Activity

1

Hundredths and percentage
Ps each have a 10 cm by 10 cm square grid on desks and T has larger version for demonstration. T asks some questions about the square and writes Ps' answers on BB.

What length are the edges of the square? Ps measure with rulers. (10 cm)
What is the area of the square? \( A = 10 \text{ cm} \times 10 \text{ cm} = 100 \text{ cm}^2 \)
What is the area of 1 grid square? (1 cm\(^2\))
If we think of the area of the large 10 cm square as 1 unit, what part of the unit is the area of each grid square? (1 hundredth)

BB:

[Percentages added later – see below]

\[
\begin{array}{|c|c|c|c|c|c|c|c|c|c|}
\hline
& & & & & & & & & \\
10 \text{ cm} & & & & & & & & & \\
\hline
& & & & & & & & & \\
& & & & & & & & & \\
& & & & & & & & & \\
& & & & & & & & & \\
& & & & & & & & & \\
\hline
50\% & 20\% & 17\% & & & & & & & \\
\hline
\end{array}
\]

a) Colour blue 1 half of the area of your large square.
How many grid squares have you coloured blue? (50)
What area have you coloured blue? (50 cm\(^2\))
How many hundredths have you coloured blue? (50 hundredths)
T writes an equation to show the equivalent fractions. (BB)

b) Colour red 1 fifth of the area of your large square.
How many grid squares have you coloured red? (20)
What area have you coloured red? (20 cm\(^2\))
How many hundredths did you colour red? (20 hundredths) Who can write an equation to show the equivalent fractions? (BB)

c) Colour green an area of 17 cm\(^2\).
How many grid squares have you coloured green? (17)
How many hundredths did you colour green? (17 hundredths) Who can write it as a fraction? (BB)

d) What part of the large square have you coloured altogether?
What operation should we write? (addition) P comes to BB or dictates to T. Agree that 100 should be the common denominator.
What area have you coloured altogether? \( A = 87 \text{ cm}^2 \)
What part of the square is not coloured? (BB) \([A = 13 \text{ cm}^2]\)

T: We also call 1 hundredth one percent and write it like this. (BB)
Who can write the coloured parts of the square as percentages?
Ps come to BB to write percentages on diagram (as above). Class points out errors.

What percentage is the area of the whole unit square? (100%)
T: 'Per cent' means 'out of 100', so when we talk about percent we mean that the whole unit has been divided into 100 equal parts, so each part is 1 hundredth or 1 out of 100 or 1 percent.'
### Lesson Plan 111

#### Notes
- Individual work, monitored, helped, corrected
- Drawn on BB or use enlarged copy master (demonstration only)
- Agreement, self-correction, praising
  - (or T has solution already prepared and uncovers each line segment as it is dealt with)
- BB: 10 cm = 100 mm
  - i) 100 mm ÷ 5 = 20 mm
  - ii) 100 mm ÷ 4 = 25 mm
  - iii) 85 hundredths: 85 mm
  - iv) 41 hundredths: 41 mm
- Whole class activity
  - (or individual trial first if Ps wish)
- Reasoning, agreement, praising
- T: To change a fraction to a percentage, we first expand it to hundredths.
- Whole class activity
  - At a good pace
  - Involve several Ps.
  - Reasoning, agreement, praising

#### Activity 2

**PbY5b, page 111**

**Q.1 a) Read:** Use a ruler to draw the required parts of this 10 cm line.

Deal with one part at a time or set a time limit. Elicit that BB: 10 cm = 100 mm. Ps calculate lengths, measure, draw and write lengths below line segments.

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

**Solution:**

<table>
<thead>
<tr>
<th>1 unit</th>
<th>10 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) 1/5</td>
<td>20 mm</td>
</tr>
<tr>
<td>ii) 1/4</td>
<td>25 mm</td>
</tr>
<tr>
<td>iii) 85/100</td>
<td>85 mm</td>
</tr>
<tr>
<td>iv) 41/100</td>
<td>41 mm</td>
</tr>
</tbody>
</table>

**b) Read:** Express the fractions in hundredths and percentages.

Ps come to BB to fill in boxes, explaining reasoning, with T's help in converting the fifth and quarter to hundredths. Ps work in Pbs too. Elicit that the number of hundredths (i.e. the number of mm) is the same as the percentage.

**Solution:**

i) \( \frac{1}{5} = \frac{20}{100} \rightarrow 20\% \)

ii) \( \frac{1}{4} = \frac{25}{100} \rightarrow 25\% \)

iii) \( \frac{85}{100} \rightarrow 85\% \)

iv) \( \frac{41}{100} \rightarrow 41\% \)

**Extension**

Let's write additions and subtractions using these fractions. Ps come to BB or dictate to T, explaining reasoning. Class points out errors. What is the result as a percentage?

BB: e.g.

\[
\begin{align*}
\frac{1}{5} + \frac{1}{4} &= \frac{4 + 5}{20} = \frac{9}{20} = \frac{45}{100} \rightarrow 45\% \\
\frac{85}{100} - \frac{1}{4} &= \frac{85 - 25}{100} = \frac{60}{100} \rightarrow 60\% \ (= \frac{3}{5}) \text{ etc.}
\end{align*}
\]

16 min

**Problem**

Listen carefully, do the calculation in your Ex. Bks and show me the answer when I say.

a) There are 100 pupils in Year 5 and 27 of them wear glasses. What percentage of pupils in Y5 do not wear glasses?

Show me the answer . . . now! (73%)

P answering correctly explains at BB to Ps who were wrong. Mistakes discussed and corrected.

BB: \( 1 - \frac{27}{100} = \frac{100}{100} - \frac{27}{100} = \frac{73}{100} \rightarrow 73\% \)
### Activity

(Continued)

b) If the names of all the pupils were put into a bag and one name was taken out at random, which outcome has more chance of happening:

1) the pupil wears glasses; or 2) the pupil does not wear glasses?

Show me . . . now! (2)

P answering correctly explains to Ps who were wrong. T helps with wording if necessary.

Probability of the outcome:

1) the P wears glasses: \( \frac{27}{100} \) or 27%  
2) the P does not wear glasses: \( \frac{73}{100} \) or 73%

T: We say that outcome 1) has a probability of 27% and outcome 2) has a probability of 73%.

### Multiplication of fractions

a) Here is an 8 cm strip and here is a 2 cm strip.

How many times is 2 cm contained in 8 cm? (4 times)

If we think of 8 cm as 1 unit, what part of the unit is 2 cm?

So how many times is 1 quarter contained in 1? (4 times)

b) Here is an 9 cm strip and here is a 3 cm strip.

How many times is 3 cm contained in 9 cm? (3 times)

If we think of 9 cm as 1 unit, what part of the unit is:

i) a 3 cm strip \( \frac{1}{3} \) 
ii) two 3 cm strips \( \frac{2}{3} \) 
iii) three 3 cm strips \( \frac{3}{1} = \frac{3}{3} \) 
iv) five 3 cm strips? \( \frac{5}{3} = \frac{12}{3} \)

c) Let's write these additions as multiplications.

Ps come to BB or dictate to T. Class agrees/disagrees.

\[
\begin{align*}
\frac{1}{4} + \frac{1}{4} &= \frac{1}{4} \times 2 = \frac{2}{4} (= \frac{1}{2}), \\
\frac{1}{4} + \frac{1}{4} + \frac{1}{4} &= \frac{1}{4} \times 3 = \frac{3}{4} \\
\frac{1}{4} + \frac{1}{4} + \frac{1}{4} &= \frac{1}{4} \times 4 = \frac{4}{4} = 1, \text{ etc.}
\end{align*}
\]

\[
\begin{align*}
\frac{1}{3} + \frac{1}{3} &= \frac{1}{3} \times 2 = \frac{2}{3}, \\
\frac{1}{3} + \frac{1}{3} + \frac{1}{3} &= \frac{1}{3} \times 3 = \frac{3}{3} = 1 \\
\frac{1}{3} + \frac{1}{3} + \frac{1}{3} &= \frac{1}{3} \times 4 = \frac{4}{3} = \frac{1}{1}, \text{ etc.}
\end{align*}
\]

\[
\begin{align*}
\frac{2}{9} + \frac{2}{9} &= \frac{2}{9} \times 2 = \frac{4}{9}, \\
\frac{2}{9} + \frac{2}{9} + \frac{2}{9} &= \frac{2}{9} \times 3 = \frac{6}{9} = \frac{2}{3}
\end{align*}
\]

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## Lesson Plan 111

<table>
<thead>
<tr>
<th>Activity</th>
<th>PbY5b, page 111</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Q.2 Read: <em>Use the diagrams to help you do the calculations.</em></td>
</tr>
<tr>
<td></td>
<td>Set a time limit. Ps colour the fractions on the grids first, then do the multiplications (with or without writing the matching additions). Review with whole class. Ps come to BB to colour diagrams and complete the multiplications, explaining reasoning. Class agrees/disagrees. If problems or disagreement, write as an addition.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td></td>
<td>a) (\frac{2}{7} \times 3 = \frac{6}{7})</td>
</tr>
<tr>
<td></td>
<td>b) (\frac{2}{3} \times 2 = \frac{4}{3} = 1\frac{1}{3})</td>
</tr>
<tr>
<td></td>
<td>c) (\frac{2}{3} \times 3 = \frac{6}{3} = 2)</td>
</tr>
<tr>
<td></td>
<td>d) (\frac{4}{7} \times 2 = \frac{8}{7} = 1\frac{1}{7})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>31 min</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Activity</th>
<th>PbY5b, page 111</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Q.3 Read: <em>In your exercise book, write each sum as a multiplication, then do the calculation.</em></td>
</tr>
<tr>
<td></td>
<td>Set a time limit. Ps can draw diagrams to help them. Review with whole class. Ps come to BB or dictate to T, saying the whole equation. Class agrees/disagrees. T helps Ps to draw diagrams on BB as a check. Mistakes discussed and corrected.</td>
</tr>
<tr>
<td></td>
<td><strong>Solution:</strong></td>
</tr>
<tr>
<td></td>
<td>a) (\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{1}{2} + \frac{1}{3} = \frac{3}{2} = 1\frac{1}{2})</td>
</tr>
<tr>
<td></td>
<td>b) (\frac{2}{7} + \frac{2}{7} + \frac{2}{7} + \frac{2}{7} = \frac{2}{7} \times 5 = \frac{10}{7} = 1\frac{3}{7})</td>
</tr>
<tr>
<td></td>
<td>c) (\frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} \times \frac{3}{8} = \frac{18}{8} = \frac{9}{4} = 2\frac{1}{4})</td>
</tr>
<tr>
<td></td>
<td>d) ((-\frac{1}{3}) + (-\frac{1}{3}) = \frac{1}{3} \times 2 = \frac{2}{3})</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>35 min</th>
</tr>
</thead>
</table>
### Activity

#### 7

**PbY5b, page 111**

**Q.4 Read:** In your exercise book, write each multiplication as an addition, then do the calculation.

Set a time limit. Review with whole class. Ps come to BB or dictate to T, saying the whole equation. Class agrees/disagrees or points out further simplification where possible. Mistakes discussed and corrected.

**Solution:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>(\frac{3}{4} \times 4 = \frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4} = \frac{12}{4} = 3)</td>
</tr>
<tr>
<td>b)</td>
<td>(\frac{2}{3} \times 5 = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} = \frac{10}{3} = \frac{3}{1})</td>
</tr>
<tr>
<td>c)</td>
<td>(\frac{4}{7} \times 6 = \frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} + \frac{4}{7} = \frac{24}{7} = \frac{3}{7})</td>
</tr>
<tr>
<td>d)</td>
<td>(\frac{2}{9} \times 3 = \frac{2}{9} + \frac{2}{9} + \frac{2}{9} = \frac{6}{9} = \frac{2}{3})</td>
</tr>
</tbody>
</table>

**Notes**

Individual work, monitored (helped)

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

Show on diagrams or models or number line if problems or disagreement.

Feedback for **T**

#### 8

**PbY5b, page 111, Q.5**

Read: In your exercise book, calculate the sums and differences in two different ways.

Let’s look carefully at part a). What do you notice? (Denominators are equal so only the numerators need to be dealt with.)

If the calculation was

BB: \((3 + 7) \times 2\)

which two ways could we do it? Two Ps come to BB to show them.

BB: 1) \((3 + 7) \times 2 = 10 \times 2 = 20\)

or 2) \((3 + 7) \times 2 = 3 \times 2 + 7 \times 2 = 6 + 14 = 20\)

Agree that both are correct.

Let’s calculate the fractions in these two different ways.

Ps come to BB to or dictate what T should write (with T’s help where needed). Class agrees/disagrees. Ps write the two ways in Ex. Bks.

**Solution:** e.g.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>(\frac{3}{5} + \frac{7}{5} \times 2 = \frac{10}{5} \times 2 = 2 \times 2 = 4)</td>
</tr>
<tr>
<td>b)</td>
<td>(\frac{6}{7} - \frac{5}{3} \times 3 = \frac{18 - 35}{21} \times 3 = -\frac{17}{21} \times 3 = -\frac{51}{21} = -\frac{17}{7})</td>
</tr>
<tr>
<td>c)</td>
<td>(\frac{1}{2} + \frac{7}{3} \times 6 = \frac{3 + 14}{6} \times 6 = \frac{17}{6} \times \frac{1}{6} = \frac{17}{1} = 17)</td>
</tr>
</tbody>
</table>

**Notes**

Whole class activity

Written on BB or SB or OHT

Discussion on what the different ways could be.

(operations in brackets first)

(multiplication done first)

Reasoning, agreement, praising

Accept any valid method.

T might show:

b) \(-\frac{17}{24} \times \frac{1}{3} = -\frac{17}{7}\)

and ask if it is correct.

\[= -\frac{3}{7}\]

T shows how to cancel out the two sixes.

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Y5

Activity

1

Multiplication and division of fractions

a) Who can show \(\frac{1}{4} \times 3\) on each of these diagrams?

Ps come to BB to colour appropriate number of parts and explain reasoning. Class agrees/disagrees. We can check by writing the multiplication as an addition. Ps dictate what T should write.

BB: \(\frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{1}{4} \times 3 = \frac{3}{4}\)

b) If this is 1 unit (T points), who can change the diagram to show 5 halves? Who can show \(\frac{5}{2} \times 3\)?

P comes to BB to amend diagram, with T’s help, explaining reasoning. Class agrees or disagrees. Let’s write an addition and a multiplication about it. Ps come to BB or dictate what T should write.

BB: \(\frac{5}{2} + \frac{5}{2} + \frac{5}{2} = \frac{5}{2} \times 3 = \frac{15}{2} = \frac{7}{2}\)

What method have we been using to multiply a fraction by a natural number? Ps explain in own words and T says it more clearly if needed.

• We multiply the numerator by the natural number and do not change the denominator.

c) Let’s write this addition in a shorter way. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees.

BB: \(\frac{5}{8} + \frac{5}{8} + \frac{5}{8} + \frac{5}{8} = \frac{5}{8} \times 4 = \frac{20}{8} = \frac{5}{2} (= \frac{2}{2})\)

Who can show it in this diagram? Ps come to BB to shade each ‘5 eighths’ in a different colour… T explains the result being a different denominator in another way, referring to the diagram

BB: \(\frac{1}{2} = 4 \times \frac{1}{8}\), so \(\frac{5}{2} = 4 \times \frac{5}{8}\)

What other way have we used to multiply a fraction by a natural number? Ps explain in own words and T repeats more clearly.

• We divide the denominator by the natural number and do not change the numerator.

What is necessary before we can use this method? (The denominator must be exactly divisible by the natural number.)

2

PhY5b, page 112

Q.1 Read: Calculate the products, reducing them to their simplest form where relevant.

Set a time limit. Encourage Ps to check each multiplication with an addition (mentally or in Ex. Bks. or on scrap paper).

Review with whole class. Ps come to BB or dictate to T, explaining reasoning with addition or using one of the ‘rules’. Class agrees/disagrees. Mistakes discussed and corrected.

T shows how the denominator and multiplier can be reduced first (by dividing by a common factor) to make the calculation easier instead of simplifying at the end.

Lesson Plan

112

Notes

Whole class activity

Drawn on BB or SB or OHT.

BB:

Ps write calculation in Ex. Bks.

BB:

Ps write calculation in Ex. Bks.

Agreement, praising

Class repeats in unison.

Reasoning, agreement, praising

Ps write calculation in Ex. Bks.

Rectangle already drawn on BB or SB or OHT:

BB:

Class repeats it in unison.

Extra praise if a P thinks of this.

Individual work, monitored, helped

Written on BB or SB or OHT

Discussion, reasoning (pointing out the method used), agreement, self-correction, praising

Draw diagrams if problems or disagreement.

Ps write this form in Ex. Bks.
### Activity 2 (Continued)

**Solution:**

- **a)** \( \frac{4}{5} \times 2 = \frac{8}{5} = 1 \frac{3}{5} \)
  - or \( \frac{3}{8} \times 4 = \frac{3}{2} = 1 \frac{1}{2} \)
  - T shows \( \frac{3}{8} \times 4 = \frac{3}{2} = 1 \frac{1}{2} \)

- **b)** \( \frac{3}{8} \times 4 = \frac{12}{8} = \frac{3}{2} = 1 \frac{1}{2} \)

- **c)** \( \frac{3}{4} \times 8 = \frac{24}{4} = 6 \)
  - or \( \frac{3}{8} \times 4 = \frac{6}{2} = 6 \)
  - T shows \( \frac{3}{4} \times 8 = \frac{6}{1} = 6 \)

- **d)** \( \frac{5}{12} \times 8 = \frac{40}{12} = \frac{10}{3} = 3 \frac{1}{3} \)
  - or T: \( \frac{5}{12} \times 4 = \frac{20}{12} = \frac{5}{3} = 3 \frac{1}{3} \)

- **e)** \( \frac{5}{8} \times 12 = \frac{60}{8} = \frac{15}{2} = 7 \frac{1}{2} \)
  - or T: \( \frac{5}{8} \times 4 = \frac{20}{8} = \frac{5}{2} = 2 \frac{1}{2} \)

- **f)** \( \frac{5}{11} \times 0 = 0 \) (As **any** number multiplied by zero is zero.)

- **3 Solving equations**

  Let’s find the numbers which can be written instead of the letters to make the equation is true.

  Ps come to BB or dictate to T, explaining reasoning by showing that their result is correct by substitution. Class agrees/disagrees.

  **BB:**

  - **a)** \( \frac{2}{7} \times a = \frac{10}{7} \); \( a = 5 \), as \( \frac{2}{7} \times 5 = \frac{10}{7} \)
  - **b)** \( \frac{3}{5} \times b = 3 = \frac{15}{5} \); \( b = 5 \), as \( \frac{3}{5} \times 5 = \frac{15}{5} = 3 \)
  - **c)** \( c \times 4 = \frac{12}{17} \); \( c = \frac{3}{17} \), as \( \frac{3}{17} \times 4 = \frac{12}{17} \)

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  Q.2 Read: Fill in the missing numbers. Check that they make the statements true.

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

  Review with whole class. Ps come to BB or dictate to T, explaining how they worked out the missing number. Class agrees/disagrees. Mistakes discussed and corrected.

  **Solution:**

  - **a)** \( \frac{2}{5} \times 2 = \frac{4}{5} \)
  - **b)** \( \frac{3}{5} \times \frac{5}{9} = \frac{15}{9} = \frac{5}{3} = 1 \frac{2}{3} \)
  - **c)** \( \frac{3}{10} \times 10 = \frac{30}{10} = 3 \)
  - **d)** \( \frac{5}{8} \times 2 = \frac{5}{4} = 1 \frac{1}{4} \)
  - **c)** \( \frac{5}{6} \times 4 = \frac{10}{3} = \frac{20}{6} = 3 \frac{1}{3} \)
  - **f)** e.g. \( \frac{5}{3} \times 6 = 10 \)

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**Activity 5**

*PbY5b, page 112*

Q.3 Read: Write each calculation in different ways.

Set a time limit. Ask Ps to write at least 2 different ways.

Review at BB with whole class. A, come and show us one way. Who agrees? Who can show us another way? etc. In a), T shows the calculation using ‘cancellation’ if no P has shown it and asks Ps if it is correct. Ps write it in Ex. Bks. Mistakes discussed and corrected.

**Solution:** e.g.

\[ \left( \frac{3}{2} + \frac{1}{3} \right) \times 12 = \frac{9 + 2}{6} \times 12 = \frac{11}{6} \times 12 = \frac{132}{6} = 22 \]

or \( \left( \frac{3}{2} + \frac{1}{3} \right) \times 12 = \frac{3}{2} \times 12 + \frac{1}{3} \times 12 = \frac{36}{2} + \frac{12}{3} \)

\[ = 18 + 4 = 22 \]

or \[ = \frac{3 \times 12}{2} + \frac{4}{5} = 18 + 4 = 22 \]

\[
\begin{align*}
\text{b) } \left( \frac{4}{5} - \frac{2}{3} \right) \times 4 & = \frac{12 - 10}{15} \times 4 = \frac{2}{15} \times 4 = \frac{8}{15} \\
\text{or } \left( \frac{4}{5} - \frac{2}{3} \right) \times 4 & = \frac{4}{5} \times 4 - \frac{2}{3} \times 4 = \frac{16}{5} - \frac{8}{3} \\
& = \frac{48 - 40}{15} = \frac{8}{15}
\end{align*}
\]

**Fraction of a fraction**

This 6 cm strip is 1 unit.

BB: 1 cm 6 cm

2 cm

3 cm

3 cm

1 cm

a) What part of the unit is the 2 cm strip? (1 third)

b) What part of the unit is the 3 cm strip? (1 half)

c) What length is half of the 2 cm strip? (1 cm)

What part of the unit is half of the 2 cm strip? BB: \( \frac{1}{2} \) of \( \frac{1}{3} \) = \( \frac{1}{6} \)

T: We can write it as a division like this: BB: \( \frac{1}{3} \div 2 = \frac{1}{6} \)

d) What length is 1 third of the 3 cm strip? (1 cm)

What part of the unit is 1 third of the 3 cm strip? BB: \( \frac{1}{3} \) of \( \frac{1}{2} \) = \( \frac{1}{6} \)

T: We can write it as a division like this. BB: \( \frac{1}{3} \div 2 = \frac{1}{6} \)

e) What part of the unit is 4 cm? (2 thirds)

What length is 1 quarter of 2 thirds? (1 cm)

What fraction of a unit is 1 quarter of 2 thirds? (1 sixth)

Who can write a division about it? BB: \( \frac{2}{3} \div 4 = \frac{1}{6} \left( = \frac{2}{12} \right) \)

Whole class activity

Strips drawn (stuck) on BB or use Cuisenaire rods or multi-link cubes

Discussion, reasoning, agreement, praising

T chooses Ps ar random, or class shouts out in unison.

Ps write divisions in Ex. Bks.

T writes:

\[ \frac{2}{3} \div 4 = \frac{4}{6} \div 4 = \frac{1}{6} \]

and asks Ps what they think of it.
Lesson Plan 112

Notes

Individual work, monitored, helped

Strips drawn (stuck) on on BB or use Cuisenaire rods or multilink cubes.

![Diagram](https://example.com/diagram)

Differentiation by time limit
Discussion, reasoning, agreement, self-correction, praising

Elicit or point out the two different ways in which we can divide a fraction.

1) We divide the numerator by the divisor and leave the denominator unchanged. [as in d) to f]

2) We multiply the denominator by the divisor and leave the numerator unchanged. [as in a) to c]

but do not expect Ps to learn them yet.

Extra praise if Ps point out the fractions which can be simplified.

Whole class activity
(or individual trial first if Ps wish)

Diagrams drawn on BB or SB or OHT

![Diagram](https://example.com/diagram)

<table>
<thead>
<tr>
<th>Y5</th>
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<td><strong>Activity</strong></td>
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8 | **PbY5b, page 112. Q.5** |
|  | **a)** Read: One third of the unit has been divided into 5 equal parts. Write a division about the part which has been shaded twice. |
|  | What part of the unit has been shaded twice? (1 fifteenth, as 1 unit has been divided into 15 equal parts, so each part is 1 fifteenth) |
|  | Who can write a division about it? P comes to BB or dictates to T. Class agrees/disagrees. Ps write division in Pbs too. |
|  | **b)** Read: Do the division and show it on the diagram in a). |
|  | Ps come to BB to shade 2 thirds on the diagram, colour 1 fifth of the shaded part and complete the division. Class agrees/disagrees. |
|  | **c)** Read: Do the division. Amend the diagram to show it. |
|  | Ps come to BB to write the division and explain BB: reasoning by drawing another column and shading. Who can think of another way to write the division? T shows it if no P can think of it. |
|  | **45 min** |

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R: (Mental) calculation
C: Practice with fractions. Division of fractions by natural numbers
E: Sequences. Equations and inequalities

### Activity 1

**Fractions practice 1**

Study these fractions. Which ones are equal to a whole number? Ps come to BB to circle them, write the whole number below and say the whole equation. Class agrees/disagrees.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>BB:</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{4}{5}$</td>
<td>$\frac{50}{10}$</td>
</tr>
<tr>
<td>$\frac{7}{5}$</td>
<td>$\frac{19}{4}$</td>
</tr>
<tr>
<td>$\frac{91}{7}$</td>
<td>$\frac{15}{9}$</td>
</tr>
<tr>
<td>$\frac{8}{9}$</td>
<td>$\frac{91}{13}$</td>
</tr>
</tbody>
</table>

Let's write an inequality about each of the other fractions, showing the next nearest whole number greater than and less than the fraction. Ps come to BB to write inequalities, explaining reasoning. Class agrees/disagrees.

To which whole number is the fraction closest? Ps underline the relevant number. Class agrees/disagrees.

BB:

$0 < \frac{4}{50} < 1; \quad 1 < \frac{7}{5} < 2; \quad 4 < \frac{19}{4} < 5; \quad 3 < \frac{15}{4} < 4; \quad 1 < \frac{15}{9} < 2; \quad 0 < \frac{8}{9} < 1$

5 min

### Activity 2

**Fractions practice 2**

Let's work out the perimeter and area of this rectangle.

Ps come to BB or dictate what T should write. Class points out errors or suggests another way to do the calculation.

BB: e.g.

\[
P = (a + b) \times 2 = (3 + 1\frac{1}{2}) \times 2 = 4\frac{1}{2} \times 2 = 8 + 1 = 9 \text{ (units)}
\]

\[
A = a \times b = 3 \times 1\frac{1}{2} = 3 \times (1 + \frac{1}{2}) = 3 + \frac{3}{2} = 3 + 1 = 4\frac{1}{2}
\]

or $3 \times 1\frac{1}{2} = 3 \times \frac{3}{2} = \frac{9}{2} = 4\frac{1}{2} \text{ (square units)}$

10 min

### Activity 3

**Fractions practice 3**

If possible, T has a piece of exciting ribbon to show to class!

If 1 metre of this ribbon costs £$\frac{3}{4}$, how much would these amounts cost? Ps come to BB to write a multiplication, or dictate to T, explaining reasoning. Class points out errors.

How can we write the result as a decimal? (Change to hundredths first, as there are 100 p in £1.)

BB: e.g.

a) 2 metres: $\frac{3}{4} \times 2 = \frac{3}{2} = \frac{1}{2} \text{ [= £1 + £} \frac{50}{100} = £1.50]\n
b) 3 metres: $\frac{3}{4} \times 3 = \frac{9}{4} = \frac{2}{4} \text{ [= £2 + £} \frac{25}{100} = £2.25]\n
c) 4 metres: $\frac{3}{4} \times 4 = £3 \text{ [= £3.00]}$

Extra praise if Ps notice relationships: e.g.

c) 2 m $\rightarrow$ £1.50

4 m $\rightarrow$ £1.50 $\times$ 2 = £3.00

Lesson Plan 113

Notes

Whole class activity
Written on BB or SB or OHT
At a good pace
Reasoning, agreement, praising
BB: $7 \times 13 = 13 \times 7 = 91$

(Ps may write inequalities in Ex. Bks first.)

Show on number line or change to equivalent fractions with common denominators if problems or disagreement.

Feedback for T

Whole class activity
Drawn on BB or SB or OHT
Elicit the general formula for perimeter and area first, then Ps replace the letters with numbers.

Agreement, praising
Feedback for T

Whole class activity
Reasoning, agreement, praising
(Once Ps understand what to do, responses could be written on scrap paper or slates and shown in unison.)

