then pour water from this bottle into the other so that the water is at the same level in the two bottles, then draw a horizontal line on the labels to mark half the capacity. Ps come to front of class to try it out. b) *How could we mark half the capacity if we had only <u>one</u> bottle?* Give Ps a minute to think and talk about it. Ps give their ideas and come to front of class to try them out (with T's help). e.g. Pour some water into the battle to roughly half-way and make a pencil mark. Seal the top of the bottle and turn the bottle upside down. Make another mark at the water level. If the water level is above the first mark, pour out some water (or if below, add some water) Repeat several times until the two levels coincide. *15 min*	Whole class activity T shows:  Ask several Ps what they think. Praise all positive contributions. Discusion, agreement, checking, praising T gives hints if nobody has an idea. Agree that the mark which is half-way will be the same whether the bottle is the right way up or upside down.

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Bk4

Lesson Plan 100

Activity		*Notes*
4	**Problem 3** Listen carefully and think about the best way to solve this problem. *Tom bought some carrots and potatoes for using in his restaurant. The vegetables weighed 100 kg altogether. If the weight of the potatoes was 1 kg more than twice the weight of the carrots, what weight of potatoes and what weight of carrots did Tom buy?* **A**, how would you solve it? Who agrees? Who would solve it in a different way? etc. T gives hints if Ps have no ideas. e.g. Let the weight of potatoes and carrots be P and C (in kg), then BB: $P + C = 100$ and $P = 2 \times C + 1$ 1) Trial and Error (Ps suggest which weights to try.) If C was 30, P would be 61 and their total weight would be 91, but $91 < 100$, so try a heavier weight for C. We could show the possible weights in a table. BB: ✔ C: 30, 31, 32, **33** P: 61, 63, 65, **67** $P + C$: 91, 94, 97, **100** 2) By calculation (T shows it if no P thinks of it.) BB: $P + C = 100$, but $P = 2 \times C + 1$, so $2 \times C + 1 + C = 100$ $3 \times C + 1 = 100$ $3 \times C = 99$ $C = 33$ (kg) $P = 2 \times 33 + 1 = 66 + 1 = 67$ (kg) *Answer:* Tom bought 67 kg of potatoes and 33 kg of carrots. *20 min*	Whole class activity T repeats slowly and Ps note data in *Ex. Bks* or on slates. Allow a minute for thought and discussion. Ps suggest methods of solution. Reasoning, agreement, checking, praising Praise any positive idea. Accept and show both methods and ask Ps to say which they prefer and why. Extra praise if a P suggests the substitution without help from T. Feedback for T
5	***Book 4, page 100*** Q.1 Read: *How much time has passed between these dates?* Deal with one part at a time. First elicit what a leap year is and the number of days in each month. Review with whole class. Ps could show results on scrap paper or slates on command. T chooses Ps to explain how they got their answers. Some slight variations are acceptable (see notes) but genuine mistakes should be corrected. *Solution:* (If we include the days given in the questions.) a) *1 January and 15 March in a year which is not a leap year.* BB: $31 + 28 + 15 = 59 + 15 = 74$ (days) 74 days = 10 weeks 4 days = 2 months 14 days* b) *20 May and 10 September* BB: $12 + 30 + 31 + 31 + 10 = 73 + 41 = 114$ (days) 114 days = 16 weeks 2 days = 3 months 21 days* c) *20 August and 24 December* BB: $12 + 30 + 31 + 30 + 24 = 73 + 54 = 127$ (days) 127 days = 18 weeks 1 day = 4 months 4 days* *28 min*	Individual work monitored helped (or whole class activity) Ps could recite, '30 days hath September, April, June, . . .' Ps could have calendars on desks if possible and/or T has large class calendar. Necessary calculations can be done in *Ex. Bks*. Discussion, reasoning, agreement, self-correcting, praising N.B. Ps might have different answers according to whether they counted on the calendar or calculated and whether they counted the days given or between the days given. * Counting on a calendar from the first to the last day.

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Bk4

Lesson Plan 100

Activity		*Notes*
6	***Book 4, page 100*** Q.2 Read: *The first bus in the morning leaves the depot at 05:30 and then buses leave every 12 minutes after that. List the times that the first 10 buses leave the depot.* Who ean explain what the time 05:30 means? (5 hours 30 minutes after 12 midnight, i.e. 5.30 am). Set a time limit. Review at BB with whole class. Ps come to BB or dicatate times to T. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* **05:30, 05:42**, 05:54, 06:06, 06:18, 06:30, 06:42, 06:54, 7:06, 07:18 *30 min*	Individual work, monitored, (helped) Discussion, reasoning, agreement, self-correction, praising **Bold** times are given. T points to some of the times and Ps set them on a real (or model) clock.
7	***Book 4, page 100*** Q.3 Read: *Write these time intervals in increasing order.* What should we do first to make it easier for us? (Change the times to the same unit of time.) Set a time limit. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected Write details of calculations on BB if problems or disagreement. *Solution:* $\frac{1}{3}$ hour $<$ 25 min. $<$ $\frac{2}{3}$ hour $<$ $\frac{3}{4}$ hour $<$ 1 hour 10 min $<$ $1\frac{1}{4}$ hour (20 min $<$ 25 min $<$ 40 min $<$ 45 min $<$ 70 min $<$ 75 min) *34 min*	Individual work, monitored, helped Reasoning, agreement, self-correction, praising Details: e.g. $\frac{2}{3}$ of 60 $=$ 60 $\div$ 3 $\times$ 2 $=$ 20 $\times$ 2 $=$ <u>40</u> (min) Feedback for T
8	***Book 4, page 100, Q.4*** Read: *Fill in the table.* Deal with one column at a time. Ps come to BB to fill in missing times, explaining reasoning. Class agrees/disagrees. Extra praise if Ps notice relationships to make calculation easier. Write details of calculations on BB if problems. e.g. BB: $\frac{3}{5}$ of 1 hour $=$ 60 min $\div$ 5 $\times$ 3 $=$ 12 min $\times$ 3 $=$ <u>36</u> min. $\frac{3}{5}$ of 8 hours $=$ 36 min $\times$ 8 $=$ 30 min $\times$ 8 + 6 min $\times$ 8 $=$ <u>4 hours 48 min</u> ***Solution:***	Whole class activity (or individual work if Ps wish) Drawn on BB or use enlarged copy master or OHP At a good pace Differentiation by difficulty of calculation Reasoning, agreement, praising Praise correct answers given in minutes or in fractions of an hour, but ask Ps to convert to hours and minutes where appropriate. Ps fill in tables in *Pbs* too. Feedback for T

Amount of time

Part of it	1 hour	2 hours	5 hours	6 hours	8 hours	9 hours	10 hours
$\frac{1}{2}$	30 min	1 hour	2 h 30 min	3 hours	4 hours	4 h 30 min	5 hours
$\frac{1}{4}$	15 min	30 min	1 h 15 min	1 h 30 min	2 hours	2 h 15 min	2 h 30 min
$\frac{1}{5}$	12 min	24 min	1 hour	1 h 12 min	1 h 36 min	1 h 48 min	2 hours
$\frac{1}{10}$	6 min	12 min	30 min	36 min	48 min	54 min	1 hour
$\frac{3}{4}$	45 min	1 h 30 min	3 h 45 min	4 h 30 min	6 hours	6 h 45 min	7 h 30 min
$\frac{3}{5}$	36 min	1 h 12 min	3 hours	3 h 36 min	4 h 48 min	5 h 24 min	6 hours
$\frac{3}{10}$	18 min	36 min	1 h 30 min	1 h 48 min	2 h 24 min	2 h 42 min	3 hours

41 min

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Bk4		*Lesson Plan 100*
Activity		***Notes***
9	***Book 4, page 100*** Q.5 Read: *In my right-hand pocket I have some £1 coins.* *In my left-hand pocket I have the same number of £2 coins and a £5 note.* *How much could be in my pockets?* What do the letters in the table mean? (*R*: money in right-hand pocket in £s, *L*: money in left-hand pocket in £s) I will give you 2 minutes to complete the table. Start . . . now! . . . Stop! Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. What is the rule? Who can write it in a mathematical way? Who agrees? Who can write it in a different way? etc. *Solution:*	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. Reasoning, agreement, self-correction, praising Whole class discussion on the rule. Agreement, checking, praising Check rules with values from table. **Bold** numbers are missing.

R (£)	0	2	**3**	**4**	5	6	**7**	8	9	10	**11**	12	13
L (£)	**5**	**9**	11	13	**15**	**17**	19	**21**	**23**	**25**	27	**29**	**31**

Rule: $L = 2 \times R + 5$, $R = (L - 5) \div 2$,
$5 = L - 2 \times R$, $2 = (L - 5) \div R$

45 min

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Bk4	R: Natural numbers **C: Negative numbers: thermometers, position on number line** *E: Problems*	*Lesson Plan* *101*
Activity		***Notes***
1	**Factorisation** a) Let's <u>factorise</u> these numbers (i.e. find their <u>prime</u> factors). BB: 76, 77, 78, 79, 80, 125 and 126 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $76 = 2 \times 2 \times 19$, $77 = 7 \times 11$, $78 = 2 \times 3 \times 13$, 79 is prime, $80 = 2 \times 2 \times 2 \times 2 \times 5$, $125 = 5 \times 5 \times 5$, $126 = 2 \times 3 \times 3 \times 7$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 76: 1, 2, 4, 19, 38, 76; 77: 1, 7, 11, 77 78: 1, 2, 3, 6, 13, 26, 39, 78; 79: 1, 79; 80: 1, 2, 4, 5, 8, 10, 16, 20, 40, 80; 125: 1, 5, 25, 125; 126: 1, 2, 3, 6, 7, 9, 14, 18, 21, 42, 63, 126 *8 min*	Whole class activity At a good pace Reasoning, agreement, praising (as 79 is <u>not</u> divisible by 2, 3, 5, 7 or 11) Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Listen carefully, note the data and think how you would solve the problem. You can talk about it with your neighbour if you wish. *A shop ordered some apples and bananas, 71 kg altogether. The apples weighed 15 kg more than the bananas. How many kg of apples and how many kg of bananas were ordered?* **A**, what do you think we should do? Who agrees? Who would use a different method? etc. Accept any correct method suggested by Ps, including trial and error. T gives hints if Ps have no ideas and shows the simplest method below if no P has suggested it. *Simplest solution:* If we take off the extra 15 kg of apples, then the remaining weight is made up equally of apples and bananas. BB: 71 kg – 15 kg = <u>56 kg</u>, 56 kg ÷ 2 = <u>28 kg</u> B: 28 kg, A: 28 kg + 15 kg = 43 kg *Check*: 28 + 43 = 71 ✔ *Answer:* The shop ordered 43 kg of apples and 28 kg of banans. *16 min*	Whole class activity T repeats slowly to give Ps time to think and discuss. Discussion, reasoning, agreement, checking, praising Or, e.g BB: $A + B = 71$ kg $A - B = 15$ kg Adding: $2 \times A = 86$ kg $A = \underline{43}$ kg so $B = 43$ kg – 15 kg $= \underline{28}$ kg
3	**Sequences** Let's continue the sequences. First the class agrees on the rule, then Ps come to BB to draw/write the next few terms, explaining reasoning. Class points out errors. BB: **a)** *Rule:* Square alternating with a circle, shading on square is moving clockwise and on circle is moving anti-clockwise. b) 430, 390, 350, 310, (270, 230, 190, 150, 110, 70, 30, – 10, – 50, – 90, . . .) *Rule*: – 40 c) $\frac{1}{20}, \frac{3}{20}, \frac{5}{20}, \frac{7}{20}, (\frac{9}{20}, \frac{11}{20}, \frac{15}{20}, \frac{17}{20}, \frac{19}{20}, \ldots)$ *Rule*: $+\frac{2}{20}$ d) 4.3, 3.9, 3.5, 3.1, (2.7. 2.3, 1.9, 1.5, 1.1, 0.7, . . .) *Rule*: – 0.4 e) 2, 6, 12, 20, (30, 42, 56, 72, 90, 110, 132, . . .) *21 min*	Whole class activity Discussion, agreement on the rule. Involve as many Ps as possible. At a good pace Reasoning, agreement, correcting, praising T might need to help with the wording of the rule for a). e) *Rule*: e.g. • Difference between terms is increasing by 2; or • 1 × 2, 2 × 3, 3 × 4, . . .

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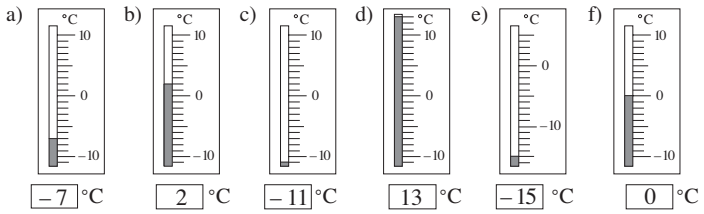
Bk4

Lesson Plan 101

Activity		*Notes*
4	**Problem 2** *I am thinking of three natural numbers. Their product is 60 and their sum is 12. What are the three numbers that I am thinking of?* Give Ps a couple of minutes to try to solve the problem in their *Ex. Bks*. Ps can discuss the solution with their neighbours if they wish. If you have worked out the answer, show me the 3 numbers . . . now! Ps who answered correctly explain at BB. If nobody is correct, T gives hints and class helps Ps to solve it at BB. *Solution:* e.g. The 3 numbers must be factors of 60. By factorising: BB: $60 = 2 \times 2 \times 3 \times 5$, but you are thinking of only 3 numbers, so instead of 2×2, use 4. BB: *Check:* $3 \times 4 \times 5 = 60$ and $3 + 4 + 5 = 12$ ✔ *Answer*: The numbers that you are thinking of are 3, 4 and 5.	Whole class activity or individual (paired) trials first with a time limit Responses written on scrap paper or slates and shown in unison. Discussion, reasoning, checking, agreement, praising Accept and praise any valid method suggested by Ps, including trial and error, but also show the method opposite if Ps do not suggest it.
	25 min	
5	***Book 4, page 101*** Q.1 Read: *Write the temperature below each thermometer.* What is temperature? What is a thermometer? What can you tell me about the diagrams? (e.g. temperature is how hot or cold something is; it is measured with a thermometer; shaded parts in diagrams represent the mercury in the thermometers; mercury is a metal which is a liquid at normal temperatures; it expands when it becomes hot, so the higher the temperature, the higher the level of mercury; unit of measure is degree Celsius (°C); scales on these thermometers show positive and negative temperatures; there is a 'tick' at every °C) Ps come to BB to show the positive and negative temperatures and explain them. (Positive temperatures are more than 0 °C, negative temperatures are less than 0 °C) What is special about 0 °C (100 °C)? [Temperature at which water freezes into ice (boils and becomes steam)]. Elicit or tell that positive numbers should really be written with '+' in front of them, e.g. + 5, but that we usually dispense with the + and write just '5'; negative numbers are always written with a '–' sign in front of them. Set a time limit. Ps write temperatures in *Pbs*. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/ disagrees. Mistakes discussed and corrected. *Solution:*  – 7 °C 2 °C – 11 °C 13 °C – 15 °C 0 °C Let's say the temperatures in increasing order.	Whole class discussion to start with – revision of temperature Involve several Ps. Praise all positive contributions. BB: mercury BB: degree Celsius: °C If Ps do not give any of this information, T tells it. BB: 0 < positive numbers, e.g. 0 < + 5, or 0 < 5 negative numbers < 0, e.g. – 5 < 0 Relate the scale on the thermometers to the class number line. Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Less able Ps could work on a copy of copy master if diagrams in *Pbs* are too small. Differentiation by time limit Agreement, self-correcting praising In unison. Praising
	30 min	

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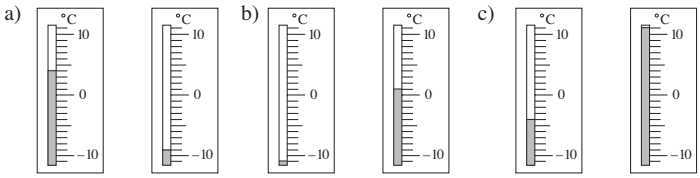
Bk4

Lesson Plan 101

Activity		*Notes*
6	***Book 4, page 101*** Q.2 Read: *Colour the temperatures on the thermometers. Fill in the missing items.* Set a time limit or deal with one part at a time. Review at BB with whole class. Ps come to BB to colour and write numbers and signs, saying the inequality. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*  a) 4 °C [>] – 9 °C [13] °C b) – 11 °C [<] 1 °C [12] °C c) – 4 °C [<] 11 °C [15] °C Let's say the temperatures in <u>decreasing</u> order. *35 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP (Less able Ps could have copy of copy master.) Discussion, agreement, self-correction, praising If problems, Ps point to the two temperatures and count the degrees between them. Show on horizontal number line too. Feedback for T In unison
7	***Book 4, page 101*** Q.3 Read: *Which temperature is higher and by how many degrees?* Deal with one part at a time. Ps may use the thermometer diagrams in previous questions to help them. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. If problems or disagreement, show on temperature scale or number line (in two steps where needed). e.g. $-4\,°C \rightarrow 0\,°C \rightarrow 11\,°C$: $4 + 11 = 15$ (°C) *Solution:* a) 8 °C [>] 5 °C [3] °C; 2 °C [<] 9 °C [7] °C; 0 °C [<] 3 °C [3] °C; 7 °C [>] 0 °C [7] °C b) – 4 °C [<] – 1 °C [3] °C; – 5 °C [>] – 10 °C [5] °C; – 6 °C [<] 0 °C [6] °C; 0 °C [>] – 2 °C [2] °C c) 3 °C [>] – 2 °C [5] °C; – 3 °C [<] 2 °C [5] °C; 4 °C [>] – 11 °C [15] °C; – 4 °C [<] 11 °C [15] °C *41 min*	Individual work, monitored helped Written on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Feedback for T **Extension** Which of these temperatures is the hottest (coldest)? (11 °C, – 11 °C) What is the difference between them? (22°C)
8 **Extension**	***Book 4, page 101, Q.4*** Read: *Write these temperatures in increasing order.* Ps come to BB or dictate to T. Class points out errors. Show on temperature scale or number line (already prepared by T) if problems. *Solution:* a) $-120\,°C < -63\,°C < -40\,°C < -31\,°C < -14\,°C < -2\,°C < -0.6\,°C < 0\,°C$ b) $-19\,°C < -8\,°C < -1.5\,°C < -1\,°C < 0\,°C < 3\,°C < 65\,°C < 6000\,°C$ What do you think <u>your</u> temperature is in °C? Ask several Ps. *45 min*	Whole class activity (or a) as individual work and b) done with whole class, or all done as individual work if Ps wish) Written on BB or SB or OHT Agreement, (self-correction), praising (The temperature of a human body ≈ 37.0 °C)

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Bk4	R: Numbers and calculations **C: Negative and positive numbers. Comparison** *E: Problems*	*Lesson Plan* *102*
Activity		***Notes***
1	**Factorisation** a) Let's <u>factorise</u> these numbers. BB: 81, 82, 83, 84, 85, 127 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $81 = 3 \times 3 \times 3 \times 3$, $82 = 2 \times 41$, 83 is prime, $84 = 2 \times 2 \times 3 \times 7$, $85 = 5 \times 17$, 127 is prime (as not divisible by 2, 3, 5, 7 or 11) b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 81: 1, 3, 9, 27, 81; 82: 1, 2, 41, 82; 83: 1, 83; 84: 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84; 85: 1, 5, 17, 85; 127: 1, 127 *7 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Listen carefully, note the data and think how you would solve the problem. Talk about it with your neighbour if you wish. *Andy Bunny and Benny Bunny have 35 carrots altogether.* *Andy Bunny and Candy Bunny have 49 carrots altogether.* *Benny Bunny and Danny Bunny have 60 carrots altogether.* *How many carrots does each bunny have?* Who thinks that they know what to do? Come and explain it to us. Who agrees? Who would do it in a different way? etc. If nobody has solved it, T gives hints. If Ps have solved it using another method, T leads Ps through the solution below too. *Solution:* BB: $A + B = 35$ $A + C = 49$ $B + C = 60$ Adding: $A + A + B + B + C + C = 35 + 49 + 60 = 144$ or $2 \times (A + B + C) = 144$ so $A + B + C = 144 \div 2 = \underline{72}$ But $A + B = 35$, so $C = 72 - 35 = \underline{37}$ *Check:* $A + C = 49$, so $A = 49 - 37 = \underline{12}$ $B + C = 60$. so $B = 60 - 37 = \underline{23}$ *Answer:* *Andy Bunny* has 12 carrots, *Benny Bunny* has 23 carrots and *Candy Bunny* has 37 carrots. *13 min*	Whole class activity T reads slowly to give Ps time to think and discuss. Reasoning, agreement, checking, praising Accept any method which gives the correct results, including trial and error but encourage Ps to use mathematical solutions. T elicits the steps opposite (or shows them with Ps' help). If a P thought of this method at the start without help from T, class should give him/her 3 cheers <u>and</u> a round of applause!

	3	7
	2	3
+	1	2
	7	2

✔

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Bk4		*Lesson Plan 102*
Activity		***Notes***
3	**Problem 2** Which positive whole numbers can be written instead of x to make the statement true? Give Ps time to try it out in *Ex. Bks*. BB: $58 + x < 62 - x$ If you know the answer, show me . . . now! ($x = 1$) P answering correctly comes to BB to explain reasoning. e.g. Difference between 58 and 62 is 4, so x must be less than $4 \div 2 = 2$ The only positive whole number less than 2 is 1, so $x = 1$.	Individual trial first, then whole class discussion Ps can discuss it with their neighbours. In unison Reasoning, agreement, praising
Extension	If x is a whole number, which numbers could be written instead of x? e.g. $x = 0$: $58 + 0 < 62 - 0$ ✔ (0 is neither positive nor negative) $x = -1$: $58 + (-1) < 62 - (-1)$, (T helps with calculations) $57 < 63$ ✔ Elicit that <u>all</u> whole negative numbers are possible, so $x \leq 1$	Whole class activity (adding – 1 is the same as subtracting 1; subtracting – 1 is the same as adding 1) Discussion, agreement, praising
	18 min	
4	**Problem 3** Listen carefully and think how you would work out the answer. *An antiques dealer bought a vase for £70. Later he sold it for £80, but soon bought it back again for £90. Then he sold it again for £100. How much profit or loss did he make after all the transactions?* **A**, come and explain how you would work out the answer. Who agrees? Who would do it in a different way? etc. e.g. BB: $-$ £70 + £80 $-$ £90 + £100 = £10 – £90 + £100 = $-$ £80 + £100 = <u>£20</u> or Total amount paid out: £70 + £ 90 = £160 Total amount received: £80 + £100 = £180 Amount left (profit): £180 – £160 = <u>£20</u> *Answer:* He made a profit of £20.	Whole class activity Elicit what an antique and an antiques dealer is first. Ps can do calculations in *Ex. Bks*. Discussion, reasoning, agreement, checking, praising Relate to income (+) and outgoings (–). or – £70 + £80 = £10 – £90 + £100 = £10 Profit: £10 + £10 = <u>£20</u>
	22 min	
5	**Problem 4** Listen carefully, note the data and work out the answer in your *Ex. Bks*. Show me the answer when I say. A *supermarket offered painted eggs for Easter. The price of a painted egg was £3 but if customers bought more than 10 eggs, they got the extra eggs for £2.50 each.* *If a customer bought 30 eggs, how much did he or she pay?* Show me . . . now! (£80) Ps responding correctly come to BB to explain their solution. Who agrees? Who did it another way? etc. e.g. BB: $10 \times$ £3 + $20 \times$ £2.50 = £30 + £40 + £10 = <u>£80</u> or $30 \times$ £3 – $20 \times$ £0.50 = £90 – £10 = <u>£80</u> *Answer*: If a customer bought 30 eggs, he paid £80.	Whole class activity T repeats slowlyto give Ps time to do the calculation. In unison Reasoning, agreement, praising Feedback for T
	25 min	

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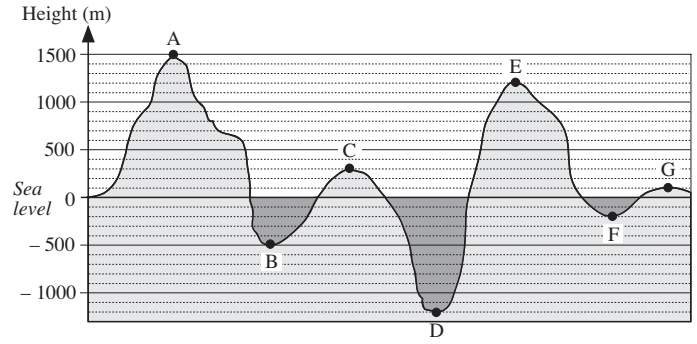
Bk4

Lesson Plan 102

Activity		*Notes*
6	***Book 4, page 102*** Q.1 Read: *Read the heights of the mountains and the depths of the bottom of the sea from this geographical cross-section and write them in the boxes. Sea level is 0 m.* T first explains/elicits what a geographical cross-section is. (If you magine a vertical slice taken out of the surface of the earth, this is what you would see from the side view.) Discuss the scale on the graph (– 1300 m to 1500 m, with grid lines at every 100 m) and what the letters represent (A, C, E and G are the highest points on the mountains; B, D and F are the deepest points below the surface level of the sea.) Set a time limit. Ps read heights on graph and write in boxes. Review at BB with the whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. Read: *Write the heights in decreasing order.* Ps come to BB or class dictates to T in unison. *Solution:*  A: 1500 m B: – 500 m C: 300 m D: – 1200 m E: 1200 m F: – 200 m G: 100 m 1500 m > 1200 m > 300 m > 100 m > – 200 m > – 500 m > – 1200 m *30 min*	Individual work, monitored, helped (or whole class activity if class is not very able) Drawn on BB or use enlarged copy master or OHP Initial discussion on context Involve several Ps. Discussion, reasoning, agreement, self-correction, praising Agreement, praising (Dark shaded part represents the sea)
7	***Book 4, page 102*** Q.2 Read: *Which level is higher and by how much? Calculate in your exercise book.* Set a time limit. Deal with one row at a time if necessary. Review at BB with whole class. Ps come to BB or dictate inequality to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) 251 m [>] 38 m 4500 m [<] 8848 m 0 m [<] 1015 m [213] m [4348] m [1015] m b) – 305 m [<] – 21 m – 100 m [>] – 2500 m 0 m [>] – 402 m [284] m [1400] m [402] m c) 42 m [>] – 15 m – 637 m [<] 40 m – 18 m [<] 19 m [57] m [677] m [37] m *35 min*	Individual work, monitored, helped Written on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising If problems or disagreement, show on relevant segment of number line drawn on BB (or show approximate height on vertical scale from Q.1) **Extension** Which level is lowest (highest)? [– 2500 m, 8848 m]

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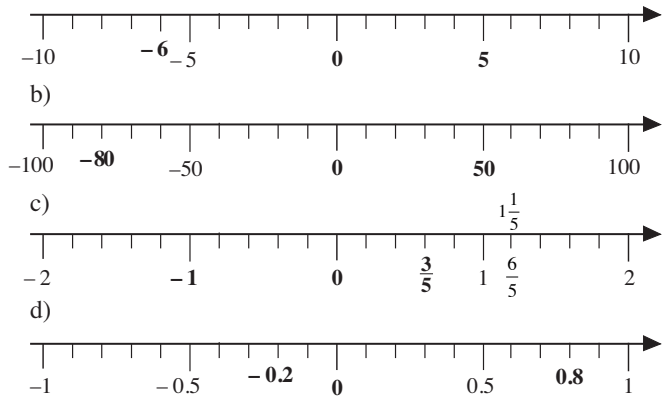
Bk4		*Lesson Plan 102*
Activity		***Notes***
8	**Number line** Study these segments of the number line. First elicit the range of each segment and label the extremes. Then Ps come to BB to point to a tick and choose another P to say the number. P could label it too. Class agrees/disagrees. BB: a)  	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Agreement, praising Accept and praise <u>improper fractions</u> but also ask Ps to give it as a <u>mixed fraction</u>. e.g. $\frac{6}{5} = 1\frac{1}{5}$
Extension	Which number line segment shows the other 3 segments too? (b) Ps come to BB to show the approximate position of each of the other segments on b).	Extra praise if Ps notice this without help from T
	41 min	
9	***Book 4, page 102, Q.3*** Read: *Complete the sentences*. Class reads the sentence aloud, saying 'something' instead of the missing words. Ps write missing words on slates and show in unison on command. T asks Ps with different answers to come to front of class to show them. Class decides which words make sense and are grammatically correct. Class reads complete sentence again in unison. *Solution:* a) *The greater of two positive numbers is the one which is* <u>further from</u> *zero*. b) *The greater of two negative numbers is the one which is nearer* <u>zero</u>. c) *Any* <u>positive</u> *number is greater than any* <u>negative</u> *number*.	Whole class activity Discussion, agreement, checking, prasing Ask Ps to give examples to check that the sentence is true, and to demonstrate on class number line.
	45 min	

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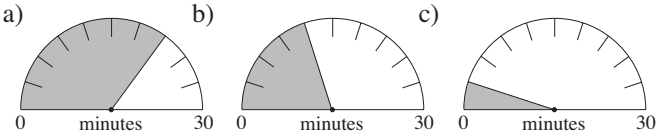
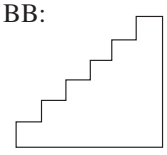
Bk4

R: Numbers. Calculations
C: Negative and positive numbers
E: Problems

Lesson Plan 103

Activity		*Notes*
1	**Factorisation** a) Let's <u>factorise</u> these numbers. BB: 86, 87, 88, 89, 90, 128 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $86 = 2 \times 43$, $87 = 3 \times 29$, $88 = 2 \times 2 \times 2 \times 11$, 89 is prime, $90 = 2 \times 3 \times 3 \times 5$, $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 86: 1, 2, 43, 86; 87: 1, 3, 29, 87; 88: 1, 2, 4, 8, 11, 22, 44, 88; 89: 1, 89; 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90; 128: 1, 2, 4, 8, 16, 32, 64, 128 *8 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Introduce context by discussing car parks and parking meters. Relate to the local area and to Ps' experiences if possible. If Ps do not know about them, T explains how they are used. Look carefully at these parking meter clocks. What do you think the shaded part shows? (The time remaining for parking before more money needs to be put in.) How much time is left on these meters? Ps come to BB to choose a meter and calculate the time in minutes, explaining reasoning. Class agrees/disgrees. BB: a) b) c)  Ps: $7 \times 3 = \underline{21}$ (min) $4 \times 3 = \underline{12}$ (min) <u>3</u> minutes *12 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP Initial discussion to clarify the context. Involve several Ps. Elicit that there is a 'tick' at evrey 3 minutes and that when the correct money is put in, the shaded part starts at 30 minutes and gradually moves back to 0. At a good pace Reasoning, agreement, praising Feedback for T
3	**Combinatorics** In how many ways can we climb up 6 stairs if we can climb 1 or 2 stairs at a time? Ps come to BB to show the different ways on a diagram or model (or set of real steps). T keeps note in order on BB. BB:  1, 1, 1, 1, 1, 1 1, 2, 1, 1, 1 1, 2, 2, 1 2, 2, 2 1, 1, 1, 1, 2 2, 1, 1, 1, 1 2, 1, 1, 2 1, 1, 1, 2, 1 1, 1, 2, 2 2, 1, 2, 1 1, 1, 2, 1, 1 1, 2, 1, 2 2, 2, 1, 1 Agree that there are <u>13</u> different ways. We could have shown it like this: BB: If 1 single step at a time: 1, 1, 1, 1, 1, 1 (1 way) 4 single steps + 1 double step: e.g. 1, 1, 1, 1, 2 (5 ways) 2 single steps + 2 double steps: e.g. 1, 1, 2, 2 (6 ways) 3 double steps: 2, 2, 2 (1 way) } 13 ways *18 min*	Whole class activity Drawn on BB or use model or real steps. At a good pace Encourage logical listing. Agreement, praising BB: $1 + 5 + 6 + 1 = \underline{13}$

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Bk4

Lesson Plan 103

Activity		*Notes*
4	**Problem 2** Listen carefully and think how you would solve this problem. *Six people put their names in a hat. The person whose name is drawn out wins a book.* *There are 3 copies of the same book, so they put all their names back in the hat and repeat the draw for each of the other two books.* *If a person can win more than 1 book, how many possibilities could occur?* T asks several Ps what they think. Let's work it out logically! e.g. • If all three books are won by the same person, there are 6 possibilities (A, B, C, D, E or F have 3 books and the others have none). • If one person wins 2 books and another wins 1 book, then the possibilities are: 2 | A A A A A B B B B B C C C C C D D D D D E E E E E F F F F F 1 | B C D E F A C D E F A B D E F A B C E F A B C D F A B C D E So there are 6 × 5 = 30 possibilities. • If 3 people each win 1 book and 3 people have none, then the possibilities for winning are: BB: ABC BCD CDE DEF ABD BCE CDF ABE BCF CEF ABF BDE ACD BDF ACE BEF ACF ADE ADF AEF So there are 20 possibilities. *Answer:* The total number of possibilities is 6 + 30 + 20 = 56 *25 min*	Whole class activity T repeats slowly to give Ps time to think and discuss it with their neighbours. If no P has thought of these strategies, T gives hints or the idea and Ps help in the solution. At a good pace T starts the table and Ps continue it by coming to BB or dictating to T. T starts the listing and Ps continue it by coming to BB or dictating to T. Discussion, reasoning, agreement, praising **Extension** If each book was different, how many different possibilities would there be? (6 × 6 × 6 = 216)
5	***Book 4, page 103*** Q.1 Read: *In a palm-house in the Botanical Gardens, the temperature is always kept 8 °C higher than the temperature in the open air so that the palm trees will grow well.* Discuss the context first. Who has been to the Botanical Gardens? Who has seen a palm tree? Where do they grow naturally? What kind of fruit do they produce? (coconuts), etc. a) Read: *Complete the table to show what the two temperatures could be.* Set at time limit. Review at BB with whole class. Ps come to BB or dictate to T. Mistakes corrected. Agree on the rule. *Solution:* Temperature outside (°C): 0, –3, –8, 2, **–7**, **4**, **–9**, **–2**, 5, – 4, **–8** Temperature inside (°C): **8**, **5**, **0**, **10**, 1, 12, – 1, 6, **13**, **4**, 0 *Rule*: *TI* = *TO* + 8, *TO* = *TI* – 8, *TI* – *TO* = 8	Whole class discussion to start T could have a picture of a palm-house if possible. Involve several Ps. Individual work, monitored, helped Table drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising **Bold** numbers are missing. Show calculations on BB or on number line if problems.