Reasoning, agreement, praising

Elicit that:

$\frac{3}{4} = \frac{75}{100} = £0.75$

Extra praise if Ps notice relationships: e.g.

c) 2 m $\rightarrow$ £1.50

4 m $\rightarrow$ £1.50 $\times$ 2 = £3.00

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### Activity 3 (Continued)

**d)** 5 metres: \( \frac{3}{4} \times 5 = \frac{15}{4} = \frac{3}{4} \times \frac{15}{4} = \frac{3}{4} + \frac{75}{100} = \frac{3.75}{1} \)

**e)** 6 metres: \( \frac{3}{4} \times \frac{3}{2} = \frac{9}{2} = \frac{41}{2} \times \frac{50}{100} = \frac{4.50}{1} \)

**f)** 20 metres: \( \frac{3}{4} \times 20 = \frac{60}{4} = \frac{15}{1} = \frac{15.00}{1} \)

### 4 Problems

Listen carefully, note the data and do the calculation in your Ex. Bks then show me the result when I say. Ps answering correctly explain at BB to Ps who were wrong. Who agrees? Who did it another way? etc. Mistakes discussed and corrected.

**a)** If 6 kg of potatoes cost £2 \( \frac{2}{5} \), what does 1 kg of potatoes cost?

Show me . . . now! (40 p or £0.40)

BB: \( \frac{2}{5} \div 6 = \frac{12}{5} \div 6 = \frac{2}{5} = \frac{40}{100} = £0.40 = 40p \)

Answer: 1 kg of potatoes costs 40 p.

**b)** If 4 m of wire cost £1 \( \frac{4}{5} \), what does 1 m of wire cost?

Show me . . . now! (45 p or £0.45)

BB: \( \frac{4}{5} \div 4 = \frac{9}{5} \div 4 = \frac{9}{20} = \frac{45}{100} = £0.45 = 45p \)

Answer: 1 m of wire costs 45 p.

### 5 PbY5b, page 113

**Q.1** Read: Do the calculations.

Let’s see how much you have learned about doing calculations with fractions. Set a time limit.

Review with whole class. Ps could show results on scrap paper or slates on command. Ps responding correctly explain at BB, explaining reasoning. Who did it the same? Who did it in a different way? etc. Mistakes discussed and corrected.

**Solution:**

**a)** \( \frac{3}{4} + \frac{5}{6} = \frac{9+10}{12} = \frac{19}{12} = \frac{7}{1} \)

**b)** \( \frac{4}{5} - \frac{3}{10} = \frac{8-3}{10} = \frac{5}{10} = \frac{1}{2} \)

**c)** \( \frac{2}{5} \times 10 = \frac{20}{5} = 4 \) or \( \frac{2}{5} \times \frac{10}{1} = \frac{4}{1} = 4 \)

**d)** \( \frac{5}{8} \div 4 = \frac{5}{8 \times 4} = \frac{5}{32} \)

**24 min**
Q.2 Read: Solve the equations and inequality. Check your solutions.

What does solve mean? (Work out which numbers the letters represent to make the statement true.)

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

Review with the whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly come to BB or dictate to T, explaining reasoning and checking by substitution. Who thought the same? Who worked it out in a different way? etc. Mistakes discussed and corrected.

Solution:

a) \[ x \times \frac{4}{3} = \frac{3}{4}; \quad x = \frac{3}{4} \div \frac{4}{3} = \frac{3}{16}; \quad \text{Check: } \frac{3}{16} \times 4 = \frac{12}{16} = \frac{3}{4} \]

(The unknown factor of a product can be calculated by dividing the product by the known factor.)

b) \[ y + 5 \times y = \frac{12}{5}; \quad 6 \times y = \frac{12}{5}, \text{ so } y = \frac{12}{5} \div 6 = \frac{2}{5} \]

Check: \[ \frac{2}{5} + 5 \times \frac{2}{5} = \frac{2}{5} + \frac{10}{5} = \frac{12}{5} \]  

(Reasoning as for a), or as opposite. Stress that whatever we do to one side of an equation we must also do to the other side to keep the equation true.)

c) \[ 6 \times z - z < \frac{5}{8}; \quad 5 \times z < \frac{5}{8}, \text{ so } z < \frac{5}{8} \div 5; \quad z < \frac{1}{8} \]

Check: If we think of the inequality as an equation:

BB: \[ 5 \times z = \frac{5}{8}, \quad z = \frac{1}{8} \]

So five times a number which is less than 1 eighth must be less than 5 eighths.

\[ \boxed{30 \text{ min}} \]

Q.3 Read: The 4th, 5th and 6th terms of a sequence are given. Complete the sequence so that the first 10 terms are listed.

How many terms must you write before (after) the 3 given? (3 before and 4 after, as \(3 + 3 + 4 = 10\))

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

Review with whole class. Ps come to BB or dictate terms to T, stating the rule they used. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) \( \left( \frac{1}{6}, \frac{1}{3}, \frac{2}{3}, \frac{4}{3} \right), \quad \frac{8}{3}, \frac{16}{3}, \frac{32}{3}, \frac{64}{3}, \frac{128}{3}, \frac{256}{3}, \right) \times [2] \]

b) \( \left( - \frac{1}{7}, -\frac{1}{7}, \frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, \frac{7}{7}, \frac{8}{7} \right), \quad [+1 \frac{1}{7}] \]

c) \( \left( \frac{1}{6}, \frac{0}{1}, \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}, \frac{8}{9} \right), \]

Lesson Plan 113

Notes

Elicit that when dividing a fraction by a natural number, either the numerator decreases or the denominator increases.

Individual work, monitored, helped (or whole class activity, with Ps suggesting what to do first and how to continue)

Drawn on BB or SB or OHT

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

Individual work, monitored, helped (or whole class activity if time is short)

Drawn on BB or use enlarged copy master or OHT

Discussion, reasoning, agreement, self-correction, praising

Rule: \( a = b \times 5, \ b = a \div 5, \)

or \( b \div a = 5, \ a \div b = \frac{1}{5} \)
### Lesson Plan 114

#### Activity 1: Ordering fractions

Let’s form as many fractions as we can using only the digits 3, 4 or 6.

Ps come to BB or dictate to T, simplifying fractions where possible. Encourage a logical listing so that none will be missed.

**BB:**

\[
\begin{align*}
\frac{3}{3}, & \quad \frac{4}{4}, \quad \frac{6}{6}, \\
\frac{3}{4}, & \quad \frac{4}{6}, \quad \frac{6}{3}, \\
\frac{2}{3}, & \quad \frac{1}{2}, \quad \frac{1}{2}
\end{align*}
\]

Let’s write the fractions in increasing order. What should we do first to make it easier to compare them? (Change to a common denominator.)

Ps dictate the fractions as twelfths and T writes on BB above original fractions, then Ps dictate the fractions in decreasing order.

**BB:**

\[
\begin{align*}
\frac{3}{6} < & \quad \frac{4}{3} < \quad \frac{3}{4} = \quad \frac{4}{4} < \quad \frac{6}{6} < \quad \frac{4}{3}
\end{align*}
\]

**Extension**

Ps think of additions and subtractions to write about the fractions.

#### Activity 2: Fractions on the number line

This number line has only 2 numbers marked.

**BB:**

How can we mark the positions of these numbers? (BB)

Ps suggest what to do (e.g. divide the space between – 1 and 3 into 4 equal sections and mark the units 0, 1 and 2; then divide each unit into sixths).

Ps come to BB to measure and draw ticks, using a BB ruler and/or BB compasses, with T’s help. Then other Ps come to BB to mark and label the required numbers. Class points out errors.

**BB:**

Ps write fractions in Ex. Bks. too.

#### Activity 3: Adding and subtracting fractions

These calculations are very long! How could we group the terms to make it easier for us? Ps come to BB to explain and show their ideas. Class agrees on the simplest way. Ps write simplest way in Ex. Bks.

**BB:**

\[
\begin{align*}
a) \quad \frac{1}{3} + & \quad \frac{2}{4} + \frac{5}{3} - \frac{2}{6} + \frac{1}{4} - \frac{2}{3} + \frac{1}{4} \\
= & \quad \left( \frac{1}{3} + \frac{5}{3} - \frac{6}{3} \right) + \left( \frac{2}{4} - \frac{2}{4} + \frac{1}{4} + \frac{1}{4} \right) - \frac{2}{6} \\
= & \quad \frac{2}{4} - \frac{2}{6} = \frac{6}{12} = \frac{2}{12} = \frac{1}{6}
\end{align*}
\]

**Notes**

Whole class activity

At a good pace

BB: 3, 4, 6

Agreement, praising

Ps write comparison in Ex. Bks. too.

Whole class activity

Drawn on BB or SB or OHT

BB: \(-\frac{5}{6}, 0, \frac{5}{6}, \frac{13}{6}, -\frac{1}{6}\)

Discussion, agreement, praising

Rest of Ps can draw number line in Ex. Bks. too

At a good pace

Agreement, praising

Show them on the number line.

Whole class activity

Written on BB or SB or OHT

Discussion, reasoning, agreement, praising

e.g. Collect fractions with equal denominators and do these calculations first.
Activity

3 (Continued)

b) \[ \frac{-4}{5} + \frac{2}{3} + \frac{3}{5} - \frac{1}{15} + \left( -\frac{2}{3} \right) + \frac{3}{5} - \left( -\frac{1}{5} \right) \]

\[ = \left( -\frac{4}{5} + \frac{3}{5} + \frac{1}{5} \right) + \left( \frac{2}{3} - \frac{2}{3} \right) + \frac{3}{5} - \frac{1}{15} \]

\[ = \frac{3}{5} - \frac{1}{15} = \frac{9 - 1}{15} = \frac{8}{15} \]

15 min

4 PbY5b, page 114

Q.1 Read: Practise calculation. Write details in your exercise book.

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

Review with whole class. Ps come to BB or dictate results, explaining reasoning. Who agrees? Who did it in a different way? etc. Mistakes discussed and corrected.

Solution:

a) \[ \frac{5}{8} + \frac{3}{16} = \frac{10}{16} = \frac{13}{16} \]

b) \[ \frac{3}{15} + \frac{7}{10} = \frac{1}{5} + \frac{7}{10} = \frac{2}{10} + \frac{7}{10} = \frac{9}{10} \] (Simplify \( \frac{3}{15} \) first)

c) \[ \frac{3}{7} + \frac{1}{5} = \frac{24 + 7}{35} = \frac{31}{35} \]

d) \[ \frac{3}{4} - \frac{5}{8} = \frac{6 - 5}{8} = \frac{1}{8} \]

e) \[ \frac{12}{15} - \frac{2}{5} = \frac{4 - 2}{5} = \frac{2}{5} \] (Simplify \( \frac{12}{15} \) first)

f) \[ \frac{3}{8} - \frac{3}{12} = \frac{3}{8} - \frac{1}{4} = \frac{3}{8} - \frac{2}{8} = \frac{1}{8} \]

g) \[ \frac{5}{6} \times \frac{1}{6} = \frac{5}{36} \]

h) \[ \frac{4}{9} \times 6 = \frac{24}{9} = \frac{8}{3} = \frac{2}{3} \]

i) \[ \frac{5}{8} \times 4 = \frac{5}{2} = \frac{21}{2} \]

j) \[ \frac{6}{7} \div 3 = \frac{2}{7} \]

(k) \[ \frac{5}{7} + 5 = \frac{5}{7} \]

l) \[ \frac{5}{6} \div 4 = \frac{5}{24} \] (Divide numerator and leave denominator unchanged, or multiply denominator and leave numerator unchanged.)

23 min

5 PbY5b, page 114


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

Review with whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly explain at BB to Ps who were wrong. Who did the same? Who did it another way? etc. Deal with all methods Mistakes discussed and corrected.

Solution:

a) \[ \frac{5}{6} + \frac{1}{4} - \frac{2}{3} = \frac{10 + 3 - 8}{12} = \frac{5}{12} \]

23 min

Notes

Extra praise for Ps who suggest collecting fractions with equal denominators which add up to zero.

Agree that \( -\frac{1}{5} = +\frac{1}{5} \)

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Differentiation by time limit.

Discussion, reasoning, agreement, self-correction, praising

Draw diagrams on BB or use models or show on the number line if problems or disagreement.

Accept any valid method of calculation.

e.g. f): \[ \frac{3}{8} - \frac{3}{12} = \frac{9 - 6}{24} = \frac{3}{24} = \frac{1}{8} \]

h) \[ \frac{4}{9} \times 6 = \frac{24}{9} = \frac{8}{3} = \frac{2}{3} \]

Reiterate the 2 methods for dividing a fraction by a natural number, as opposite.

Individual work, monitored helped

(or whole class activity if Ps had difficulties in Q.1)

Written on BB or SB or OHT

Discussion, reasoning, agreement, self-correction, praising

Feedback for T
**Y5**

**Activity 5 (Continued)**

b) \( \frac{9}{6} \div 6 \times 4 = \frac{9}{36} \times 4 = \frac{9}{9} = 1 \)

c) \( \frac{7}{6} \times (7 - 4) = \frac{7}{6} \times 3 = \frac{7}{2} = 3\frac{1}{2} \)

d) \( \frac{8}{3} - \frac{3}{4} \times \frac{3}{6} = \frac{8}{3} - \frac{9}{2} = \frac{16 - 27}{6} = -\frac{11}{6} = -1\frac{5}{6} \)

---

**Notes**

Whole class activity (with short individual trial first)

Discussion, reasoning, agreement, (self-correction), praising

Accept any valid method of solution. e.g.

a) \( \frac{3}{14} \) of 7 days

\[
= 7 \div 14 \times 3 \ (\text{days})
\]

\[
= \frac{7}{14} \times 3 = \frac{21}{14} \ (\text{days})
\]

\[
= \frac{3}{2} \text{ days} = 1\frac{1}{2} \ (\text{days})
\]

\[
= 24 \text{ h} + 12 \text{ h} = 36 \text{ hours}
\]

Ps who could not work out the answer in the allotted minute could write the solution they understand best in Ex. Bks.

---

**Activity 6**

**PbY5b, page 114, Q.3**

Read: Solve the problems in your exercise book.

Write the answers here.

Deal with one question at a time. Allow Ps a minute to read the problem themselves and to work out the answer if they can.

Who has an answer? Come and show us what you did. Who agrees? Who did it a different way? etc. If no P has an answer, class solves it together, with hints from T where necessary.

**Solution:** e.g.

a) How many hours are in 3 fourteenths of a week

BB: 1 week = 7 days = 7 \( \times \) 24 h + 28 h = 168 hours

\[
\frac{3}{14} \text{ of 168 hours} = 168 \div 14 \times 3 = 12 \text{ h} \times 3 = 36 \text{ (h)}
\]

b) What part of a week is half a day?

BB: 1 week = 7 days = 14 half days

So 1 half day is \( \frac{1}{14} \) of a week.

c) How many days is twenty-four thirds of an hour?

BB: 1 day = 24 hours

\[
\frac{24}{3} \text{ hours} = 8 \text{ hours} = \frac{8}{24} \text{ of a day} = \frac{1}{3} \text{ of a day}
\]

---

**Notes**

Individual work, monitored, (helped)

Written on BB or SB or OHT

Discussion, reasoning, checking, agreement, self-correcting, praising

Check by writing extremes of the range of possible numbers instead of the shapes to see if they make the inequality true.

---

**Activity 7**

**PbY5b, page 114**

Q.4 Read: Which natural numbers could be written instead of each of the shapes?

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:**

a) \( \square \ll 11 \) 9

b) \( \frac{5}{53} \ll \frac{10}{53} \)

c) \( \frac{7}{3} \ll \frac{3}{3} > 1 \)

\( \square: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1 \)

\( \triangle: 6, 7, 8, 9 \)

\( \bigcirc: 1, 2, 3 \)
PbY5b, page 114

Q.5 Read: Solve the problem in your exercise book.

A 10 cm cube can hold 1 litre of water. What height would the water level be in the cube if we pour into it:

a) half a litre  

b) 3 quarters of a litre  

c) 25 cl  

d) 800 cm³?

If possible T has a 10 cm × 10 cm × 10 cm cube to show to class (ideally glass or plastic and hollow), otherwise draw on BB.

If we filled it with 1 litre of water, how high would the water level be? (It would reach the top, i.e. 10 cm high)

If we poured in only half a litre, which dimension would change? (Agree that the area of the base would be the same, so only the height would change.)

Set a time limit of 2 minutes. Review with whole class.

Ps could show results on scrap paper or slates on command.

Ps answering correctly explain to Ps who were wrong, referring to the cube (or a diagram drawn on BB). Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) 1 litre → 10 cm high;

\[ \frac{1}{2} \text{ a litre} \rightarrow 10 \text{ cm} ÷ 2 = 5 \text{ cm high} \]

b) \[ \frac{3}{4} \text{ of a litre} \rightarrow 10 \text{ cm} ÷ 4 \times 3 = 2.5 \text{ cm} \times 3 = 7.5 \text{ cm} \]

c) 25 cl = \[ \frac{25}{100} \text{ litre} = \frac{1}{4} \text{ litre} \]

\[ \frac{1}{4} \text{ of a litre} \rightarrow 10 \text{ cm} ÷ 4 = 2.5 \text{ cm} \text{ (or 25 mm)} \]

c) \[ V = 800 \text{ cm}^³ = 10 \text{ cm} \times 10 \text{ cm} \times 8 \text{ cm} \]

Level of water: \[ \frac{8}{42} \text{ min} \]

\[ \frac{45}{45} \text{ min} \]

PbY5b, page 114. Q.6

Read: What part of the whole unit is shaded? Write the fraction in different forms in your exercise book.

What do you think we should do first to make it easier for ourselves? (Divide the shapes into equal parts using the marks provided)

Elicit that part a) should be divided into equal squares and b) into equal triangles. Ps come to BB to draw grid lines and rest of Ps work in Pbs.

Agree on the number of equal parts and how many are shaded. [In a), 9 equal squares, 4 and a half squares shaded; i.e. half of the unit is shaded]

Tell me the fraction in different forms. Ps dictate to T, explaining what they have done to numerator and denominator. Class points out errors.

Solution: a)\[ \frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{9}{18} \ldots \]

b) \[ \frac{13}{25} = \frac{26}{50} = \frac{39}{75} \ldots \]

Whole class activity

(or a 1 minute individual trial first if Ps wish and there is time)

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, praising

At speed round class

Praising, encouragement only

Elicit that such fractions of equal value are called equivalent fractions.

Feedback for T
Tables and calculation practice, activities, consolidation

*PbY5b, page 115*

**Solutions:**

Q.1  

a) \( \frac{3}{8} + \frac{7}{20} = \frac{15 + 14}{40} = \frac{29}{40} \)

b) \( \frac{4}{7} + \frac{11}{21} = \frac{12 + 11}{21} = \frac{23}{21} = 1 \frac{2}{21} \)

c) \( \frac{2}{9} + \frac{3}{8} = \frac{16 + 27}{72} = \frac{43}{72} \)

d) \( \frac{5}{6} - \frac{1}{3} = \frac{5 - 2}{6} = \frac{3}{6} = \frac{1}{2} \)

e) \( \frac{5}{12} - \frac{1}{3} = \frac{5 - 4}{12} = \frac{1}{12} \)

f) \( \frac{11}{15} - \frac{3}{5} = \frac{11 - 9}{15} = \frac{2}{15} \)

\( \big( \frac{3}{4}\big) \times \big( \frac{2}{8}\big) = \frac{6}{1} = 6 \)  

\( \big( \frac{7}{8}\big) \times \big( \frac{1}{4}\big) = \frac{7}{2} = 3 \frac{1}{2} \)

\( \frac{4}{7} \div 2 = \frac{4 \div 2}{7} = \frac{2}{7} \)  

i)  

\( \frac{5}{9} + 5 = \frac{5 + 5}{9} = \frac{10}{9} \)

j)  

\( \frac{3}{8} \div 4 = \frac{3}{8 \times 4} = \frac{3}{32} \)

Q.2  

a) \( \big( \frac{5}{7}\big) < \frac{5}{7} \)  

b) \( \big( \frac{3}{23}\big) < \frac{8}{23} \)  

c) \( \frac{9}{5} - \frac{18}{10} > \frac{10}{10} \)

\( \big( \big( 4, 3, 2, 1 \big)\big) < \big( \big( 4, 5, 6, 7 \big)\big) \)  

\( \big( \big( 1, 2, 3, 4, 5, 6, 7 \big)\big) > 1 \)

Q.3  

a) \( x \times 3 = \frac{2}{5}, \ x = \frac{2}{5} \div 3 = \frac{2}{5 \times 3} = \frac{2}{15} \)

b) \( y + 3 \times y = \frac{20}{3}, \ 4 \times y = \frac{20}{3}, \ y = \frac{20}{3} \div 4 = \frac{5}{3} = 1 \frac{2}{3} \)

c) \( 5 \times z - z < \frac{4}{7}, \ 4 \times z < \frac{4}{7}, \ z < \frac{1}{7} \)

Q.4  

a) \( \text{half of a quarter} = \frac{1}{4} \div 2 = \frac{1}{8} \)

b) \( \text{a quarter of a half} = \frac{1}{2} \div 4 = \frac{1}{8} \)

c) \( \text{a quarter of a quarter} = \frac{1}{4} \div 4 = \frac{1}{16} \)

d) \( \text{a third of 9 sixteenths} = \frac{9}{16} \div 3 = \frac{3}{16} \)

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### Activity

(Solutions continued)

Q.5  

- **a)** 
  - i) \( P = 4 \times a = \frac{3}{4} \text{ m} \)  
    \[ a = \frac{3}{4} \text{ m} \div 4 = \frac{3}{16} \text{ m} \]  
  - ii) \( \frac{3}{4} \text{ m} = 75 \text{ cm}, \quad 75 \text{ cm} \div 4 = 18 \frac{3}{4} \text{ cm} \)

- **b)** 
  - i) \( \frac{2}{3} \text{ litre} \div 4 = \frac{2}{12} \text{ litre} = \frac{1}{6} \text{ litre} \)
  - ii) \( \frac{1}{6} \text{ litre} = \frac{1}{6} \text{ of 100 cl} = 100 \text{ cl} \div 6 = 16 \frac{4}{6} \text{ cl} \)  
    \[ = 16 \frac{2}{3} \text{ cl} \]
Revision of decimals
T has 3 amounts in decimal form written on BB.

What kind of numbers are these? (decimals) Let’s read them together.
(fourteen point nine nine pounds; two hundred and thirty point four metres; seven point six litres)

What does the decimal point show? (It separates the whole units from the parts of a unit.) Let’s think about what the decimal number really means. Ps come to BB to write other forms of the numbers. Class agrees/disagrees.

BB:

a) £14.99 = £14 99 p = £\(14 + \frac{99}{100}\)

b) 230.4 m = 230 m 40 cm = \(\left(230 + \frac{4}{10}\right)\) m

c) 7.6 litres = 7 litres 60 cl = \(\left(7 + \frac{6}{10}\right)\) litres

T points to certain digits and Ps say its digit value, place value and real value. (e.g. 230.4 m: digit value: 4, place value: 4 t real value: \(\frac{4}{10}\))

Place value 1
Study this place value table. What does the thick vertical line show? (It separates the whole numbers from the parts and is where the decimal point would be written.)

<table>
<thead>
<tr>
<th>Thousands</th>
<th>Hundreds</th>
<th>Tens</th>
<th>Units</th>
<th>tenths</th>
<th>hundredths</th>
<th>thousandths</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>7</td>
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</tr>
<tr>
<td>72</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>2650</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>4004</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>900015</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Let’s write each number in the place value table as an addition, then as a single fraction, then in decimal form. Ps come to BB or dictate to T. Class points out errors. (If Ps write on BB, ask them to say the numbers too. e.g. 5 plus 3 hundredths; 503 hundredths; 5 point zero 3)

BB:

a) \(5 + \frac{3}{100} = \frac{503}{100} = 5.03\)

b) \(0 + \frac{72}{100} = \frac{72}{100} = 0.72\)

c) \(50 + \frac{26}{100} = \frac{5026}{100} = 50.26\)

d) \(400 + \frac{9}{10} = \frac{4009}{10} = 400.9\)

e) \(1000 + \frac{5}{100} = \frac{100005}{100} = 1000.05\) (‘1 hundred thousand and 5 hundredths’)

Whole class activity
Written on BB or SB or OHT
BB: decimals
In unison

Involve several Ps.
Agreement, praising

Feedback for T

Whole class activity
Drawn on BB or use enlarged copy master or OHT

Involve several Ps.
At a good pace
Agreement, praising
Place value 2
Let’s change these numbers to decimals first, then write them in the place-value table. P.s come to BB to convert numbers to decimals and write digits in appropriate column in table, explaining reasoning. Class points out errors.

BB:

\[
\begin{align*}
\text{a) } & \quad \frac{4}{10} = 0.4 \quad \text{b) } \frac{5}{100} = 0.05 \\
\text{c) } & \quad 47 + \frac{3}{100} = 47.03 \quad \text{d) } 17.92 \\
\text{e) } & \quad 5 + \frac{7}{100} = 5.07 \\
\text{f) } & \quad \frac{450}{100} = 4.50
\end{align*}
\]

<table>
<thead>
<tr>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
<th>th</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>4</td>
<td>7</td>
<td>0</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>1</td>
<td>7</td>
<td>9</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>5</td>
<td>0</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f)</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the place value of the digit 4 (7, 5) in the different numbers? P.s come to BB to point them out and say the place value. Class agrees/disagrees.

15 min

Number line 1
What can you tell me about this segment of the number line? (Ranges from –2 to 2.4 or 2 and 4 tenths; there is a tick at every tenth)

BB:

\[
\begin{align*}
-2 & \quad -1 \quad 0 \quad 1 \quad 2 \\
\text{Ps come to BB to choose a number, convert to a decimal if necessary and mark and label it on the number line. Class agrees/disagrees.}
\end{align*}
\]

BB: \[0.7, \quad 1.3, \quad \frac{15}{10}, \quad -1.2, \quad \frac{8}{10}, \quad \frac{21}{10}, \quad 1 + \frac{7}{10} \]

\[1.5 \quad -0.8 \quad 2.1 \quad 1.7\]

20 min

Number line 2
What can you tell me about this segment of the number line? (ranges from –0.3 to 0.5; the ticks show hundredths)

Let’s read and write the numbers marked. P.s come to BB to choose a dot, say the number and write it as a decimal. Class agrees/disagrees. What is the number as a fraction?

BB:

\[
\begin{align*}
-0.28 & \quad -0.21 \quad -0.15 \quad -0.02 \quad 0.05 \quad 0.19 \quad 0.24 \quad 0.35 \quad 0.49 \\
-0.3 & \quad -0.2 \quad -0.1 \quad 0 \quad 0.1 \quad 0.2 \quad 0.3 \quad 0.4 \quad 0.5
\end{align*}
\]

25 min
Lesson Plan 116

Activity 6  
**PbY5b, page 116**

Q.1 Read: Join the numbers to the corresponding points on the number line.

Set a time limit. Review with whole class. Ps come to BB to draw dots and joining lines, explaining reasoning (and saying the decimals as fractions and the fractions as decimals). Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**

Let's say the numbers as:

a) decimals in increasing order,

b) fractions in decreasing order.

29 min

---

Q.2 Read: List the marked numbers in order if:

a) \( x = 10 \),  
b) \( x = 1 \),  
c) \( x = 0.1 \)

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

Review at BB with whole class. P says what each tick on the number line represents. T points to each dot in turn and a P says the number. Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**

a) \( x = 10: -12 < -10 < -3 < 2 < 5 < 13 \)

b) \( x = 1: -1.2 < -1 < -0.3 < 0.2 < 0.5 < 1.3 \)

c) \( x = 0.1: -0.12 < -0.1 < -0.03 < 0.02 < 0.05 < 0.13 \)

33 min

---

Q.3 Read: List the fractions as decimals in increasing order.  
Write < or = signs between them.

What is the easiest way to compare them? (Change the tenths to hundredths first.) 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. Show in a place-value table or on a number line drawn on BB if problems or disagreement.

**Solution:**

\[
\begin{align*}
\frac{3}{10} &< \frac{1}{100} < \frac{27}{100} < \frac{30}{100} < \frac{30}{100} < \frac{84}{100} < \frac{70}{100} < \frac{16}{10} < \frac{160}{100} < \frac{7}{10} \\
\frac{30}{100} &< \frac{160}{100} < \frac{70}{100} < \frac{100}{100} \\
0.01 &< 0.27 < 0.3 < 0.30 < 0.70 = 0.7 < 0.84 < 1.6 = 1.60
\end{align*}
\]

37 min
Week 24

Lesson Plan 116

Notes

Individual work, monitored helped

Written/drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Whole class activity

First let Ps to suggest what more could be done with the fractions. T suggests anything not mentioned by Ps.