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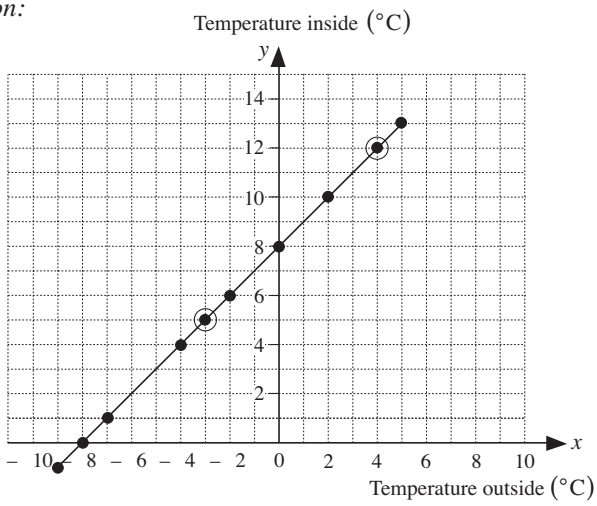
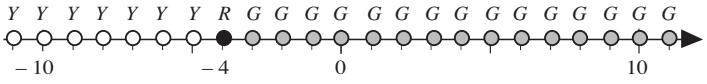
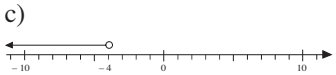
Bk4

Lesson Plan 103

Activity		*Notes*
5	(Continued) b) Read: *Plot the data by drawing dots on the graph.* What do you notice? (Two dots have already been drawn.) Where are the matching columns in the table? Who can explain why the dots have been drawn in these positions on the graph? Ps come to BB to point and explain (with T's help if necessary). Make sure that Ps understand what the graph means. Let's plot the other data. Ps come to BB to choose a column, find the appropriate position on the graph (by pointing to the appropriate values on the x and y axes with both hands and moving their fingers along the grid lines until they meet, or Ps come to BB in pairs), then to draw the dot. Class agrees/disagrees. Ps might notice that two columns in the table are the same $(-8, 0)$ and that the dot for $(-9, -1)$ needs to be drawn <u>below</u> the x-axis.	Whole class activity Graph drawn on BB or use enlarged copy master or OHP Discussion involving several Ps. Praise all contributions. At a good pace Reasoning, agreement, praising Other Ps draw dots in *Pbs* too. T helps with drawing the dot for $(-9, -1)$
Extension	Does it make sense to join up the dots? Ask several Ps what they think and why. (Yes, because the dots only refer to the values in the table but other temperatures are possible. Drawing a line will show <u>all</u> the possible temperatures.) Ps could suggest some . *Solution:*  	Discussion, reasoning, agreement e.g. (7, 15), (1.5, 9.5), etc. Agree that temperature rises or falls <u>continuously</u> and <u>any</u> point on the line is possible, including <u>fractions</u> of degrees. Circled dots are given.
	32 min	
6	***Book 4, page 103*** Q.2 Read: *a) Mark in green the whole numbers greater than – 4.* *b) Mark – 4 in red.* *c) Mark in yellow the whole numbers less than – 4.* Set a time limit. Review at BB with whole class. Ps come to BB to draw dots. Class agrees/disagrees. Mistakes discussed and corrected. How could we write it in a mathematical way? Who can think of another way? etc. *Solution:*  a) *Green*: $-3, -2, -1, 0, 1, \ldots$ $G > -4$, or $-3 \leq G$ b) *Red*: -4 $R = -4$ c) *Yellow*: $-5, -6, -7, \ldots$ $Y < -4$, or $Y \leq -5$	Individual work, monitored, helped Number line drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising **Extension** If we included fractions as well as whole numbers, how could we show them? a) c) 
	37 min	

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Bk4		*Lesson Plan 103*
Activity		***Notes***
7	***Book 4, page 103*** Q.3 Read: C*ontinue the sequences for 3 terms in both directions*. When you have written the terms, write the rule that you used at the end of the line. Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T., explaining the rule. Who agrees? Who used a different rule? Mistakes discussed and corrected. *Solution:* a) $-15, -12, -9, [-6, -3, 0, 3, 6, 9], 12, 15, 18, (+3)$ b) $-30, -23, -16, [-9, -2, 5, 12], 19, 26, 33, (+7)$ c) $-90, -40, 10, [60, 10, 160, 210], 260, 310, 360, (+50)$ d) $-1, -\frac{7}{9}, -\frac{5}{9}, [-\frac{3}{9}, -\frac{1}{9}, \frac{1}{9}, \frac{3}{9}], \frac{5}{9}, \frac{7}{9}, 1, (+\frac{2}{9})$ *42 min*	Individual work, monitored, (helped) Written on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising Bracketed numbers are given. Feedback for T
8	**Number line** Follow my instructions in your head and show me the number you end up at when I say. (Less able Ps may use the number line in *Pbs*.) *Start at zero. Step 1 to the right, then 2 to the left, then 3 to the right, then 4 to the left, then 5 to the right, then 6 to the left, then 7 to the right, then 8 to the left, then 9 to the right, then 10 to the left.* *Which number have you finished on?* Show me . . . now! (– 5) T chooses a P to demonstrate the steps on the class number line. *45 min*	Whole class activity In good humour! Ps can write the interim numbers on scrap paper or slates. In unison. Checking, praising

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Bk4	R: Numbers. Calculations **C: Negative and positive numbers** *E: Problems*	*Lesson Plan* *104*
Activity		***Notes***
1	**Factorisation** a) Let's <u>factorise</u> these numbers. BB: 91, 92, 93, 94, 95, 129 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $91 = 7 \times 13$, $92 = 2 \times 2 \times 23$, $93 = 3 \times 31$, $94 = 2 \times 47$, $95 = 5 \times 19$, $129 = 3 \times 43$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 91: 1, 7, 13, 91; 92: 1, 2, 4, 23, 46, 92; 93: 1, 3, 31, 93; 94: 1, 2, 47, 94; 95: 1, 5, 19, 95; 129: 1, 3, 43, 129 *7 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2 **Extension**	**Problem 1** Listen carefully, do the calculation in your *Ex. Bks* and show me the answer when I say. *Sue spent half of her money. Then she spent another £30 and had £80 left. How much money did she have at first?* Show me . . . now! (£220) P answering correctly comes to BB to explain reasoning. Who agrees? Who did it another way? etc. Deal with all methods. e.g. Do the opposite calculations in the reverse order. BB: $(£80 + £30) \times 2 = £110 \times 2 = \underline{£220}$ or $£80 + £30 = £110$; $£110 \times 2 = \underline{£220}$ T shows this method if no P has used it. Let x be Sue's money (in £s) at first. BB: $x \div 2 - 30 = 80$ $x \div 2 = 80 + 30 = 10$ $x = 110 \times 2 = \underline{220}$ (£s) *Answer:* Sue had £220 at first. *12 min*	Whole class activity but individual calculating T repeats slowly and P repeats in own words. In unison (on scrap paper or slates) Reasoning, agreement, checking, praising *Check:* $\underline{£220} \div 2 = £110$ $£110 - £30 = £80$ ✔
3	**Problem 2** Listen carefully and think how you would solve the problem. *We have only £2 coins and £5 notes in our purse and we have to pay a bill of £33. If we want to use as few £2 coins as possible, how will we pay the bill?* **A**, what do you think we should do? Who agrees with **A**? Who would use another method to find the answer? etc. e.g. Show the possible ways in a table, starting with one £2 coin. BB: or If we use as few £2 coins as possible, we must use as many £5 notes as possible. BB: $£33 \div £5 = \underline{6}$ (times), and £3 remains BUT we cannot pay £3 with only £2 coins, so try 5 £5 notes. BB: $£5 \times 5 = £25$, $£33 - £25 = £8$, and $£8 = £2 \times 4$ *Answer:* We will pay using five £5 notes and four £2 coins. *17 min*	Whole class activity T repeats slowly to give Ps time to think and discuss with their neighbours. T gives hints if Ps have no ideas. Discussion, reasoning, checking, agreement, praising *Check:* $4 \times £2 + 5 \times £5 = £8 + £25$ $= £33$ ✔

£2	1	2	3	4
£5	×	×	×	5

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Bk4

Lesson Plan 104

Activity		*Notes*
4	**Secret numbers** I am thinking of a number. I will give you a clue and you must show me the number when I say. (Ps responding correctly show calculation on BB. Class agrees/disagrees.) a) *It is 738 less than 8457.* BB: $8457 - 738 = 7719$ Show me . . . now! (7719) b) *It is made up of 3 tens, 41 units, 7 thousands and 18 hundreds.* BB: $30 + 41 + 7000 + 1800 = 8871$ Show me . . . now! (8871) c) *7560 is 28 times its value.* BB: $7560 \div 28 = 3780 \div 14 = 1890 \div 7 = 270$ Show me . . . now! (270) Agree that decreasing dividend and divisor by the same number of times does not change the result. *22 min*	Whole class activity but individual calculation (on scrap paper or slates or in *Ex. Bks*.) Responses shown in unison. Reasoning, checking, agreement, praising or $3 \times 10 + 41 + 7000 + 18 \times 100$ $= 30 + 41 + 7000 + 1800 = \underline{8871}$ Or T helps with long division by 28. BB: $7560 \div 28 = 270$
5	**Problem 3** Listen carefully, note the data and try to work out the answers in your *Ex. Bks*. You can discuss it with your neighbour if you wish. *A bookcase has two shelves. On the bottom shelf there are 276 books. On the top shelf there are 30 more books than on the top shelf.* a) *How could you move the books so that there is an equal number of books on both shelves?* Who thinks that they have an answer? Come and explain it to us. Who agrees? Who did it a different way? etc. e.g. BB: $30 \div 2 = 15$; Top Shelf: $276 + 15 = \underline{291}$; Bottom Shelf: $276 + 30 - 15 = \underline{291}$ *Answer:* Move 15 books from the top to the bottom shelf. a) *How could you move the books so that the bottom shelf has half the number of books on the top shelf?* Who thinks that they have an answer? Come and explain it to us. Who agrees? Who did it a different way? etc. e.g. BB: Total books: $306 + 276 = 582$ BS: $582 \div 3 = 194$ (as 1 part of 3 equal parts) TS: $194 \times 2 = 388$ (as 2 parts of 3 equal parts) Extra books needed on TS: $388 - 306 = \underline{82}$ *Check:* $276 - 82 = 194 =$ half of 388 ✔ *Answer:* Move 82 books from the bottom to the top shelf. *26 min*	Individual (paired) trial first, monitored T repeats slowly to give Ps time to think, discuss and calculate. Reasoning (with T's help), agreement, praising BB: 15 ↻ 306 / 276 → 291 / 291 Praise any valid method which gives correct answer. BB: $306 + 276 = 582$; $582 \div 3 = 194$ 82 ↻ 306 / 276 → 388 / 194

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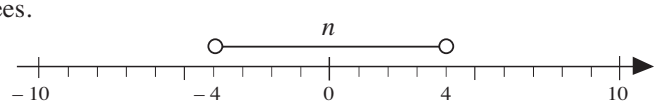
Bk4		*Lesson Plan 104*
Activity		***Notes***
6	***Book 4, page 104*** Q.1 Read: *Follow the instructions on how to jump along the number line. Write down the numbers you land on.* *(Start from – 2. Step 1 to the left, then 2 to the right, then3 to the left, then 4 to the right, then 5 to the left, then 6 to the right, and so on.)* Ps read instructions themselves and list the numbers, using the number line given in *Pbs* to help them. Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Class points out errors. Mistakes corrected. *Solution:* – 2, – 3, – 1, – 4, 0, – 5, 1, – 6, 2, – 7, 3, – 8, 4, – 9, . . .	Individual work, monitored, helped Use class number line or draw on BB or use enlarged copy master or OHP Differentiation by time limit Agreement, self-correction, praising Ps demonstrate the steps on class number line if possible. [Practice in moving from positive to negative numbers]
	31 min	
7	***Book 4, page 104*** Q.2 Read: *Mike starts at 0 km each time. Where does he get to on the number line if he cycles these distances?* Use the number line to help you. Let's see how many you can do in 3 minutes. Start . . . now! . . . Stop! Review with whole class. Ps could show results on scrap paper or slates on command. Ps who answer incorrectly come to BB to demonstrate the moves on the number line (with help of class). T might write them on BB as a calculations. *Solution:* BB: a) 16 km East, then 18 km West (– 2 km) [16 + (– 18) = – 2] b) 12 km East, then 6 km West (6 km) [12 + (– 6) = 6] c) 13 km West, then 9 km East (– 4 km) [– 13 + 9 = – 4] d) 25 km West, then 29 km East (4 km) [– 25 + 29 = 4] e) 82 km West, then 6 km West (– 88 km) [– 82 + (– 6) = – 88] b) 14 km East, then 14 km West (0 km) [14 + (– 14) = 0]	Individual work, monitored, helped Number line drawn on BB or use enlarged copy master or OHP, or use class number line (with cut-out bicycle so that it can be moved and turned to face West where necessary) Reasoning, agreement, self-correction, praising Elicit that: • East of zero is positive; • West of zero is negative; • if Mike moves East, the numbers are increasing; • if Mike moves West the numbers are decreasing.
	36 min	
8 **Extension**	**Number line** On the number line in Q.1, mark in *red* the whole numbers greater than – 4. Now mark in *blue* the whole numbers less than 4. Which numbers did you mark in *red* and *blue*? Ps dictate to T. BB: – 3, – 2, – 1, 0, 1, 2, 3 Let's call this set of numbers n. Who can write an inequality about n? P comes to BB to write and say it. Who agrees? Who can think of another inequality which would be true? T shows them if no P can think of them. Check that both are correct on the class number line. If we include fractions as well as whole numbers, how could we mark them on the number line? Ps come to BB to show it. Class agrees/ disagrees. BB: 	Individual work, monitored (or whole class activity, with Ps coming to BB or OHP, or sticking coloured dots on class number line) Agreement, praising BB: $-4 < n < 4$ or $-3 \leq n \leq 3$ (where n is a whole number) Whole class activity Agree that the <u>open</u> circles mean that – 4 and 4 are <u>not</u> included in the list.
	40 min	

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Bk4

Lesson Plan 104

Activity		*Notes*
9	***Book 4, page 104***	Whole class discussion to start
	Q.3 Read: *Each day the receptionist in a hotel has to write down the number of guests arriving and departing.*	Table drawn on BB or use enlarged copy master or OHP
	Who has stayed in a hotel? Ps (or T if no P has done so) tell briefly their experiences to class to set the scene.	
	a) *Read: Complete the bottom row of the table to show the increase or decrease in the number of guests staying at the hotel each day.*	
	T or P explains the task using the column already completed. Set a time limit. Encourage mental calculation.	Differentiation by 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.	Reasoning, agreement, self-correcting, praising
	Solution:	

Arrived	**25**	16	19	15	21	0	18	0	7	22
Departed	18	23	19	0	27	2	23	11	5	10
Change	+ 7	**– 7**	**0**	**+ 15**	**– 6**	**– 2**	**– 5**	**– 11**	**+ 2**	**+ 12**

Bold numbers are missing.

b) Read: *Which change was the most positive?* (Ps: 15)

c) Read: *Which change was the most negative?* (Ps: – 11)

Ps shout out in unison or show on scrap paper or slates.

d) Read: *What was the total change after the ten days?*

Whole class activity

How could we work it out? Ps suggests strategies. e.g.

Praise all positive contributions.

i) Calculating in small steps:

BB: $+7-7=0$, $+15-6-2-5=+2$,
$+2-11=-9$, $-9+2=-7$, $-7+12=\underline{+5}$

Show on number line if problems.

ii) Comparing all positive changes with all negative changes:

BB: $+7+15+2+12=36$
$-7-6-2-5-1=-31$ } $\underline{+5}$

BB: $36-31=\underline{5}$

iii) Calculating the total number of people who arrived and the total number of people who left and finding the difference.

BB: Total arrivals: 143
Total departures: – 138
Total change: 5

Ps may use a calculator to save time and dictate results to T.

Remind Ps that positive numbers are usually written without the + sign: $+5 = 5$

Agree that after the 10 days, 5 more people had arrived than had departed.

45 min

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Bk4	R: Numbers, calculations **C: Positive and negative numbers. Money: cash and debt** *E: Problems*	*Lesson Plan* *105*
Activity		***Notes***
1	**Factorising** a) Let's factorise these numbers. BB: 96, 97, 98, 99, 100, 130, 131 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$, 97 is prime; $98 = 2 \times 7 \times 7$, $99 = 3 \times 3 \times 11$, $100 = 2 \times 2 \times 5 \times 5$; $130 = 2 \times 5 \times 13$; 131 is prime. b) Let's list all the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 96: 1, 2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 96; 97: 1, 97 98: 1, 2, 7, 14, 49, 98; 99: 1, 3, 9, 11, 33, 99; 100: 1, 2, 4, 5, 10, 20, 25, 50, 100; 130: 1, 2, 5, 10, 13, 26, 65, 130; 131: 1, 131 *8 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Note that $100 = 10 \times 10$ Feedback for T
2	**Problem 1** Listen carefully, note the important data, do the calculation in your *Ex. Bks* and show me the answer when I say. *Some children were making small gifts to put at each place setting for a special party. They put 4 chocolates into a little box, tied it with ribbon and attached a name card.* *a) If the children prepared 137 such gifts and there were 2 chocolates left over, how many chocolates did they have at first?* Show me . . . now! (550) P answering correctly comes to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected. BB: No. of chocolates: $137 \times 4 + 2 = 548 + 2 = \underline{550}$ *Answer:* The children had 550 chocolates at first. *b) If they had put 5 chocolates into each box, how many gifts could they have made?* Show me . . . now! (110) P answering correctly comes to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected. BB: No. of gifts: $550 \div 5 = \underline{110}$ *Answer:* They could have made 110 gifts. *16 min*	Whole class activity but individual calculating T repeats slowly and P repeats in own words. In unison (on scrap paper or slates) Reasoning the plan, agreement, self-correcting, praising In unison Agreement, praising

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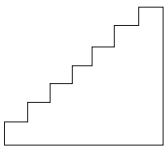
Bk4

Lesson Plan 105

Activity		*Notes*
3	**Combinatorics** In how many ways can we climb up 7 stairs if we can climb 1 or 2 stairs at a time? Ps come to BB to show the different ways on a diagram or model (or set of real steps). T keeps note in order on BB. BB:  1, 1, 1, 1, 1, 1, 1 — 1, 1, 1, 2, 2 — 2, 1, 1, 2, 1 — 1, 2, 2, 2 1, 1, 1, 1, 1, 2 — 1, 1, 2, 1, 2 — 2, 1, 2, 1, 1 — 2, 1, 2, 2 1, 1, 1, 1, 2, 1 — 1, 1, 2, 2, 1 — 2, 2, 1, 1, 1 — 2, 2, 1, 2 1, 1, 1, 2, 1, 1 — 1, 2, 1, 1, 2 — 2, 2, 2, 1 1, 1, 2, 1, 1, 1 — 1, 2, 1, 2, 1 1, 2, 1, 1, 1, 1 — 1, 2, 2, 1, 1 2, 1, 1, 1, 1, 1 — 2, 1, 1, 1, 2 Agree that there are 21 different ways. We could have shown it like this: BB: If 1 single step at a time: 1, 1, 1, 1, 1, 1, 1 (1 way) 5 single steps + 1 double step: e.g. 1, 1, 1, 1, 1, 2 (6 ways) 3 single steps + 2 double steps: e.g. 1, 1, 1, 2, 2 (10 ways) 1 single step + 3 double steps: e.g. 1, 2, 2, 2 (4 ways) } 21 ways	Whole class activity Drawn on BB or use model or real steps. At a good pace Encourage logical listing. Agreement, praising Ps might remember the idea from *LP 128/3*. T starts and Ps continue. BB: 1 + 6 + 10 + 4 = 21 Agreement, praising
	22 min	
4	**Problem 2** Listen carefully, picture the story in your head, note the data and decide which are important. Think about how you would solve the problem. *Peter weighs 32 kg and is 11 years old. His Dad is 39 years old and weighs 72 kg. His Mum is 168 cm tall and weighs 59 kg. They are taking two guests to dinner in a restaurant. Neither of the guests is lighter than Peter's Dad.* *To reach the restaurant, they have to take a lift from the ground floor.* *If a sign on the lift states that the maximum load is 300 kg, is it safe for them all to get into the lift together?* Which data are important? (The weights of the people) Let's write them on the BB. Ps dictate what T should write. What should we do now? Who agrees? Who thinks something else? etc. e.g. BB: P: 32 kg D: 72 kg M: 59 kg Elicit that each of the two guests must weigh at least 72 kg. So the least possible total weight of the group is: BB: 32 + 59 + 3 × 72 = 91 + 216 = 307 (kg); 307 kg > 300 kg *Answer:* It is not safe for them all to get into the lift together.	Whole class activity Ps make notes in *Ex. Bks.* or on slates or scrap paper. T repeats slowly to give Ps time to think. Discussion, reasoning, agreement, praising Or Ps might suggest: P + D + M = 32 + 72 + 59 = 163 (kg) 300 kg – 163 kg = 137 kg $G_1 + G_2$: 72 × 2 kg = 144 kg 144 kg > 137 kg
	26 min	