Reasoning, agreement, praising

Ps could write extra forms in Pbs too if they have room.

BB:

<table>
<thead>
<tr>
<th></th>
<th>H</th>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td>0</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
</tbody>
</table>

Whole class activity

Written on BB or SB or OHT

T chooses Ps at random.

At a good pace

In good humour

Agreement, praising

Ps write quantities in Pbs at same time.

Extra praise if a P suggests tonnes.

BB: 1 tonne = 1000 kg

1 kg = 0.001 tonne
### Y5

#### Lesson Plan

**Week 24**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
</table>
| **Exact measures** | Whole class activity  
Involve as many Ps as possible. |

- **R:** Mental calculation  
- **C:** Comparison of decimals. Rounding decimals  
- **E:** Quantities

<table>
<thead>
<tr>
<th>1</th>
<th>Exact measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) A line segment is exactly 15 cm long. Tell me different ways to write its length. Ps dictate to T. Class points out errors.</td>
<td></td>
</tr>
<tr>
<td>BB: e.g. 15 cm = 150 mm = 15.0 cm = 0.15 m = 0.150 m</td>
<td></td>
</tr>
</tbody>
</table>
| or \[
\frac{15}{100} \text{ m} = \frac{150}{1000} \text{ m}, \text{ etc.}
\] |

- b) If a stick is exactly 15 cm 2 mm long, in which different ways could we write its length? Ps dictate to T. Class points out errors  
BB: e.g. 15 cm 2 mm = 152 mm = 15.2 cm = 0.152 m  
or \[
\frac{15}{10} \frac{2}{10} \text{ cm} = \frac{152}{1000} \text{ m}, \text{ etc.}
\] |

- c) We have two sticks, one is 1.6 m long and the other is 1.49 m long. Which is longer? Let’s compare them in different ways. T starts each comparison and Ps continue it.  
BB: e.g.  
1.6 m = 1 m 60 cm = 160 cm > 1.49 m = 1 m 49 cm = 149 cm  
\[
\frac{1.6}{10} = \frac{160}{100} > \frac{1.49}{100}
\]  
\[
1.6 = 1.60 > 1.49
\]  
Elicit that 1.6 = 1.60 = 1.600 = 1.6000 . . . (i.e. any number of zeros can be written after the decimal point but the value doesn’t change.  

<table>
<thead>
<tr>
<th>2</th>
<th>Rounding 1</th>
</tr>
</thead>
</table>
| a) Measure the width of your Practice Book. T asks 3 or 4 Ps for their measurements and writes them on BB. e.g.  
BB: 208 mm, 20 cm 9 mm, 21 cm, 211 mm, etc. |

- T: I measured it as 20 cm 9 mm but I am not sure that it is exact.  
What I can say is that the width is 20 cm 9 mm, to the nearest mm.  
If I call the width \( w \), I can write it mathematically like this.  
BB:  
20 cm 8.5 mm \( \leq \) \( w \) < 20 cm 9.5 mm  
or in cm: 20.85 cm \( \leq \) \( w \) < 20.95 cm  
Let’s show it on the number line. Ps dictate what T should draw and write. If necessary, remind Ps about the notation for showing inequalities on the number line. [A closed (black) circle means the number is included; an open (white) circle means the number is not included; horizontal line joining the circles covers all the possible numbers.]  

- b) The length of a stick was measured as approximately 1.6 m. What does it really mean? Ps come to BB or dictate what T should write. Class agrees/disagrees.  
BB: 1.55 m \( \leq \) length < 1.65 m or 155 cm \( \leq \) length < 165 cm  

- c) Another person measured the same stick and gave its measurement as approximately 1.60 m. What did they really mean? Ps come to BB or dictate to T. Class agrees/disagrees.  
BB: 1.595 m \( \leq \) length < 1.605 m or 159.5 cm \( \leq \) length < 160.5 cm  
Agree that 1.60 m is a more exact measurement than 1.6 m.  

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### Activity 3

#### Rounding 2

a) T has numbers written on BB:

BB: 6318, 6518, 6358, 6315

Let's round each number to the nearest 10, 100 and 1000.

Ps come to BB to write approximations, explaining reasoning.

Class agrees/disagrees.

BB: 6318 ≈ 6320 ≈ 6300 ≈ 6000

6518 ≈ 6520 ≈ 6500 = 7000

6358 ≈ 6360 ≈ 6400 = 6000

6315 ≈ 6320 ≈ 6300 ≈ 6000

b) Let's round these quantities to the nearest 10 units and convert them to larger units of measure.

Deal with one at a time. T writes quantity on BB and Ps come to BB or dictate what T should write. Class agrees/disagrees.

BB: e.g.

i) 438 cm ≈ 440 cm = 4.4 m

ii) 3846 mm ≈ 3850 mm ≈ 385 cm = 3.85 m

iii) 2641 g = 2640 g = 2.64 kg

iv) 555 g = 560 g = 0.56 kg

v) 835 m = 840 m = 0.84 km, etc.

15 min

### 4 PbY5b, page 117

Q.1 Read: Convert each pair of fractions so that they have equal denominators. Compare them.

Set a time limit. Ps convert mentally or write beside relevant fraction in PbS, then fill in the missing sign.

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

**Solution:**

a) \( \frac{6}{10} = \frac{60}{100} \) \( \frac{50}{100} \)

b) \( \frac{7}{10} = \frac{70}{100} \) \( \frac{14}{100} \)

c) \( \frac{5}{100} \) \( \frac{20}{100} \)

d) \( \frac{9}{10} = \frac{90}{100} \) \( \frac{90}{100} \)

e) \( \frac{5}{10} = \frac{50}{100} \) \( \frac{51}{100} \)

f) \( \frac{161}{1000} \) \( \frac{16}{100} \) \( \frac{160}{1000} \)

**Extension**

T points to some of the inequalities and asks Ps to say them in decimal form (e.g. 0.6 > 0.50; 0.05 < 0.20, etc.)

20 min
### Y5

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong> PbY5b, page 117</td>
<td>Individual work, monitored, helped</td>
</tr>
<tr>
<td><strong>Q.2</strong> Read: <em>Convert the decimal numbers to hundredths and compare them.</em></td>
<td>Written on BB or SB or OHT</td>
</tr>
<tr>
<td>Set a time limit. Ps write extra zeros in hundredths column where appropriate and fill in the missing signs.</td>
<td>Discussion, reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td>Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.</td>
<td>Show on number line if problems or disagreement.</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td>Feedback for T</td>
</tr>
<tr>
<td>a) 0.60 &gt; 0.06 &amp; b) 0.70 = 0.70 &amp; c) 0.11 &gt; 0.10</td>
<td>Individual work, monitored, helped</td>
</tr>
<tr>
<td>d) 0.03 &lt; 0.70 &amp; e) 0.07 &lt; 0.30 &amp; f) 0.40 &gt; 0.39</td>
<td>Written on BB or SB or OHT</td>
</tr>
<tr>
<td><strong>6</strong> PbY5b, page 117</td>
<td>Reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td><strong>Q.3</strong> Read: <em>Write three numbers between the two decimals.</em></td>
<td>Show on number line if problems or disagreement.</td>
</tr>
<tr>
<td>T also asks Ps to compare the 3 numbers by writing appropriate sign between each pair. Set a time limit.</td>
<td>Feedback for T</td>
</tr>
<tr>
<td>Review at BB with whole class. Ps come to BB or dictate to T. Who agrees? Who wrote different numbers? Deal orally with all cases. Mistakes discussed and corrected.</td>
<td></td>
</tr>
<tr>
<td><strong>Solution:</strong> e.g.</td>
<td></td>
</tr>
<tr>
<td>a) 3.4 &lt; 3.45 &lt; 3.53 &lt; 3.59 &lt; 3.6</td>
<td></td>
</tr>
<tr>
<td>b) 5.2 &lt; 5.21 &lt; 5.25 &lt; 5.28 &lt; 5.3</td>
<td></td>
</tr>
<tr>
<td>c) −0.2 &lt; −0.1 &lt; 0 &lt; 0.08 &lt; 0.1</td>
<td></td>
</tr>
<tr>
<td>d) 2.9 &lt; 2.91 &lt; 2.92 &lt; 2.93 &lt; 3</td>
<td></td>
</tr>
<tr>
<td><strong>7</strong> PbY5b, page 117</td>
<td></td>
</tr>
<tr>
<td><strong>Q.4</strong> Read: <em>Write the next nearest whole number less than and greater than the decimal number.</em></td>
<td></td>
</tr>
<tr>
<td>Set a time limit. Ask Ps to underline the nearest whole number.</td>
<td></td>
</tr>
<tr>
<td>Review with whole class. Ps come to BB or dictate numbers to T. Class agrees/disagrees. Mistakes discussed and corrected.</td>
<td></td>
</tr>
<tr>
<td>Show on relevant segment of number line drawn on BB if problems or disagreement.</td>
<td></td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td></td>
</tr>
<tr>
<td>a) 4 &lt; 4.7 &lt; 5</td>
<td></td>
</tr>
<tr>
<td>b) 7 &lt; 7.26 &lt; 8</td>
<td></td>
</tr>
<tr>
<td>c) 0 &lt; 0.09 &lt; 1</td>
<td></td>
</tr>
<tr>
<td>d) 99 &lt; 99.99 &lt; 100</td>
<td></td>
</tr>
<tr>
<td>e) 101 &lt; 101.01 &lt; 102</td>
<td></td>
</tr>
<tr>
<td>f) 2 &lt; 2.306 &lt; 3</td>
<td></td>
</tr>
<tr>
<td>25 min</td>
<td></td>
</tr>
<tr>
<td>30 min</td>
<td></td>
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<td>35 min</td>
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<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Y5</td>
<td></td>
</tr>
<tr>
<td><strong>PbY5b, page 117</strong></td>
<td>Individual work, monitored, helped</td>
</tr>
<tr>
<td><strong>Q.5 Read:</strong> Write the next nearest tenths less than and greater than the decimal number.</td>
<td>Written on BB or SB or OHT</td>
</tr>
<tr>
<td>Set a time limit. Ask Ps to underline the nearest tenth.</td>
<td>Reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td>Review with whole class. Ps come to BB or dictate numbers to T. Class agrees/disagrees. Mistakes discussed and corrected.</td>
<td>Show on number line if problems or disagreement.</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td>Feedback for T</td>
</tr>
<tr>
<td>a) $\frac{5}{2} &lt; 5.21 &lt; 5.3$</td>
<td></td>
</tr>
<tr>
<td>b) $3.8 &lt; 3.85 &lt; 3.9$</td>
<td></td>
</tr>
<tr>
<td>c) $21.0 &lt; 21.06 &lt; 21.1$</td>
<td></td>
</tr>
<tr>
<td>d) $0.4 &lt; 0.44 &lt; 0.5$</td>
<td></td>
</tr>
<tr>
<td>e) $\frac{5}{1} &lt; 5.01 &lt; 5.1$</td>
<td></td>
</tr>
<tr>
<td>f) $0.9 &lt; 0.97 &lt; 1$</td>
<td></td>
</tr>
<tr>
<td><strong>40 min</strong></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Y5</td>
<td></td>
</tr>
<tr>
<td><strong>PbY5, page 117, Q.6</strong></td>
<td>Whole class activity</td>
</tr>
<tr>
<td>a) <strong>Read:</strong> Round the decimals to the nearest whole number.</td>
<td>(or individual work in Pbs if Ps prefer and there is time, reviewed with whole class)</td>
</tr>
<tr>
<td>P comes to front of class to read each decimal. Ps show nearest whole number on slates or scrap paper on P’s command.</td>
<td>Responses shown in unison.</td>
</tr>
<tr>
<td>T (P) chooses Ps with different answers to explain their reasoning and class decides who is correct. Ps refer to number line if necessary.</td>
<td>Reasoning, agreement, (self-correction), praising</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td></td>
</tr>
<tr>
<td>$2.4 \approx 2$, $6.8 \approx 7$, $43.5 \approx 44$, $59.9 \approx 60$, $99.65 \approx 100$</td>
<td></td>
</tr>
<tr>
<td>b) <strong>Read:</strong> Round the decimals to the nearest tenth.</td>
<td></td>
</tr>
<tr>
<td>A different P comes to front of class. Repeat as for a).</td>
<td></td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td></td>
</tr>
<tr>
<td>$6.34 \approx 6.3$, $5.56 \approx 5.6$, $8.4 = 8.4$, $10.20 = 10.2$, $5.076 \approx 5.1$</td>
<td></td>
</tr>
<tr>
<td>c) <strong>Read:</strong> A melon weighed 3 kg on scales which are accurate to the nearest tenth of a kg.</td>
<td></td>
</tr>
<tr>
<td>Write an inequality for the actual mass of the melon.</td>
<td></td>
</tr>
<tr>
<td>If the weight of the melon is accurate to the nearest tenth of a kg, what place value do we need to consider? (hundredths)</td>
<td></td>
</tr>
<tr>
<td>What is the lightest weight it could be? (2.95 kg) What is the heaviest weight it could be? (3.05 kg) Who can write an inequality about it? P comes to BB. Who agrees? Who thinks something else?</td>
<td>[T could have a real (3 kg) melon to show to class and share among Ps afterwards as a reward for working so hard!]</td>
</tr>
<tr>
<td>If we want to note down the weight of the melon shown on the scales, what would we write? Class applauds P who writes it correctly. (BB)</td>
<td></td>
</tr>
<tr>
<td><strong>BB:</strong> $2.95 \text{ kg} \leq m &lt; 3.05 \text{ kg}$</td>
<td></td>
</tr>
<tr>
<td>$m = 3.0 \text{ kg}$</td>
<td>(to the nearest tenth of a kg)</td>
</tr>
<tr>
<td><strong>45 min</strong></td>
<td></td>
</tr>
</tbody>
</table>
Y5

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Puzzle</strong>&lt;br&gt;Let’s solve this puzzle and find the word in the thick vertical box which will make us better at mathematics! T reads out the clues across in numerical order and Ps suggests words to try. Ask Ps for examples (or further examples) as each clue is found.&lt;br&gt;(1) An example is $\frac{4}{7}$. (fraction)&lt;br&gt;(2) The upper number in a fraction. (numerator)&lt;br&gt;(3) The lower number in a fraction. (denominator)&lt;br&gt;(4) This is what we do when we multiply the upper and lower numbers in a fraction by the same number. (expand)&lt;br&gt;(5) This is what we do when we divide the upper and lower numbers in a fraction by the same number. (simplify)&lt;br&gt;(6) The next place-value smaller than units. (tenths)&lt;br&gt;(7) An adjective which describes fractions with the same value. (equivalent)&lt;br&gt;What should we do to make us better at mathematics? (practise!) We did not have a clue for row 8. Who can think of one?</td>
<td>Whole class activity&lt;br&gt;Drawn on BB or use enlarged copy master or OHT Ps could have copies on desks too.&lt;br&gt;Involve as many Ps as possible.&lt;br&gt;Agreement, praising BB:&lt;br&gt;T helps with the spelling where needed.&lt;br&gt;Class shouts out in unison. (e.g. plan, perimeter, polygon, probability, prime, etc.)</td>
</tr>
<tr>
<td><strong>Addition of decimals</strong>&lt;br&gt;Let's add these fractions, then write the addition with decimals and fill in the place-value table. Ps come to BB to write additions and fill in the table. Class points out errors.&lt;br&gt;BB:&lt;br&gt;$\frac{3}{10} + \frac{57}{100} + \frac{40}{100} = \frac{30 + 57 + 40}{100} = \frac{127}{100} = 1 + \frac{27}{100} + \frac{0.3 + 0.57 + 0.40}{100} = 1.27$</td>
<td>Whole class activity&lt;br&gt;Table drawn on BB or SB or OHT&lt;br&gt;At a good pace&lt;br&gt;Reasoning, agreement, praising&lt;br&gt;Repeat with other fractions which have denominators of 10 and 100, suggested by Ps.</td>
</tr>
<tr>
<td><strong>Problem</strong>&lt;br&gt;Listen carefully to this problem and tell me the operation you would use to solve it.&lt;br&gt;We need four lengths of cord to tie up some parcels. The lengths we need are 2 m 75 cm, 380 cm, 405 cm and 3 m 66 cm. What length of cord do we need altogether?&lt;br&gt;What operation would you use? (addition)&lt;br&gt;Let's write the lengths in this table, then add them up. Ps come to BB or dictate what T should write. +&lt;br&gt;Elicit that, e.g. $16 \text{ cm} = 1 \times 10 \text{ cm} + 6 \text{ cm}$, etc.&lt;br&gt;If we change all the lengths to cm, we can add up in the normal way like this.&lt;br&gt;Ps come to BB or dictate what T should write.</td>
<td>Whole class activity&lt;br&gt;Tables drawn on BB or use enlarged copy master or OHT&lt;br&gt;T repeats slowly to give Ps time to note the data in Ex. Bks. BB: 2 m 75 cm + 380 cm + 405 cm + 3 m 66 cm = ? Reasoning, with T's help if necessary, agreement, praising&lt;br&gt;Place-value table completed first, then vertical addition written as normal. Ps write the addition in Ex. Bks.</td>
</tr>
</tbody>
</table>
If we choose 1 m as the unit, then our table looks like this.
Ps come to BB or dictate to T.
If we use this table, we can write the addition with decimals.
Ps dictate what T should write.
If we use 1 m as the unit, we could also write an addition with fractions like this. T starts calculation and Ps continue when they understand.

BB:

\[
\begin{array}{c}
\text{Th} & \text{H} & \text{T} & \text{U} & \text{t} & \text{h} \\
3 & 8 & 0 & 0 & \frac{5}{10} & \frac{3}{10} \\
4 & 0 & 5 & 0 & \frac{5}{10} & \frac{3}{10} \\
+ & 3 & 6 & 6 & \frac{5}{10} & \frac{3}{10} \\
\hline & 1 & 4 & 2 & 6 & \frac{3}{10} \\
\end{array}
\]

\[\frac{14.26}{100} = \frac{1426}{1000}\]

Agree that: BB: \[14 + \frac{26}{100} = 14.26 \text{ m} = 1426 \text{ cm}\]

Answer: The total length of cord needed is 14.26 m.

4

"PbY5b, page 118"

Q.1 Read: We had 30 m 58 cm of parcel tape and used 14 m 26 cm. How much parcel tape do we have left? Write the subtraction in the tables.

Elicit that 30 m 58 cm = 3058 cm and 14 m 26 cm = 1426 cm.
Set a time limit. (If majority of Ps are struggling, stop individual work and continue as a whole class activity.)
Review with whole class. Ps come to BB to complete tables, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c|c}
\text{Th} & \text{H} & \text{T} & \text{U} & \text{t} & \text{h} \\
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
\hline
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
\hline
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
\hline
3 & 0 & 5 & 8 & - & - \\
1 & 4 & 2 & 6 & - & - \\
\hline
\hline
30.58 & -14.26 & \frac{1632}{1000} & (cm) & \frac{30.58}{100} & -14.26 & \frac{1632}{1000} (m)
\end{array}
\]

Let’s write subtractions in cm and in metres.

Ps come to BB or dictate what T should write.
Rest of Ps write in Ex. Bks.
**Activity**

**5**  
*PbY5b, page 118*

Q.2 Read:  *Write each decimal as the sum of units, tenths and hundredths, then do the subtraction in decimal form and fractional form.*  
Deal with one step at a time or set a time limit. (Ps might find it easier to do the addition with fractions first.)  
Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.  
*Solution:*

<table>
<thead>
<tr>
<th>2</th>
<th>0</th>
<th>4</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>1</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

= 20 + \(\frac{4}{10}\) + \(\frac{8}{100}\) = 20 + \(\frac{48}{100}\)

= 14 + \(\frac{1}{10}\) + \(\frac{6}{100}\) = 14 + \(\frac{16}{100}\)

= 6 + \(\frac{32}{100}\)

29 min

**6**  
*PbY5b, page 118*

Q.3 Read:  *Do the subtractions, then check them with additions.*  
Deal with one at a time. Set a time limit. Ps fill in place-value table first, then do decimal subtraction, then check with a decimal addition. (If majority of Ps have difficulties, stop individual work and continue as a whole class activity.)  
Review at BB with whole class. Ps come to BB to complete table and subtraction and write an addition, explaining reasoning with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected.  
*Solution:*

a)  
<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>-</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>-</td>
<td>9</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

Check:

<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

b)  
<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-</td>
<td>1</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>-</td>
<td>3</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

Check:

<table>
<thead>
<tr>
<th>T</th>
<th>U</th>
<th>t</th>
<th>h</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

How else could we have checked the subtraction?  
(Subtract the difference from the reductant to give the subtrahend.)  
Feedback for T

33 min

**Notes**

Individual work, monitored, helped  
Written on BB or use enlarged copy master or OHP  
Reasoning, agreement, self-correction, praising  
Feedback for T

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**Activity 7**

**PbY5b, page 118**

Q.4 Read: *Estimate the result here by rounding each decimal to the nearest whole number, then do the calculation accurately in your exercise book.*

Ps round all the numbers first in *Pbs*, then review.

Ps dictate rounding to T, explaining reasoning. Ps correct any mistakes before they do the calculations.

Set a time limit for the calculations. Ps could write place-value labels above each column to help them.

Review with whole class. Ps come to BB to write calculations and explain reasoning with place-value detail. Mistakes discussed and corrected.

**Solution:**

a) \[ 2.24 + 21.56 + 0.75 = 2 + 22 + 1 = 25 \]

b) \[ 31 + 3.1 + 0.31 + 0.031 = 31 + 3 + 0 + 0 = 34 \]

c) \[ 26.68 – 19.35 = 27 – 19 = 8 \]

d) \[ 37.5 – 8.37 = 38 – 8 = 30 \]

**Notes**

Individual work, monitored, helped

Written on BB or SB or OHT

Reasoning: e.g.

‘2.24 is approximately equal to 2, as 2 and 24 hundredths is nearer 2 than 3’

Agreement, self-correction, praising

Feedback for T

**Activity 8**

**PbY5b, page 118, Q.5**

Read: *Solve the problem in your exercise book.*

_Dad bought a water melon which weighed 6.5 kg._

_At lunch, Mum ate 500 g, Irene ate 3 quarters of a kg, Steve ate 1.2 kg and Dad ate 1.5 kg._

_How much was left for dinner?_

Ps round all the numbers first in *Pbs*, then review.

Ps dictate rounding to T, explaining reasoning. Ps correct any mistakes before they do the calculations.

Set a time limit for the calculations. Ps could write place-value labels above each column to help them.

Review with whole class. Ps come to BB to write calculations and explain reasoning with place-value detail. Mistakes discussed and corrected.

**Solution:**

\[ 6.5 \text{ kg} – (0.5 + 0.75 + 1.2 + 1.5) \text{ kg} = 6.5 \text{ kg} – 4 \text{ kg} = 2.5 \text{ kg} \]

**Notes**

Individual work, monitored, helped

Written on BB or SB or OHT

Reasoning: e.g.

‘2.24 is approximately equal to 2, as 2 and 24 hundredths is nearer 2 than 3’

Agreement, self-correction, praising

Feedback for T

**Whole class activity**

(or individual trial first if Ps wish and there is time, with Ps showing results on scrap paper or slates on command)

Discussion, reasoning, agreement, (self-correction), praising

or in grams:

\[ 6500 – (500 + 750 + 1200 + 1500) \]

\[ C: 6500 \text{ (g)} – 3950 \text{ (g)} = 2550 \text{ (g)} \]

Using fractions of a kg is also possible but is rather difficult!
Lesson Plan

119

Notes

Whole class activity
At speed in order round class
If a P makes a mistake, the next P must correct it.
In good humour!
Praising, encouragement only
(Ps start off additional sequences if there is time.)

Week 24

**Activity**

1 **Sequences**

T says the first 3 terms of a sequence and Ps continue it, then give the rule. Class points out errors.

a) 1.2, 1.4, 1.6, (1.8, 2, 2.2, 2.4, 2.6, . . .) [+ 0.2]
b) 3.5, 2.9, 2.3, (1.7, 1.1, 0.5, – 0.1, – 0.7, – 1.3, . . .) [– 0.6]
c) 10.24, 5.12, 2.56, (1.28, 0.64, 0.32, 0.16, 0.08, 0.04, 0.02, 0.01, 0.005, . . .) [÷ 2]

e etc.

6 min

2 **Comparison of decimals**

In each pair of decimals, which is more? How many more? Ps come to BB to write appropriate sign between each pair and the difference below the sign, explaining reasoning. Class agrees/disagrees. Ps show calculation on BB or demonstrate on number line if problems or disagreement.

BB:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 0.25</td>
<td>0.8(0)</td>
<td>b) 6.2</td>
</tr>
<tr>
<td></td>
<td>0.55</td>
<td></td>
</tr>
<tr>
<td>d) 0.303</td>
<td>0.33(0)</td>
<td>e) – 0.3</td>
</tr>
<tr>
<td></td>
<td>0.027</td>
<td></td>
</tr>
</tbody>
</table>

12 min

3 **Find the mistake**

What do you think of these calculations. Are they correct? Ps come to BB to estimate result by rounding and write a tick or a cross. If incorrect, Ps say what mistake has been made and write the calculation again correctly. Class agrees/disagrees.

BB:

<table>
<thead>
<tr>
<th>Mistake:</th>
<th>Correction:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 4 5 6</td>
<td>3 0 0</td>
</tr>
<tr>
<td>+ 3 2</td>
<td>+ 3 2</td>
</tr>
<tr>
<td>7 8 8 x</td>
<td>3 3 6 5 6</td>
</tr>
<tr>
<td>E: 5 + 300 + 32 = 337</td>
<td></td>
</tr>
<tr>
<td>b) 2 3 7</td>
<td>2 3 7</td>
</tr>
<tr>
<td>8 4 5</td>
<td>8 4 5</td>
</tr>
<tr>
<td>+ 3 2 1</td>
<td>+ 3 2 1</td>
</tr>
<tr>
<td>1 4 0 3 x</td>
<td>4 0 7 8 7</td>
</tr>
<tr>
<td>E: 2 8 4 + 321 = 407</td>
<td></td>
</tr>
<tr>
<td>c) 4 6 7</td>
<td>6 10 10</td>
</tr>
<tr>
<td>– 6 0 4</td>
<td>– 4 6 7</td>
</tr>
<tr>
<td>2 6 5</td>
<td>6 0 4</td>
</tr>
<tr>
<td>x</td>
<td>1 3 7</td>
</tr>
<tr>
<td>E: 5 6 = – 1</td>
<td></td>
</tr>
</tbody>
</table>

18 min
**Activity 4**

**Number line**

T has car model drawn (stuck) on BB. If possible, Ps have smaller version on desks. Let’s play the car game.

Revise the ‘rules’ first.

- When the car faces the house it means a positive number is added or subtracted.
- When the car faces the tree it means a negative number is added or subtracted.
- When the car moves forward we have to add.
- When the car reverses we have to subtract.

T describes how the car moves and Ps come to BB to show it, then write an operation about it. Class agrees/disagrees. Ps write operation in Ex. Bks. too.

**BB:**

- **a)** i) The car is at –0.8 and faces the house. It moves forward 1.4 units.
  
  \[ \text{BB: } -0.8 + (+1.4) = 0.6 \]
  
  or
  
  \[ -0.8 + 1.4 = 0.6 \]

- ii) The little car is at 1.6 and faces the house. It reverses 2.1 units.
  
  \[ \text{BB: } +1.6 - (+2.1) = -0.5 \]
  
  or
  
  \[ 1.6 - 2.1 = -0.5 \]

- **b)** T writes additions or subtractions on BB and Ps come to BB to show the motion of the car, describe it in words and say the result.

  e.g. –0.2 + (–0.7), 0.9 + 1.1, –1.4 – (–0.5), 0.3 – (–0.2), etc.

24 min

**5 PbY5b, page 119**

**Q.1 Read:** Estimate first by rounding to the nearest tenth, then do the calculations accurately.

Ps round all the numbers first, then review and correct any mistakes before doing the calculations.

Set a time limit for calculations. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**

- **a)** 4.12 + 29.35 + 0.87 ≈ 4.1 + 29.4 + 0.9 = 34.4

  \[
  \begin{array}{c}
  4 \ 1 \ 2 \\
  + 2 \ 9 \ 3 \ 5 \\
  + 0 \ 8 \ 7 \\
  \hline
  7 \ 1 \ 0 \ 5 \\
  \end{array}
  \]

- **b)** 7.05 + 27.6 + 6.715 + 37.17 ≈ 7.1 + 27.6 + 6.7 + 37.2 = 78.6

  \[
  \begin{array}{c}
  7 \ 0 \ 5 \\
  + 2 \ 7 \ 6 \\
  + 6 \ 7 \ 1 \ 5 \\
  + 3 \ 7 \ 1 \ 1 \\
  + 7 \ 8 \ 4 \ 1 \ 7 \ 5 \\
  \hline
  7 \ 1 \ 0 \ 5 \ 1 \ 5 \ 5 \\
  \end{array}
  \]

- **c)** 34.67 – 25.58 ≈ 34.7 – 25.6 = 9.1

  \[
  \begin{array}{c}
  3 \ 4 \ 6 \ 7 \\
  - 2 \ 5 \ 5 \ 8 \\
  \hline
  9 \ 4 \ 0 \ 9 \\
  \end{array}
  \]

- **d)** 85.49 – 16 ≈ 85.5 – 16 = 69.5

  \[
  \begin{array}{c}
  8 \ 5 \ 4 \ 9 \\
  - 1 \ 6 \\
  \hline
  8 \ 3 \ 8 \ 3 \\
  \end{array}
  \]

30 min
**Y5**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lesson Plan 119</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6</strong> PbY5b, page 119</td>
<td></td>
</tr>
</tbody>
</table>
Q.2 Read: Practise addition. 
Remind Ps to estimate mentally first by rounding, then to check sums by adding in opposite direction. Set a time limit. 
Review with whole class. Ps come to BB or dictate to T, explaining reasoning with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected. 
**Solution:** 

```
  |  |  |
  |  |  |
+ |  |  |
  |  |  |
```

- a) 
- b) 
- c) 
- d) 

**Extension** 
• Round each result to the nearest tenth (whole number).
• What is the sum of the 4 results? 

**35 min**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lesson Plan 119</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7</strong> PbY5b, page 119</td>
<td></td>
</tr>
</tbody>
</table>
Q.3 Read: Practise subtraction. Check with addition. 
Encourage Ps to estimate the result mentally first by rounding. 
Set a time limit. 
Review with whole class. Ps come to BB or dictate to T, explaining reasoning with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected. 
**Solution:** 

```
  |  |  |
  |  |  |
+ |  |  |
  |  |  |
```

- a) 
- b) 
- c) 
- d) 

**Extension** (for quicker Ps) 
How much needs to be added to each difference to make the next greater whole ten? 

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lesson Plan 119</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8</strong> PbY6b, page 119, Q.4</td>
<td></td>
</tr>
</tbody>
</table>
Read: Answer each question by writing an equation. 
T (P) reads each question. Ps show result on scrap paper or slates on command. Ps answering correctly explain at BB to Ps who were wrong, writing an equation (i.e. calling the unknown number a letter) or an operation. Class agrees/disagrees. Ps write equations in Pbs too. Show calculation details if problems or disagreement. 
**Solution:** 

|  |  |  |  |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

- a) 
- b) 
- c) 
- d) 
- e) 
- f) 

Whole class activity (or individual work under a time limit if Ps prefer) 
Responses shown in unison. 
Reasoning, agreement, (self-correction), praising BB: e.g. 

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* Individual work, monitored, (helped) 
* Written on BB or use enlarged copy master or OHP 
* Reasoning, agreement, self-correction, praising 
* Feedback for T 

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**Lesson Plan**

**Y5**

**Activity**

Calculation and tables practice, revision, activities, consolidation

*PhY5b, page 120*

**Notes**

**Solutions:**

Q.1  
\[ a) \frac{18 + \frac{2}{10}}{100} + \frac{3}{1000} = 18 + \frac{703}{1000} = 18.703 \]
\[ b) \frac{8}{100} + \frac{7}{1000} = \frac{87}{1000} = 0.087 \]
\[ c) \frac{70 + \frac{2}{10}}{100} + \frac{8}{10000} = \frac{70 + 308}{10000} = 70.308 \]
\[ d) \frac{8 + \frac{1}{100}}{100} + \frac{37}{1000} = \frac{8 + 47}{1000} = 8.047 \]

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<tr>
<th>T</th>
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<th>t</th>
<th>h</th>
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<tbody>
<tr>
<td>1</td>
<td>8</td>
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<td>0</td>
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<td>8</td>
<td>0</td>
<td>4</td>
<td>7</td>
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</tbody>
</table>

**Q.2**  
\[ a) 5.39 < 5.98 \quad b) 0.03 < 0.3 \]
\[ c) 3.087 < 3.1 \quad d) 1.45 > 1.145 \]
\[ e) 4.0 = 4 \quad f) 0.699 < 0.7 \]
\[ g) 8.1 = 8.10 \quad h) 7.099 < 7.1 \]

**Q.3**  
\[ a) 0.008, 0.009, 0.08, 0.09, 0.89 \]
\[ b) 3.025, 3.205, 3.25, 3.502, 3.52 \]
\[ c) 4.099, 4.386, 4.638, 4.683, 4.9 \]

**Q.4**  
\[ a) \frac{23}{7} + \frac{21}{7} = \frac{23 + 21}{7} = \frac{44}{7} \]
\[ b) \frac{53}{7} + \frac{10}{7} = \frac{53 + 10}{7} = \frac{63}{7} \]
\[ c) \frac{10}{10} + \frac{10}{10} = \frac{10 + 10}{10} = \frac{20}{10} = 2 \]
\[ d) \frac{10}{10} + \frac{10}{10} = \frac{10 + 10}{10} = \frac{20}{10} = 2 \]
\[ e) \frac{13}{10} - \frac{8}{10} = \frac{13 - 8}{10} = \frac{5}{10} = 0.5 \]
\[ f) \frac{14}{11} + \frac{11}{11} = \frac{14 + 11}{11} = \frac{25}{11} \]
\[ g) \frac{8}{10} + \frac{8}{10} = \frac{8 + 8}{10} = \frac{16}{10} = 1.6 \]
\[ h) \frac{10}{10} + \frac{10}{10} = \frac{10 + 10}{10} = \frac{20}{10} = 2 \]

**Q.5**  
\[ a) 7.2 \text{ litres} = 7 \text{ litres 20 cl} = 720 \text{ cl} \]
\[ = 7 \text{ litres 200 ml} = 7200 \text{ ml} \]
\[ b) 2.803 \text{ km} = 2 \text{ km 803 m} = 2803 \text{ m} = 280300 \text{ cm} \]
\[ c) 2.047 \text{ kg} = 2 \text{ kg 47 g} = 2047 \text{ g} \]
\[ d) 11700 \text{ sec} = 195 \text{ min} = \frac{3}{4} \text{ hours 15 min} = 3.25 \text{ hours} \]
**Activity**

1. **Time**

   What do these units measure? (time) Let’s fill in the missing numbers. Ps come to BB to write numbers, explaining reasoning. Class points out errors. Ask Ps to say the decimal answers as fractions too.

   **BB:**
   
   a) 1 hour = \( \frac{60}{100} \) min  
   b) 0.1 of an hour = \( \frac{6}{100} \) min  
   c) 0.2 of an hour = \( \frac{12}{100} \) min  
   d) 0.9 of an hour = \( \frac{54}{100} \) min  
   e) 1.3 hours = \( \frac{78}{100} \) min  
   f) 2.5 hours = \( \frac{150}{100} \) min  
   g) 6 min = \( \frac{0.1}{100} \) of an hour  
   h) 18 min = \( \frac{0.3}{100} \) of an hour  
   i) 90 min = \( \frac{1.5}{100} \) hours  
   j) 3 min = \( \frac{0.05}{100} \) of an hour  
   k) 9 min = \( \frac{0.15}{100} \) of an hour  

   \( (\frac{15}{100} = \frac{3}{20} h) \)  
   \( (\frac{75}{100} = \frac{3}{4} h) \)  

   **Problem**

   Listen carefully, note the data in your Ex. Bks and think about how you would work out the answer.

   I worked in the garden for 2.4 hours then I sat on the grass to rest for 15 minutes. After that I continued working for another 1.8 hours.

   a) For how many hours did I rest?

   Who thinks they know what to do? Come and show us. Who agrees? Who can think of another way to do it? T helps where necessary.

   **BB:**
   
   e.g. 15 min = \( \frac{15}{60} h = \frac{5}{20} h = \frac{1}{4} h \)  
   \( (= \frac{25}{100} h = 0.25 h) \)

   or 6 min = 0.1 of an hour  
   3 min = 0.1 \( \div \) 2 = 0.05 (h)  
   15 min = 0.05 \( \times \) 5 = 0.25 (h)

   **Answer:** I rested for a quarter (or 0.25) of an hour.

   b) For how many minutes did I work in the garden?

   **BB:**
   
   e.g. 2.4 h + 1.8 h = 4.2 h = 4 \times 60 min + \( \frac{2}{10} \) of 60 min  
   = 240 min + 12 min = 252 min

   or 2.4 h + 1.8 h = (120 + 24) min + (60 + 48) min  
   = 144 min + 108 min = 252 min

   **Answer:** I worked for 252 minutes in the garden.

   c) How much time did I spend in the garden altogether?

   **BB:**
   
   (2.4 h + 1.8 h) + 15 min = 252 min + 15 min = 267 min  
   = 4 hours 27 minutes

   **Answer:** I spent 4 hours 27 minutes in the garden altogether.

   Discuss how time is usually expressed. (Not normally as decimals.)
### Lesson Plan 121

#### Activity

**3 Measurements**

T chooses Ps to measure certain things with the appropriate measuring tools. Ps write measures on BB.

After each type of measurement, class discusses how accurate the tools can be and how accurate the written measures are.

- a) T (Ps) uses a stop-watch to time Ps running to touch the BB and back to their seats.
  
  BB: e.g. 22 seconds (to the nearest second)

- b) Ps weigh objects (e.g., book, pencil, ball) on scales in grams.
  
  BB: e.g. Book: 232 g (to nearest g) ≈ 230 g (to nearest 10 g)

- c) Ps measure length or width or height of objects with ruler or ruler and compasses.
  
  BB: e.g. thickness of a book: 2.38 cm ≈ 2.4 cm = 24 mm

- d) Ps measure angles with a protractor. (Revise degrees and angle minutes first if necessary.)
  
  BB: e.g. 31° 17' (read as '31 degrees and 17 angle minutes', to the nearest angle minute)
  
  = 31° (to the nearest degree)

#### Notes

Whole class activity

In good humour!

**4 Angles**

What is the biggest unit we use to measure angles? (degrees) What is the next smaller unit? (angle minutes)

Can you guess what the next smaller unit is? (angle seconds)

How many angle seconds do you think are in an angle minute? (60)

Angle seconds are so tiny that we cannot see them and this unit is only used by scientists in written calculations.

It is possible to measure angle minutes with very precise equipment but we do not have it in the classroom! We must imagine each degree on the protractor divided into 60 equal parts, each part 1 angle minute.

Let’s fill in the missing numbers. Ps come to BB to write numbers and explain reasoning. Class agrees/disagrees.

BB:

- a) \(1^\circ = 60'\) \(0.1^\circ = 6'\) \(0.2^\circ = 12'\) \(0.9^\circ = 54'\) \(1.3^\circ = 78'\) \(2.5^\circ = 150'\)

- b) \(6' = 0.1^\circ\) \(18' = 0.3^\circ\) \(90' = 1.5^\circ\)

Whole class activity

BB: 1 whole turn = 360°

\(1^\circ = 60'\)

(1 angle minute = 60 angle seconds)

Extra praise for Ps who guessed correctly.

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

Note similarity with time.
Y5

Activity

PbY5b, page 121

Q.1  Read: A chemist was making up some medicine and measured out 3 different liquids very carefully in these quantities: 28 ml, 2.4 cl and 20.5 cl.

How much liquid did he measure out altogether?

Set a time limit of 1 minute. Ps write a plan, do the calculation and write the answer as a sentence.

Review with whole class. Ps come to BB to write operation and result. Who agrees? Who did it a different way? etc.

Mistakes discussed and corrected.

Solution:

Plan:

\[28 \text{ ml} + 24 \text{ ml} + 205 \text{ ml} = 257 \text{ ml} = 25.7 \text{ cl}\]

or \[2.8 \text{ cl} + 2.4 \text{ cl} + 20.5 \text{ cl} = 25.7 \text{ cl}\]

Answer: The chemist measured out 25.7 cl of liquid altogether.

Lesson Plan 121

Notes

Individual work, monitored, helped.

(If possible, T has different coloured liquids already measured out to give Ps an idea of the quantities involved.)

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

Reasoning, agreement, self-correction, praising.

T chooses a P to read out the answer in a sentence.

Q.2  Read: Sally went shopping for an outfit for a wedding and made a list of what she had spent.

Who has been to a wedding? Who was married? What did you wear? Did you buy anything new? If no P has, T tells briefly of own experience. (Show a photograph if possible!)

Deal with one part at a time or set a time limit. Ps read questions themselves and do what is asked.

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

Solution:

a) Write the amounts in the place-value table and grid.

BB:

<table>
<thead>
<tr>
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<th>H</th>
<th>T</th>
<th>U</th>
<th>I</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hat: £38.99 p</td>
<td>3</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>1 dress: £40.50</td>
<td>4</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1 pair of shoes: £26.70 p</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1 handbag: £34.50</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>0</td>
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</tr>
</tbody>
</table>

\[\text{ (£)} = 140.69\]

b) How much did Sally spend altogether? (bottom row of table)

Answer: She spent £140.69 altogether.

c) If Sally had £200 in her bank account at the start of her shopping trip, how much did she have left at the end?

Plan: £200 – £140.69 = £59.31

C: \[\begin{array}{ccc}
10 & 10 & 10 \\
\hline
2 & 0 & 0 \\
1 & 4 & 0 \\
\hline
10 & 10 & 10 \\
\hline
5 & 9 & 3 \\
1 & \hline
\end{array}\]

Answer: Sally had £59.31 left at the end.

Extension

T points to each item in turn and Ps say its price in pence, then how many pence spent altogether and how many pence are left.

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### Y5

#### Activity

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<th>7</th>
<th><strong>PhY5b, page 121</strong></th>
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</table>
| Q.3 | Read: *Use the diagram to help you do this addition in different ways. Calculate using:*  
|     | *a) fractions, b) decimals, c) percentages.*  |
|     | **BB:** \( \frac{1}{5} + 0.3 + \frac{17}{100} + \frac{1}{10} + 0.21 \)  |
|     | If possible, less able Ps have larger 10 by 10 grid on desks so that they can colour the parts more easily. Deal with one part at a time and set a time limit.  |
|     | Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes corrected.  |
|     | **Solution:**  
|     | a) **Fractions:** \( \frac{1}{5} + \frac{3}{10} + \frac{17}{100} + \frac{1}{10} + \frac{21}{100} = \frac{20 + 30 + 17 + 10 + 21}{100} = \frac{98}{100} \)  |
|     | b) **Decimals:** 0.2 + 0.3 + 0.17 + 0.1 + 0.21 = 0.6 + 0.38 = 0.98  |
|     | c) **Percentages:** 20% + 30% + 17% + 10% + 21% = 98%  |
|     | If we colour all the parts mentioned, what part of the square is left uncoloured? Ps give the answer in the 3 forms.  |
|     | Uncoloured: \( 1 - \frac{98}{100} = \frac{2}{100} = \frac{1}{50} \)  |
|     | 1 - 0.98 = 0.02  |
|     | 100% - 98% = 2%  |

#### Extension

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<th>8</th>
<th><strong>PhY5b, page 121, Q.4</strong></th>
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<tr>
<td></td>
<td>Read: <em>Solve the problems in your exercise book. Write only the answers here.</em></td>
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<td>Deal with one part at a time. T chooses a P to read the problem and Ps come to BB to draw a diagram (with T's help), write a plan and calculate the result. Who agrees? Who would do it another way? etc.</td>
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<td></td>
<td>T chooses Ps to say the answers in a sentence.</td>
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</table>
|     | **Solution:**  
|     | a) A rectangular games court has sides of length 45.8 m and 15.6 m. How long is the fence around it if the gate is 2.2 m wide?  
|     | **BB:** \((45.8 \text{ m } + 15.6 \text{ m}) \times 2 - 2.2 \text{ m}\)  
|     | = 61.4 m \times 2 - 2.2 m  
|     | = 122.8 m - 2.2 m = 120.6 m  
|     | or Perimeter: \((45.8 \text{ m } + 15.6 \text{ m}) \times 2 = 61.4 \text{ m } \times 2 = 122.8 \text{ m}\)  
|     | Length of fence: 122.8 m - 2.2 m = 120.6 m  
|     | **Answer:** The length of the fence is 120.6 m.  

---

### Notes

- Individual work, monitored helped.
- Grid squares drawn on BB or use enlarged copy master from LP 111/1b.
- Use copy master for LP 111/1a.
- Reasoning (referring to diagram), agreement, self-correction, praising.
- Whole class activity (or individual trial first if Ps wish and there is time).
- Discussion, reasoning, agreement, (self-correction), praising.
- Ps could write solutions in Ex. Bks. at the same time.
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(Continued)

b) The price of a bottle of medicine is £11.80, which includes the cost of the bottle. If the bottle costs £5.20 less than the medicine, how much are you paying for:

i) the medicine  
ii) the bottle?

BB: e.g.  
\[
B + M = £11.80, \quad B = M - £5.20
\]
\[
(M - £5.20) + M = £11.80
\]
\[
M + M = £11.80 + £5.20 = £17.00
\]

i) \[ M = £17.00 \div 2 = £8.50 \]

ii) \[ B = £8.50 - £5.20 = £3.30 \]

or If M cost the same as B, the price would be

\[ £11.80 - £5.20 = £6.60 \]

and M and B would each cost £3.30,

but M actually costs £5.20 more than B,

so \[ B = £3.30 \text{ and } M = £3.30 + £5.20 = £8.50 \]

or If B cost the same as M, the price would be

\[ £11.80 + £5.20 = £17.00 \]

and M and B would each cost £17.00 \( \div 2 = £8.50 \),

but B actually costs £5.20 less than M,

so \[ M = £8.50 \text{ and } B = £8.50 - £5.20 = £3.30 \]

**Answer:** You are paying £5.20 for the medicine and £3.30 for the bottle.

---

**Notes**

Let the bottle be B and the medicine be M.

T helps with the calculations and reasoning.

Ps write the method they understand best in *Ex. Bks.*

**Check:**

- £8.50 – £3.30 = £5.20 ✓
- £8.50 + £3.30 = £11.80 ✓

**45 min**
## Lesson Plan 122

### Activity

#### 1. Sequences

T writes the first 3 terms of a sequence on BB. Ps dictate the following terms, calculating on scrap paper or slates if they cannot do it mentally. T decides when to stop and asks final P to give the rule.

| BB: | 1.2, 2.4, 3.6, (4.8, 6, 7.2, 8.4, 9.6, 10.8, 12, . . .) | (+ 1.2) |
| BB: | 1.2, 2.4, 4.8, (9.6, 19.2, 38.4, 76.8, 153.6, . . .) | (× 2) |
| BB: | \(\frac{1}{10000}, \frac{1}{1000}, \frac{1}{100}, \frac{1}{10}, 1, 10, 100, 1000, . . .\) | (× 10) |
| BB: | 58,600, 5860, 586, (58.6, 5.86, 0.586, 0.0586, . . .) | (÷ 10) |

**5 min**

#### 2. Decimals and fractions

**a)** Let's write this decimal as the sum of a whole number and fractions before we do the multiplication, then change it back to a decimal. Ps come to BB or dictate what T should write. Class points out errors. Before Ps do the multiplication, ask them to estimate first.

BB: 3.497 \(\times\) 100 = (3 + \(\frac{4}{10}\) + \(\frac{9}{100}\) + \(\frac{7}{1000}\)) \(\times\) 100

= 300 + 40 + 9 + \(\frac{7}{10}\) = **349.7**

Let's compare 3.497 and 349.7. What do you notice? (Each digit has moved 2 place-values to the left.)

**b)** Let's write this decimal as the sum of whole numbers and a fraction before we do the division. Ps come to BB or dictate what T should write. Class points out errors. Before doing the division, ask Ps to estimate result first.

BB: 6082.5 \(÷\) 100 = (6000 + 80 + 2 + \(\frac{5}{10}\)) \(÷\) 100

= 60 + \(\frac{8}{10}\) + \(\frac{2}{100}\) + \(\frac{5}{1000}\) = **60.825**

Let's compare 6082.5 and 60.825. What do you notice? (Each digit has moved 2 place-values to the right.)

**10 min**

#### 3. Quantities

Let's fill in the missing numbers. Ps come to BB to write numbers, explaining reasoning. Class agrees/disagrees.

| a) 26150 mm | 2615 cm | 26.15 m (≈ 0.02615 km) |
| b) 789 ml | 78.9 cl | 0.789 litres |
| c) 6370 g | 6.370 kg | d) 1.843 kg = **1843 g** |
| e) 4.518 m | 451.8 cm | 4518 mm |
| f) 3.601 litres | 360.1 cl | 3601 ml |
| g) 5.8 m | 580 cm | 5800 mm |

**18 min**

---

**Notes**

- Whole class activity
- T chooses Ps at random.
- In good humour!
- At fast pace
- Agreement, praising
- Feedback for T

---

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**Y5**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Lesson Plan 122</th>
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</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td><strong>PbY5b, page 122</strong></td>
<td>Individual work, monitored, helped</td>
</tr>
<tr>
<td><strong>Q.1</strong> Read: Write each addition as a multiplication and calculate the result.</td>
<td>Written on BB or SB or OHT</td>
</tr>
<tr>
<td>Set a time limit of 2 minutes. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.</td>
<td>Reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td>Elicit that when a number is multiplied by 10, each of its digits moves to the next greater place-value.</td>
</tr>
<tr>
<td>a) $0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 + 0.3 \left[= 0.3 \times 10 = 3 \right]$</td>
<td></td>
</tr>
<tr>
<td>b) $15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 + 15.7 \left[= 157 \right]$</td>
<td></td>
</tr>
<tr>
<td><strong>21 min</strong></td>
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<tr>
<td><strong>5</strong></td>
<td><strong>Extension</strong></td>
</tr>
<tr>
<td><strong>PbY5b, page 122</strong></td>
<td>What are the thicknesses in cm (m)?</td>
</tr>
<tr>
<td><strong>Q.2</strong> Read: If a sheet of paper is 0.12 mm thick, what is the thickness in mm of these amounts of paper? Write the measures in the place-value table.</td>
<td>(e.g. 1.2 mm = 0.12 cm)</td>
</tr>
<tr>
<td>Set a time limit. Ps write operations and write results in table. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Elicit how the digits have moved columns. (When a number is multiplied by 10, each of its digits is moved to the next greater place-value.)</td>
<td></td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td></td>
</tr>
<tr>
<td>a 10 sheet notepad: $0.12 \times 10 = 1.2 \text{ (mm)}$</td>
<td></td>
</tr>
<tr>
<td>a 100 leaf exercise book: $0.12 \times 100 = 12 \text{ (mm)}$</td>
<td></td>
</tr>
<tr>
<td>a 1000 leaf encyclopaedia: $0.12 \times 1000 = 120 \text{ (mm)}$</td>
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<tr>
<td>a 10 000 sheet pack of paper: $0.12 \times 10 000 = 1200 \text{ (mm)}$</td>
<td></td>
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<tr>
<td><strong>26 min</strong></td>
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<td><strong>6</strong></td>
<td><strong>BB:</strong></td>
</tr>
<tr>
<td><strong>PbY5b, page 122</strong></td>
<td>Individual work, monitored, helped</td>
</tr>
<tr>
<td><strong>Q.3</strong> Read: 100 equal-sized pearls weigh 480 g. How much do 10 such pearls weigh? How much does 1 such pearl weigh? Write the weights in the table, then write divisions about them.</td>
<td>Drawn on BB or use enlarged copy master or OHP</td>
</tr>
<tr>
<td>Set a time limit. Ps complete table and write operations. Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Elicit how the digits have moved columns. (When a number is divided by 10, each of its digits is moved to the next smaller place-value.)</td>
<td>Discussion, reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td><strong>Solution:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$480 \div 1 = 480 \text{ (g)}$</td>
</tr>
<tr>
<td>100 pearls:</td>
<td>$480 \div 10 = 48 \text{ (g)}$</td>
</tr>
<tr>
<td>10 pearls:</td>
<td>$480 \div 100 = 4.8 \text{ (g)}$</td>
</tr>
<tr>
<td>1 pearl:</td>
<td></td>
</tr>
<tr>
<td><strong>Extension</strong></td>
<td></td>
</tr>
<tr>
<td>If we change the unit of measure to kg, what would the place-value table look like then? Ps come to BB to draw and complete new table, with help of rest of class.</td>
<td></td>
</tr>
<tr>
<td><strong>31 min</strong></td>
<td></td>
</tr>
</tbody>
</table>

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**Activity 7**

**PbY5b, page 122, Q.4**

T reads out one question at a time. Ps calculate mentally or on scrap paper or slates, then show result on command. P answering correctly explains to Ps who were wrong by writing an operation on BB. Mistakes discussed. Ps write correct numbers in boxes in Pbs.

**Solution:**

a) i) 70 p = £0.7
   
   
   \[0.7 \times 10 = 7, \quad 0.7 \times 100 = 70, \quad 0.7 \times 1000 = 700\]
   
   or 70 p × 10 = 700 p = £7, etc.
   
   ii) £2.70 p = £2.70
   
   \[2.70 \times 10 = 27, \quad 2.70 \times 100 = 270, \quad 2.70 \times 1000 = 2700\]
   
   b) i) £630 ÷ 10 = £63, £630 ÷ 100 = £6.30
   
   \[630 \div 1000 = 0.63\]
   
   ii) £47.50 p = £47.50
   
   \[47.50 \div 10 = 4.75, \quad 47.50 \div 100 = 0.475\]
   
   Elicit that in real life £0.475 is impossible. It can only be £0.47 or £0.48, i.e. 47 p or 48 p, as 1 p is the smallest coin. Which do you think it is? (48 p, as 5 rounds up to next greater place value)
   
   \[47.50 \div 1000 = 0.0475\]
   
   Again, elicit that in real life it can only be be £0.04 or £0.05, i.e. 4 p or 5 p. Which do you think it is? (It rounds up to 5 p.)

39 min

---

**Activity 8**

**PbY5b, page 122**

Q.5 Read: Practise calculation.

How many calculations are there? (3 × 4 = 12)

Let's see how many you can do in 3 minutes!

Start . . . now! . . . Stop!

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

Stand up if you had all 12 correct! Let's give them 3 cheers!

**Solution:**

a) 0.3 × 100 = 30

b) 3.45 × 10 = 34.5

c) 605 ÷ 100 = 6.05
d) 574 ÷ 10 = 57.4

e) 0.87 × 10 = 8.7

f) 0.303 × 100 = 30.3

g) 1.39 ÷ 10 = 0.139

h) 45.7 ÷ 100 = 0.457

i) 0.07 × 10 = 0.7

j) 0.05 × 100 = 5

k) 0.81 ÷ 10 = 0.081

l) 30.06 ÷ 10 = 3.006

45 min
### Activity 1

**Multiplication**

Let’s think of different ways to calculate these sums. Ps suggest ways.

a) BB: \( 5.3 + 5.3 = (10.6) \)

or \( 5.3 \times 2 = (10 + \frac{6}{10}) = 10.6 \)

T: If the amount was 5.3 cm, we could change it to mm and do the multiplication with natural numbers, then change back to cm.

BB: 5.3 cm = 53 mm

\[
\begin{array}{c}
5.3 \\
\times 2 \\
\hline
10.6 \text{ cm}
\end{array}
\]

T: Or we could multiply with decimals like this.

BB: 10.6 cm

b) Let’s do this sum in the same kinds of ways.

BB: \( 5.3 + 5.3 + 5.3 + 5.3 + 5.3 = (26.5) \)

or \( 5.3 \times 5 = (25 + \frac{15}{10}) = 26 + \frac{5}{10} = 26.5 \)

BB: \[
\begin{array}{c}
5.3 \\
\times 5 \\
\hline
53 \text{ mm}
\end{array}
\]

or multiplying with decimals:

\[
\begin{array}{c}
2.65 \\
\times 5 \\
\hline
12.8 \text{ cm}
\end{array}
\]

### Activity 2

**Mental multiplication**

Let’s see if you can do these calculations mentally. Ps come BB to write products, reasoning loudly with place-value details. Class agrees/disagrees.