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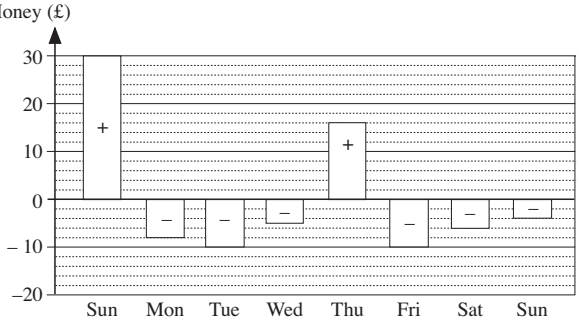
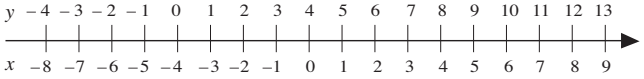
Bk4

Lesson Plan 105

Activity		*Notes*
5	***Book 4, page 105*** Q.1 Read: *Charlie drew a diagram to show his income (+) and spending (–) last week.* Who can explain to us what the graph means? BB: Money (£)  Ps come to BB to point and explain. Class agrees/disagrees. (e.g. Vertical scale shows amount of money in £s from £30 to – £20; the horizontal grid lines show every £2; the height (depth) of the white rectangle above each day of the week shows how many £s Charlie has earned or spent.) a) Read: *Fill in how much he earned or spent each day.* Set a time limit. Ps read data from graph and write in boxes. Review at BB with whole class. Ps come to BB to show, say and write the value. Class agrees/disagrees. Mistakes discussed and corrected *Solution:* *Sun. Mon. Tue. Wed. Thu. Fri. Sat. Next Sun.* £30 – £8 – £10 – £5 £16 – £10 – £6 – £4 b) Read: *How much did he save last week?* Ps can calculate in *Ex. Bks.* Show me . . . now! (£4) **X**, come and tell us how you got your answer. Who did the same? Who worked it out in a different way? etc. *Solution:* e.g. Income: £30 + £16 = £46 Spending: – £8 – £10 – £5 – £10 – £6 – £4 = – £43 Saved: £46 – £43 = £3 *Answer: Charlie saved £3 last week.* *31 min*	Whole class discussion on meaning of graph Involve several Ps. Praise all positive contributions. Drawn on BB or use enlarged copy master or OHP Agreement, praising Ps might notice that Charlie's graph shows 8 days, which is more than 1 week! Individual work, monitored, helped Reasoning, agreement, self-correction, praising Responses shown on scrap paper or slates in unison. Discussion, reasoning, agreement, self-correction, praising Ps might reason that the final Sunday should not be included as it is in the next week!
6	***Book 4, page 105*** Q.2 Read: *Write additions and subtractions from the diagram.* Who can explain what the table means? BB:  (The *y* numbers are 4 more than the *x* numbers; or the *x* numbers are 4 less than the *y* numbers.) T or P checks using the operation given. Let's see how many additions and subtractions you can write in your *Ex. Bks.* in 3 minutes. Start . . . now! . . . Stop!	Individual work, monitored, helped Diagram drawn on BB or use enlarged copy master or OHP If no P volunteers, T explains uisng the example given. Differentiation by time limit

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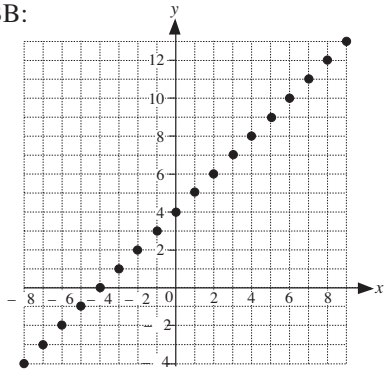
Bk4

Lesson Plan 105

Activity		*Notes*
6	(Continued)	
	Review at BB with whole class. Ps dictate operations to T. Class points out errors. Ask Ps to show the operation on the diagram if problems or disagreement. Mistakes discussed and corrected.	Discussion, reasoning, agreement, self-correction, praising
	BB: e.g. $0+4=4$, $5+4=9$, $-3+4=1$, $-4+4=0$, etc. $10-4=6$, $4-4=0$, $1-4=-3$, $-4-4=-8$, etc.	Extra praise for P who wrote the most correct operations in the time allowed.
	Read: *Write the rule*.	
	Ps come to BB or dictate to T. Class checks each form with values from table.	Whole class activity Agreement, checking, praising
	BB: *Rule:* $y = x+4$ $x = y-4$ $4 = y-x$	
Extension	Let's show the data from the table in a graph. BB: 	Whole class activity (or individually if Ps wish) Drawn on BB or use enlarged copy master or OHP (Ps could have copy on desks.)
	Tell or elicit that the position of any point on a graph can be described by 2 numbers called <u>coordinates</u> (x, y) and that the x (horizontal) coordinate is given first.	At a good pace
	Ps come to BB to point to x and y values on the axes, move fingers along grid lines until they meet and draw a dot.	T helps with plotting the negative points. Reasoning, agreement
	Class points out errors. Ps write the coordinates for their dots.	Praising, encouragement only! e.g. $(-7, -3)$
	36 min	
7	***Book 4, page 105***	
	Q.3 Read: *Complete the drawings so that the money is equal to the balance given*.	Individual work, monitored, helped
	Do one or two examples with the whole class first to make sure that Ps understand what to do. Rest done as individual work under a time limit.	Drawn (stuck) on BB or use enlarged copy master or OHP Differentiation by time limit.
	Review at BB with whole class. Ps come to BB to draw (stick on) the missing money, explaining reasoning. T helps with Ps' wording. e.g.	Reasoning, agreement, self-correction, praising
	a) 'My balance is £0. I have £3 in cash so I must be £3 in debt.'	
	Class agrees/disagrees. Mistakes discussed and corrected.	
	Solution:	
	a) £0: (1) (1) [−1] (1) [−1]	b) £6: (1) (1) [−1] (1) (1) (1) (1) (1)
	c) −£4: [−1] [−1] (1) [−1] [−1] [−1]	d) −£5: [−1] [−1] [−1] [−1] [−1] [−1] (1)
	e) £3: [−1] (1) (1) (1) (1) (No extra needed)	f) −£6: (1) [−1] (1) [−1] [−1] [−1] [−1] [−1] [−1]
Extension	Let's write an operation about each part. Ps come to BB to write and say their operations. Class points out errors.	Whole class activity At a good pace
	BB:	(With T's help if ncessary)
	a) $3+(-3)=0$ b) $7+(-1)=6$ c) $1+(-5)=-4$ d) $1+(-6)=-5$ e) $4+(-1)=3$ f) $2+(-8)=-6$ or $-8+2=-6$	Agreement, praising Show on number line if problems.
	41 min	

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Bk4		*Lesson Plan 105*
Activity		***Notes***
8	***Book 4, page 105, Q.4*** Read: *How much money does each person really have?* Elicit that owing money is the same as being in debt. T (P) reads each statement and class show balances on scrap paper or slates on command. Ps responding correctly dictate operation for T to write on BB. Class agrees/disagrees. Class gives answer in a sentence. *Solution:* *Alan has £16 but owes £3.* (£13) BB: A: $16 + (-3) = \underline{13}$ Alan really has £13. *Betty has £40 but owes £25.* (£15) BB: B: $40 + (-25) = \underline{15}$ Betty really has £15. *Cindy has £24 but owes £25.* (– £1) BB: C: $24 + (-25) = -1$ Cindy is really £1 in debt. *Daniel owes £39 and has £39.* (£0) BB: D: $-39 + 39 = \underline{0}$ Daniel really has no money. *Ella has debts of £100 but has £1000 in her bank account.* (£900) BB: E: $-100 + 1000 = \underline{900}$ Ella really has £900. *Freddie has £10.50 in his piggy bank but owes his sister £2.50.* (£8) BB: F: $10.50 + (-2.50) = \underline{8}$ Freddie really has £8. *George has £2.20 in cash but owes his Mum £3.20.* (– £1) BB: G: $2.20 + (-3.20) = \underline{-1}$ George is really £1 in debt *45 min*	Whole class activity (or individual work under a time limit, monitored then reviewed with whole class) Reasoning, agreement (self-correcting), praising Or $16 - 3 = \underline{13}$ Or $40 - 25 = \underline{15}$ Or $24 - 25 = \underline{-1}$ Or $39 - 39 = \underline{0}$ Or $1000 - 100 = \underline{900}$ Or $10.50 - 2.50 = \underline{8}$ Or $2.20 - 3.20 = \underline{-1}$

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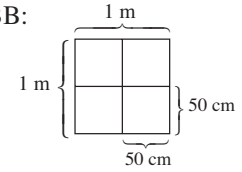
Bk4

R: Numbers. Calculations
C: Positive and negative numbers. Debt and cash
E: Problems

Lesson Plan
106

Activity		*Notes*
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 101, 102, 103, 104, 105, 132 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: 101 is prime; $102 = 2 \times 3 \times 17$; 103 is prime; $104 = 2 \times 2 \times 2 \times 13$; $105 = 3 \times 5 \times 7$, $132 = 2 \times 2 \times 3 \times 11$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 101: 1, 101; 102: 1, 2, 3, 6, 17, 34, 51, 102; 103: 1, 103; 104: 1, 2, 4, 8, 13, 26, 52, 104; 105: 1, 3, 5, 7, 15, 21, 35, 105; 132: 1, 2, 3, 4, 6, 11, 12, 22, 33, 44, 66, 132 *8 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Listen carefully, note the data and try to solve this problem in your *Ex. Bks*. Show me your answer when I say. *Some men are making a pavement which is 1 m wide and 1 km long.* *They are using square stone slabs of side 50 cm. How many slabs do they need to make the pavement?* If you have worked out the answer, show me . . now! (4000) Ps answering correctly come to BB or dictate to T, explaining reasoning. Who agrees? Who would do it another way? etc. e.g. 1 m = 100 cm, so you need 4 × 50 cm slabs to make a square which is 1 m wide and 1 m long. Length of the path = 1 km = 1000 m, so 1000 of such 4-slab squares are needed. $4 \times 1000 = \underline{4000}$ *Answer:* They need 4000 stone slabes to make the pavement. *13 min*	Whole class activity but individual trial first T repeats slowly to give Ps time to think and calculate. In unison. (If no P has answered correctly, class solves it with T's help.) BB:  Reasoning, agreement, praising
3	**Sequences** Let's continue these sequences. T writes first 3 terms on BB. Ps first agree on the rule, then come to BB or dictate to T. Class agrees/disagrees. BB: a) $-120, -90, -60, (-30, 0, 30, 60, 90, \ldots)$ [*Rule*: + 30] b) 16 000, 13 000, 10 000, (7000, 4000, 1000, − 2000, . . .) [*Rule*: − 3000] c) $\frac{6}{11}, \frac{4}{11}, \frac{2}{11}, (0, -\frac{2}{11}, -\frac{4}{11}, -\frac{6}{11}, -\frac{8}{11} \ldots)$ [*Rule*: $-\frac{2}{11}$] d) $-7.3, -5.1, -2.9, (-0.7, 1.5, 3.7, 5.9, 8.1, \ldots)$ [*Rule*: + 2.2] *18 min*	Whole class activity (or individual work in *Ex. Bks*.) At a good pace T decides when to stop. Reasoning, agreement, praising Feedback for T

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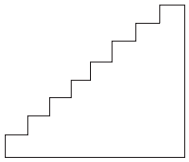
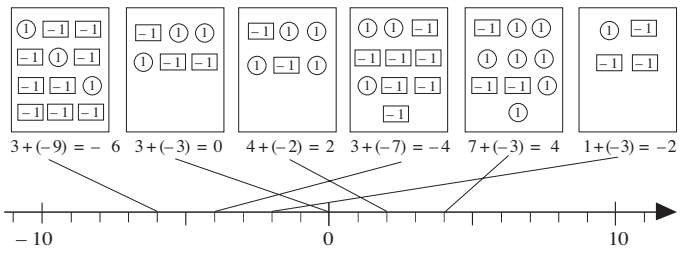
Bk4

Lesson Plan 106

Activity		*Notes*
4	**Combinatorics** In how many ways can we climb up 8 stairs if we can climb 1 or 2 stairs at a time? Ps come to BB to show the different ways on a diagram or model (or set of real steps). T keeps note in order on BB. BB:  1, 1, 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 1, 1, 2 1, 1, 1, 1, 1, 2, 1 1, 1, 1, 1, 2, 1, 1 1, 1, 1, 2, 1, 1, 1 1, 1, 2, 1, 1, 1, 1 1, 2, 1, 1, 1, 1, 1 2, 1, 1, 1, 1, 1, 1 1, 1, 1, 1, 2, 2 1, 1, 1, 2, 1, 2 1, 1, 1, 2, 2, 1 1, 1, 2, 1, 1, 2 1, 1, 2, 1, 2, 1 1, 1, 2, 2, 1, 1 1, 2, 1, 1, 1, 2 1, 2, 1, 1, 2, 1 1, 2, 1, 2, 1, 1 1, 2, 2, 1, 1, 1 2, 1, 1, 1, 2, 1 2, 1, 1, 2, 1, 1 2, 1, 2, 1, 1, 1 2, 2, 1, 1, 1, 1 1, 1, 2, 2, 2 1, 2, 1, 2, 2 1, 2, 2, 1, 2 1, 2, 2, 2, 1 2, 1, 1, 2, 2 2, 1, 2, 1, 2 2, 1, 2, 2, 1 2, 2, 1, 1, 2 2, 2, 1, 2, 1 2, 2, 2, 1, 1 2, 2, 2, 2 Agree that there are 34 different ways. T shows, with Ps' help, or Ps might remember from earlier lessons: BB: If 1 single step at a time: 1, 1, 1, 1, 1, 1, 1 (1 way) 6 single steps + 1 double step: e.g. 1, 1, 1, 1, 1, 1, 2 (7 ways) 4 single steps + 2 double steps: e.g. 1, 1, 1, 1, 2, 2 (15 ways) 2 single steps + 3 double steps: e.g. 1, 1, 2, 2, 2 (10 ways) 4 double steps: 2, 2, 2, 2 (1 way) } 34 ways	Whole class activity Drawn on BB or use model or real steps. At a good pace Encourage logical listing. Agreement, praising (Once Ps notice the pattern, they can dictate the ways without demonstrating them!) T starts and Ps continue. BB: 1 + 7 + 15 + 10 + 1 = 34 Agreement, praising
	Note to Ts only The number of different ways coincides with the Fibonacci sequence: 1, 1, 2, 3, 5, 8, 13, 21, (34), 55, 89, 144, . . . (where each term is the sum of the previous two terms). *25 min*	. . . 5 steps → 8 ways 6 steps → 13 ways 7 steps → 21 ways 9 steps → 55 ways . . .
5	***Book 4, page 106*** Q.1 Read: *What is the balance in each box? Join up the boxes to the matching points on the number line.* Set a time limit. Ps write the balances below the boxes first. Review at BB with whole class. Ps come to BB to write an addition (with T's help) and to draw joining lines. Class agrees or disagrees. Mistakes discussed and corrected. *Solution:*  3 + (– 9) = – 6 3 + (– 3) = 0 4 + (– 2) = 2 3 + (– 7) = – 4 7 + (– 3) = 4 1 + (– 3) = – 2 – 10 0 10 Read: *List the balances in decreasing order. Write a rule for the sequence.* Ps dictate to T who writes on BB. BB: 4 > 2 > 0 > – 2 > – 4 > – 6 What is the rule? Ps shout out in unison. (– 2) *30 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Differentiation by time limit Reasoning, agreement, self-correction, praising Whole class activity Agreement, praising

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Bk4

Lesson Plan 106

Activity		*Notes*
6	***Book 4, page 106*** Q.2 Read: *Use the table to help you solve the additions. Write the rule in different ways.* What do you notice about the additions? (The number being added is always 8) How can the table help you? (Find the first number in row *b*, and the result is directly above it in row *a*.) Let's see how many you can do in 2 minutes! Start . . . now! Review at BB with whole class. Ps dictate to T, saying the whole addition. Class agrees/disagrees. Mistakes discussed and corrected. If problems show on number line. **A**, come and write the rule. Who agrees? Who can write it another way? etc. Check with values in table. *Solution:* a: −2 −1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 b: −10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 $7+8=\underline{15}$ $6+8=\underline{14}$ $5+8=\underline{13}$ $4+8=\underline{12}$ $3+8=\underline{11}$ $2+8=\underline{10}$ $1+8=\underline{9}$ $0+8=\underline{8}$ $-1+8=\underline{7}$ $-2+8=\underline{6}$ $-3+8=\underline{5}$ $-4+8=\underline{4}$ $-5+8=\underline{3}$ $-6+8=\underline{2}$ $-7+8=\underline{1}$ $-8+8=\underline{0}$ $-9+8=\underline{-1}$ $-10+8=\underline{-2}$ *Rule*: $b=a-8$, $a=b+8$, $8=a-b$	Individual work, monitored, helped Drawn on BB or use enlarged copy maser or OHP Initial discussion about table. Differentiation by time limit. Reasoning, agreement, self-correction, praising Agreement, checking, praising **Extension** Ask Ps to give a money context for some of the additions, e.g. $-9+8=-1$ 'I owe £9 and I have only £8 in cash, so I am £1 in debt.' T helps with the wording. Praising, encouragement only
	35 min	
7	***Book 4, page 106*** Q.3 Read: *Start from zero each time and follow the instructions. Where do you end up?* Set a time limit. Ps use number line to help them. Review with whole class. Ps could show answers on scrap paper or slates on command. Ps who answered incorrectly demonstrate the moves on class number line, saying what they are doing. BB: e.g. d) 'I move 1 to the left, then 9 to the right, then another 3 to the right, then 5 to the left.' Mistakes discussed and corrected *Solution:* a) *Move 8 to the right, 5 to the left, 10 to the right, then 11 to the left.* BB: $8+(-5)+10+(-11)=18+(-16)=18-16=\underline{2}$ b) *Move + 5, − 2, + 3, − 10* BB: $5+(-2)+3+(-10)=8+(-12)=8-12=\underline{-4}$ c) $7+(-3)+2+(-10)=9+(-13)=9-13=\underline{-4}$ d) $-1+9+3-5=-6+12=\underline{6}$	Individual work, monitored, helped Number line drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising or $3-1=\underline{2}$ or $3+(-7)=3-7=\underline{-4}$ or $4+(-8)=4-8=\underline{-4}$ or $8+(-2)=8-2=\underline{6}$
	40 min	