BB:

a) \( 21 \times 4 = 84 \)

b) \( 63 \times 2 = 126 \)

c) \( 2 \times 4 = 8 \)

2.1 \( 2.1 \times 4 = 8.4 \)

6.3 \( 6.3 \times 2 = 12.6 \)

0.2 \( 0.2 \times 4 = 0.8 \)

d) \( 43 \times 4 = 172 \)

e) \( 7 \times 9 = 63 \)

f) \( 9 \times 6 = 54 \)

0.9 \( 0.09 \times 7 = 0.63 \)

0.09 \( 0.09 \times 6 = 0.54 \)

g) \( 203 \times 4 = 812 \)

h) \( 11 \times 11 = 121 \)

2.03 \( 2.03 \times 4 = 8.12 \)

0.11 \( 0.11 \times 11 = 1.21 \)

Who can explain how to multiply a decimal by a natural number? T asks several Ps what they think, then repeats in a clear way.

‘We multiply a decimal number by a natural number in the same way as we multiply a natural number by a natural number. Then we must mark the decimal point so that there is the same number of decimal digits in the product as there is in the multiplicand.’

---

**Lesson Plan**

### Notes

Whole class activity

T gives hints if Ps cannot think of any.

Reasoning, agreement, praising

Ps dictate what T should write, reasoning with place-value detail.

T starts reasoning and Ps continue it.

T points out that the product should have the same number of digits after the decimal point as the multiplicand.

BB:

T helps where necessary.

Whole class activity

Written on BB or use enlarged copy master or OHP

Reasoning, e.g. \( 6.3 \times 2 \):

2 times 6 is 12, \( 2 \times 0.3 \) is 0.6,

12 + 0.6 = 12.6

Agreement, praising

Discussion, agreement, praising

Elicit that the multiplicand is the number being multiplied.

Class repeats in unison.

---

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Q.1 Read: Write each operation in a shorter way and calculate the result.

Elicit that the shorter way is multiplication. Set a time limit.
Review with whole class. Ps come to BB or dictate to T, explaining reasoning with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) \[2.7 + 2.7 + 2.7 + 2.7 = 2.7 \times 4\]
   \[= 2 \times 4 + 0.7 \times 4 = 8 + 2.8 = 10.8\]

or \[2.7 \times 4 = (2 + \frac{7}{10}) \times 4 = 8 + \frac{28}{10} = 10 + \frac{8}{10} = 10.8\]

b) \[13.26 + 13.26 + 13.26 + 13.26 + 13.26 = 13.26 \times 5\]
   \[= 13 \times 5 + 0.26 \times 5 = 65 + (\frac{26}{100} \times 5)\]
   \[= 65 + \frac{130}{100} = 66 + \frac{30}{100} = 66.3\]

or

\[
\begin{array}{c}
1\ 3\ 2\ 6 \\
\times\ 5 \\
\hline
3\ 1\ 0\ 0
\end{array}
\]

I write 0 in the hundredths column and write 3 below the tenths column.’ etc.

[c) \[0.83 + 0.83 + 0.83 = 0.83 \times 3\]
   \[= \frac{24}{10} + \frac{9}{100} = 2 + \frac{9}{100} = 2.49\]

If problems or disagreement, check by doing the addition.

Check:

\[
\begin{array}{c}
0\ 8\ 3 \\
\times\ 3 \\
\hline
2\ 4\ 9
\end{array}
\]

23 min

Q.2 Deal with one part at a time or set a time limit. Ps read problems themselves, write an operation and calculate the result.

Review with whole class. Ps could show result on scrap paper or slates on command. Ps answering correctly explain at BB to Ps who were wrong. Who did the same? Who did it a different way? etc. Mistakes discussed and corrected.

Solution: e.g.

a) The length of each side of a square is 52.4 cm.
   Write the length of its perimeter in cm, mm and metres.
   \[P = 52.4 \text{ cm} \times 4 = 209.6 \text{ cm} = 2096 \text{ mm} = 2.096 \text{ m}\]

b) The length of the sides of a rectangle are \(b = 6.42 \text{ cm}\) and \(a = 2 \times b\). What is the length of its perimeter?
   \[P = (6.42 \text{ cm} + 12.84 \text{ cm}) \times 2 = 19.26 \text{ cm} \times 2 = 38.52 \text{ cm}\]
   or \[P = (a + b) \times 2 = 3a \times 2 = 6a = 6.42 \text{ cm} \times 6 = 38.52 \text{ cm}\]

29 min

Individual work, monitored, helped
Diagrams drawn on BB.
Reasoning, agreement, self-correction, praising
Accept any valid method.

BB:

a) \[
\begin{array}{c}
a \times 4 \\
\hline
1\ 9\ 2\ 6
\end{array}
\]

b) \[
\begin{array}{c}
a \times 6 \\
\hline
3\ 8\ 5\ 2
\end{array}
\]

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Lesson Plan 123

**Activity**

5  
*PhY5b, page 123*

Q.3 Read: *Calculate the products. Estimate the result mentally first.*

Ps write estimates (rounding to the nearest whole number) above calculations in *Pbs* and check results against them.

Set a time limit

Review with whole class. Ps come to BB to show solutions, reasoning with place-value detail. Class agrees/disagrees. Mistakes discussed and corrected.

What do you notice about the multipliers? (Not in their correct place-value column) T tells Ps that it is not necessary to write the multiplier in the correct place-value column, as we are not adding or subtracting and it does not affect the result. T shows the multiplications written with multipliers in correct column. Ps decide which version they find easier to work with.

**Solution:**

\[
\begin{align*}
  E: & \quad 8 \times 3 = 24  & \quad E: & \quad 6 \times 5 = 25  & \quad E: & \quad 15 \times 7 = 105  & \quad E: & \quad 102 \times 11 = 1122 \\
  a) & \quad 281 \times 3 & \quad b) & \quad 358 \times 53 & \quad c) & \quad 11 \times 428 & \quad d) & \quad 111 \times 123 \times 101 \\
  \end{align*}
\]

or with multipliers in corresponding place-value columns:

\[
\begin{align*}
  a) & \quad 281 \times 3 & \quad b) & \quad 358 \times 53 & \quad c) & \quad 11 \times 428 & \quad d) & \quad 111 \times 123 \times 101 \\
  \end{align*}
\]

6  
*PhY5b, page 123*

Q.4 Read: *Which is more? Calculate in your exercise book, then fill in the missing signs.*

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

Review with whole class. Ps come to BB to write values of LHS and RHS of inequality, then to write the missing sign. Class agrees/disagrees. Mistakes discussed and corrected.

Show details of calculations if problems or disagreement.

**Solution:**

\[
\begin{align*}
  a) & \quad 43 \times 2.5 \, \text{m} \quad \text{(m)} & \quad 25 \times 5.3 \, \text{m} \\
  \quad 2.5 \times 4.3 & \quad 5.3 \times 2.5 \\
  \quad 10.75 & \quad 10.6 \, \text{m} \\
  \quad 10.75 \, \text{m} & \quad 10.75 \, \text{m} \\
  \end{align*}
\]

b) 0 times 197 kg  197 times 0 kg

(0 kg)  

(0 kg)

\[
\begin{align*}
  c) & \quad 12 \times 4.8 \, \text{litres} \quad 48 \times 1.2 \, \text{litres} \\
  \quad 4.8 \times 12 & \quad 1.2 \times 4.8 \\
  \quad 9.6 & \quad 9.6 \\
  \quad 4.8 \times 12 & \quad 4.8 \times 12 \\
  \quad 57.6 \, \text{litres} & \quad 57.6 \, \text{litres} \\
  \end{align*}
\]

Notes

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Feedback for T

Discussion on layout of multiplications.

Reiterate that when multiplying a decimal number by a natural number, the product must have the same number of decimal digits as the multiplicand.

Individual work, monitored, helped

(or whole class activity if time is short)

Written on BB or SB or OHT

Discussion, reasoning, agreement, self-correction, praising

Extra praise if Ps reason correctly without doing the calculations in c):

\[
4.8 \times 12 = 1.2 \times 48 \\
\text{(as } 48 \times 12 = 12 \times 48, \text{ and products on LHS and RHS both have 1 digit after the decimal point)}
\]
Lesson Plan 123

Notes

Individual work, monitored, helped
(or whole class activity, with Ps suggesting what to do first and how to continue)
Responses shown in unison
(or can use pre-agreed actions for a)
Discussion, reasoning, agreement, self-correction, praising

Q.5 Read: Solve the problems in your exercise book and write the answers in a sentence here.

Deal with one at a time or set a time limit. Review with whole class. Ps could write answers on slates or scrap paper and show on command.

A, tell us how you worked it out. Who did the same? Who did it a different way? etc. Mistakes discussed and corrected.
T chooses a P to read the answer in a sentence.

Solution: e.g.

a) Pete has £36 50 p. Olivia has twice as much and Sue has 3 times as much as Pete.

If they all put all their money together, do they have enough to buy a television which costs £210?

P: £36.50, O: £36.50 x 2 = £73, S: £36.50 x 3 = £109.50

P + O + S: £36.50 + £73 + £109.50 = £219.00,

£219 > £210

or P + O + S = P + P x 2 + P x 3 = P x 6

£36.50 x 6 = £219.00, £219 > £210

Answer: Yes, they have enough to buy a television set.

b) The units of measure used when measuring angles are degrees and minutes.

If 1 degree equals 60 minutes, how many degrees is 6 times 12° 30’?

Plan: (12° + 30’) x 6 = 72° + 180’ = 72° + 3° = 75°

or 12° 30’ = 12.5°, 12.5° x 6 = 75°

Answer: Six times 12 degrees 30 minutes is 75 degrees.
### Activity 1: Sequences

Here are 3 terms of a sequence. Continue it for 3 more terms in either direction. Pupils calculate mentally (or in Ex. Bks or on scrap paper or slates if necessary) and dictate terms to T. Class agrees/disagrees.

What is the rule?

| a)     | (1.1, 1.8, 2.5), 3.2, 3.9, 4.6, (5.3, 6, 6.7) | [+ 0.7] |
| b)     | (14.4, 7.2, 3.6), 1.8, \( \frac{9}{10}, \frac{9}{20}, (\frac{9}{40}, \frac{9}{80}, \frac{9}{160}) \) | [÷ 2] |
| c)     | \( \frac{3}{1000}, \frac{9}{1000}, \frac{27}{1000}, \frac{81}{1000}, \frac{243}{1000}, \frac{729}{1000}, (\frac{2187}{1000}, \frac{6561}{1000}) \) | [× 3] |

Elicit the decimal forms too:
- a) 0.9, 0.45, (0.225, 0.1125, 0.05625)
- b) 0.9, 0.45, (0.225, 0.1125, 0.05625)
- c) 0.003, 0.009, 0.027, 0.081, 0.243, 0.729, 2.187, 6.561, 19.683

### Activity 2: Solving equations

Deal with one at a time. Pupils copy equation in Ex. Bks and try to solve it, checking that their solution makes the equation true. When Ps have an answer, they come to BB to explain to class. Class checks that they are correct. Elicit the general rule for solving such equations. Ask several Ps what they think, then repeat it more clearly if necessary.

**BB:**

| a)     | \( 2 \times 0.9 - x = 0.7 \) | \( 1.8 \) |
|        | \( 1.8 - x = 0.7 \) | \( \frac{9}{10} \) |
|        | \( x = 1.8 - 0.7 = 1.1 \) | |
| b)     | \( y - 2.7 \div 3 = 1.5 \) | \( 0.9 \) |
|        | \( y - 0.9 = 1.5 \) | |
|        | \( y = 1.5 + 0.9 = 2.4 \) | |
| c)     | \( (u + 2.5) \div 3 = 5.9 \) | \( \frac{17.7}{10} \) |
|        | \( u + 2.5 = 5.9 \times 3 = 17.7 \) | \( 0.9 \) |
|        | \( u = 17.7 - 2.5 = 15.2 \) | |

**Check:**

| a) \( 2 \times 0.9 - 1.1 = 0.7 \) | ✓ |
| b) \( 2.4 - 2.7 \div 3 = 1.5 \) | ✓ |
| c) \( 15.2 + 2.5) \div 3 = 5.9 \) | ✓ |

**Feedback for T:**

Elicit the decimal forms too:
- a) 0.9, 0.45, (0.225, 0.1125, 0.05625)
- b) 0.9, 0.45, (0.225, 0.1125, 0.05625)
- c) 0.003, 0.009, 0.027, 0.081, 0.243, 0.729, 2.187, 6.561, 19.683

### Activity 3: Parts of quantities

a) *Let's calculate 0.7 of 63 kg.*

How could we do it? Pupils come to BB or dictate to T.

**BB:**

| 0.7 of 63 kg \( = \frac{7}{10} \) of 63 kg \( = \frac{63 \times 7}{10} \) | \( = 6.3 \times 7 \) |
| 63 kg \( \div 10 \times 7 \) | \( = 42 \times 2.1 \) kg \( = 44.1 \) kg |

or using direct proportion:

\( 0.1 \) of 63 kg \( \rightarrow 63 \times 10 \div 7 = 6.3 \times 7 = 44.1 \) kg

\( 0.7 \) of 63 kg \( \rightarrow 63 \times 10 \div 7 = 6.3 \times 7 = 44.1 \) kg

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3

Let's multiply 63 by 0.7.
Ps come to BB to write the calculation, explaining reasoning with place value detail. Class points out errors.

T: When we multiply a decimal by a natural number or a natural number by a decimal, we calculate as if both are natural numbers, then we mark the decimal point in the product so that it has the same number of decimal digits as the original decimal.

What do you notice about the result? [Same result as a]

4

Inequalities
Which numbers could be written instead of the shapes? Accept and praise any valid numbers suggested by Ps, then T helps to find the whole solution. Class checks that the solution is correct.

BB:

a) $5 \times \square \leq 4$ (Ps might suggest 0, −1, 0.1, 0.5, etc.)

$\square \leq 4 \div 5$

$(4 \div 5 = \frac{4}{5} = \frac{8}{10} = 0.8 )$

$\square \leq 0.8$

Check: $5 \times 0.8 = 4$

b) $1.2 \times \bigcirc > 6$ (Ps might suggest 6, 7, 8, etc.)

$\bigcirc > 6 \div 1.2$

$(6 \div 1.2 = 60 \div 12 = 5 )$

$\bigcirc > 5$

Check: $1.2 \times 5 = 6$

c) $9 < 3.2 \times \bigtriangleup < 33$ (Ps might suggest 3, 4, 5, etc.)

Lowest value: If $\bigtriangleup = 3$, $3.2 \times 3 = 9.6 > 9$

Greatest value: If $\bigtriangleup = 10$, $3.2 \times 10 = 32 < 33$

So $3 < \bigtriangleup < 10$

$\bigtriangleup : 3, 4, 5, 6, 7, 8, 9, 10$ (If $\bigtriangleup$ is a whole number)

19 min

25 min
**Activity 5**  
*PbY5b, Page 124*

Q.1  Read: *Calculate the products.*

What do you notice about the multipliers here? (They are written in the appropriate place-value columns.)

Remind Ps to do each calculation as if the two numbers were both natural numbers, then to mark the decimal point in the product so that it has the same number of decimal digits as the multiplicand. What should you do first? (Estimate the result as a check.) Set a time limit.

Review with whole class. Ps come to BB to estimate, do the calculations and explain reasoning with place-value details. Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**

\[
\begin{align*}
E: & \quad 3 \times 3 = 9 \quad E: \quad 4 \times 5 = 20 \quad E: \quad 20 \times 7 = 140 \\
\text{a)} & \quad \begin{array}{c}
2 \times 3 \\
\hline
6 \\
\end{array} \quad \begin{array}{c}
4 \times 5 \\
\hline
20 \\
\end{array} \quad \begin{array}{c}
20 \times 7 \\
\hline
140 \\
\end{array} \\
\text{b)} & \quad \begin{array}{c}
3 \times 3 \\
\hline
9 \\
\end{array} \quad \begin{array}{c}
5 \times 5 \\
\hline
25 \\
\end{array} \quad \begin{array}{c}
7 \times 7 \\
\hline
49 \\
\end{array} \\
\text{c)} & \quad \begin{array}{c}
2 \times 1 \\
\hline
2 \\
\end{array} \quad \begin{array}{c}
0 \times 2 \\
\hline
0 \\
\end{array} \quad \begin{array}{c}
0 \times 3 \\
\hline
0 \\
\end{array} \\
\text{d)} & \quad \begin{array}{c}
2 \times 1 \\
\hline
2 \\
\end{array} \quad \begin{array}{c}
6 \times 5 \\
\hline
30 \\
\end{array} \quad \begin{array}{c}
1 \times 3 \\
\hline
3 \\
\end{array} \\
\text{e)} & \quad \begin{array}{c}
2 \times 3 \\
\hline
6 \\
\end{array} \quad \begin{array}{c}
4 \times 5 \\
\hline
20 \\
\end{array} \quad \begin{array}{c}
0 \times 7 \\
\hline
0 \\
\end{array} \\
\text{f)} & \quad \begin{array}{c}
2 \times 2 \\
\hline
4 \\
\end{array} \quad \begin{array}{c}
4 \times 3 \\
\hline
12 \\
\end{array} \quad \begin{array}{c}
1 \times 4 \\
\hline
4 \\
\end{array} \\
\text{g)} & \quad \begin{array}{c}
1 \times 1 \\
\hline
1 \\
\end{array} \quad \begin{array}{c}
6 \times 2 \\
\hline
12 \\
\end{array} \quad \begin{array}{c}
5 \times 3 \\
\hline
15 \\
\end{array} \\
\text{h)} & \quad \begin{array}{c}
1 \times 0 \\
\hline
0 \\
\end{array} \quad \begin{array}{c}
4 \times 0 \\
\hline
0 \\
\end{array} \quad \begin{array}{c}
1 \times 0 \\
\hline
0 \\
\end{array} \\
\text{i)} & \quad \begin{array}{c}
1 \times 3 \\
\hline
3 \\
\end{array} \quad \begin{array}{c}
2 \times 4 \\
\hline
8 \\
\end{array} \quad \begin{array}{c}
3 \times 5 \\
\hline
15 \\
\end{array} \\
\text{j)} & \quad \begin{array}{c}
1 \times 1 \\
\hline
1 \\
\end{array} \quad \begin{array}{c}
6 \times 2 \\
\hline
12 \\
\end{array} \quad \begin{array}{c}
5 \times 3 \\
\hline
15 \\
\end{array} \\
\end{align*}
\]

31 min

---

**Activity 6**  
*PbY5b, page 124*

Q.2  Ps read problems themselves, then calculate in *Pbs* or in *Ex. Bks*. Set a time limit.

Review with whole class. Ps could show results on slates or scrap paper on command. Ps answering correctly show operation on BB. Class agrees/disagrees. Mistakes discussed and corrected.

Agree that: \( \frac{3}{5} = \frac{6}{10} = 0.6 = \frac{60}{100} = 60\% \), so all the questions are really the same!

**Solution:** (In one line as below, or in two steps as opposite)

\[
\begin{align*}
a) & \quad \frac{3}{5} \text{ of } 840 \text{ m} = 840 \text{ m} \div 5 \times 3 = 168 \text{ m} \times 3 = 504 \text{ m} \\
b) & \quad 0.6 \text{ of } 840 \text{ m} = 840 \text{ m} \div 10 \times 6 = 84 \text{ m} \times 6 = 504 \text{ m} \\
c) & \quad 60\% \text{ of } 840 \text{ m} = 840 \text{ m} \div 100 \times 60 = 8.4 \text{ m} \times 60 \\
& \quad = 84 \text{ m} \times 6 = 504 \text{ m} \\
\end{align*}
\]

35 min

---

**Notes**

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Discussion by time limit.

Discussion, reasoning, agreement, self-correction, praising

Ask Ps what they think of this layout of multiplications. (Most Ps will probably find it easier to write the multiplier at the RHS.)

Agree that the result is the same in both cases, so it does not really matter – Ps should use the easiest layout.

---

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### Activity 7

**PbY5b, page 124, Q.3**

Read: Which number am I thinking of? Write a plan and do the calculation.

Deal with one part at a time. T chooses a P to read out the question. Rest of Ps write a plan and do calculation in Ex. Bks, then show their result on command. Ps answering correctly explain their reasoning to Ps who were wrong. Who did the same? Who did it a different way? etc. Ps who were wrong write correct plan and result in Pbs.

**Solution:**

a) **Half of the number I am thinking of is 2.3 more than 3.8. What is my number?**

**Plan:**

\[
\frac{x}{2} = 3.8 + 2.3 = 6.1 \quad \text{or} \quad (3.8 + 2.3) \times 2 = 12.2
\]

\[
x = 6.1 \times 2 = 12.2
\]

**Check:**

Half of 12.2 = \(\frac{12 + 2}{10} \times 2 = 6 + \frac{1}{10} = 6.1\)

6.1 – 2.3 = 3.8 ✔

b) **If I subtract 10.4 from the number I am thinking of, the difference is 3 times 1.2. What is my number?**

**Plan:**

\[
y - 10.4 = 1.2 \times 3 = 3.6 \quad \text{or} \quad 1.2 \times 3 + 10.4 = 14
\]

\[
y = 3.6 + 10.4 = 14
\]

**Check:**

14 – 10.4 = 3.6, 3.6 ÷ 3 = 1.2 ✔

c) **If I add 4.3 to the number I am thinking of, the sum is 5 times 2.3. What is my number?**

**Plan:**

\[
z + 4.3 = 2.3 \times 5 = 11.5 \quad \text{or} \quad 2.3 \times 5 - 4.3 = 7.2
\]

\[
z = 11.5 - 4.3 = 7.2
\]

**Check:**

7.2 + 4.3 = 11.5, 11.5 = 5 × 2.3 ✔

### Activity 8

**PbY5b, Page 124, Q.4**

Read: Find a rule and complete the table. Write the rule in different ways.

Agree on one form of the rule using the completed columns. Ps come to BB to choose a column and fill in the missing number, explaining reasoning. Class agrees/disagrees. Ps fill in table in Pbs too. Who can write the rule in a mathematical way? Who can think of another way to write it? etc. Class checks rules mentally with values from table.

**Solution:**

<table>
<thead>
<tr>
<th>a</th>
<th>0.4</th>
<th>1</th>
<th>1/3</th>
<th>4</th>
<th>1/7</th>
<th>2/9</th>
<th>0.7</th>
<th>10.1</th>
<th>0.9</th>
<th>−1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>2.4</td>
<td>6</td>
<td>2</td>
<td>24</td>
<td>6</td>
<td>12/9</td>
<td>4.2</td>
<td>60.6</td>
<td>5.4</td>
<td>−3</td>
</tr>
</tbody>
</table>

Rule: \(b = 6 \times a, \ a = b \div 6, \ b \div a = 6, \ a \div b = \frac{1}{6}\)

41 min

45 min
**Activity**

Calculation practice, revision, activities, consolidation  

*PbY5b, page 125*

**Solutions:**

-Q.1 a) \(0.2 + \frac{1}{10} + \frac{37}{100} + 0.17 + \frac{3}{100}\)

\[= \frac{2}{10} + \frac{1}{10} + \frac{37}{100} + \frac{17}{100} + \frac{3}{100}\]

\[= \frac{20 + 10 + 37 + 17 + 3}{100} = \frac{87}{100}\]

b) \(0.2 + 0.1 + 0.37 + 0.17 + 0.03 = 0.87\)

c) \(20\% + 10\% + 37\% + 17\% + 3\% = 87\%\)

Q.2 a) \(0.4 \times \frac{100}{10} = 40\)  
b) \(5.62 \times 10 = 56.2\) 

c) \(684 \div 10 = 68.4\)  
d) \(68.4 \div 10 = 6.84\)  

e) \(0.09 \times 10 = 0.9\)  
f) \(0.37 \times 100 = 37\)  

g) \(14.3 \div 10 = 1.43\)  
h) \(20.5 \div 10 = 2.05\)  

i) \(0.49 \div 10 = 0.049\)  
j) \(0.06 \times 100 = 6\)  

k) \(4.274 \times 10 = 42.74\)  
l) \(0.037 \times 100 = 3.7\)

Q.3 a) \(\frac{2}{5}\) of 760 km = 760 km \(\div\) \(\frac{5}{2}\) \(\times\) \(2\) = 152 km \(\times\) \(2\) = 304 km

b) 20\% of 760 km = \(\frac{20}{100}\) of 760 km = \(\frac{1}{5}\) of 760 km = 152 km

c) 0.6 of 760 km = \(\frac{6}{10}\) of 760 km = \(\frac{3}{5}\) of 760 km = 456 km

or = 760 km \(\div\) \(10\) \(\times\) \(6\) = 76 km \(\times\) \(6\) = 456 km

Q.4

<table>
<thead>
<tr>
<th>(x)</th>
<th>0.2</th>
<th>3</th>
<th>(\frac{2}{5})</th>
<th>2</th>
<th>(\frac{3}{5})</th>
<th>(\frac{1}{5})</th>
<th>0.7</th>
<th>9.2</th>
<th>0.5</th>
<th>(\frac{1}{3})</th>
<th>0.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>(y)</td>
<td>1.0</td>
<td>15</td>
<td>2</td>
<td>(10)</td>
<td>3</td>
<td>(\frac{5}{6})</td>
<td>(\frac{5}{7})</td>
<td>3.5</td>
<td>(25)</td>
<td>(\frac{1}{4})</td>
<td>0.75</td>
</tr>
</tbody>
</table>

*Rule:* \(x = y \div 5\), \(y = 5 \times x\), \(y \div x = 5\), \(x \div y = \frac{1}{5}\)

Q.5 a) \(\frac{47}{100}\) > 0.047 b) 0.205 > \(\frac{25}{1000}\) c) \(\frac{3}{5}\) < 3.69

(0.47) (0.025) (3.6)

d) \(\frac{3}{5}\) > 0.065 e) 0.35 = \(\frac{35}{100}\) f) 0.87 > \(\frac{78}{100}\)

(0.6) (0.35) (0.78)

Q.6 *Plan:* e.g \((2.4 + 7) \div 4 = 0.6 + 1 + \frac{3}{4} = 1.6 + \frac{75}{100}\)  

= 1.6 + 0.75  

= 2.35 (litres)

**Answer:**

I used 2.35 litres of paint for each room.
Lesson Plan

126

Activity

1

Missing values

Study this table and think about what the rule could be. When they know the rule, Ps come to BB to choose a column and fill in the missing number but do not say the rule yet. Class agrees/disagrees.

<table>
<thead>
<tr>
<th>a</th>
<th>0.4</th>
<th>2.1</th>
<th>3</th>
<th>1.1</th>
<th>0.2</th>
<th>0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>1.6</td>
<td>30</td>
<td>2</td>
<td>12</td>
<td>2.9</td>
<td>11.6</td>
</tr>
</tbody>
</table>

Who can write the rule? Who can write the rule another way? Class checks that the rule is correct by inserting values from the table.

BB: Rule: \( b = 4 \times a \), so \( a = b \div 4 \), \( b \div a = 4 \), so \( a \div b = \frac{1}{4} \)

When checking, Ps might choose 'difficult' columns, e.g.

\( b = 4 \times a: \)

\( \frac{4}{5} \times 4 = \frac{16}{5} = 3 \frac{1}{5}; \quad a = b \div 4: \quad \frac{3}{5} \div 4 = \frac{3}{20} \)

BB: Rule: \( \frac{3}{5} \div \frac{4}{5} = \frac{16}{5} \div \frac{4}{5} = (4) \) or \( 2.9 \div 11.6 = (\frac{1}{4}) \)

2

Sequence

Here are the first 3 terms of a sequence. What are the following terms? Ps try it in Ex. Bks. first then come to BB or dictate to T. Class agrees/disagrees. What rule did you use? Who agrees? Who used a different rule?

BB: 641.6, 320.8, 160.4, (80.2, 40.1, 20.05, 10.025, . . .)

Rule: Each following term is half of the previous term. \( \lceil \div 2 \rceil \)

Let's think about how we actually did the division. T starts first calculation and Ps continue it and do the others, explaining reasoning.

BB: \( 80.2 \div 2 = (80 + \frac{2}{10}) \div 2 = 80 \div 2 + \frac{2}{10} \div 2 = 40 + \frac{1}{10} = 40.1 \)

\( 40.1 \div 2 = (40 + \frac{1}{10}) \div 2 = 20 + \frac{1}{20} = 20 + \frac{5}{100} = 20.05 \)

\( 20.05 \div 2 = (20 + \frac{5}{100}) \div 2 = 10 + \frac{5}{200} = 10 + \frac{25}{1000} = 10.025 \)

3

Problem

Listen carefully and think about how you would solve this problem.

The length of the fence around a square garden is 612.8 m. How long is each side of the garden?