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Bk4		*Lesson Plan 106*
Activity		***Notes***
8	***Book 4, page 106***	
	Q.4 Read: *How many pennies does each person have? Write an addition about it.*	Individual work, monitored, helped
	Set a time limit. Review with whole class. Ps could show balances on scrap paper or slates on command. P responding correctly comes to BB to write and say the addition. Class agrees/disagrees. Mistakes discussed and corrected.	(or whole class activity if time is short)
	T asks Ps to give each answer in a sentence in context.	Reasoning, agreement, self-correction, praising
	e.g. 'Alan has £24 in cash, but owes £20, so he really has £4.'	
	Solution:	
	A: – £20 + £24 = £4	Show on number line if problems.
	B: £50 + (– £66) = £50 – £66 = – £16	
	C: £680 + (– £140) = £680 – £140 = £540	
	D: – £88 + £88 = £0 (or £88 – £88 = £0)	
Extension	*Ella has £16.40 in her piggy bank but owes her brother £5.80. How much money does Ella really have?*	Whole class activity
	Show me . . . now! (£10.60)	Ps show result on scrap paper or slates in unison.
	Who can write it as an operation?	Agreement, praising
	BB: £16.40 + (– £5.80) = £16.40 – £5.80 = £10.60	Feedback for T
	45 min	

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Bk4	R: Numbers. Calculations **C: Addition of negative and positive numbers. Debt and cash** *E: Comparison of negative and positive numbers. Subtraction as difference*	*Lesson Plan* *107*
Activity		***Notes***
1	**Factorising** a) Let's <u>factorise</u> these numbers. BB: 106, 107, 108, 109, 110, 133 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: 106 = 2 × 53; 107 is prime; 108 = 2 × 2 × 3 × 3 × 3; 109 is prime; 110 = 2 × 5 × 11; 133 = 7 × 19 b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 106: 1, 2, 53, 106; 107: 1, 107; 108: 1, 2, 3, 4, 6, 9, 12, 18, 27, 36, 54, 108; 109: 1, 109; 110: 1, 2, 5, 10, 11, 22, 55, 110; 133: 1, 7, 19, 133 *8 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Listen carefully, note the data, picture the story in your head and try to solve the problem. You can discuss it with your neighbour if you wish. *There are 9 red, 6 yellow and 5 green marbles in a box.* *What is the least number of marbles I must take out of the box with my eyes closed to be <u>certain</u> of having at least one red and one green marble?* T asks several Ps what they think the answer is and why. Praise all suggestions, however silly! If no P has worked out the correct answer, T gives hints or leads Ps through the reasoning. As soon as a P has grasped the idea, allow him or her to continue the explanation. e.g. The first 9 marbles I take out could all be *red*, then the next 6 marbles could all be *yellow,* but the <u>next</u> marble <u>must</u> be *green*. *Answer:* The least number of marbles I must take out is 16. *13 min*	Whole class activity Ps note data and calculate on slates or on scrap paper or in *Ex. Bks*. T repeats slowly to give Ps time to think and discuss. Allow Ps time to explain by themselves. Reasoning, agreement, praising BB: 9 + 6 + 1 = <u>16</u> (R) (Y) (G)
3	**Comparison** Study these quantities. Which is more and how much more? Ps come to BB or dictate to T. (Ps could do calculation in *Ex. Bks* first.) Class agrees/disagrees. BB: a) 120 m [>] – 56 m [176] m b) 28 kg [<] 71 kg [43] kg c) – £420 [<] – £310 £[110] d) – 710 m [<] – 29 m [681] m e) – 31°C [<] + 14°C [45] °C f) 0 m [>] – 310 m [310] m Which operation would you normally write to show the difference between two quantities? (subtraction) Let's show each difference as a subtraction. Ps come to BB or dictate to T. Class agrees/disagrees. *20 min*	Whole class activity Written on BB or use enlarged copy master or OHP Reasoning, agreement, praising If problems, show on relevant segment of number line. BB: a) 120 – (– 56) = <u>176</u> (m) *Check*: 176 + (– 56) = 120 ✔ b) 71 kg – 28 kg = <u>43 kg</u> *Check*: 43 + 28 = 71 (kg) ✔ c) – £310 – (– £420) = £10 *Check*: 110 + (– 420) = – 310 ✔ etc.

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Bk4		*Lesson Plan 107*
Activity		***Notes***
4	**Combinatorics** I am going to write a set of 4 Christian names and a set of 3 surnames on the BB. What should they be? e.g. BB: *Christian names*: { Anne, Brian, Carol, David} *Surnames*: { Russell, Smith, Turner} How many different full names (i.e. Christian name and surname) can we make from these sets? Ps dictate possible names to T, who writes as initial letters on BB. e.g. BB: AR BR CR DR AS BS CS DS } 12 different full names AT BT CT DT Elicit that for each of the 4 Christian names there are 3 possible surnames, i.e. $4 \times 3 = 12$ possible full names. *25 min*	Whole class activity T chooses Ps at random to suggest names. In order round class Encourage logical listing. Agreement, praising Feedback for T
5	***Book 4, page 107*** Q.1 Read: *Continue the sequence. Write the rule you used.* Deal with one part at a time. Set a time limit. Review at BB with whole class. Ps dictate terms as far as they have reached. What is the rule? Who agrees? Who used a different rule? etc. *Solution:* a) $-53, -44, -35, -26, (-17, -8, 1, 10, 19, 28, 37, \ldots)$ *Rule*: Terms are increasing by 9, or + 9 b) $8, 7.3, 6.6, 5.9, (5.2, 4.5, 3.8, 3.1, 2.4, 1.7, 1, 0.3, -0.4, \ldots)$ *Rule*: Terms are decreasing by 0.7, or – 0.7 [or $+(-0.7)$] c) $-2\frac{1}{4}, -2, -\frac{3}{4}, -1\frac{1}{2}, (-1\frac{1}{4}, -1, -\frac{3}{4}, -\frac{1}{2}, -\frac{1}{4}, 0, \frac{1}{4} \ldots)$ *Rule*: Terms are increasing by $\frac{1}{4}$, or $+\frac{1}{4}$ d) $3\frac{2}{3}, 3, 2\frac{1}{3}, 1\frac{2}{3}, (1, \frac{1}{3}, -\frac{1}{3}, -1, -1\frac{2}{3}, -2\frac{1}{3}, -3, \ldots)$ *Rule*: Terms are decreasing by $\frac{2}{3}$, or $-\frac{2}{3}$ [or $+(-\frac{2}{3})$] *30 min*	Individual work, monitored, helped Written on BB or SB or OHT Differentiation by time limit (Able Ps can write extra terms in *Ex. Bks* if they run out of room in *Pbs*.) Discussion, reasoning, agreement, self-correction, praising [Agree that subtracting 0.7 gives the same result as adding – 0.7] Show on number line if problems. [Only if Ps suggest it]
6	***Book 4, page 107*** Q.2 Read: *Pete noted his income and outgoings for the first week of the month in a table.* Discuss income and outgoings in relation to Ps' own experiences. (e.g. income could be money earned or received as a gift, or won on the lottery, etc.; outgings could be bills to pay, or spending on bus fares, food, etc. or paying back borrowed money, etc.; balance is how much money he has left; unit of money could be £s or pence)	Whole class discussion first to clarify the context and vocabulary. Involve several Ps. Praise all contributions.

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Bk4

Lesson Plan 107

Activity		*Notes*
6	(Continued) Read: *Help him to work out the balance each day and the totals at the end of the week. Write the additions or subtractions in your exercise books.* If necessary, do 2nd column with whole class first as a model for Ps to follow. Set a time limit. Remind Ps to check their totals vertically in each column and horizontally along each row. Review at BB with whole class. Ps come to BB to fill in balances, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. If problems, write operations on BB. *Solution:*	Individual work, monitored, helped Table drawn on BB or use enlarged copy master or OHP Differentiation by time limit. Reasoning, agreement, checking, self-correction, praising e.g. BB: $\begin{array}{r} {}^{10}\\ 2\,6\,7\,0 \\ -\,2\,4_{1}8\,0 \\ \hline 1\,9\,0 \end{array}$ **Bold** numbers are missing.

	Total							
Income	300	520	450	730	240	430	0	**2670**
Outgoings	200	600	450	680	320	0	230	**2480**
Balance	**100**	**– 80**	**0**	**50**	**– 80**	**430**	**– 230**	**190**

Show that the balances in the bottom row can be added in steps:

e.g. $100 + 50 + 430 = 580$, $-(80 + 80 + 230) = -390$,

$580 + (-390) = 580 - 390 = \underline{190}$

35 min

7	***Book 4, page 107, Q.3*** Read: *Write the moves along the number lines as additions.* Ps come to BB to show the moves and write the additions, explaining their reasoning loudly to class (with T's help in wording if necessary). e.g. a) 'I start at zero, move 3 to the right, then another 4 to the right and I finish on 7.' BB: $+3+4 = \underline{+7}$ (or $3+4 = 7$) Class points out errors. Ps can work in *Pbs* too. *Solution:* a) $+3+4 =$ **7** b) $-3-4 =$ **-7** c) **$+6-8=-2$** d) **$-9+5=-4$**	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Discussion, reasoning, agreement, praising At a good pace Or $3+4=7$ Or $-3+(-4)=-7$ Or $6+(-8)=-2$ Or $-9+(+5)=-4$
Extension	Demonstrate that: • Adding a positive amount, or taking away a negative amount, means moving to the <u>right</u> along the number line. i.e. the number <u>increases</u>. • Subtracting a positive amount, or adding a negative amount, means moving to the <u>left</u> along the number line. i.e. the number <u>decreases</u>.	(as number becomes <u>more</u> positive or <u>less</u> negative) (as number becomes <u>less</u> positive or <u>more</u> negative)

40 min

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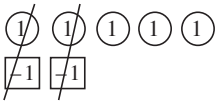
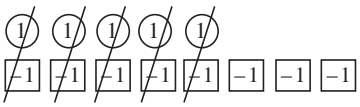
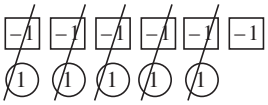
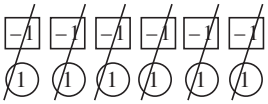
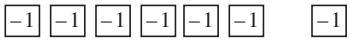
Bk4

Lesson Plan 107

Activity		*Notes*
8	***Book 4, page 107*** Q.4 Read: *Fill in the missing numbers. Check by drawing 1 and – 1 for each part.* Ps can use the number lines in previous question to help them fill in the missing results. Ps check by drawing in *Ex. Bks.* or on scrap paper or slates. Set a time limit. Review at BB with whole class. Ps dictate result, then come to BB to draw (or stick on) (1)s and [– 1]s (prepared in advance by T). Class agrees/disagrees. If problems, show on class number line too. Mistakes discussed and corrected. *Solution:*	Individual work, monitored, helped (Or whole class activity if time is short, with Ps coming to BB to write and say the complete operation and draw (or stick on) model money. Differentiation by time limit. Reasoning, agreement, self-correction, praising
	a) $5 + 2 = \underline{7}$	
	b) $5 + (-2) = \underline{3}$ 	Agree that $1 + (-1) = 0$ i.e. they cancel each other out.
	c) $5 + (-8) = \underline{-3}$ 	
	d) $-6 + 5 = \underline{-1}$ 	
	e) $-6 + 6 = \underline{0}$ 	
	f) $-6 + (-1) = \underline{-7}$ 	
Extension	T points to an equation and Ps make up a context about it. e.g. c) 'I have £5 in cash but am £8 in debt, so my balance is – £3.' or 'I owe my friend 8 marbles but can only give him back 5 marbles, so I still owe him 3 marbles.' f) 'I owe my sister 6 p and my brother 1 p, so altogether I owe 7 p.' or 'I was £6 in debt, then I borrowed another £1, so I am now £7 in debt.'	Whole class activity T repeats in a clearer or more concise way if necessary. Praise all contributions but extra praise for clever contexts.

45 min

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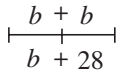
Bk4

R: Numbers. Calculations

C: Addition of negatve and positive numbers. Debt and cash

E: Comparison of negative and positive numbers. Subtraction as difference.

Lesson Plan *108*

Activity		*Notes*
1	**Factorisation** a) Let's <u>factorise</u> these numbers. BB: 111, 112, 134 Ps come to BB or dictate to T. (Ps can draw factor trees on scrap paper or slates first if necessary). Class agrees/disagrees. BB: $111 = 3 \times 37$; $112 = 2 \times 2 \times 2 \times 2 \times 7$; $134 = 2 \times 67$ b) Let's list <u>all</u> the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 111: 1, 3, 37, 111; 112: 1, 2, 4, 7, 8, 14, 16, 28, 56, 112; 134: 1, 2, 67, 134 *6 min*	Whole class activity At a good pace Reasoning, agreement, praising Ps may use a calculator. Ps could join up the factor pairs in long lists. Feedback for T
2	**Problem 1** Listen carefully, note the data, draw a diagram and think how you would solve the problem. You can discuss it with your neighbours if you wish. *We know that the longer side of a rectangle is 34 cm and that the perimeter of the rectangle is 96 cm longer than the shorter side.* *What is the area of this rectangle?* T asks several Ps what they think. Praise all ideas and suggestions, including trial and error (e.g. in a table as opposite), but also show mathematical method of solution as below. If no P has a good idea or is on the right track, T gives hints or leads Ps through the reasoning. Let Ps continue the explanation whenever they can. e.g. First draw a diagram. BB: Let the longer side be a and the shorter side be b. Write what we know in a mathematical way: BB: $P = 2 \times 34 + 2 \times b$ (cm) $P_{96\text{ cm}} > b$, so $P = b + 96$ (cm) What could we do now? (Write $b + 96$ instead of P in the first equation.) BB: $b + 96 = 2 \times 34 + 2 \times b$ $b + 96 = 68 + 2 \times b$ $b + 96 - 68 = 2 \times b$ $b + 28 = 2 \times b = b + b$ BB:  $\underline{b = 28}$ (cm) Now let's calculate the area of the rectangle. Ps dictate what T should write. Area $= a \times b = 34 \times 28 = 68 \times 14 = 136 \times 7 = \underline{952}$ (cm^2) (Agree that reducing the dividend and divisor by the same number of times does not change the quotient.) Or Ps could do long division by a 2-digit number on BB with T's help. Elicit the unit of measure. (cm^2) *Answer:* The area of the rectangle is 952 cm squares. *15 min*	Whole class activity Ps note data and draw diagram on scrap paper or slates or in *Ex. Bks*. T repeats slowly to give Ps time to think and discuss. Discussion, reasoning, agreement, praising e.g. <u>Trial and error</u> Give Ps the chance to suggest it first, otherwise T gives the idea. Allow Ps to dictate the next line of the reasoning if they can. Praising, encouragement only BB: $136 \times 7 = 952$ or $34 \times 28 = 272 + 680 = 952$ Ps say answer in unison.

a	b	P	$P - b$	
34	33	134	101	(b too long)
34	30	128	98	(b too long)
34	28	124	96	✔

Bk4

Lesson Plan 108

Activity		*Notes*
3	**Comparison** Let's compare these numbers. (T writes one comparison at a time on the BB.) Which is more and by how much more? P comes to BB to fill in missing sign and difference (using class number line to help them if necessary). Class agrees/disagrees. Which operation do we use to calculate the difference between two numbers? (subtraction) How do we usually check a subtraction? (with a reverse addition) Let's write a subtraction and check it. Ps come to BB in pairs, one to write difference as a subtraction, the other to check it by writing a reverse addition. Class points out errors. Remind Ps that we do not need to say if a number is positive, we just say the number, i.e. '+ 5' = '5' but we <u>always</u> say if a number is negative. BB: a) $+9 \underset{5}{\boxed{>}} +4$ Ps: $(+9)-(+4) = \underline{+5}$ or $9-4 = \underline{5}$ *Check:* $(+5)+(+4) = +9$ or $5+4 = 9$ b) $+4 \underset{5}{\boxed{<}} +9$ Ps: $(+4)-(+9) = \underline{-5}$ or $4-9 = \underline{-5}$ *Check:* $(-5)+(+9) = +4$ or $-5+9 = 4$ c) $+9 \underset{9}{\boxed{>}} 0$ Ps: $(+9)-0 = \underline{+9}$ or $9-0 = \underline{9}$ *Check:* $(+9)+0 = +9$ or $9+0 = 9$ d) $+4 \underset{7}{\boxed{>}} -3$ Ps: $(+4)-(-3) = \underline{+7}$ or $4-(-3) = \underline{7}$ *Check:* $(+7)+(-3) = +4$ or $7+(-3) = 4$ e) $-3 \underset{7}{\boxed{<}} +4$ Ps: $(-3)-(+4) = \underline{-7}$ or $-3-4 = \underline{-7}$ *Check:* $(-7)+(+4) = -3$ or $-7+4 = -3$ f) $-3 \underset{3}{\boxed{>}} -6$ Ps: $(-3)-(-6) = \underline{+3}$ or $-3-(-6) = \underline{3}$ *Check:* $+3+(-6) = -3$ or $3+(-6) = -3$ g) $-6 \underset{3}{\boxed{<}} -3$ Ps: $(-6)-(-3) = \underline{-3}$ or $-6-(-3) = \underline{-3}$ *Check:* $+3+(-6) = -3$ or $3+(-6) = -3$ h) $-5 \underset{5}{\boxed{<}} 0$ Ps: $(-5)-0 = \underline{-5}$ or $-5-0 = \underline{-5}$ *Check:* $-5+0 = -5$ or $-5+0 = -5$ i) $0 \underset{5}{\boxed{>}} -5$ Ps: $0-(-5) = \underline{+5}$ or $0-(-5) = \underline{5}$ *Check:* $+5+(-5) = 0$ or $5+(-5) = 0$ *22 min*	Whole class activity Written on BB or SB or OHT but built up gradually Agreement, praising e.g. BB: $5-2 = \underline{3}$ *Check*: $\underline{3} + 2 = 5$✔ Accept and praise any correct form, (e.g. in b) Ps might write $9 - 4 = 5$) but in such cases, T suggests the subtractions given opposite. Relate at all times to the number line. Show that: • subtracting a <u>positive</u> number means moving to the <u>left</u> along the number line. i.e. the result is <u>less</u> positive. • subtracting a <u>negative</u> number means moving to the <u>right</u> along the number line, i.e. the result is <u>less</u> negative. In a), c), g) and h) ask Ps to reason using debt and cash. e.g. a) I had £9 in cash, then I spent £4 and had £5 left. c) I had £9 in cash and spent nothing, so I still have £9. g) I had debts of £6 but then a £3 debt was cancelled, so I now owe only £3. h) I had debts of £5, but no debts were cancelled, so I still have debts of £5.
4	***Book 4, page 108*** Q.1 Read: *Complete the drawing to match the balances. Write additions about them.* Set a time limit. Review at BB with whole class. Ps come to BB to complete drawings and write the additions, explaining reasoning using cash and debt. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) £0: ① ① ① $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $3+(-3) = 0$ b) – £6: ① $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $1+(-7) = -6$ c) £4: $\boxed{-1}$ ① $\boxed{-1}$ ① ① ① ① ① $6+(-2) = 4$ d) – £3: ① ① $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $2+(-5) = -3$ *27 min*	Individual work, monitored (helped) Drawn (or stuck) on BB or use enlarged copy master or OHP Differentiation by time limit. Reasoning, agreement, self-correcting, praising Accept any correct solution with matching addition, e.g. a) £0: ① ① ① $\boxed{-1}$ $\boxed{-1}$ ① $\boxed{-1}$ $\boxed{-1}$ b) – £6: ① $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ ①