Ps come to BB to draw a diagram and to write a plan. Then Ps suggest different ways to do the calculation. (e.g. breaking up the number into easy multiples of 4, or using fractions.) Class points out errors.

BB: e.g. \( P = 612.8 \text{ m} = 4 \times a \)

\( a = 612.8 \text{ m} \div 4 = (400 + 200 + 12 + 0.8) \div 4 \)

\( = 100 + 50 + 3 + 0.2 = 153.2 \text{ (m)} \)

Notes

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Discussion, reasoning, agreement, praising

Feedback for T

Whole class activity

Terms written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

Ps could copy in Ex. Bks. too.

Elicit that to divide a fraction by a natural number, either divide the numerator or multiply the denominator.

Whole class activity

T repeats slowly and a P repeats in own words to give class time to think.

Discussion, reasoning, agreement, praising

or BB:

\( (612 + \frac{8}{10}) \div 4 = 153 + \frac{2}{10} \)

\( = 153.2 \)
**Lesson Plan 126**

### Activity

**3**

(Continued)

T suggests changing lengths to cm, thus doing a vertical division with natural numbers in the normal way, then changing the result back to m.

**BB:** 612.8 m = 61280 cm

\[
\begin{array}{c}
461280 \\
15320 \\
21
\end{array}
\text{(cm)}
\]

Let’s try to do the division in this way, but keeping the decimal point where it is. T starts explaining reasoning with place-value detail and Ps continue it when they understand. Ps write the division in Ex. Bks.

**BB:**

\[
\begin{array}{c}
1153228 \\
24128 \times 4 \\
612128 \text{(m)}
\end{array}
\]

**Check:**

\[
\begin{array}{c}
1153228 \\
24128 \times 4 \\
612128 \text{(m)}
\end{array}
\]

**Answer:** Each side of the garden is 153.2 m long.  

15 min

### Notes

Extra praise if a P suggests it! Ps come to BB or dictate to T. Class points out errors.

**4**

**PbY5b, page 126**

**Q.1** Read: Practise mental division.

Set a time limit of 3 minutes. Encourage Ps to check their results mentally with multiplication.

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

**Solution:**

a) i) 36 ÷ 9 = 4, ii) 36 ÷ 9 = 0.4, iii) 0.36 ÷ 9 = 0.04
b) i) 56 ÷ 7 = 8, ii) 5.6 ÷ 7 = 0.8, iii) 0.56 ÷ 7 = 0.08
c) i) 48 ÷ 6 = 8, ii) 4.8 ÷ 6 = 0.8, iii) 0.48 ÷ 6 = 0.08
d) i) 96 ÷ 8 = 12, ii) 9.6 ÷ 8 = 1.2, iii) 0.96 ÷ 8 = 0.12

20 min

### Money model

T has appropriate amounts of model money on desk.

Let’s stick 8 £10 notes, 1 £1 coin and 7 10 p coins on the BB.

How much money do they make up altogether? (£81 70 p)

What is the amount in £s? (£81.70 or £81.7)

Let’s divide it into 5 equal parts. How could we do it? Ps suggest ways. T directs Ps thinking if necessary. (Start with the largest place-value, i.e. tens, divide them by 5, then change any remaining tens into the next smallest place-value, i.e. units, etc.)

T (P) manipulates money on BB (Ps do the same on desks if possible), then T writes calculation on BB, explaining with place-value detail.

**BB:**

\[
\begin{array}{c}
8 \text{ tens} \\
5 \\
3 \text{ tens}
\end{array}
\]

We can change the 3 tens remaining into 30 units (£1 coins), add to the unit already there to make 31 units, then continue the division.

20 min

### Whole class activity

Coins needed for the activity: £10 (8); £1 (31); 10 p (17); 1 p (20) (or use copy master)

**BB:**

Ideally, Ps have model money on desks too and work in pairs.

If Ps have no ideas, T starts and Ps continue, following the T’s example.

Discussion, reasoning, demonstration, agreement, praising
Lesson Plan 126

At a quicker pace as Ps begin to understand the concept.

Each group:

BB: £81.70 ÷ 5 = £16.34
BB: 81.70 ÷ 5 = 16.34
or 81.7 ÷ 5 = 16.34
Ps suggest what to do and how to continue.

Grids drawn on BB or use enlarged copy master or OHP
Reasoning (with T’s help where necessary), agreement, correcting, praising
Ps could write the divisions in Ex. Bks too.

Whole class activity
BB: £81.7 = 8170 p
In pence:

1634 p = £16.34

26 min
### Activity 6

**PbY5b, page 126**

#### Q.2

Read: *Estimate the result, do the division in two ways and check with a multiplication.*

Set a time limit. Ps estimate, do the long and short divisions, check with multiplication, compare with estimate, then write the result in the horizontal division and underline it.

Review with whole class. Ps come to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**  

**Long division:**

- \(129.5 \div 7 = 18.5\)
- \(E: \ 140 \div 7 = 20\) (known multiple of 7)
- or \(126 \div 7 = (70 + 56) \div 7 = 10 + 8 = 18\)

**Short division:**

- \(129.5 \div 7 = 18.5\)
- \(7 \times 18.5 = 129.5\)

Who can explain how to divide a decimal by a natural number? T repeats in a clearer way if necessary. E.g.

‘We divide a decimal by a natural number in the same way as we divide a natural number by a natural number but when we reach the decimal point in the dividend, we also mark it in the quotient.’

---

### Notes

Individual work, monitored, helped  
Drawn on BB or use enlarged copy master or OHP  
If majority of Ps are struggling, stop individual work and continue as whole class activity.  
Discussion, reasoning, agreement, checking, self-correction, praising

**Extension**  
(Extra work for quicker Ps.)  
Do the division with fractions.

\[
B: (129 + \frac{1}{2}) \div 7 = (70 + 56 + \frac{3}{2}) \div 7 = 10 + \frac{7}{2} = 18 + \frac{1}{2} = 18.5
\]

---

### Activity 7

**PbY5b, page 126, Q.3**

Read: *Estimate the result, do the division in two ways and check with a multiplication.*

What do you notice about this division? (Almost the same as Q.2 but the dividend is 1 tenths more, so estimate can be the same.)

Ps come to BB to do long division, explaining with place-value detail. Class points out errors. When Ps have calculated the tenths and have a remainder of 1, T asks what the 1 actually means. (1 tenth) We could stop here and write BB: \(129.6 \div 7 = 18.5, R 1\) tenth

What else could we do? (Change the tenths to hundredths.) Elicit that 1 tenth = 10 hundredths, and there are no hundredths in the dividend to add on.)

Ps continue the division until there are 3 hundredths remaining. What could we do now? (Change the 3 hundredths to 30 thousandths.)

We could continue like this to the next smaller and smaller place-values until there is no remainder but we do not have time. Let's stop at the hundredths. Is it correct to say that the quotient is 18.51? (No, it is 18.51 and 3 hundredths.)

Let's do the short division and stop at the hundredths too. Ps come to BB or dictate to T, explaining reasoning with place-value detail. Class points out errors.

Ps then check result against estimate and by doing the multiplication and addition.

---

Whole class activity  
(or individual trial first to see what Ps do with the remainder)  
Drawn on BB or use enlarged copy master or OHP  
At a good pace  
Reasoning, agreement, praising  
Discussion, agreement, praising  
Ps write calculations in Pbs at the same time.
Lesson Plan 126

Notes

Agree that 18.51 is more accurate than 18.5.

Agree that 3 hundredths is 0.03.

Do not expect Ps to learn this vocabulary for approximation yet – just to start to become familiar with it.

Individual work, monitored, helped
(or do part a) i) with whole class first if Ps are unsure)
Written on BB or SB or OHT
Reasoning, agreement, self-correction, praising
Agree that as there are no remainders, the quotients are exact.

Feedback for T

Agree that the other 2 answers are approximate.

Which answer is exact?  (129.6 ÷ 7 = 18.51, r 3 hundredths)
Agree that the other 2 answers are approximate.

Lesson Plan 126

Notes

Individual work, monitored, helped
(or do part a) i) with whole class first if Ps are unsure)
Written on BB or SB or OHT
Reasoning, agreement, self-correction, praising
Agree that as there are no remainders, the quotients are exact.

Feedback for T

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Lesson Plan 126

Notes

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(or do part a) i) with whole class first if Ps are unsure)
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Feedback for T

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Lesson Plan 126

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Lesson Plan 126

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Lesson Plan 126

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(or do part a) i) with whole class first if Ps are unsure)
Written on BB or SB or OHT
Reasoning, agreement, self-correction, praising
Agree that as there are no remainders, the quotients are exact.

Feedback for T

Agree that the other 2 answers are approximate.
<table>
<thead>
<tr>
<th>Activity</th>
<th>Fractions, decimals and percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ps have two 10 cm by 10 cm square grids on desks and T has large versions for demonstration.</td>
</tr>
<tr>
<td></td>
<td>a) Colour 3 twentieths of the grid red, then 0.2 of the grid green, then 36% yellow but do not colour any grid squares more than once.</td>
</tr>
<tr>
<td></td>
<td>i) What part of the square have you coloured altogether? Ps come to BB to write an addition, explaining reasoning. Class agrees/disagrees. Who can think of another way to write it?</td>
</tr>
<tr>
<td></td>
<td>BB: Part coloured:</td>
</tr>
<tr>
<td></td>
<td>e.g. $\frac{3}{20} + 0.2 + 36% = \frac{15}{100} + \frac{20}{100} + \frac{36}{100} = \frac{71}{100}$</td>
</tr>
<tr>
<td></td>
<td>or $\frac{3}{20} + 0.2 + 36% = 0.15 + 0.2 + 0.36 = 0.71$</td>
</tr>
<tr>
<td></td>
<td>or $15% + 20% + 36% = 71%$</td>
</tr>
<tr>
<td></td>
<td>ii) What part of the square is not coloured?</td>
</tr>
<tr>
<td></td>
<td>Ps come to BB or dictate what T should write, using fractions, decimals and percentages. Class agrees/disagrees.</td>
</tr>
<tr>
<td></td>
<td>BB: Part not coloured:</td>
</tr>
<tr>
<td></td>
<td>e.g. $1 - \frac{71}{100} = \frac{100}{100} - \frac{71}{100} = \frac{29}{100} = 0.29 = 29%$</td>
</tr>
<tr>
<td></td>
<td>i) What part of the grid have you coloured this time?</td>
</tr>
<tr>
<td></td>
<td>ii) What part is not coloured?</td>
</tr>
<tr>
<td></td>
<td>Ps come to BB or dictate what T should write. Who can write it another way? etc. Class agrees/disagrees.</td>
</tr>
<tr>
<td>2</td>
<td>Comparison</td>
</tr>
<tr>
<td></td>
<td>Which side is greater? How much greater? Ps come to BB to calculate each side mentally or to write calculations on BB, explaining reasoning with place-value detail. Then Ps fill in the missing signs and calculate the differences. Clas agrees/disagrees.</td>
</tr>
<tr>
<td></td>
<td>BB:</td>
</tr>
<tr>
<td></td>
<td>a) $13 + 1.7 - \frac{3}{2} \leq 40 - 27 - \frac{5}{2} + 2.7$</td>
</tr>
<tr>
<td></td>
<td>LHS: $14.7 - 1.5 = 13.2$</td>
</tr>
<tr>
<td></td>
<td>RHS: $13 - 2.5 + 2.7 = 13.2$</td>
</tr>
<tr>
<td></td>
<td>b) $(2 + \frac{3}{4}) \times 5 \leq 25 - 14.8 \div 5$</td>
</tr>
<tr>
<td></td>
<td>LHS: $10 + \frac{15}{4} = 10 + 3 \frac{3}{4} = 13 \frac{3}{4}$</td>
</tr>
<tr>
<td></td>
<td>RHS: $25 - 2.96 = 22.04$</td>
</tr>
<tr>
<td></td>
<td>c) $(0.31 + 0.69) \div 5 \leq 18.3 \div 3 - 4.9$</td>
</tr>
<tr>
<td></td>
<td>$(1 \div 5 = \frac{1}{5} = 1 \frac{6.1 - 4.9}{4.9} = 1.2)$</td>
</tr>
<tr>
<td></td>
<td>$= \frac{2}{10} = 0.2$</td>
</tr>
<tr>
<td>11 min</td>
<td></td>
</tr>
</tbody>
</table>
Y5

Activity

3 Mean height

T puts Ps into groups and they measure their heights with a measuring tape or against a vertical scale or using a metre rule and note their heights to the nearest cm. Do this under a time limit.

T makes two tally charts, as below, one for the girls and one for the boys. Ps dictate their heights and T chooses a boy and a girl to keep a tally.

How can we work out the average height of the girls and the boys?

(Add up all the heights, then divide by the number of girls or boys.)

T writes heights in a column as dictated by Ps (or Ps might suggest using multiplication for multiple tally marks). Ps add up the heights and dictate sum to T, then do long division in Ex. Bks (or T might allow Ps to use calculators). Ps need only calculate to 2 decimal places.

BB: e.g. Girls (and similarly for boys)

<table>
<thead>
<tr>
<th>Tally Chart</th>
<th>139 cm</th>
<th>140 cm</th>
<th>141 cm</th>
<th>142 cm</th>
<th>143 cm</th>
<th>144 cm</th>
<th>145 cm</th>
<th>146 cm</th>
<th>147 cm</th>
<th>148 cm</th>
<th>149 cm</th>
<th>150 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+ 150 cm</td>
</tr>
<tr>
<td>139 cm</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2295 cm</td>
</tr>
<tr>
<td>140 cm</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>141 cm</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>142 cm</td>
<td>4</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>143 cm</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>144 cm</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>145 cm</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>146 cm</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>147 cm</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>148 cm</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>149 cm</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 cm</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>280 cm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>(cm)</td>
</tr>
<tr>
<td>426 cm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>720 cm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>290 cm</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Agree on the average height of the girls (boys) in the class. T shows that to be accurate to the nearest whole number, we should calculate to tenths and to be accurate to the nearest tenth we must calculate to hundredths, etc. i.e. we must calculate to the next smaller place-value column than the one we wish to stop at.

T: Who remembers the name we give to the average value in a set of data? (the mean)

e.g. Girls’ heights: Mean = 143.4 cm

Boys’ heights: Mean = 142.9 cm

What do the mean values for boys and girls tell us? (e.g. In this class, the girls are on average taller than the boys.)

21 min

4 Mean ages

T divides Ps into groups of 5 or 6. Within each group, each child works out his or her age in months, then the group calculates their mean age. Discuss and agree beforehand how accurate they should be (e.g. to the nearest month or to tenths or hundredths of a month)

The groups dictate their data and mean when they have finished and T writes on BB. Class checks that they are correct (using calculators).

What can you say about the data? (e.g. Group A is on average older than Group B, or Group A is about the same age as Group C, etc.)

25 min

Lesson Plan 127

Notes

Whole class activity
(The number of groups and thus the number in each group will depend on how many measuring tools are available – the more tools, the faster the data can be collected!)

BB: average height

First discuss what average means. Ps generally will have some knowledge or idea about its meaning (from home, TV, radio, newspapers, etc.) or might remember from previous work in Year 4.)

Involve several Ps in the discussion.

If all boys or all girls in class, divide the class into 2 groups.

Ps may use calculators to check the calculations.

At a fast pace

In good humour!

Agreement, praising (as 143.43 is nearer 143.4 than 143.5)

BB: mean = average value

What is the rule for calculating the mean of a set of data?

(Add up all the values, then divide the sum by the number of values.)

Group work in collecting data and calculating the means

Monitor, helped, corrected

Whole class checking and discussion of the results.

Ps may use calculators for the addition and for checking the division.
Q.1 Read: A group of 6 children weighed themselves and these were the results.

32.5 kg, 31.0 kg, 32.0 kg, 31.0 kg, 30.5 kg, 33 kg

What do they each weigh on average? Calculate the mean value to the nearest 10 g.

How can we work out the mean? (Add up all the weights, then divide by 6.) Elicit that calculating to the nearest 10 g means to the nearest hundredth or 0.01 kg, so there should be 2 digits after the decimal point in our answer. Therefore we need to calculate as far as the thousandths column, i.e. grams.

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

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

Solution:

e.g. Total weight of 6 children:

\[32.5 + 31.0 + 32.0 + 31.0 + 30.5 + 33 = 190.0 \text{ (kg)}\]

Mean mass: \[\frac{190.0}{6} \approx 31.67 \text{ (kg)}\]

Agree that 31.666 is nearer 31.67 than 31.66, so the answer is 31.67 kg (to the nearest 10 g, or 0.01 kg, or 2 decimal places)

T shows how the 2 calculations can be written in one line:

Mean = \[\frac{32.5 + 31.0 + 32.0 + 31.0 + 30.5 + 33}{6} = \frac{190.0}{6} = 31.67 \text{ (kg)}\]

T points out (or Ps might notice) that if the division is continued to 10 thousands, 100 thousandths, etc, there will always be a remainder of 4 in each place-value column, so there will always be the digit 6 in the next place-value column in the quotient. We could go on and on to infinity without ever reaching a remainder of zero.

We call such decimals recurring decimals and to save writing the same digit lots of times, we write a dot above the decimal digit which keeps recurring. We can write the division without rounding like this (BB) and say '31.6 recurring', meaning 31.666666 . . . to infinity.

Elicit that we can round it to:

- 32, to the nearest whole number,
- 31.7, to the nearest 10th, or to 1 decimal place
- 31.67, to the nearest 100th, or to 2 decimal places
- 31.667, to the nearest 1000th, or to 3 decimal places, etc.

30 min
**Activity 6**

**PbY5b, page127**

Q.2 Read: A group of 5 pupils were asked their ages and these were the results in months.

110 months, 121 months, 113 months, 116 months, 117 months

What is the mean value of their ages?

Set a time limit. Ps write operation in one line in Pbs, do the addition and division in Ex. Bks, and write the result in Pbs.

Review with the whole class. Ps come to BB to show solution, explaining reasoning. Who agrees? Who did it a different way? Discuss whether the answer is exact or approximate. Mistakes discussed and corrected.

**Solution:**

Mean age: \[ \frac{110 + 121 + 113 + 116 + 117}{5} = \frac{577}{5} \] (months)

\[ = 115.4 \text{ months} \quad (\approx 115 \text{ months}) \]

35 min

**Lesson Plan 127**

**Notes**

Individual work, monitored, helped

Discussion, reasoning, checking with a calculator, agreement, self-correction, praising

Accept fractions too.

e.g. \[ \frac{577}{5} = 115 + \frac{2}{5} \]

\[ = 115 + \frac{4}{10} = 115.4 \]

Agree that in real life we would say that the average age of the group is 'about 9 years 7 months'.

**Activity 7**

**PbY5b, page127**

Q.3 Read: Calculate the mean age of each family and then compare them.

Set a time limit, or deal with one part at a time. Ps write operation in one line in Pbs, do calculations in Ex. Bks and write result in Pbs.

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

**Solution:**

a) The Cabbage family:

Mean age: \[ \frac{1 + 2 + 11 + 33 + 35 + 59 + 65}{7} = \frac{206}{7} \]

\[ = 29.4 \text{ (years)} \]

b) The Sprout family

Mean age: \[ \frac{10 + 11 + 16 + 19 + 21 + 42 + 44}{7} = \frac{163}{7} \]

\[ = 23.3 \text{ (years)} \]

Agree that the average age of the Cabbage family is older than that of the Sprout family, although there are 2 very young children.

Discuss what the relationships in each family might be. e.g. 2 grandparents, Mum and Dad and their 3 children in the Cabbage family and Mum and Dad and their 5 children in the Sprout family.

Read: Which family has more people able to work in their garden? Write C or S on your slates and show me . . . now! (S)

T asks Ps with different responses to explain their reasoning. Class decides who is correct. (In the Sprout family, 7 people could do some gardening but in the Cabbage family, only 5 people could do the work and one of these would have to look after the two young children.)

41 min
**Activity**

8

*PbY5b, page127, Q.4*

a) Read: *Find a rule and complete the table. Write the rule in different ways.*

Agree on one form of the rule in words using the given completed columns. Ps come to BB to choose a column and fill the missing numbers, explaining reasoning. Class agrees/disagrees. Who can write the rule in a mathematical way? Who can write it a different way? etc. Class checks the rules using values from table.

*Solution:*

<table>
<thead>
<tr>
<th>a</th>
<th>1</th>
<th>1</th>
<th>3</th>
<th>5</th>
<th>2</th>
<th>6</th>
<th>12</th>
<th>2.4</th>
<th>20</th>
<th>16</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>3.6</td>
<td>40</td>
<td>10</td>
<td>5.2</td>
</tr>
<tr>
<td>c</td>
<td>2</td>
<td>2.5</td>
<td>3</td>
<td>3.5</td>
<td>4.5</td>
<td>5</td>
<td>10</td>
<td>3</td>
<td>30</td>
<td>13</td>
<td>5.1</td>
</tr>
</tbody>
</table>

*Rule:* \( c = \frac{a + b}{2} \); \( a = 2 \times c - b \); \( b = 2 \times c - a \)

(or \( c \) is the mean of \( a \) and \( b \))

b) Read: *In your exercise book, calculate the mean values for \( a \), \( b \), and \( c \).*

Set as homework and review before the start of *Lesson 128.*

(Ps might be allowed to check their calculations with calculators.)

**Notes**

Whole class activity

(or individual trial first if Ps wish and there is time)

Drawn on BB or use enlarged copy master or OHP

At a good pace

Discussion, reasoning, agreement, praising

**Bold** numbers are missing.

Extra praise if Ps notice that \( c \) is the mean of \( a \) and \( b \), otherwise T points it out.

*Solution:*

Mean of \( a \) = \( \frac{6.672}{6} \approx 6.67 \)

Mean of \( b \) = \( \frac{8.163}{6} \approx 8.16 \)

Mean of \( c \) = \( \frac{7.418}{6} \approx 7.42 \)
**Y5**

### Activity 1

**Review**

T dictates a number and Ps write it in *Ex. Bks* with digits.

Review quickly with whole class. P comes to BB to write and say the number. Class agrees/disagrees. Mistakes discussed and corrected.

e.g.

a) one million, fifty-six thousand, one hundred and seven (1 056 107)

Remind Ps that a space between every group of 3 digits from the right makes the number easier to read.

b) One whole unit and 51 hundredths of a unit (1.51 or 1 \frac{51}{100})

c) Two point five zero two (2.502)

d) Eight thirteenth (\frac{8}{13})

e etc.

5 min

### Activity 2

**Rounding**

T says a number and asks P₁ to round it to the nearest unit, P₂ to round it to the nearest ten and P₃ to round it to the nearest tenth.

e.g. 3, 1.2, 11.9, 23.5, 18.08, 15.48, 15.0

<table>
<thead>
<tr>
<th>to nearest unit</th>
<th>to nearest ten</th>
<th>to nearest tenth</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 = 3</td>
<td>3 = 0</td>
<td>3 = 3 (or 3.0)</td>
</tr>
<tr>
<td>1.2 ≈ 1</td>
<td>1.2 ≈ 0</td>
<td>1.2 = 1</td>
</tr>
<tr>
<td>11.9 ≈ 12</td>
<td>11.9 ≈ 10</td>
<td>11.9 = 11.9</td>
</tr>
<tr>
<td>23.5 ≈ 24</td>
<td>23.5 ≈ 20</td>
<td>23.5 = 23.5</td>
</tr>
<tr>
<td>18.08 ≈ 18</td>
<td>18.08 ≈ 20</td>
<td>18.08 = 18.1</td>
</tr>
<tr>
<td>15.48 ≈ 15</td>
<td>15.48 ≈ 20</td>
<td>15.48 = 15.5</td>
</tr>
<tr>
<td>15.0 = 15</td>
<td>15.0 = 20</td>
<td>15.0 = 15.0</td>
</tr>
</tbody>
</table>

10 min

### Activity 3

**Calculation practice**

T says and writes an operation on BB. Ps calculate mentally if possible (or on scrap paper or *Ex. Bks.*) and show the result on slates on command. Ps responding correctly who did it mentally say how they did it. Ps show calculations in vertical form on BB if problems or disagreement and check result with a calculator.

a) 45 + 2.7 + 6.1 + 9.8 = (63.6) [e.g. 62 + 1.6]

b) 100 – 0.54 = (99.46) [e.g. 99.5 – 0.4]

c) 4.5 \times 7 = (31.5) [e.g. 28 + 3.5]

d) 9 \div 4 = (2.25 or 2 \frac{1}{4}) [e.g. 8 \div 4 + 1 \div 4]

15 min

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Fractions of numbers

a) What part of 24 is:
   i) \( \frac{1}{24} \)  
   ii) \( \frac{3}{24} = \frac{1}{8} \)  
   iii) \( \frac{12}{24} = \frac{1}{2} \)
   iv) \( \frac{15}{24} = \frac{5}{8} \)  
   v) \( \frac{36}{24} = \frac{3}{2} = \frac{1}{2} \)

What part of 24 is the mean of the five numbers? How can we do it? Ps suggest what to do first and how to continue. T helps or gives hints where necessary.

Mean of numbers: \( 1 + 3 + 12 + 15 + 36 = 67 \); \( 67 \div 5 = \frac{67}{5} \)

Part of 24: \( \frac{13}{24} \) \( \div 24 = \frac{67}{24} \) \( \div 24 = \frac{67}{120} \)

or Mean of parts:

\[ \left( \frac{1}{24} + \frac{3}{24} + \frac{12}{24} + \frac{15}{24} + \frac{36}{24} \right) \div 5 = \frac{67}{24} \div 5 = \frac{67}{120} \]

b) What is the complete number if 1 fifth of it is:
   i) \( \frac{1}{2} \) (1 \( \times \) 5 = 5)  
   ii) \( \frac{2}{5} \) (3 \( \times \) 5 = 15)  
   iii) \( \frac{7}{5} \) (12 \( \times \) 5 = 60)
   iv) \( \frac{1}{10} \times \frac{5}{10} = \frac{1}{2} \)  
   v) 20 (20 \( \times \) 5 = 100)

Ps show numbers on scrap paper or slates in unison.
Ps answering correctly explain reasoning.
Agreement, praising

Solution:

a) i) \( \frac{1}{2} \) of 36 = 36 \( \div \) 2 = 18  
   ii) \( \frac{2}{2} \) of 36 = 36  
   iii) \( \frac{3}{2} \) of 36 = 36 \( \div \) 2 \( \times \) 3 = 18 \( \times \) 3 = 54

b) i) \( \frac{1}{2} \) of 25 = 25 \( \div \) 2 = 12.5  
   ii) \( \frac{2}{5} \) of 25 = 25 \( \div \) 5 \( \times \) 2 = 5 \( \times \) 2 = 10  
   iii) \( \frac{7}{5} \) of 25 = 25 \( \div \) 5 \( \times \) 7 = 5 \( \times \) 7 = 35  
   iv) \( \frac{7}{10} \) of 25 = 25 \( \div \) 10 \( \times \) 7 = 2.5 \( \times \) 7 = 17.5

Ps answering correctly explain reasoning.
Agreement, praising

Individual work, monitored, helped
Written on BB or SB or OHT
Reasoning, agreement, self-correction, praising
Feedback for T
## Lesson Plan 128

### Activity

**Y5**

<table>
<thead>
<tr>
<th>6</th>
</tr>
</thead>
</table>

**PbY5b, page 128**

Q.2  

a) Read: **Write the decimals as fractions.**

Set a time limit. Review at BB with whole class.

Ps dictate fractions to T, explaining reasoning. Class agrees or disagrees. Mistakes discussed and corrected.

**Solution:**

i) \(0.1 = \frac{1}{10}\)  

ii) \(0.5 = \frac{5}{10} = \frac{1}{2}\)

iii) \(1.2 = \frac{2}{10} = \frac{1}{5}\)

iv) \(0.01 = \frac{1}{100}\)

v) \(0.35 = \frac{35}{100} = \frac{7}{20}\)

vi) \(3.05 = \frac{3}{100} = \frac{3}{20}\)

vii) \(0.001 = \frac{1}{1000}\)

b) Read: **Express the quotient of 5 divided by 8 as a fraction and as a decimal.**

Ps come to BB to write fraction and do the short division, explaining with place-value detail, to calculate the decimal. Class points out errors. Rest of Ps write in *Pbs* too.

**Solution:**  

\[5 \div 8 = \frac{5}{8} = 0.625\]

BB:  

- Elicit that:  
  \[\frac{5}{8} = \frac{625}{1000}\]
  as \(5 \times 125 = 625\), and \(8 \times 125 = 1000\).

Extra praise if Ps realise that however many smaller place-values they use, there will never be a remainder of zero.  