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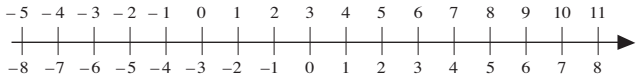
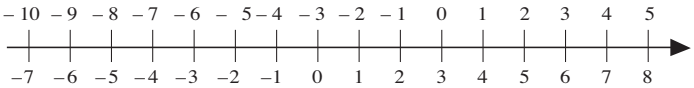
Bk4

Lesson Plan 108

Activity		*Notes*
5	***Book 4, page 108*** Q.2 Read: *Use the diagram to help you solve the additions*. What do you notice about the additions? (The number 3 is always one of the terms.) How can the table help you? (Find the other term in the bottom row, then the number directly above it is the sum.) Let's see how many you can do in 2 minutes! Start . . . now! Review at BB with whole class. Ps dictate to T, saying the whole addition. Class agrees/disagrees. Mistakes discussed and corrected. If problems or disagreement, ask Ps to reason with debt and cash or show on the number line. *Solution:*  $3+2=\underline{5}$ $3+(-2)=\underline{1}$ $3+(-6)=\underline{-3}$ $-2+3=\underline{1}$ $3+1=\underline{4}$ $3+(-3)=\underline{0}$ $3+(-7)=\underline{-4}$ $-5+3=\underline{-2}$ $3+0=\underline{3}$ $3+(-4)=\underline{-1}$ $3+(-8)=\underline{-5}$ $0+3=\underline{3}$ $3+(-1)=\underline{2}$ $3+(-5)=\underline{-2}$ $3+(-9)=\underline{-6}$ $2+3=\underline{5}$ *32 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy maser or OHP Initial discussion about table. Differentiation by time limit. Reasoning, agreement, self-correction, praising e.g. $\underline{-5+3=-2}$ 'I owe £5 and I have £3 in cash, so I am £2 in debt.' T helps with wording if necessary.
6	***Book 4, page 108*** Q.3 Read: U*se the diagram to help you solve the additions*. What do you notice about these additions? (– 3 is always the first term.) How can the table help you? (Find the 2nd term in the bottom row, then the number directly above it is the result of adding it to – 3,) Let's see if you can do better this time! Start . . . now! . . . Stop! Review at BB with whole class. Ps dictate to T, saying the whole addition. Class agrees/disagrees. Mistakes discussed and corrected. If problems or disagreement, ask Ps to reason with debt and cash or show on the number line. *Solution:*  $-3+(-7)=\underline{-10}$ $-3+(-3)=\underline{-6}$ $-3+1=\underline{-2}$ $-3+5=\underline{2}$ $-3+(-6)=\underline{-9}$ $-3+(-2)=\underline{-5}$ $-3+2=\underline{-1}$ $-3+6=\underline{3}$ $-3+(-5)=\underline{-8}$ $-3+(-1)=\underline{-4}$ $-3+3=\underline{0}$ $-3+7=\underline{4}$ $-3+(-4)=\underline{-7}$ $-3+0=\underline{-3}$ $-3+4=\underline{1}$ $-3+8=\underline{5}$ *37 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy maser or OHP Initial discussion about table. Differentiation by time limit. Reasoning, agreement, self-correction, praising e.g. $\underline{-3+7=4}$ 'I was £3 in debt, then I earned £7 and paid off the £3 debt, so now I have £4 in cash left.' T helps with wording if necessary.

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Bk4		*Lesson Plan 108*
Activity		***Notes***
7	***Book 4, page 108, Q.4*** Read: *Follow the example. Complete the sentences. Use the number line to help you.* What is this question about? (Temperature measured in degrees Celsius) Elicit that the greater the number of degrees, the hotter it is. T (or P) explains the task using the completed row and highlighting the pattern. Ps come to BB to write the missing items and say the complete statement. Class agrees/disagrees. Check on a vertical temperature scale or on class number line. *Solution:* *Check:* a) 8 °C is greater than 3 °C by 5 °C. $8-3=5$, $5+3=8$ b) 3 °C is **less** than 8 °C by 5 °C. $3-8=\boxed{-5}$, $\boxed{-5}+8=3$ c) 8 °C is greater than 0 °C by **8°C** $8-0=\boxed{8}$, $\boxed{8}+0=8$ d) 3 °C is greater than −2 °C by **5°C** $3-(-2)=\boxed{5}$, $\boxed{5}+(-2)=3$ e) −2 °C is less than 3 °C by **5°C** $-2-3=\boxed{-5}$, $\boxed{-5}+3=-2$ f) −2 °C is **greater** than −5 °C by 3 °C. $-2-(-5)=\boxed{3}$, $\boxed{3}+(-5)=-2$	Whole class activity (or individual work if Ps wish) Written on BB or use enlarged copy master or OHP (T could tell class what the room temperature was at the beginning of the day, read what it is now and elicit the difference.) At a good pace T helps Ps to write the subtractions as they might find the pattern of subtracting a greater number from a smaller number difficult! Reasoning, agreement, checking on number line, agreement, praising Ps can work in *Pbs* too if they wish
Extension	T chooses some of the subtractions for Ps to reason using debt and cash. e.g. a) 'I had £8 in cash then I spent £3 and I had £5 left.' c) 'I had £8 in cash and spent nothing, so I still have £8 left.' etc. *45 min*	Whole class activity T helps with wording, especially negative amounts Praising, encouragement only

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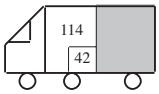
Bk4

R: Calculations
C: Revision and practice: Numbers. Word problems
E: Problems

Lesson Plan
109

Activity		*Notes*
1	**Factorisation** a) Let's factorise 135 and 136. Ps come to BB or dictate to T. Class agrees/disagrees. BB: 135 = 3 × 3 × 3 × 5; 136 = 2 × 2 × 2 × 17 b) Let's list all the factors of these numbers. Ps come to BB or dictate to T. Class points out errors or missed factors. BB: 135: 1, 3, 5, 9, 15, 27, 45, 135; 136: 1, 2, 4, 8, 17, 34, 68, 136 *5 min*	Whole class activity Ps draw factor trees on BB if necessary. Agreement, praising Ps may use a calculator. Agreement, praising Feedback for T
2	**Problem 1** Listen carefully, note the data, and think how you would solve the problem. You can discuss it with your neighbours if you wish. *A retailer sent a van to collect raspberries from two local farms. The raspberries were packed in boxes and there were 6 kg in each box.* *At the first farm they filled half of the van with 6 kg boxes of fruit and then put in an additional 42 kg. At the second farm they picked up another 114 kg of raspberries and the van was full.* *How much income did the retailer make from the raspberries if he sold each box of fruit at £36 each?* T asks several Ps what they think. Praise all ideas and suggestions. If no P has a good idea or is on the right track, T directs Ps planning step by step. Allow Ps to continue the explanation when they can. e.g. 1) Total weight of raspberries: BB: Half of capacity of van: 42 kg + 114 kg = 158 kg Whole capacity of van: 158 kg × 2 = 312 kg 2) Number of boxes: BB: 312 kg ÷ 6 kg = 52 (boxes) $6\overline{)312}$ (52, remainder 1) 3) Income: BB: (£) 52 × 36 = 104 × 18 = 208 × 9 = 1872 *Answer:* The retailer's income was £1872. *11 min*	Whole class activity T repeats slowly to give Ps time to think and discuss. Dscussion, reasoning, agreement, praising At a good pace BB:  BB: 208 × 9 = 1872 or 52 × 36 = 312 + 1560 = 1872
3	**Rounding to nearest unit** What is the next nearest whole unit smaller and greater than these numbers? Ps come to BB or dictate to T. Class agrees/disagrees. Show on number line if necessary. Which of the two numbers is nearer the middle number? Ps come to BB to underline it or dictate to T. Class agrees/disagrees. Confirm on number line if disagreement. BB: $\underline{4} < 4.3 < 5$; $\underline{12} < 12\frac{1}{3} < 13$; $\underline{0} < 0.2 < 1$ $7 < 7 + \frac{4}{5} < \underline{8}$; $\underline{0} < \frac{9}{11} < 1$; $\underline{2} < \frac{9}{4} < 3$ $62 < 61 + \frac{3}{2} < \underline{63}$; $1 < \frac{11}{5} - \frac{2}{5} < \underline{2}$; $\underline{100} < 100.1 < 101$ $3 < 3.99 < \underline{4}$; $\underline{-1} < -\frac{4}{5} < 0$; $\underline{-3} < -2.5 < -2$ *17 min*	Whole class activity Written on BB or use enlarged copy master or OHP At a good pace Agreement, praising Discuss and note that: $62\frac{1}{2} \approx 63$ (i.e. $\frac{1}{2}$ rounds up) $-2.5 \approx -3$ (rounds up in absolute value, i.e. ignoring the negative sign, but in its true value it rounds down, as -3 is less than -2.5)

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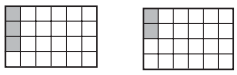
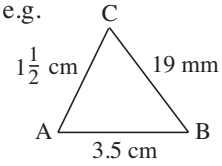
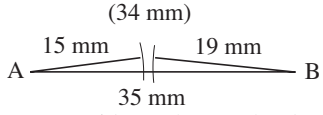
Bk4

Lesson Plan 109

Activity		*Notes*
4	***Book 4, page 109*** Q.1 Read: *What should be put between the digits 3 and 4 to make a number which is greater than 3 but less than 4?* I will give you a minute to think about it! Write the number on your slates (or on scrap paper) and show me . . . now! (3.4) Agree that : BB: $3 < 3.4 < 4$. Confirm on number line. Class applauds Ps who were correct. *20 min*	Individual trial first BB: $3 \square 4$ In unison BB: $3 \boxed{.} 4$ Agreement, praising
5	***Book 4, page 109*** Q.2 Read: *Which is more? How many more? Fill in the missing signs and differences.* Set a time limit. Less able Ps may use number lines to help them. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. If problems or disagreement, show on class number line and/or draw diagrams to show the fractions. *Solution:* a) i) $4 \underset{2}{\boxed{<}} 6$ ii) $-4 \underset{2}{\boxed{>}} -6$ iii) $\frac{1}{4} \underset{\frac{1}{12}}{\boxed{>}} \frac{1}{6}$ iv) $0.4 \underset{0.2}{\boxed{<}} 0.6$ b) i) $8 \underset{4}{\boxed{<}} 12$ ii) $-8 \underset{4}{\boxed{>}} -12$ iii) $\frac{1}{8} \underset{\frac{1}{24}}{\boxed{>}} \frac{1}{12}$ iv) $0.8 \underset{0.68}{\boxed{>}} 0.12$ $(0.80 > 0.12)$ *26 min*	Individual work, monitored, helped Drawn on BB or SB or OHT Discussion, reasoning, agreement, self-correction, praising BB: e.g. a) iii) $\frac{1}{4} = \frac{3}{12} > \frac{1}{6} = \frac{2}{12}$ b) iii) $\frac{1}{8} = \frac{3}{24} > \frac{1}{12} = \frac{2}{24}$ 
6	***Book 4, page 109*** Q.3 Read: *The lengths of the sides of a triangle are 3.5 cm, 19 mm and 1 and a half cm.* *What is the length of its perimeter?* What should we do first? (e.g. draw a diagram; change the lengths to the same unit of measure) Set a time limit. Ps draw diagrams and calculate in *Ex. Bks*, then write the answer in *Pbs*. Review at BB with whole class. Ps come to BB to draw, calculate and explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* AB = 3.5 cm = 35 mm or AB = 3.5 cm BC = 19 mm BC = 1.9 cm AC = $1\frac{1}{2}$ cm = 15 mm AC = 1.5 cm P = AB + BC + AC = 35 + 19 + 15 = 69 (mm) = <u>6.9 cm</u> If no P has noticed that the triangle is impossible, T suggests drawing it accurately. Ps try in *Ex. Bks* (or Ps come to BB if T has a set of BB compasses and BB ruler). Agree that even if AC and BC were <u>horizontal</u> lines, they would not meet up. BB: 1.5 cm + 1.9 cm = 3.4 cm < 3.5 cm *Answer:* The 3 lengths total 6.9 cm, but do not form a triangle. *34 min*	Individual work, monitored helped Initial discussion (Ps might notice here that such a triangle is impossible because the sum of the two shorter sides is less than the longest side, but if not, carry on as normal.) Reasoning agreement, self-correction, praising BB: e.g.  Whole class activity/discussion  How could we change the data to make a <u>real</u> triangle?

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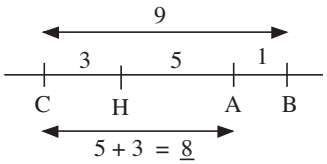
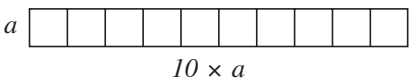
Bk4

Lesson Plan 109

Activity		*Notes*
7	***Book 4, page 109*** Q.4 Read: *Bob Bunny lives 1 km from Adam Ant.* *Clark Crow lives 9 km from Bob Bunny.* *Henry Hedgehog lives 3 km from Clark Crow.* *Adam Ant lives 5 km from Henry Hedgehog.* *How far away does Clark Crow live from Adam Ant?* Give Ps a couple of minutes to try to solve it in *Ex. Bks* first, discussing with neighbours if they wish. If Ps have solved it, they come to BB to explain to class. Who agrees? Who thinks something else? etc. Class checks statements against solution to make sure of correct answer. Mistakes discussed and corrected. If nobody has an answer, class solves it together, with hints and help from T where necessary. *Solution:* BB:  *Answer*: *Clark Crow* lives 8 km from *Adam Ant*. *35 min*	Individual work, monitored helped (or whole class activity if time is short) Once Ps obtain an answer, they draw it clearly and neatly on diagram in *Pbs*. Discussion, reasoning, agreement, self-correction, praising Ps might try variations (e.g. A to the right of B) which will not work eventually. Agree that as 1 + 3 + 5 = 9, only one result is possible.
8	***Book 4, page 109*** Q.5 Read: *The perimeter of a rectangle is 154 cm. We can cut the rectangle into 10 congruent squares by drawing lines parallel to its sides. What is the area of the rectangle? (Draw a diagram to help you.)* Give Ps 2 or 3 minutes to try it out in *Ex. Bks* and discuss with their neighbours if they wish. If they obtain an answer, they show it clearly and neatly in *Pbs*. Review at BB with whole class. Ps who found a solution explain at BB to class. Who agrees? Who thinks something else? etc. (Two solutions are possible.) Class agrees/disagrees. Class applauds the Ps who were correct. If nobody has a correct solution, T gives hints and helps class through solution on BB (or if only one solution has been demonstrated, T encourages Ps to think of the other one). *Solution:* e.g. Let the side of each of the 10 congruent squares be a. They can be arranged as a rectangle in only two ways. (10 × 1 or 5 × 2) 1) BB:  $P = 10 \times a + a + 10 \times a + a = 154$ cm $22 \times a = 154$ cm $a = 154$ cm $\div 22$ $= 77$ cm $\div 11 = \underline{7 \text{ cm}}$ *Area* $= 10 \times a \times a = 70$ cm $\times 7$ cm $= \underline{490 \text{ cm}^2}$	Individual work, monitored helped (or whole class activity if T prefers) T encourages Ps who are on the right track and tells Ps to think again if they are not. Or Ps who have a result could show on slates in unison. Discussion, reasoning, checking, agreement, (self-correction), praising T could give this idea, then let Ps do calculation on BB. *Check:* $P = 2 \times (70 + 7)$ $= 2 \times 77 = 154$ (cm) ✔

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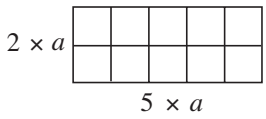
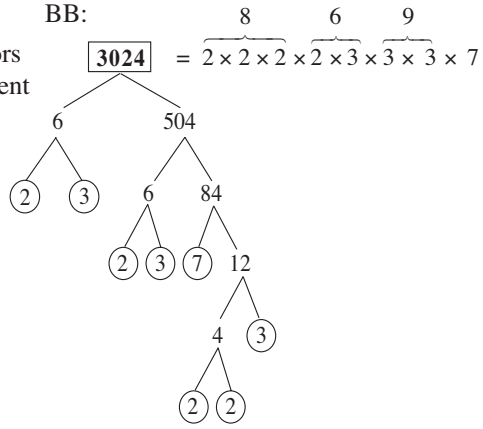
Bk4

Lesson Plan 109

Activity		*Notes*
8	Q.5 (Continued) 2) BB:  $P = 5 \times a + 2 \times a + 5 \times a + 2 \times a = 154$ cm $14 \times a = 154$ cm $a = 154$ cm $\div 14$ $= 77$ cm $\div 7$ $= \underline{11 \text{ cm}}$ $Area = (5 \times a) \times (2 \times a) = 55$ cm $\times 22$ cm $= 110$ cm $\times 11$ cm $= \underline{1210 \text{ cm}^2}$ *Answer:* The area of the rectangle could be 490 or 1210 cm^2.	Or *C*: 11 14 | 154 −14 14 −14 0 *Check:* $P = 2 \times (55 + 22)$ $= 2 \times 77 = 154$ (cm) ✔ Or *C*: 110 × 11 = 110 + 1100 = 1210 or 55 × 22 = 110 + 1100 = 1210
	40 min	
9	***Book 4, page 109, Q.6*** Read: *The product of four adjacent natural numbers is 3024. What are these numbers?* How could we solve it. Ps suggest what to do first and how to continue. T helps or gives hints only if Ps are stuck. e.g. <u>Method 1</u> Factorise 3024, as the 4 numbers must be some of its factors. Ps come to BB to draw a factor tree on BB and to write 3024 as the product of its prime factors. Class points out errors. What should we do now? (Combine the prime factors so that they make 4 adjacent numbers.) Ps come to BB or dictate to T. Class checks that their chosen 4 factors have product 3024. BB:  Or <u>Method 2</u> What can we say about the 4 numbers? • The units digits must be 1, 2, 3, 4 or 6, 7, 8, 9, as we cannot use 5 or 0 (any number multiplied by 5 or 0 cannot have units digit 4) • They must be 1-digit numbers, as $10 \times 10 \times 10 \times 10 = 10\,000$ and the product would more than 10 000 if using 11, 12, 13, 14, etc. BB: $1 \times 2 \times 3 \times 4 = \underline{24}$, which is too small. $6 \times 7 \times 8 \times 9 = 42 \times 8 \times 9 = 336 \times 9 = 3360 - 336$ $= \underline{3024}$ ✔ *Answer:* The four numbers are 6, 7, 8 and 9.	Whole class activity (or individual trial first if Ps wish) Discussion, reasoning, agreement, checking, (self-correcting), praising Ps may use a calculator to check the product. *Check:* $6 \times 7 \times 8 \times 9 = \underline{3024}$ ✔ (Ps might use a combination of both methods) BB: $10 \times 10 \times 10 \times 10$ $= 100 \times 10 \times 10$ $= 1000 \times 10 = 10\,000$ **or** 336 × 9 = 3024 (3 5)
	45 min	

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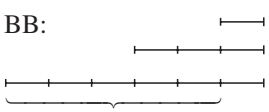
Bk4	R: Calculations **C: Revision and practice: Numbers. Word problems** *E: Problems*	*Lesson Plan* *110*
Activity		***Notes***
1	**Factorisation** Let's factorise 137. How can we check whether it is a prime number? (Try dividing it by the prime numbers 2, 3, 5, 7 and 11) What about the prime numbers more than 11, e.g. 13? BB: $13 \times 13 = 10 \times 13 + 3 \times 13 = 130 + 39 = 169 > 137$ So we only need to consider the prime numbers less than 13. Ps try each prime number in turn, coming to BB or dictating to T. Class agrees/disagrees. • 2 is not a factor of 137, as 137 is odd • 3 is not a factor of 137, as $137 = 45 \times 3 + 2$ • 5 is not a factor, of 137, as units digit is not 5 or 0 • 7 is not a factor of 137, as $137 = 19 \times 7 + 4$ • 11 is not a factor of 137, as $137 = 12 \times 11 + 5$ Elicit that 137 is a prime number and its only factors are 1 and 137. *4 min*	Whole class activity Revision of method for checking prime numbers T directs Ps' thinking. Agreement, praising At a good pace Ps could do divisions on slates or reason in other ways, e.g. 3: $137 = 120 + 17$ and 17 is not a multiple of 3 7: $137 = 140 - 3$ 11: $137 = 110 + 27$ Agreement, praising
2	**Problem 1** Listen carefully, note the data, and think how you would solve the problem. You can discuss it with your neighbours if you wish. *Ann's mother is half as old as Ann's grandfather and three times as old as Ann. What are their ages if Ann's grandfather was born 60 years before Ann?* Who thinks they know how to solve it? Come and explain it to us. Who agrees? Who would do it another way? etc. Praise all positive suggestions, including trial and error, but also lead Ps through the method below if no P has used it. BB: $G = 2 \times M$, $M = 3 \times A \rightarrow G = 6 \times A$ $G = 60 \div 5 \times 6 = 12 \times 6 = 72$ $A = 72 \div 6 = 12$ $M = 3 \times 12 = 36$ *Answer:* Ann is 12 years old, her Mum is 36 years old and her grandfather is 72 years old. *9 min*	Whole class activity T repeats slowly to give Ps time to think and discuss. Discussion, reasoning, checking, agreement, praising BB:  60 years **= 5 sixth of G** *Check:* 36 = half of 72, $36 = 3 \times 12$, $72 - 12 = 60$ ✔
3	**Number sets** Study the diagram. What can you tell me about it? • The *Base Set* contains the natural numbers greater than 19 and less than 71. • *Set A* contains prime numbers, i.e. numbers which have only two factors, themselves and 1. • *Set B* contains square numbers, i.e. numbers which are formed by multiplying another number by itself, so can be the area of a square) Ps can show what they mean on the BB. Which number have we reached in the diagram? (36) Let's write the rest of the base numbers in the corrrect set. Ps come to BB one after another to write a number and explain their reasoning. Class points out errors.	Whole class activity Drawn on BB or use enlarged copy master or OHP Discussion. Involve several Ps. BB: Set A: prime numbers Set B: square numbers e.g. $25 = 5 \times 5 = 5^2$ **25** 5 At a good pace 5 Resoning, agreement, praising

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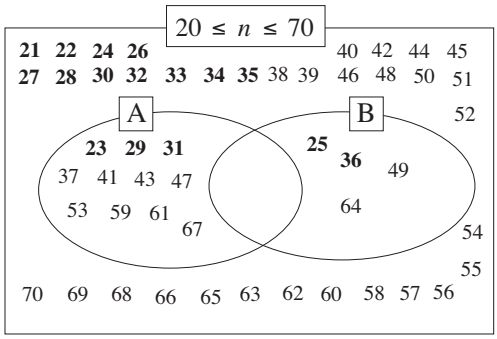
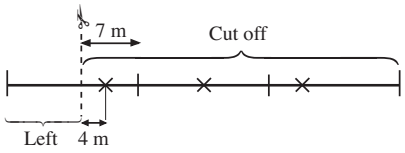
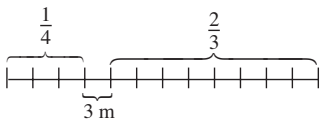
Bk4

Lesson Plan 110

Activity		*Notes*
3	(Continued) BB: e.g.  Why are there no numbers in the intersection of A and B (i.e. where A and B cross over)? (Such numbers would be square prime numbers, which are impossible!)	**Bold** numbers are given. Ask several Ps what they think. Reasoning, agreement, extra praising
	15 min	
4	**Problem 2** Listen carefully, note the data, draw a diagram to help you, and think how you would solve the problem. Discuss it with your neighbours if you wish. *We had a length of wire. After we cut off 7 m more than 2 thirds of it, the piece left was 4 m shorter than a quarter of its original length.* *What length of wire did we have at first?* Who thinks they know how to solve it? Come and explain it to us. Who agrees? Who would do it another way? etc. If no P has solved it, class does so with hints and help from T. BB: e.g.  $\frac{2}{3}$ of the length + 7 m + $\frac{1}{4}$ of the length – 4 m = 1 length $(\frac{2}{3} + \frac{1}{4})$ of the length + 3 m = 1 length $(\frac{8}{12} + \frac{3}{12})$ of the length + 3 m = 1 length $\frac{11}{12}$ of the length + 3 m = 1 length So $\frac{1}{12}$ of the length = 3 m 1 length = 3 m × 12 = <u>36 m</u> *Answer:* We had 36 m of wire at first.	Whole class activity T repeats slowly to give Ps time to think and discuss. Ps tell class their plans, ideas and findings. Reasoning, agreement, praising (Thirds shown by vertical ticks, quarters shown by crosses) T suggests (if no P has shown it) that the simplest method is to draw the diagram in twelfths. BB: + 7 m – 4 m = 3 m  Then, reading from the diagram: $\frac{1}{12}$ → 3 m $\frac{12}{12}$ → 36 m
	21 min	

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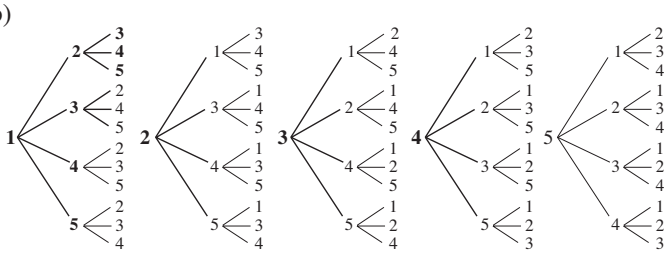
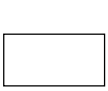
Bk4

Lesson Plan 110

Activity		*Notes*
5	***Book 4, page 110*** Q.1 Read: *How many different 3-digit numbers can you make from these number cards? (1, 2, 3, 4, 5)* *a) Continue the list.* *b) Continue drawing the tree diagram.* Encourage logical listing in order. Elicit that the number of different 3-digit numbers should be the same in b) as in a), so Ps should check for omissions. Set a time limit. (Deal with one part at a time if neessary.) Review at BB with whole class. Ps dictate to T (or T has solution already prepared and uncovers each line as it is dealt with). Ps correct mistakes or omissions. Could we have worked out how many different numbers there are without listing them all and without drawing a tree diagram? (Yes, by calculation. For each of the 5 possible hundreds digits, there are 4 possible tens digits and for each of the 4 possible tens digits there are 3 possible units digits, so the total number of possibilities is 60.) *Solution:* a) **123, 124, 125, 132**, 134, 135, 142, 143, 145, 152, 153, 154 **213, 214, 215**, 231, 234, 235, 241, 243, 245, 251, 253, 254 **312, 314**, 315, 321, 324, 325, 341, 342, 345, 351, 352, 354 **412**, 413, 415, 421, 423, 425, 431, 432, 435, 451, 452, 453 **512**, 513, 514, 521, 523, 524, 531, 532, 534, 541, 542, 543 b) 	Individual work, monitored, helped (or whole clas activity) Written/drawn on BB or use enlarged copy master or OHP Differentiation by time limit Reasoning, agreement, self-correction, praising Discussion, agreement, praising BB: No. of possibilities: $5 \times 4 \times 3 = \underline{60}$ **Bold** numbers and lines are given.
	28 min	
6	***Book 4, page110*** Q.2 Read: *Calculate the perimeter and area of this rectangle if* $a = 21$ *cm,* $b = 150$ *mm.* Eicit that $P = 2 \times (a + b)$ and $A = a \times b$ What should we do first? (Change the two lengths to the same unit.) Set a time limit. Ps write plan and result in *Pbs*. Review with whole class. Ps could show results on scrap paper or slates on command. Ps responding correctly explain reasoning at BB to those who were wrong. Class agrees or disagrees. Who did the calculation another way? Mistakes corrected. *Solution:* e.g. *a)* $P = 2 \times (21\text{ cm} + 150\text{ mm}) = 2 \times (21\text{ cm} + 15\text{ cm})$ $= 2 \times 36\text{ cm} = \underline{72\text{ cm}}$ *b)* $A = 21\text{ cm} \times 15\text{ cm} = 63\text{ cm} \times 5\text{ cm} = \underline{315\text{ cm}^2}$	Individual work, monitored BB:  $b = 150$ mm $a = 21$ cm In unison Reasoning, agreement, self-correction, praising Accept answers in mm and mm^2 too. or $20 \times 15 + 15$ or $\begin{array}{r} 21 \\ \times\ 15 \\ \hline 105 \\ 210 \\ \hline 315 \end{array}$ $= 300 + 15$ $= \underline{315}\ (\text{cm}^2)$
	33 min	

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Bk4		*Lesson Plan 110*
Activity		***Notes***
7	***Book 4, page 110*** Q.3 Read: *What is the smallest positive whole number which is exactly divisible by 1, 2, 3, 4 and 5?* Set a time limit. Ps try out numbers in *Ex. Bks*. Encourage a logical proceedure. Review with whole class. Ps could show number on scrap paper or slates on command. P responding correctly explains how he or she worked out the answer. Who agrees? Who did it another way? etc. *Solution:* e.g. If 2 is a factor, the number must be even and if 5 is also a factor, it must be a whole ten. BB: 10 – not divisible by 3; 20 – not divisible by 3; 30 – not divisible by 4; 40 – not divisible by 3; 50 – not divisible by 3; <u>60</u> – divisible by 2, 3, 4 and 5 ✔ *38 min*	Individual work, monitored, helped Discussion, reasoning, agreement, self-correction, praising Deal with all methods used. *Check:* $60 \div 2 = 30$ $60 \div 3 = 20$ $60 \div 4 = 15$ $60 \div 5 = 12$
8	***Book 4, page 110*** Q.4 Read: *In an opaque bag, there are 10 black and 30 white marbles.* *What is the smallest number of marbles you must take out of the bag (with your eyes closed) to be certain of getting 2 marbles which are the same colour?* Ask Ps to picture the experiment in their heads. Elicit what the word opaque means. (not able to be seen through) Set a time limit. (Less able Ps could have coloured counters on desks.) Review with whole class. Ps could show answer on scrap paper or slates on command. Ps answering correctly explain reasoning to class. Demonstrate if necessary. *Solution:* The first 2 marbles taken out could be 1 *black* and 1 *white* but the 3rd marble <u>must</u> be either *black* or *white*. *Answer:* The smallest number of marbles you must take out is <u>3</u>.	Individual work, monitored, less able Ps helped In unison Reasoning, agreement, self-correction, praising
Extension	What is the smallest number of marbles you must take out to be certain of getting: a) at least 2 *black* marbles (<u>32</u>, as the first 30 could be *white*) b) at least 2 *white* marbles (<u>12</u>, as the first 10 could be *black*) *41 min*	Ps show answers on scrap paper or slates in unison on command.
9	***Book 4, page 110, Q.5*** Read: *List the nunbers between 999 and 10 000 which have 2 as the sum of their digits.* Ps check numbers mentally and dictate to T in increasing order. Class points out mistakes or missed numbers. *Solution:* 1001, 1010, 1100, 2000 Who could show the numbers between 999 and 10 000 as an inequality? *45 min*	**Whole class activity** T chooses Ps at random Extra praise for P who points out that none are possible beyond 2000. Agreement, praising BB: $999 < n < 10\,000$

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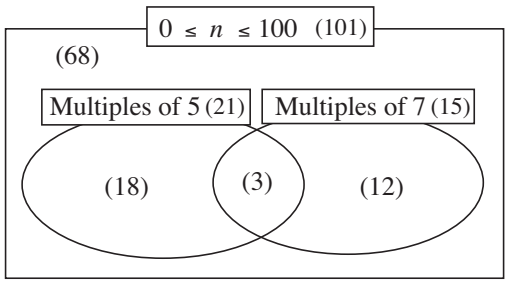
Bk4	R: Calculations **C: Revision and practice: Factors, multiples. Numbers** *E: Miscellaneous problems*	*Lesson Plan* *111*

Activity		***Notes***
1	**Factorisation** Let's factorise 138. Ps draw factor tree in *Ex. Bks* or on slates and show 138 as the product of its prime factors in unison on command. BB: $138 = 2 \times 3 \times 23$ Who can tell me <u>all</u> the factors of 138? Ps dictate to T, using the prime factors to help them. Class points out missed factors. BB: 1, 2, 3, 6, 23, 46, 69, 138 *4 min*	Whole class activity Reasoning, agreement, praising Ps may use a calculator
2	**Problem 1** Listen carefully and think about the best way to solve the problem. *How many whole numbers from 0 to 100 are not divisible by 5 or 7?* T asks several Ps for their ideas. If no P suggests it, T leads Ps through the strategy of showing the numbers in a set diagram. BB: Multiples of 5: 0, 5, 10, 15, . . ., 90, 95, 100 (21) Multiples of 7: 0, 7, 14, 21, . . ., 84, 91, 98 (15) Multiples of 5 and 7: 0, 35, 70 (3) We say that these 3 numbers are <u>common multiples</u> of 5 and 7. Let's show the multiples in a set diagram. Ps dictate what the labels for each set should be. Instead of writing all the numbers again, which will take a long time, let's just write in brackets how many multiples there are in each area of the set diagram. Ps come to BB or dictate to T. Class agrees/disagrees. BB:  Reasoning for solution to question: Number of elements which are multiples of 5 and/or multiples of 7: BB: $18 + 3 + 12 = 33$ Number of elements in the base set: 101 (as we are including 0) Number of elements <u>outside</u> the two sets: $101 - 33 = \underline{68}$ *Answer:* There are 68 numbers from 0 to 100 which are not divisible by 5 or 7. *12 min*	Whole class activity Praise all positive suggestions. Reasoning, agreement, checking, praising BB: <u>common multiple</u> multiple of more than one number At a good pace Reasoning, agreement, praising Discuss many elements should be in the area outside the two sets. Point out that the common multiples are in the BB: <u>intersection</u> of the two sets. i.e. where the two sets cross over. This is called the <u>union</u> of the two sets. i.e. the 2 sets added together Reasoning, agreement, praising T chooses a P to say the answer in a sentence.

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Bk4

Lesson Plan 111

Activity		*Notes*
3	**Calculation practice** T dictates the operations and Ps note them down in *Ex. Bks*. a) 14 200 + 3800 – 1 300 b) 19 800 – 3 × 4500 c) 11 724 + 3076 + 2903 d) 2807 × 7 e) 591 × 23 f) 17 654 ÷ 43 Let's see how many you can do in 5 minutes! You can use any method you wish. Remember to check your results. Start . . . now! . . . Stop! Ps exchange *Ex. Bks* and mark (correct) neighbour's work. Ps dictate results to T, saying which method they used to calculate and showing calculation on BB if problems or disagreement. Who did it a different way? (Deal with all cases.) Mistakes discussed and corrected. Who had all 6 correct? The person nearest them give them a pat on the back! Who had a) to d) correct? Let's give them a clap because e) and f) were rather difficult! *Solutions:* e.g. a) 14 200 + 3800 – 1 300 = 18 000 – 11 300 = 6700 b) 19 800 – 3 × 4500 = 19 800 – 13 500 = 6300 c) 11724 + 3076 + 2903 = 17703 (carries: 1 1 1) d) 2807 × 7 = 19649 (carries: 5 4) e) 591 × 23 = 1773 + 11820 = 13593 (carry: 1) g) 17654 ÷ 43 = 410 r 24 43 | 17654 – 172 45 – 43 (24) or 43 | 17654 – 4300 100 13354 – 8600 200 4754 – 4300 100 454 – 430 10 (24) 410, r 24 (using known multiples)	Individual work in *Ex. Bks*. monitored, helped T could also write on BB or SB or OHT Differentiation by time limit. Only expect the more able Ps to do parts e) and f) (Or Ps could show results on scrap paper or slates in unison on command.) Reasoning, agreement, self-correcting, praising Feedback for T Accept and praise any valid method of calculation.
	20 min	
4	***Book 4, page 111*** Q. 1 Read: *How many different 3-digit numbers can you make with the digits 1, 2, 3 or 4?* What is different about this question compared with the one we did yesterday? (only 4 digits to choose from instead of 5, but as they are not number cards, each digit can be used more than once. a) *Read: Continue the list*. Encourage logical listing in order. Set a time limit. Review at BB with whole class. Ps dictate to T (or T has solution already prepared and uncovers each line as it is dealt with). Ps correct mistakes or omissions.	Individual work, monitored, helped Written on BB or SB or OHT Comparison with *LP137/5* Extra praise if Ps notice the main difference without hint from T Differentiation by time limit Reasoning, agreement, self-correction, praising

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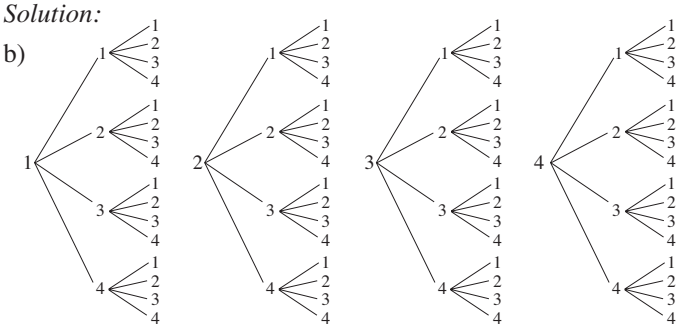
Bk4