BB: **recurring decimal**  

Who can work out what 2 thirds (1 third) is as a decimal? (0.6, 0.3)

### Notes

- Individual work, monitored, helped  
- Written on BB or SB or OHT  
- Differentiation by time limit  
- Reasoning, agreement, self-correction, praising  
- Feedback for T  

Whole class activity  
T has grids already prepared on BB or SB or OHT.  
Discussion, reasoning, agreement, praising  

Elicit that:

- *BB:* recurring decimal  
  - Who can work out what 2 thirds (1 third) is as a decimal? (0.6, 0.3)  
- Extra praise if Ps realise that however many smaller place-values they use, there will never be a remainder of zero.  
- BB: recurring decimal  
  - Who can work out what 2 thirds (1 third) is as a decimal? (0.6, 0.3)  
- Whole class activity but individual calculation in *Ex. Bks.* too  
- Discussion, reasoning, agreement, praising  
- Elicit the 'rules' for changing a fraction to a decimal:
  - express the fraction as 10ths (100ths, 1000ths, etc); or
  - divide the numerator by the denominator (using vertical decimal division).
Activity (Continued)

b) \( \frac{1}{5} = \frac{2}{10} = 0.2; \quad \frac{2}{5} = \frac{4}{10} = 0.4; \quad \frac{3}{5} = \frac{6}{10} = 0.6; \)

or

\[
\begin{array}{c}
0.2 \\
5 \_ 10 \\
1 \\
\end{array}
\quad
\begin{array}{c}
0.4 \\
5 \_ 20 \\
2 \\
\end{array}
\quad
\begin{array}{c}
0.6 \\
5 \_ 30 \\
3 \\
\end{array}
\]

\( \frac{4}{5} = \frac{8}{10} = 0.8; \quad \frac{5}{5} = 1; \quad \frac{6}{5} = \frac{12}{10} = 1.2 \) (or \( = 1 \frac{1}{5} = 1.2) \)

or

\[
\begin{array}{c}
0.8 \\
5 \_ 40 \\
4 \\
\end{array}
\quad
\begin{array}{c}
1.2 \\
5 \_ 60 \\
6 \\
\end{array}
\]

c) \( \frac{1}{4} = \frac{25}{100} = 0.25; \quad \frac{2}{4} = \frac{1}{2} = 0.5; \quad \frac{3}{4} = \frac{75}{100} = 0.75; \)

or

\[
\begin{array}{c}
0.25 \\
4 \_ 100 \\
1 \_ 2 \\
\end{array}
\quad
\begin{array}{c}
0.5 \\
4 \_ 50 \\
5 \\
\end{array}
\quad
\begin{array}{c}
0.75 \\
4 \_ 75 \\
3 \_ 2 \\
\end{array}
\]

\( \frac{4}{4} = 1; \quad \frac{5}{4} = \frac{125}{100} = 1.25 \) (or \( = 1 \frac{1}{4} = 1.25) \) or

\[
\begin{array}{c}
1.25 \\
4 \_ 50 \\
5 \_ 2 \\
\end{array}
\]

Notes

Individual work, monitored, helped
Written on BB or use enlarged copy master or OHP
Make sure that divisions in previous activity are not visible!
Differentiation by time limit
Reasoning, agreement, self-correction, praising
Ask Ps which method they like best (decimal division or expressing fraction as tenths or hundredths) and why.
**Activity 9**

*PhY5b, page 128, Q.4*

Read: Write the fractions as decimals. Do the divisions in the grids.

Ps come to BB to do the divisions, explaining reasoning with place-value detail. Some Ps might remember that thirds form recurring decimals before doing the division. If not, Ps should realise after the calculation. Ask Ps to write each result with ellipses (i.e. . . .) and then as an exact decimal (i.e. with a dot above the repeating digit).

T reads part d) and Ps shout out the missing word in unison.

P comes to BB to write it, class checks spelling, then rest of Ps write it in Pbs.

**Solution:**

\[
\begin{align*}
\frac{1}{3} &= 0.333 \ldots = 0.\overline{3} \\
\frac{2}{3} &= 0.666 \ldots = 0.\overline{6} \\
\frac{5}{6} &= 0.833 \ldots = 0.\overline{83}
\end{align*}
\]

\[
\begin{array}{c|c|c}
0 & 3 & 3 \\
3 & 1 & 0 \\
\hline
1 & 1 & 1
\end{array} \quad \begin{array}{c|c|c}
0 & 6 & 6 \\
3 & 2 & 0 \\
\hline
2 & 2 & 2
\end{array}
\]

\[
\begin{array}{c|c|c}
0 & 8 & 3 \\
6 & 5 & 0 \\
\hline
5 & 2 & 2
\end{array} \quad \begin{array}{c|c|c|c|c}
0 & 1 & 8 & 3 & 3 \\
6 & 5 & 0 & 0 & 0 \\
\hline
5 & 2 & 2 & 2 & 2
\end{array}
\]

Ps round each recurring decimal to the nearest 10th, 100th, 1000th and 10 000th.

d) Decimals in which the last digit is repeated endlessly are called **recurring decimals.**
### Lesson Plan

#### Activity 1

**Equal numbers**

Let’s join up the decimals to the equal fractions and mixed numbers. Ps come to BB to draw joining lines, explaining reasoning. Class agrees/disagrees.

**BB:**

```
0.4  2.25  10.21  21/4  7/14  1/3  0.3  21/100  0.50  21/100  5/6  2/5
```

1. **Equal numbers**

   Let’s join up the decimals to the equal fractions and mixed numbers. Ps come to BB to draw joining lines, explaining reasoning. Class agrees/disagrees.

   **BB:**

   - **Activity 1**
     - **Equal numbers**
     - Let's join up the decimals to the equal fractions and mixed numbers. Ps come to BB to draw joining lines, explaining reasoning. Class agrees/disagrees.
     - **BB:**

   - **Activity 2**
     - **Converting fractions to decimals**
     - Let's convert (i.e. change) these fractions to decimals. For each fraction, a different P comes to work on BB while rest of class works in Ex. Bks. Ps might remember some recurring decimals without needing to do the division. Class points out errors or suggest other methods of calculation. T or Ps check results on a calculator.

   - **BB:**
     - **a)** i) \( \frac{1}{6} = \frac{1}{1} \div 6 = 0.16 \)
     - ii) \( \frac{2}{6} = \frac{1}{3} = 0.3 \)
     - iii) \( \frac{3}{6} = \frac{1}{2} = 0.5 \)
     - iv) \( \frac{4}{6} = \frac{2}{3} = 0.6 \)

   - **b)** i) \( \frac{1}{8} = \frac{125}{1000} = 0.125 \)
     - or \( \frac{1}{8} = \frac{125}{1000} = 0.125 \)
     - ii) \( \frac{2}{8} = \frac{1}{4} = \frac{25}{100} = 0.25 \)
     - or \( \frac{2}{8} = \frac{1}{4} = \frac{25}{100} = 0.25 \)
     - iii) \( \frac{3}{6} = \frac{3}{8} = 0.375 \)
     - iv) \( \frac{4}{8} = \frac{1}{2} = 0.5 \)

   - **c)** i) \( \frac{1}{9} = \frac{1}{1} \div 9 = 0.1 \)
     - ii) \( \frac{2}{9} = \frac{2}{1} \div 9 = 0.2 \)
     - iii) \( \frac{3}{9} = \frac{1}{3} = 0.3 \)
     - iv) \( \frac{4}{9} = \frac{4}{1} \div 9 = 0.4 \)

   (Ps might know this now. If not, do the division.)

   - **Activity 2**
     - **Converting fractions to decimals**
     - Let's convert (i.e. change) these fractions to decimals. For each fraction, a different P comes to work on BB while rest of class works in Ex. Bks. Ps might remember some recurring decimals without needing to do the division. Class points out errors or suggest other methods of calculation. T or Ps check results on a calculator.

   - **BB:**
     - **a)** i) \( \frac{1}{6} = \frac{1}{1} \div 6 = 0.16 \)
     - ii) \( \frac{2}{6} = \frac{1}{3} = 0.3 \)
     - iii) \( \frac{3}{6} = \frac{1}{2} = 0.5 \)
     - iv) \( \frac{4}{6} = \frac{2}{3} = 0.6 \)

   - **b)** i) \( \frac{1}{8} = \frac{125}{1000} = 0.125 \)
     - or \( \frac{1}{8} = \frac{125}{1000} = 0.125 \)
     - ii) \( \frac{2}{8} = \frac{1}{4} = \frac{25}{100} = 0.25 \)
     - or \( \frac{2}{8} = \frac{1}{4} = \frac{25}{100} = 0.25 \)
     - iii) \( \frac{3}{6} = \frac{3}{8} = 0.375 \)
     - iv) \( \frac{4}{8} = \frac{1}{2} = 0.5 \)

   - **c)** i) \( \frac{1}{9} = \frac{1}{1} \div 9 = 0.1 \)
     - ii) \( \frac{2}{9} = \frac{2}{1} \div 9 = 0.2 \)
     - iii) \( \frac{3}{9} = \frac{1}{3} = 0.3 \)
     - iv) \( \frac{4}{9} = \frac{4}{1} \div 9 = 0.4 \)

   (Ps might know this now. If not, do the division.)

---

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Converting fractions to decimals 2

Let's convert sevenths to decimals. Do you think we could do it easily by changing the denominator to 10ths, 100th or 1000ths? (No, as they are not multiples of 7) Agree that the only way is division.

Let's continue doing the division until we get a remainder of zero, or until we know that we will keep getting the same remainder if we continue.

Ps come to BB to write and explain the division with place-value detail. Rest of Ps do division in Ex. Bks too and point out any errors made on BB.

Use calculators to check the results (If possible, Ps have one each, T prepared to make it easier for Ps to do the calculations.) What do you notice?

BB:

<table>
<thead>
<tr>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) ( \frac{1}{7} = 1 \div 7 = 0.142857 )</td>
<td>0.142857...</td>
</tr>
<tr>
<td>b) ( \frac{2}{7} = 2 \div 7 = 0.285714 )</td>
<td>0.285714...</td>
</tr>
<tr>
<td>c) ( \frac{3}{7} = 3 \div 7 = 0.428571 )</td>
<td>0.428571...</td>
</tr>
<tr>
<td>d) ( \frac{4}{7} = 4 \div 7 = 0.571428 )</td>
<td>0.571428...</td>
</tr>
<tr>
<td>e) ( \frac{5}{7} = 5 \div 7 = 0.714285 )</td>
<td>0.714285...</td>
</tr>
<tr>
<td>f) ( \frac{6}{7} = 6 \div 7 = 0.857142 )</td>
<td>0.857142...</td>
</tr>
</tbody>
</table>

25 min

Notes

Whole class activity

T could have grids already prepared to make it easier for Ps to do the calculations.
At a good pace
Reasoning, agreement, praising

Extra praise if Ps notice that in each case, the pattern of 6 digits will keep repeating to infinity, so the decimal is a recurring decimal.

T shows two ways of writing recurring decimals:

- with a dot above the first and last digit in the repeating group, or
- with a horizontal bar above all the digits in the group (as on some calculators).

Ps might also notice (or T points it out if they don't) that the same 6 digits appear in the same order in each decimal, and that the smallest decimal starts with the smallest digit, the next biggest decimal starts with the next biggest digit, etc.

PbY5b page 129

Q.1 Read: Write the fractions as decimals. Do necessary calculations in your exercise book.

First review the different methods. (Change to an equivalent fraction with denominator 10 or 100 or 1000, or do a division until there is no remainder or until a digit or group of digits repeats itself.) Set a time limit.

Review with whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly explain at BB to Ps who were wrong. Who did the same? Who worked it out a different way? etc. Mistakes discussed and corrected.

Solution: e.g.

<table>
<thead>
<tr>
<th>Fraction</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) ( \frac{3}{2} = \frac{15}{10} = 1.5 )</td>
<td>b) ( \frac{13}{5} = \frac{26}{10} = 2.6 )</td>
</tr>
<tr>
<td>c) ( \frac{6}{15} = \frac{2}{5} = \frac{4}{10} = 0.4 )</td>
<td>d) ( \frac{13}{20} = \frac{65}{100} = 0.65 )</td>
</tr>
<tr>
<td>e) ( \frac{9}{8} = 1 + \frac{1}{8} = 1 + \frac{125}{1000} = 1.125 )</td>
<td>or ( \frac{11125}{10000} )</td>
</tr>
</tbody>
</table>

30 min

Individual work, monitored, helped
Written on BB or SB or OHT
Differentiation by time limit

Responses shown in unison.
Reasoning, agreement, self-correction praising
Accept any valid method.
### Activity

#### 5

**PbY5b, page 129, Q.2**

**Read:** Write the fractions as decimals. Do necessary calculations in your exercise book.

Which of these fractions are you sure forms a finite decimal and which do you think forms a recurring decimal? Let’s see if you are right!

Ps come to BB to write decimals directly for those they remember, or to do divisions. T helps with long divisions, especially in b). Class agrees/disagrees and writes agreed decimals in Pbs.

**Solution:**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>$\frac{2}{3} = 0.6$ (by memory)</td>
<td>b)</td>
<td>$\frac{5}{13} = 5 \div 13 = 0.38461\ldots$</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>$\frac{15}{6} = \frac{5}{2} = 2 \frac{1}{2} = 2.5$</td>
<td>d)</td>
<td>$\frac{7}{15} = 7 \div 15 = 0.4\overline{6}$</td>
<td></td>
</tr>
<tr>
<td>e)</td>
<td>$\frac{7}{11} = 7 \div 11 = 0.\overline{63}$</td>
<td>f)</td>
<td>$\frac{8}{9} = 0.8$ (by memory or by division)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

Whole class activity
(or individual work, monitored, helped, with b) done with whole class or only by more able Ps)

Written on BB or SB or OHT
Discussion, reasoning, agreement, (self-correction), praising

#### 6

**PbY5b, page 129**

**Q.3** Read: Without doing divisions, circle the fractions which have a finite decimal form.

We have learned that recurring decimals are not exact – the recurring digits repeat and repeat to infinity. What do you think finite decimals are? T asks several Ps what they think.

(Decimals which are exact, or have a definite end point, or when the nominator of the corresponding fraction is divided by the denominator, a remainder of zero is reached eventually)

Set a time limit. Review with whole class. Ps come to BB to circle fractions or dictate which fractions T should circle, explaining reasoning. Who agrees? Who disagrees? Why?

T uncovers already prepared solution, with corresponding decimals written beside fractions. Ps correct their mistakes.

What do you notice about the uncircled fractions? (e.g. their denominators cannot be expanded to 10, 100, 1000, etc.)

**Solution:**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>$\frac{7}{2} = 3 \frac{1}{2} = 3.5$</td>
<td>b)</td>
<td>$\frac{4}{3} = 1 \frac{1}{3} = 1.3$</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>$\frac{18}{20} = \frac{9}{10} = 0.9$</td>
<td>d)</td>
<td>$\frac{12}{15} = \frac{8}{10} = 0.8$</td>
<td></td>
</tr>
<tr>
<td>g)</td>
<td>$\frac{15}{12} = \frac{5}{4} = 1 \frac{1}{4} = 1.25$</td>
<td>h)</td>
<td>$\frac{17}{25} = \frac{68}{100} = 0.68$</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>$\frac{80}{125} = \frac{16}{25} = \frac{64}{100} = 0.64$</td>
<td>j)</td>
<td>$\frac{10}{225} = \frac{2}{45} = 0.04$</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

Individual trial first, monitored
Written on BB or SB or OHT
Discussion on the two types of decimals:
BB: recurring decimals
finite decimals

Ps expand or simplify fractions as necessary in Ex. Bks.

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

Show divisions in detail only if necessary, e.g. in f) and j).
**Activity 7**

**PbY5b, page 129, Q.4**

Read: *Fill in the missing numerators, denominators or numbers.*

Ps come to BB to fill in missing numbers, explaining reasoning. Class agrees/disagrees. Ps write in Pbs too.

Agree that the easiest way to convert fractions to decimals is to express it as 10ths, 100ths or 1000ths, if possible.

Discuss how such times would be described in real life (not normally as decimals – more likely to be fractions).

**Solution:**

a) 3 minutes = \(\frac{3}{60}\) hour = \(\frac{1}{20}\) hour = \(\frac{5}{100}\) hour = \(0.05\) hour

b) 15 minutes = \(\frac{15}{60}\) hour = \(\frac{1}{4}\) hour = \(\frac{25}{100}\) hour = \(0.25\) hour

c) 63 minutes = \(\frac{63}{60}\) hour = \(\frac{21}{20}\) hour = \(\frac{105}{100}\) hour = \(1.05\) hours

d) 6 hours = \(\frac{6}{24}\) day = \(\frac{1}{4}\) day = \(0.25\) day

\(\frac{1}{4}\) day \(\div 2\) \(= 0.125\) day

\(\frac{1}{4}\) day \(\times 5\) \(= 0.625\) day

\(\frac{1}{4}\) day \(\times 5\) \(= 0.625\) day

\(\frac{1}{4}\) day \(\div 2\) \(= 0.125\) day

\(\frac{1}{4}\) day 

\(\frac{1}{4}\) day 

\(\frac{1}{4}\) day 

\(\frac{1}{4}\) day

Extra praise if Ps notice relationships which make the calculation easier.

Feedback for T
Calculation practice, revision, activities, consolidation

**PbY5b, page 130**

**Solutions:**

Q.1  
- a) i) $72 \div 8 = 9$  
  - ii) $7.2 \div 8 = 0.9$  
  - iii) $0.72 \div 8 = 0.09$
- b) i) $49 \div 7 = 7$  
  - ii) $4.9 \div 7 = 0.7$  
  - iii) $0.49 \div 8 = 0.07$
- c) i) $55 \div 5 = 11$  
  - ii) $5.5 \div 5 = 1.1$  
  - iii) $0.55 \div 5 = 0.11$
- d) i) $63 \div 9 = 7$  
  - ii) $6.3 \div 9 = 0.7$  
  - iii) $0.063 \div 9 = 0.007$

Q.2

\[
\begin{array}{c|c|c|c|c}
\text{Fraction} & 0.125 & 0.2 & 0.625 \\
\hline
0.8 & 0.5 & 0.75 \\
0.75 & 0.23 & 0.375 \\
0.625 & 0.2 & 0.75 \\
0.5 & 0.23 & 0.75 \\
0.23 & 0.375 & 0.75 \\
0.125 & 0.75 & 1
\end{array}
\]

Q.3  
- a) $b = 2.35 \times 2 = 4.70 \text{ m} = 4.7 \text{ m}$
- b) $P = (4.7 \text{ m} + 2.35 \text{ m}) \times 2$
  
  \[= 7.05 \times 2 = 14.10 \text{ m} = 14.1 \text{ m}\]
  
  or $P = 2.35 \times 6 = 14.10 \text{ m} = 14.1 \text{ m}$

Q.4  
- a) 16:30 hours $\rightarrow$ 36.9°C  
  - 17:30 hours $\rightarrow$ 37.3°C  
  - 18:30 hours $\rightarrow$ 37.7°C  
  - 19:30 hours $\rightarrow$ 38.1°C  
  - 20:00 hours $\rightarrow$ 38.3°C  
  (as $t$ rises 0.2°C in half an hour)

or $t = 36.9 + (20 - 16.5) \times 0.4 = 36.9 + 3.5 \times 0.4$
  
  \[= 36.9 + 0.35 \times 4\]
  
  \[= 36.9 + 1.4 = 38.3 \text{ (°C)}\]

*Answer:* Ben's temperature at 20:00 hours was 38.3°C.

- b) Cost of 10 apples: £0.35 × 10 = £3.50
  
  Cost of 8 pears: £0.70 × 8 = £5.60
  
  Total cost: £9.10
  
  or ( £0.35 × 10) + (£0.35 × 2 × 8) = £3.50 + £5.60
  
  \[= £9.10\]

*Answer:* Suzy paid £9.10 altogether.

- c) $(13 \text{ m} - 2.5 \text{ m}) \div 6 = 10.5 \div 6 = 1.75 \text{ m}$

*Answer:* Each piece of string was 1.75 m long.

---

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<table>
<thead>
<tr>
<th>Lesson Plan 131</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td>Whole class activity</td>
</tr>
<tr>
<td>Encourage creativity</td>
</tr>
<tr>
<td>At a good pace</td>
</tr>
<tr>
<td>Class checks the responses.</td>
</tr>
<tr>
<td>BB: to define</td>
</tr>
<tr>
<td>to describe exactly</td>
</tr>
<tr>
<td>Reasoning, agreement, praising</td>
</tr>
</tbody>
</table>

### Week 27

#### MEP: Primary Project

**Y5**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td><strong>Defining numbers</strong></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td><strong>Numbers Venn diagram</strong></td>
</tr>
<tr>
<td><strong>3</strong></td>
<td><strong>Ratio</strong></td>
</tr>
</tbody>
</table>

#### Notes

- **R:** Fractions
- **C:** Ratio. Percentage. Chance or probability of certain events
- **E:** Probability as a percentage

---

**1 Defining numbers**

T writes the number 131 on the BB. Tell me different ways of describing this number **exactly** so that it could not possibly be any other number.

(e.g. 13 tens and 1 unit; 1 hundred and 13 units; 60 less than 200; 3-digit number between 130 and 140 which has the same digit in the hundreds and units column; half of 262, etc.)

T: We say that such examples **define** the number.

If Ps suggest a general description such as:

- prime number: gives a remainder of 2 after division by 3; odd number, etc.
- T asks rest of class if the description could be applied to other numbers too and if so, Ps give examples. What additional information do we need so that the description can apply only to 131?

(e.g. the next prime number after 127; gives a quotient of 43 and a remainder of 2 after division by 3; the next nearest odd number greater than 129, etc.)

**8 min**

**2 Numbers Venn diagram**

T has Venn diagram and numbers already on BB.

Let's write these numbers in the correct set. P come to BB to write (place) numbers in appropriate sets, saying what type of number it is. Class agrees/disagrees.

BB:

- 5, \(\frac{2}{3}\), 10.6, –71,
- \(-\frac{4}{5}\), 0, –0.80,
- \(\frac{70}{10}\), –1.333 . . .

What do you notice about the diagram? (Two sets are empty because they are impossible; e.g. a number is either negative or not negative, it can't be both; there is no number which is neither negative nor not negative.) Who can draw a better diagram without these impossible sets? P comes to BB to draw new diagram (with T's help).

**14 min**

**3 Ratio**

Study these shapes.

BB: \(\bigcirc\bigcirc\bigcirc\bigcirc\square\square\square\square\square\)

- a) What part of the shapes are circles? (3 out of 8, so \(\frac{3}{8}\))
- b) What part of the shapes are squares? (5 out of 8, so \(\frac{5}{8}\))
- c) What is the **ratio** of circles to squares? (3 to 5)
- d) What is the **ratio** of squares to circles? (5 to 3)

How do we write ratios? P's come to BB or T reminds Ps if necessary. We can also write the ratios using fractions, like this. (BB) Both ways mean the same.

**18 min**
**Lesson Plan 131**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td>Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Whole class activity Elicit that there are 10 marbles in the bag altogether and each marble has an equal chance of being picked. (i.e. they are the same size and mass, so the different colours cannot be identified by touch). Discussion, reasoning, agreement, praising Ps could show what they think by writing appropriate responses on scrap paper or slates, or by pre-agreed actions, and Ps with different responses explain reasoning. Class decides who is correct.</td>
</tr>
</tbody>
</table>

**Probability**

T puts 4 white marbles, 1 red marble and 5 blue marbles into an opaque bag and shakes the bag so that the marbles are mixed up.

T chooses 6 Ps to come to front of class one at a time to take a marble out of the bag with their eyes closed. Before they do so, they predict the colour of the marble. If correct, class gives them a clap. Each P puts the marble back in the bag and shakes the bag again before the next P makes a prediction and repeats the procedure.

Let’s see what you think about these questions.

a) *Is it possible that the red marble could be taken out 5 times in a row?*

(Yes, it is *possible* but it would have a very small chance of happening.)

b) *Which colour of marble do you think has the greater chance of being taken out?*

(A blue marble has more chance of being taken out, as there are more of them.)

c) *Can you be certain that out of 10 experiments, a blue marble would be taken out most frequently?*

(No, it is not certain, as the red marble or a white marble could be chosen each time but blue is the most likely.)

d) *After 10 experiments, which colour do you think will be taken out more frequently, a red or a white marble?*

(A white marble, as there are more of them.)

---

**Lesson Plan 131**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td>Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, self-correction, praising</td>
</tr>
<tr>
<td><strong>5</strong></td>
<td>Whole class activity Elicit that there are 10 marbles in the bag altogether and each marble has an equal chance of being picked. (i.e. they are the same size and mass, so the different colours cannot be identified by touch). Discussion, reasoning, agreement, praising Ps could show what they think by writing appropriate responses on scrap paper or slates, or by pre-agreed actions, and Ps with different responses explain reasoning. Class decides who is correct.</td>
</tr>
</tbody>
</table>

---

**Activity**

4. **PbY5b, page 131**

Q.1 Read: *In a group of children, there are 8 boys and 12 girls. Write the parts and ratios required.*

Deal with one part at a time. Ps read the questions themselves and write the ratio or fraction.

Review with whole class. Ps could show results on scrap paper or slates on command. Ps responding correctly explain to Ps who were wrong. Mistakes discussed and corrected. Elicit the simplified forms.

What would the parts and ratios be as percentages? Ps do calculations in Ex. Bks. then dictate to T. Class agrees/disagrees.

T asks Ps to put the percentages into a sentence to make sure that they understand what they mean. (e.g. '40% of the group are boys.' or 'The number of boys is about 66.7% of the number of girls.')[

**Solution:**

a) *What is the ratio of boys to girls?* (B : G = 8 : 12 = 2 : 3)

b) *What part of the group is boys?* \( \frac{8}{20} = \frac{2}{5} \)

c) *What is the ratio of girls to boys?* (G : B = 12 : 8 = 3 : 2)

d) *What part of the group is girls?* \( \frac{12}{20} = \frac{3}{5} \)

24 min

---

**Activity**

5. **Probability**

T puts 4 white marbles, 1 red marble and 5 blue marbles into an opaque bag and shakes the bag so that the marbles are mixed up.

T chooses 6 Ps to come to front of class one at a time to take a marble out of the bag with their eyes closed. Before they do so, they predict the colour of the marble. If correct, class gives them a clap. Each P puts the marble back in the bag and shakes the bag again before the next P makes a prediction and repeats the procedure.

Let’s see what you think about these questions.

a) *Is it possible that the red marble could be taken out 5 times in a row?*

(Yes, it is *possible* but it would have a very small chance of happening.)

b) *Which colour of marble do you think has the greater chance of being taken out?*

(A blue marble has more chance of being taken out, as there are more of them.)

c) *Can you be certain that out of 10 experiments, a blue marble would be taken out most frequently?*

(No, it is not certain, as the red marble or a white marble could be chosen each time but blue is the most likely.)

d) *After 10 experiments, which colour do you think will be taken out more frequently, a red or a white marble?*

(A white marble, as there are more of them.)
(Continued)

c) If we repeated the experiment 1000 times, about how many times would you expect to take out a white marble?
Show me . . . now! (400 times)
P responding correctly explains reasoning to class, with T’s help if necessary. (e.g. The number of white marbles is 4 tenths of the total number of marbles in the bag, so after 1000 experiments we would expect to take out a white marble 4 tenths of 1000 times, which is 400 times.)

What percent of times would you expect to take out a white marble? (40%)

f) How many marbles do we need to take out of the bag without putting any back to be certain of taking out at least one white marble?
Show me . . . now! (7)
Ps responding correctly explain reasoning to class. (The first 5 marbles could all be blue and the next marble could be the red one, but the 7th marble must be white, as only white marbles are left in the bag.)

34 min

PbY5b, page 131

Q.2 Read: Answer the questions by writing a ratio or a fraction, as required.

Deal with one block of questions at a time. Ps read questions themselves and write answer in Pbs. Set a time limit.

Review with whole class. Ps could show results on scrap paper or slates on command. Ps with different responses explain reasoning. Class decides who is correct. Mistakes discussed and corrected.

Extension

T could ask more able Ps for parts and ratios as percentages too.