Lesson Plan 111

Activity		*Notes*
4	(Continued) *Solution:* a) **111, 112, 113, 114**, 121, 122, 123, 124, 131, 132, 133, 134 141, 142, 143, 144 **211, 212, 213,** 214, 221, 222, 223, 224, 231, 232, 233, 234 241, 242, 243, 244 **311, 312,** 313, 314, 321, 322, 323, 324, 331, 332, 333, 334 341, 342, 343, 344 **411,** 412, 413, 414, 421, 422, 423, 424, 431, 432, 433, 434 441, 442, 443, 444	**Bold** numbers are given. (64 numbers altogether)
	Read: b) *Draw a tree diagram in your exercise book to show all the possibilities.*	Whole class activity
	Ps decide what to do first and how to continue. Ps come to work on BB while rest of class work in *Ex. Bks*. T helps with spacing out the numbers on BB. Class points out errors. Check that there are 64 possible 3-digit numbers.	Reasoning, agreement, praising Encourage Ps to use rulers to draw the 'arms' of the tree diagram.
	Solution: b) 	
	Which method do you think is best, writing all the possible numbers or showing them in a tree diagram? T asks several Ps what they think and why. (e.g. Drawing a tree diagram is clearer and makes it easier to see if you have missed any numbers; but spacing out the numbers is not easy)	Discussion involving several Ps
	Could we have worked out how many different numbers there are without listing them all or drawing a tree diagram?	Agreement, praising
	(Yes, by calculation. For each of the 4 possible hundreds digits, there are 4 possible tens digits and for each of the 4 possible tens digits there are 4 possible units digits, so the total number of possibilities is 64.)	BB: No. of possibilities: $4 \times 4 \times 4 = 64$
	30 min	
5	***Book 4, page 111*** Q.2 Read: *Write the smallest natural multiple of 2, 3, 4, 5 and 6.*	Individual work, monitored
	Sit up with your arms folded when you know it. You can try out numbers in your *Ex. Bks* if you need to. T notes Ps who are quick to work it out. Allow 1 min. Show me the number . . . now! (60)	Elicit that natural numbers are positive whole numbers Answer written on scrap paper or slates and shown in unison.
	Ps finished first explain to class why they were so quick. (e.g. In Q.3 on page 137 in *Pb*, we found that 60 was the smallest number divisible by 2, 3, 4 and 5. 60 is also divisible by 6, so 60 is the smallest multiple of 2, 3, 4, 5 and 6.)	Discussion, reasoning, agreement, praising
	Which of the numbers 0 to 70 is the smallest number divisible by 2, 3, 4, 5, 6 and 7? Ask several Ps. (0) Elicit that 0 is divisible by any natural number but cannot be divided by itself.	BB: $0 \div 2 = 0$, $0 \div 3 = 0$, $0 \div 4 = 0$, etc but $0 \div 0$ is impossible!
	33 min	

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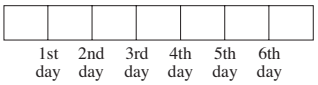
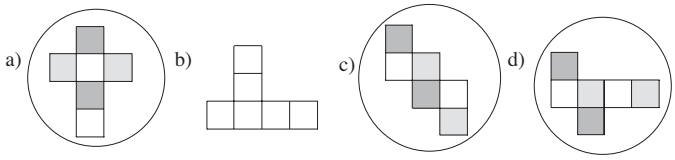
Bk4

Lesson Plan 111

Activity		*Notes*
6	***Book 4, page 111*** Q.3 Read: *A hard-working tailor in Wonderland was given a 14 m length of magic material. Each day he had to cut 2 m from it with magic scissors. While he was cutting, he could make a wish and his wish would be granted.* *How many wishes could the tailor make?* Picture the story in your head and imagine that you are the tailor. Work it out in your E*x. Bks* and write only the the result in your *Pb*. Set a time limit. Review with whole class. Ps could show answer on scrap paper or slates in unison on command. (Many Ps are likely to write 7 as the answer. If a P does answer 6, let him or her explain their reasoning. If no P answers with 6, demonstrate the story at the front of the class, or show on a diagram on the BB.) *Solution:* The tailor makes the final cut on the 6th day and has 2 m of material left for the 7th day, so cannot cut it again. *Answer:* The tailor could make 6 wishes. *35 min*	Individual work, monitored Discussion, reasoning, demonstration, agreement, self-correcting, praising Round of applause fo r Ps who respond correctly BB: 14 m ÷ 2 m = 7 (pieces) but only 6 cuts: 
7	***Book 4, page 111*** Q.4 Read: *A patient in a hospital has to take a pill every half an hour. How much time will be needed for him to take 5 pills?* Picture the story in your head. Be careful! I will give you 2 minutes to work it out in your *Ex. Bks*. Show me the answer . . . now! (2 hours) P responding correctly explains at BB. Class agrees/disagrees. (If nobody gets the correct answer, demonstrate at front of class with a model clock and counters.) *Solution:* e.g. 12.00 12.30 13.00 13.30 14.00 1st pill 2nd pill 3rd pill 4th pill 5th pill So he needs 2 hours to take 5 pills. *38 min*	Individual work, monitored On slates in unison. Discussion, reasoning, (demonstration), agreement, self-correcting, praising Round of applause for Ps who responded correctly Agree that some problems need to be visualised, not just calculated!
8	***Book 4, page 111*** Q.5 Read: *Circle the nets which can make a cube. Colour their opposite faces in the same colour.* Here is another problem that you will have to picture in your head. Imagine the nets folded up. Set a time limit. Review at BB with whole class. Ps come to BB to circle and colour. Class agrees/disagrees. T could have nets already prepared as a check in case of disagreement. Mistakes discussed and corrected. *Solution:*  *42 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP (Less able Ps may have small nets on desks too.) Discussion, reasoning, agreement, checking with models, self-correcting, praising What can you tell me about a cube? (e.g.It has 6 square faces, 8 vertices, 12 edges. It is a regular cuboid.)

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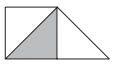
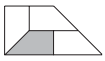
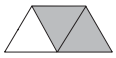
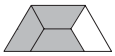
Bk4		*Lesson Plan 111*
Activity		***Notes***
9	***Book 4, page 111*** Q.6 Read: *What part of each shape has been shaded?* I will give you 1 minute to write the fractions. Review with whole class. Ps come to BB or dictate to T, explaining reasoning in detail. e.g. 'The shape has been divided into 3 equal parts and 2 of them have been shaded, so 2 thirds is shaded.' Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a)  $\frac{1}{3}$ b)  $\frac{1}{4}$ c)  $\frac{2}{3}$ d)  $\frac{3}{4}$	Individual work, monitored (helped) Drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising Feedback for T
Extension	Who can think of other questions to ask about the shapes? (e.g. What part is not shaded? What name describes all the shapes? Which of them are congruent? etc.)	Extra praise for creativity
	45 min	

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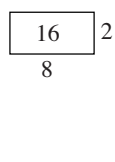
Bk4	R: Calculations **C: Revision and practice** *E: Miscellaneous problems*	*Lesson Plan* *112*
Activity		***Notes***
1	**Factorising** Let's factorise 139. Wht should we do? (Try dividing it by the prime numbers 2, 3, 5, 7 and 11.) What about the prime numbers more than 11, e.g. 13? BB: $13 \times 13 = 10 \times 13 + 3 \times 13 = 130 + 39 = 169 > 139$ So we only need to consider the prime factors less than 13. Ps try each prime number in turn, coming to BB or dictating to T. Ps can do divisons on slates or scrap paper or calculate mentally as below. Class agrees/disagrees. e.g. • 2 is not a factor, as 139 is odd • 3 is not a factor, as $139 = 120 + 19$ (and 19 is not a multiple of 3) • 5 is not a factor, as units digit is not 5 or 0. • 7 is not a factor, as $139 = 140 - 1$ (and 140 is a multiple of 7) • 11 is not a factor, as $139 = 110 + 29$ (and 29 is not a multiple of 11) Elicit that 139 is a prime number and its only factors are 1 and 139. *4 min*	Whole class activity Elicit method for checking prime numbers. T directs Ps' thinking if necessary. At a good pace Agreement, praising Ps use easy known multiples. BB: $139 = 1 \times 139$
2	**Calculation relay** T says an addition or subtraction, Ps say result. e.g. $640 + 530$ (= 1170), $4200 - 900$ (= 3300), etc. Ps can think of additions and subtractions too. *9 min*	Whole class activity At speed in order round class Differentiation by question Class points out errors. Praising, encouragement only
3	**True or False?** I will say a statement and you must tell me if it is true of false. (Ps can write T or F on scrap paper or slates, or agree on certain actions.) a) *If the diagonals of a rectangle are perpendicular to each other then the rectangle is a square.* (T) b) *Every positive number is less than any negative number.* (F) How can we change the statement to make it true? (e.g. Every positive number is greater than any negative number.) c) *There is no smallest natural number.* (F) How can we change the statement to make it true? (e.g. There is a smallest natural number.) (1) d) *There is no smallest whole number.* (T) e) *If the area of a rectangle is a square number of units, then the rectangle is a square.* (F) How can we change the statement to make it true? (e.g. If a rectangle is a square, its area is a square number of units.) *14 min*	Whole class activity Ps can suggest the actions. BB: BB: e.g. $-4 < 1$ The negative part of the number line never ends. Counter example: 

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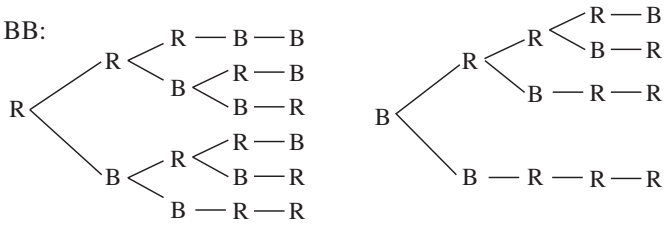
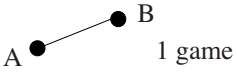
Bk4

Lesson Plan 112

Activity		*Notes*
4	***Book 4, page 112***	
	Q.1 Read: *In how many different ways can you lay out 3 red and 2 blue eggs in a row? Continue the list.*	Individual work, monitored, helped
	Set a time limit. Review with whole class. Ps dictate to T who writes on BB. Class points out duplications or missed combinations. Mistakes corrected.	Less able Ps could have red and blue counters on desks.
	Solution:	Reasoning, agreement, self-correcting, praising
	RRRBB, RRBRB, RRBBR, RBRRB, RBRBR, RBBRR, BRRRB, BRRBR, BRBRR, BBRRR **(10 ways)**	
	Let's show the different ways in a tree diagram. T starts and Ps continue it by coming to BB or dictating what T should write.	Whole class activity
	We could choose either *red* or *blue* to start.	At a good pace
	BB: 	Agreement, praising
		Ps show the 10 possible ways.
	Agree that calculation would be very difficult here, so drawing a tree diagram is the easiest way to solve the problem.	Discussion on which is the easiest method of solution.
	20 min	
5	***Book 4, page 112***	
	Q.2 Read: *List the numbers between 999 and 3000 which have 3 as the sum of their digits.*	Individual work, monitored
	Set a time limit. Encourage logical listing.	
	Review with whole class. Ps come to BB or dictate to T. Class checks that they are correct. Mistakes corrected.	Reasoning, agreement, self-correction, praising
	Solution:	
	1002, 1011, 1020, 1101, 1110, 1200, 2001, 2010, 2100	
Extension	If the numbers were between 999 and 30 000, what extra numbers would there be?	Whole class activity (or extra individual work for able Ps)
	BB: 3000, 10 002, 10 011, 10 020, 10 101, 10 110, 10 200, 11 001, 11 010, 11 100, 12 000, 20 001, 20 010, 20 100, 21 000	Ps dictate to T
		Agreement, praising
	25 min	
6	***Book 4, page 112***	
	Q.3 Read: F*ive children are taking part ina a chess competition. Each child has to play each of the others. How many games have been played when each child has played:*	Whole class introduction
	a) 2 games b) 3 games?	Dots drawn on BB
	Clarify the context first. What is chess? Who has seen a chess board? Who knows how to play it? (If possible, T has real chess board and pieces to show to class.)	Allow Ps to explain if they can, otherwise T does so.
	What do you think the dots in your *Pb* represent? (the 5 children) How could we show which child a dot represents? (Name each child with a letter, e.g. A, B, C, D, E) How could we show the games. (Join up the players with a straight line.)	Discussion on strategy for trials. e.g. BB: 

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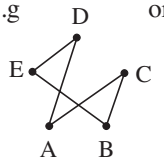
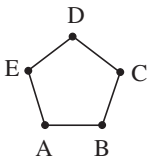
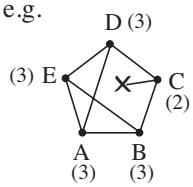
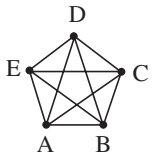
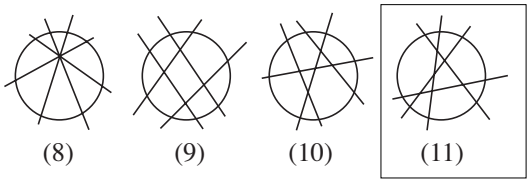
Bk4		*Lesson Plan 112*
Activity		***Notes***
6	(Continued) Agree that if each child plays 2 games, then 2 lines must be drawn from each of their dots. If they play 3 games, 3 lines must be drawn. Deal with one part at a time. Set a time limit. Ps try it out in *Pbs* (or in *Ex. Bks* if they need more space)	
	Review at BB with whole class. Ps come to BB to show and explain their findings. Class agrees/disagrees. Mistakes discussed and corrected. Could we have solved it with a calculation?	Individual work, monitored, (helped)
	a) e..g  or  By calculation: 5 children, 2 games each, 2 children each game: $(5 \times 2) \div 2 = \underline{5}$	Discussion, reasoning, agreement, self-correction, praising
	Answer: When each child has played 2 games, 5 chess games have been played altogether.	Ps say answer in a sentence.
	b) e.g.  Not possible! By calculation: 5 children, 3 games each, 2 children each game: $(5 \times 3) \div 2 \neq$ a whole number	Extra praise if Ps find this out by themselves . (or Ps might reason that 5×3 is not an even number)
	Answer: It is not possible for each child to have played 3 games!	
Extension	How many games have been played by the end of the competition?	Whole class activity Ps come to BB to show the games, write the calculation and say the answer in a sentence.
	e.g.  By calculation: 5 children, 4 games each, 2 children each game: $(5 \times 4) \div 2 = \underline{10}$	
	Answer: By the end of the competition, 10 games have been played,	Reasoning, agreement, praising
	30 min	
7	***Book 4, page 112*** Q.4 Read: *What is the most number of parts you can divide a circle into by drawing 4 lines?*	Individual trial first Circles drawn on BB or SB or OHT
	Ps try it out in *Pbs* (or in *Ex. Bks* if they need more room). Set a time limit.	
	Review at BB with whole class. **A**, how many parts did you divide your circle into? Come and show us. Who had more than **A**? etc. P with most parts comes to BB to show his or her drawing. Class checks the number of parts. If no P has reached 11 parts, T shows it (or Ps try again in *Lesson 140*).	Demonstration, agreement, praising Class applauds Ps who found 11 parts.
	BB: e.g.  (8) (9) (10) (11)	Ps draw solution in *Pbs* if they did not find it before.
	Answer: The most number of parts that you can divide a circle into by drawing 4 lines is 11.	Ps say the answer in a sentence.
	35 min	

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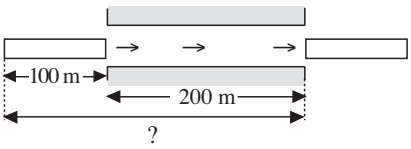
Bk4

Lesson Plan 112

Activity		*Notes*
8	***Book 4, page 112*** Q.5 Read: *Can the sum of 3 adjacent natural numbers be these numbers? If so, write an addition to show it. If not, give your reason.* Think hard about the 3 adjacent numbers on the number line. What can you say about them? (e.g. the smallest number is 1 less than the middle number and the greatest number is 1 more than the middle number.) What can you say about their sum? (It will be the same as if the middle number was added 3 times, because $(-1)+(+1)=0$). How can we tell if these numbers can be their sum? (If you divide by 3 there will be no remainder.) Ps do calculations in *Ex. Bks.*, then write results in *Pbs*. Review with whole class. T says the number and class shout Yes or No in unison. T chooses Ps to give the numbers, or the reasons. Class agrees/disagrees. Mistakes discussed and corrected. Let's calculate their sum and check that we are correct. *Solution:* a) 2000 ✗ Remainder 2 b) 2001 ✔ 666 + 667 + 668 c) 2002 ✗ Remainder 1 *40 min*	Individual work, monitored, helped Intial whole class discussion on strategy for solution. (If class is very able, allow Ps to try it without help first.) Involve several Ps. T directs Ps' thinking if necessary. e.g. Or let middle number be n, then the 3 numbers are: BB: $n-1, n, n+1$ $n-1+n+n+1 = n+n+n = 3\times n$ *C:* $3\overline{)2000}$ 666, remainders 2 2 (2); $3\overline{)2001}$ 667, remainders 2 2; $3\overline{)2002}$ 667, remainders 2 2 (1) *Check:* 666 + 667 + 668 = 2001 (remainders 2 2)
9	***Book 4, page 112, Q.6*** Read: *A 100 m long train passes completely through a 200 m long tunnel in exactly 1 quarter of a minute.* *If the train travels at a steady speed, how many km does it cover every hour?* Give Ps time to think about it and disucss with their neighbours if they wish. What should we do? Ps suggest what to do first and how to continue. T helps with drawing a digram. BB: e.g.  Agree that the train needs to travel 100 m + 200 m = 300 m to get all its carriages completely through the bridge. BB: $\frac{1}{4}$ minute $\rightarrow$ 300 m 1 min $\rightarrow$ 300 m × 4 = 1200 m 1 hour = 60 min $\rightarrow$ 1200 m × 60 = 72 000 m = <u>72 km</u> *Answer:* The train covers 72 km every hour.	Whole class activity (or individual trial first if Ps wish) Discussion involving several Ps. T suggests a diagram if no P mentions it. Reasoning, agreement, praising
Extension	If this was real life, what else should we say in this answer? ('on average', as in real life a train does not travel at the same speed all the time; it goes slower up inclines or around bends, has to stop at stations or signals and goes faster on straight stretches of the track.) *45 min*	Whole class discussion. Extra praise for Ps who remember the word 'average'.

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