Solution:

In a group of students at a youth camp, 3 are Americans, 4 are British and 1 is Greek.

a) i) What part of the group is American?

\[
\frac{3}{8} \quad \text{[= } \frac{375}{1000} \quad \text{]} \rightarrow \quad 37.5\%
\]

b) What is the ratio in the group of:

i) American students to British students (3 : 4)

ii) American students to Greek students (3 : 1)

iii) British students to American students (4 : 3)

iv) British students to Greek students (4 : 1)

v) Greek students to American students (1 : 3)

vi) Greek students to British students? (1 : 4)

Other forms for ratios in b):

i) \(\frac{A}{B} = \frac{3}{4} = \frac{75}{100} \rightarrow 75\%
\)

ii) \(\frac{A}{G} = \frac{3}{1} = \frac{300}{100} \rightarrow 300\%
\)

iii) \(\frac{B}{A} = \frac{4}{3} = 1 \frac{1}{3} \rightarrow
\left(100 + \frac{100}{3}\right)\% = 133 \frac{1}{3}\%
\)

iv) \(\frac{B}{G} = \frac{4}{1} = \frac{400}{100} \rightarrow 400\%
\)

v) \(\frac{G}{A} = \frac{1}{3} \rightarrow 33 \frac{1}{3}\%
\)

vi) \(\frac{G}{B} = \frac{1}{4} = \frac{25}{100} \rightarrow 25\%
\)
Activity 6

(Continued)

c) The group is going on a trip in a minibus. They get on the bus in a random order. How certain are you of these events occurring?

If you think that it is certain to happen, write C, if you think that it is possible but not certain, write P and if you think that it is impossible, write I.

i) The first 4 students to get on the bus are American. (I)

(There are only 3 Americans.)

ii) The last student to get on the bus is American or British or Greek. (C)

(No other nationality is getting on the bus.)

iii) The first student to get on the bus is Greek (P)

(but has a very small chance of happening as only 1 Greek)

[Elicit that the chance is 1 out of 8, or \( \frac{1}{8} \) or 0.125%]

iv) The first 4 students to get on the bus are an American, a Greek, an American and a British student in that order. (P)

(but a very small chance of happening)

v) Two Americans, a British and the Greek student are the first four to get on the bus. (P)

(Again, a very small chance of happening)

d) i) Which nationality is the most likely to get on the bus first?

(British, as there are more of them)

[Elicit that the chance is 4 out of 8, or \( \frac{4}{8} = \frac{1}{2} \rightarrow 50\% \)]

ii) Is the first student to get on the bus more likely to be American or British?

(British, as there are more of them; or as the ratio of B to A is 4 : 3; or

Chance of the student being American: \( \frac{3}{8} \)

Chance of the student being British: \( \frac{4}{8} \), and \( \frac{4}{8} > \frac{3}{8} \)

45 min
R: Numbers. Calculations

C: Positive and negative numbers. Debt and cash

E: Problems

Activity

1

Defining numbers

T writes the number 132 on BB

a) Let’s define this number. (i.e. describe it exactly)

T gives an example first if necessary, then Ps dictate their own.

Class checks that they are correct and that the description does not fit any other number.

(e.g. 132% of 100; 1 third of 396; 11 × 12; 2 × 2 × 3 × 11; half of 264; 100 + 32; the 133rd number from 0; 1000 – 868, etc.)

Elicit the difference between defining a number (which relates only to that number) and saying a true statement about the number (which can also be true for other numbers too).

b) Tell me true statements about the number 132.

(e.g. It is even. It has 3 digits. It is divisible by 6. It is not a multiple of 5. It is a factor of 396. It is not a prime number. etc.)

8 min

2

Ratio

What can you tell me about this rectangle? BB: [Illustration]

(Divided into 10 equal parts; 4 of the parts are shaded.)

Who can write different ratios about it? Ps come to BB or dictate what T should write, explaining reasoning. (If necessary, T gives first ratio as an example for Ps to follow.)

Ratio of: Shaded to White: 4 : 6 = 2 : 3

White to Shaded: 6 : 4 = 3 : 2

Shaded to the whole: 4 : 10 = 2 : 5

White to the whole: 6 : 10 = 3 : 5

8 min

3

PbY5b, page 132

Q.1 Read: Write the ratios between the shaded and white parts and the whole square.

Set a time limit or deal with one at a time. More able Ps can be asked to write the ratios as fractions, decimals and percentages too.

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

Solution:

a) to : 34 : 66 = 17 : 33 = 0.51 → 52%

b) to : 66 : 34 = 33 : 17 = 1.9412

c) to the whole: 34 : 100 = 17 : 50 = 0.34 → 34%

d) to the whole: 66 : 100 = 33 : 50 = 0.66 → 66%

18 min

Notes

Whole class activity
At a good pace
in good humour!
Reasoning, agreement, praising

Encourage creativity.
Extra praise for unexpected definitions or statements
Feedback for T.

Whole class activity
Drawn (stuck) on BB or SB or OHT
Reasoning, agreement, praising
Feedback for T
[or = 0.666 . . . → 66.7 %]

Extension
T asks Ps to express the ratio as a fraction, decimal and percentage. Show calculations on BB. e.g.

Discussion, reasoning, agreement, self-correction, praising

T (Ps) can use a calculator to do difficult divisions.
**Y5**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td>Let's consider whether these events are certain, possible but not certain, or impossible. Show me what you think when I say.</td>
</tr>
<tr>
<td>a) <strong>There will be a 29th of February in the year 2004.</strong> (C)</td>
<td></td>
</tr>
<tr>
<td>(2004 will be leap year, so will have an extra day)</td>
<td></td>
</tr>
<tr>
<td>[Accept possible if a P reasons that the world might end before 29 February 2004!]</td>
<td></td>
</tr>
<tr>
<td>b) <strong>More girls than boys will be born next year.</strong> (P)</td>
<td></td>
</tr>
<tr>
<td>(Over several years, on average, the same number of boys as girls are born but it might not necessarily happen next year.)</td>
<td></td>
</tr>
<tr>
<td>c) <strong>If I throw a dice, I will get a 7.</strong> (I)</td>
<td></td>
</tr>
<tr>
<td>(A dice has only the numbers 1 to 6)</td>
<td></td>
</tr>
<tr>
<td>d) <strong>If I take 12 marbles from a bag containing 10 black marbles and 20 white marbles, I will have taken out at least one white marble.</strong> (C)</td>
<td></td>
</tr>
<tr>
<td>(The first 10 marbles could all be black but the 11th and 12th must be white, as only white marbles are left in the bag.)</td>
<td></td>
</tr>
</tbody>
</table>

**Q.2** Read: *How certain of these events occurring? Write C for certain, P for possible but not certain, or I for impossible.*

Set a time limit. Ps write appropriate letters in the boxes.

Review with whole class. Ps could show initial letters on scrap paper or slates, or use probability cards. Ps with different responses explain reasoning. Class decides who is correct. Mistakes discussed and corrected.

**Solution:**

a) **The next Olympic Games will be in the year 2004.** (C)

b) **The next time I throw a dice I will get a 5.** (P)

c) **The next time I throw a dice I will get a 0.** (I)

d) **Next year, the number of boys born will be twice the number of girls** (P)

a) **Next year, fewer boys than girls will be born.** (P)

| 23 min |

**PbY5b, page 132**

| 5 |

Listen carefully, note the data and think about how you would solve this problem.

In a bag of marbles, the ratio of red marbles to green marbles is 2 : 5. There are 6 red marbles in the bag.

a) How many green marbles are there?

b) How many marbles are in the bag altogether?

Ps come to BB or dictate to T, explaining reasoning. Who agrees? Who thought of another way to do it? etc. T suggests some ways too.

**BB:**

a) \( R : G = 2 : 5 \), so \( R = \frac{2}{5} \) of \( G = 6 \), \( G = 6 \div 2 \times 5 = 15 \)

**29 min**

| 6 |

Listen carefully, note the data and think about how you would solve this problem.

**Problem**

<table>
<thead>
<tr>
<th>Lesson Plan 132</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td>Whole class activity</td>
</tr>
</tbody>
</table>

Ps could have probability cards on desks, or write C, P or I on slates or scrap paper and show in unison on command.

T asks Ps with different responses to explain their reasoning. Class decides if they are correct or not.

In good humour!

Reasoning, agreement, praising, encouragement only

Feedback for T

Individual work, monitored, (helped)

Reasoning, agreement, self-correction, praising

More Ps might write P in a) after the discussion in Activity 4a!

but very unlikely!

**Whole class activity**

T repeats slowly and a P repeats in own words to give Ps time to think and write.

Discussion, reasoning, agreement, praising

Ps write the different plans in Ex. Bks.

or \( R : G = 2 : 5 = 6 : 15 \) or Ps might draw a diagram, as below, or use algebra.

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### Activity

#### 6 (Continued)

b) Total number of red and green marbles in the bag:

\[ R + G = 6 + 15 = 21\]

or \[ \frac{2}{7} \rightarrow 6; \quad \frac{1}{7} \rightarrow 3; \quad \frac{7}{7} \rightarrow 21\]

So there are 21 marbles in the bag if the bag contains only red and green marbles – but there could be other colours too!

---

### Notes

- **Lesson Plan 132**
- **Y5**

#### P6Y5b, page 132

Q.3 Read: A group of children is visiting a museum. In the group, there are 12 girls and the ratio of girls to boys is 3 to 2.

Set a time limit for a) to c). Ps read questions themselves, and solve them. Ps may calculate in Ex. Bks. if they need more room.

Review with whole class. Ps come to BB or dictate what T should write, explaining reasoning. Who agrees? Who thinks something else? etc. Mistakes discussed and corrected.

**Solution:**

a) How many boys are in the group?

\[ G : B = 3 : 2 = 12 : 8\]

(or \[ G = \frac{3}{2} \text{ of } B = 12; \quad B = 12 + 3 \times 2 = 8\]

b) How many children are in the group?

No. of children: \[ 8 + 12 = 20\]

c) If the children enter the museum in a random order, underline the outcome which you think is more likely to occur.

i) A boy enters first. ii) A girl enters first.

(As there are more girls than boys.)

d) What do you think is the probability of each of the outcomes in c) occurring?

Elicit /tell Ps that probability means chance. If an outcome is impossible and has no chance of happening, what do you think its probability is? (0) (BB)

If an outcome is certain to happen, what do you think its probability is? (1, as 4 chances out of 4, or 10 chances out of 10, or 100 chances out of 100, etc. is equivalent to 1) (BB)

If an outcome is possible but not certain, how could we write its probability? Ps come to BB or dictate inequality to T.

What kind of numbers are more than 0 and less than 1? (fractions or decimals)

Let’s write the probability of each of these outcomes.

i) A boy enters first. \[ p = \frac{8}{20} = \frac{2}{5}\]

ii) A girl enters first. \[ p = \frac{12}{20} = \frac{3}{5}\]

---

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### Y5

#### Activity 8

<table>
<thead>
<tr>
<th>Lesson Plan 132</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PbY5b, page 132, Q.4</strong></td>
</tr>
<tr>
<td>Read: <em>In a bag there are 50 marbles altogether. The marbles are either black or white. The ratio of black marbles to white marbles is 1 : 4.</em></td>
</tr>
<tr>
<td>a) <strong>How many marbles are there of each colour?</strong></td>
</tr>
<tr>
<td>How many:</td>
</tr>
<tr>
<td>i) <em>black</em> marbles are there? Show me . . . now! (10)</td>
</tr>
<tr>
<td>(1 out of 5 or ( \frac{1}{5} ) is <em>black</em>.) ( \frac{1}{5} ) of 50 = 50 ÷ 5 = 10</td>
</tr>
<tr>
<td>ii) <em>white</em> marbles are there? Show me . . . now! (40)</td>
</tr>
<tr>
<td>(4 out of 5 or ( \frac{4}{5} ) are <em>white</em>.) ( \frac{4}{5} ) of 50 = 50 ÷ 5 × 4 = 40</td>
</tr>
<tr>
<td>b) <strong>If you take a marble out of the bag with your eyes shut, what is the probability that it will be white?</strong></td>
</tr>
<tr>
<td>Show me . . . now! (( \frac{4}{5} ))</td>
</tr>
<tr>
<td>(40 chances out of 50, so 4 chances out of 5)</td>
</tr>
<tr>
<td>Elicit the probability as a percentage too.</td>
</tr>
<tr>
<td>BB: ( P = \frac{4}{5} = \frac{40}{50} = \frac{80}{100} \rightarrow 80% )</td>
</tr>
</tbody>
</table>

| Notes |
| Whole class activity but individual calculation (or individual trial first if Ps prefer) |
| Responses shown on scrap paper or slates in unison. |
| Ps with different answers explain reasoning to class. |
| Class decides who is correct. |
| Agree that the ratio BB: B : W = 1 : 4 means that out of every 5 marbles, 1 will be *black* and 4 will be *white*; i.e. the no. of *black* marbles is *quarter* of the number of *white* marbles but is *fifth* of the total number of marbles. |
| Ps write agreed results in *Pbs*. |
| Praising |
### Y5 Lesson Plan

**Week 27**

**Activity 1**

**Numbers**

T writes the number 133 on BB.

b) Let's factorise 133.

What does factorise mean? (To break down a number into its prime factors.) What is a factor of a number? (A number which divides into that number exactly) What is a prime factor? (A factor which is a prime number, i.e. is exactly divisible only by itself and 1)

How can we factorise 133? (e.g. 133 is an odd number, so has no even prime factors; there is no 5 or 0 in the units column, so 5 is not a prime factor. Divide by 3, 7, etc. in turn to see if there is a remainder. We do not need to go past 11, as $11 \times 12 = 132$.)

T points out that factors are whole numbers, so we do not continue the division beyond the units column. Elicit or remind Ps that every number has the factors 1 and the number itself.

b) Let's define this number. (i.e. describe it exactly)

Ps dictate definitions and class checks that they are correct and that the description is unique to 133.

(e.g. the 67th positive odd number; $111 \times 3 – 200$; $\frac{1}{3}$ of 399; $50\%$ of 266; $133\%$ of 100; $266\%$ of 50; $\frac{1}{10}$ of 1330; $100 \times 1.33$, etc.)

8 min

**Ratio**

In this box are 3 black pencils, 1 red pencil and 4 green pencils.

Let's write different ratios about the pencils.

Ps come to BB or dictate what T should write. Class agrees/disagrees. T asks Ps to give the ratios in other forms too.

BB: e.g.

- **Ratio of:** $B : R = 3 : 1$ ($= 3 \times 3 \rightarrow 100\%$)
  - $B : G = 3 : 4$ ($= \frac{3}{4} = \frac{75}{100} \rightarrow 75\%$)
  - $R : B = 1 : 3$ ($= \frac{1}{3} \rightarrow 33\frac{1}{3} = 33.3\% = 33\%$)
  - $R : G = 1 : 4$ ($= \frac{1}{4} = \frac{25}{100} \rightarrow 25\%$)
  - $G : B = 4 : 3$ ($= \frac{4}{3} = \frac{1}{3} \rightarrow 133\frac{1}{3} = 133.3\% = 133\%$)
  - $G : R = 4 : 1$ ($= 4 \times 4 \rightarrow 400\%$)

or, e.g.

- **B : (R or G) = 3 : 5** ($= \frac{3}{5} = \frac{60}{100} \rightarrow 60\%$)
  - **R or G : B = 5 : 3** ($= \frac{5}{3} = \frac{1}{2} \rightarrow 166\frac{2}{3} = 166.6\%$) etc

or, e.g.

- **B : All pencils = 3 : 8** ($= \frac{3}{8} = \frac{375}{1000} \rightarrow 37.5\%$)
  - **R : All pencils = 1 : 8** ($= \frac{1}{8} = \frac{125}{1000} \rightarrow 12.5\%$, etc.

18 min

### Notes

Whole class activity
Quick revision of how to factorise.

Discussion, reasoning, agreement, praising

Ps tell their ideas. T gives hints if Ps have forgotten how to factorise numbers.

BB: $\frac{133}{719} = 7 \times 19$

Factors: 1, 7, 19, 133

At a good pace
Encourage creativity
Extra praise for unexpected but correct definitions

Whole class activity
T has real pencils to show.

At a good pace
Encourage logical listing.

T could start each new type if Ps do not suggest it and Ps dictate the other similar ratios.

Reasoning, agreement, praising

Ps can work out recurring decimals and percentages with a calculator.

or, e.g.

- **(B or R) : All = 4 : 8**
  - ($= \frac{4}{8} = \frac{1}{2} = 50\%$)

- **(B or G) : All = 7 : 8**
  - ($= \frac{7}{8} = \frac{875}{1000} = 87.5\%$)

or **B : R : G = 3 : 1 : 4**

Agree that a 3-part ratio cannot be given as a fraction, decimal or percentage.
Activity

3

Possible outcomes: tossing a coin

If I toss this coin, how many possible outcomes could there be?
Ps come to front of class to toss the coin a few times.
What different outcomes did you see? (The coin landed Head up, or the coin landed Tail up.)
Did anyone’s coin land on its edge? (No) Is it possible for a coin to land on its edge? T asks several Ps what they think. Class might agree that you can imagine it happening but in practice it does not happen unless the coin lands leaning against something, which does not count.
Let’s assume that tossing a coin always gives either a Head or a Tail, so there are 2 possible outcomes.
What chance do you think these outcomes have? Do they have an equal or unequal chance of happening? Agree that if a normal coin is used, H or T has an equal chance of occurring. (Some Ps might know of biased or unfair coins, which are weighted so that they land more often on one side than on the other.)
T: When we toss a coin, we assume that it is a normal (unbiased or fair) coin and has only 2 possible outcomes, H or T, and each outcome has an equal chance of happening.

22 min

4

PbY5b, page 133

Q.1 Read: Predict the result for each outcome first, then do the experiment. Toss a coin 20 times and note how it lands in this table.

Elicit/explain what a prediction means. (If you toss the coin 20 times, how many times do you think it will land on a Head and how many times do you think it will land on a Tail?)
Ps fill in their predictions first, then do the experiment, making a tally mark in either the Heads row or the Tails row for each toss. Keep class together on the 20 tosses.
Then Ps count their totals and check that they add up to 20.

e.g.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Prediction</th>
<th>Tosses</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>10</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</td>
<td>9</td>
</tr>
<tr>
<td>Tail</td>
<td>10</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</td>
<td>11</td>
</tr>
</tbody>
</table>

Read: What fraction of your tosses resulted in:

a) a Head
b) a Tail?

Ps write fractions in Pbs, then T asks some Ps to report on their experiment and to compare their predictions with what actually happened. Agree that the 2 fractions should add up to 1.
Let’s collect the data from everyone and write it in this table. How many Ps are in the class? (e.g. 25) If each pupil tossed the coin 20 times, how many tosses were there altogether? (e.g. $25 \times 20 = 500$) Ps fill in appropriate column in table.
T quickly asks each P in turn to say their totals for Heads and Tails and writes it on BB. P’s keep a running total in Ex. Bks. (or use a calculator). After checking that the two totals add up to the total number of tosses, Ps write class totals in table in Pbs.

Individual prediction and experiment, monitored, (helped)
Tables drawn on BB or use enlarged copy master or OHP T might ask some Ps for their predictions. (Accept unequal predictions too but say that we will wait for the results of the experiment to see who is correct.)
At a fast pace P finished first could write his or her data on table on BB.

Individual work, monitored
e.g. Head: $\frac{9}{20}$ Tail: $\frac{11}{20}$
Discussion, reasoning, agreement, praising

Whole class activity T works on BB, Ps in Pbs.
(If totals do not add up correctly, T in good humour says that some one has made a mistake and adjusts the figures appropriately.)
We call the total number of times a Head was tossed its frequency. What is the ratio of the frequency of a Head (Tail) to the total number of throws? Ps come to BB or dictate to T.

(e.g. No. of Heads : No. of tosses = 252 : 500
No. of Tails : No. of tosses = 248 : 500)

We call this ratio the relative frequency. It means how frequently a Head or Tail was thrown compared with (relative to) the total number of throws.

Write the ratio or relative frequency in the table in your Pbs as a fraction and as a percentage. (Ps may use calculators to work out the percentages.)

If necessary, calculate the percentages with the whole class, eliciting each step. (Divide the numerator by the denominator, then multiply by 100.).

BB: e.g. $\frac{252}{500} = 2.52 \div 5 = 0.504 = 50.4\%$

$\frac{248}{500} = 248 \div 500 = 248 \div 5 = 0.496 = 49.6\%$

Review completed table with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected. What do you notice? (Percentages are almost equal.)

BB: e.g.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Number of tosses</th>
<th>Totals (frequency)</th>
<th>Ratio (relative frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>500</td>
<td>252</td>
<td>252/500 = 50.4%</td>
</tr>
<tr>
<td>Tail</td>
<td>248</td>
<td>248</td>
<td>248/500 = 49.6%</td>
</tr>
</tbody>
</table>

Read: *What do you think is the probability of tossing:*

a) a Head   b) a Tail?

Ps could show on scrap paper or slates on command. Ps with different answers explain reasoning. Class decides who is correct. Ps write agreed fractions in Pbs.

(There are only 2 possible outcomes, H or T, and assuming that the coin is unbiased, each outcome will have an equal chance of occurring. So each will have a probability of 1 chance out of 2 or 1 half or 50%.)

If some Ps’ individual data and the class data do not match this probability, T points out that the more times the experiment is done, the closer the actual data will get to the calculated probability.

[T might mention that after lots of such experiments using Euros, it was found that the coins were biased, as the relative frequencies of the two sides were never equal!]

---

BB: frequency

BB: relative frequency

Whether or not Ps use calculators depends on the difficulty of the division.

(Remind Ps that reducing the dividend and divisor by the same number of times does not change the quotient.)

Discussion, reasoning, agreement, (self-correction), praising

(Ps who disagreed before might now agree that throwing a Head and throwing a Tail have an equal chance of happening.)

Reasoning, agreement, praising

BB: Probability of:

a) Head: $\frac{1}{2}$  b) Tail: $\frac{1}{2}$

(If possible, use a computer simulation of tossing coins now, or in Lesson 135, to show that the more times a coin is tossed, the nearer the actual outcomes are to the predicted probability.)

---

32 min
**Activity**

5  
**Possible outcomes: throwing a dice**
If we throw a dice, what possible outcomes could there be?  
Let’s try it! Ps throw a dice several times (on desks and/or at front of class). What different outcomes did you see? (The dice landed showing 1, 2, 3, 4, 5 or 6 facing up.)

Did anyone’s dice land on an edge or vertex? (No) Is it possible for a dice to land on an edge or vertex? T asks several Ps what they think. Class might agree that you can imagine it happening but in practice it does not happen unless the dice lands leaning against something, which does not count.

Let’s assume that a dice always lands with 1, 2, 3, 4, 5 or a 6 facing up, so there are 6 possible outcomes.

What chance do you think these outcomes have? Do they have an equal or unequal chance of happening? Elicit that as a dice is usually a cube and is symmetrical, each of the numbers should have an equal chance of being thrown.

T: When we throw a dice, we assume that it is a normal (unbiased or fair) dice and has 6 possible outcomes, 1, 2, 3, 4, 5 or 6, and each outcome has an equal chance of occurring.

<table>
<thead>
<tr>
<th>Prediction Outcome</th>
<th>Tally of 20 throws</th>
<th>Totals (frequency)</th>
<th>Ratio (relative frequency)</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>4</td>
<td>4/20 = 0.20 = 20%</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>4</td>
<td>4/20 = 0.20 = 20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

(20)  
(20)  
(100%)

Read: *Collect the class data and fill in this table.*

First agree on total number of throws. (e.g. if 25 Ps in class, and 20 throws each, then number of throws: 25 × 20 = 500)

Ps dictate their results for each outcome and T writes on BB. Ps keep count in Ex. Bks and/or T chooses Ps to keep a running total for each outcome on a calculator as a check. After checking that the 6 totals add up to 500, Ps write agreed frequencies in class data table on BB and in Pbs.

6  
**PbY5h, page 133**

Q.2 Read: *Predict the results for each outcome first, then do the experiment. Throw a dice 20 times and note how it lands in this table.*

Ps make predictions (checking that they add up to 20) and throw a dice 20 times. If possible, keep Ps together at each throw. Ps check that they have made 20 tally marks altogether.

Then Ps write totals in frequency column in table and calculate the ratios (relative frequencies) as fractions and percentages.

P finished first could write his or her results in table on BB.

T asks some Ps to report their results to class and to compare their actual results with their predictions.

<table>
<thead>
<tr>
<th>Prediction Outcome</th>
<th>Tally of 20 throws</th>
<th>Totals (frequency)</th>
<th>Ratio (relative frequency)</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>4</td>
<td>4/20 = 0.20 = 20%</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>3</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>3</td>
<td>3/20 = 0.15 = 15%</td>
<td>15%</td>
</tr>
<tr>
<td>4</td>
<td>[ ] [ ] [ ] [ ]</td>
<td>4</td>
<td>4/20 = 0.20 = 20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

(20)  
(20)  
(100%)

Read: *Collect the class data and fill in this table.*

First agree on total number of throws. (e.g. if 25 Ps in class, and 20 throws each, then number of throws: 25 × 20 = 500)

Ps dictate their results for each outcome and T writes on BB. Ps keep count in Ex. Bks and/or T chooses Ps to keep a running total for each outcome on a calculator as a check. After checking that the 6 totals add up to 500, Ps write agreed frequencies in class data table on BB and in Pbs.

**Notes**

Whole class activity  
If possible, Ps have dice on desks too.

Discussion, agreement, praising

BB: *Dice*  
6 outcomes: 1, 2, 3, 4, 5 or 6

(Again, some Ps might not agree because of their experience of board games where throwing a 6 is required to start or finish, or because they have used an unfair dice.)

Individual work, closely monitored, helped, corrected  
Tables drawn on BB or use enlarged copy master or OHP  
At a fast pace  
Calculations can be done in Ex Bks. or Ps may use a calculator for the percentages. T helps where necessary.

Elicit that relative frequency is the ratio of the number of times a certain number is thrown (frequency) compared with (relative to) the total number of throws.

BB: \[ \frac{4}{20} = \frac{20}{100} \rightarrow 20\% \], etc.

Praising, encouragement only

Whole class activity  
T writes in table on BB and Ps write in Pbs.  
Deal with one outcome at a time.  
At a fast pace.  
In good humour!
Calculate the ratios (relative frequencies) as fractions and percentages with the whole class. Ps come to BB or dictate what T should write, explaining reasoning. Class agrees/disagrees. Check on a calculator. Ps fill in table in Pbs too. e.g.

**Outcome** | **Number of throws** | **Totals** (frequency) | **Ratio** (relative frequency) | **Percentage**
---|---|---|---|---
1 | 81 | 81/500 | 16.2%
2 | 85 | 85/500 | 17.0%
3 | 82 | 82/500 | 16.4%
4 | 84 | 84/500 | 16.8%
5 | 83 | 83/500 | 16.6%
6 | 85 | 85/500 | 17.0%

What do you notice about the percentages in this table compared with your table? (They are closer together.) Why do you think that is so? (We have collected lots more data.)

Read: *What do you think is the probability of throwing a: 1, 2, 3, 4, 5 or 6?*

Ps write fractions in Pbs. A, what did you write for each one? Why? Who agrees? Elicit that each number has a probability of 1 sixth. (6 possible outcomes, each with an equal chance of happening, so each outcome has a probability of 1 sixth.)

Read: *Divide 100% by 6. What does it have to do with the experiment?*

Ps do the division in Ex. Bsks. T gives them time to consider the question, then asks several Ps what they think. e.g.

BB: 100% ÷ 6 = \( \frac{2}{3} \times \frac{100}{6} = 16.6\% \) and \( \frac{1}{6} \rightarrow 16.6\% \)

which is the chance of each outcome. Agree that the percentages in the table are all very close to 16.6%.

Why do you think that the ratios from our experiment are not exactly 16.6% or \( \frac{1}{6} \)? (We still do not have enough data – we need to do the experiment thousands of times.)

T: The more times we throw the dice, the closer the actual outcomes will be to the outcomes we expect.

**Elicit that to change a fraction into a percentage, express it as 100ths if possible, or divide the numerator by the denominator and multiply by 100.**

If percentages are difficult because of the number of Ps in the class, use a calculator.

Reasoning agreement, praising
At a good pace

Ps check that the total for each column is correct.

Discussion, agreement

Or Ps write fraction on scrap paper or slates and show in unison on command.

Discussion, reasoning, agreement, praising
If Ps do not see the connection, T points it out.
(1 out of 6 times is the same as 16 and 2 thirds times out of 100.)

If possible, T shows a computer simulation of throwing a dice in Lesson 135.
### Activity

#### Numbers

T writes the number **134** on BB.

a) Let's factorise 134 and list all its factors.

Ps come to BB or dictate to T. Class agrees/disagrees.

BB: $134 = 2 \times 67$ (67 is a prime number)

Factors of 134: 1, 2, 67, 134

b) Let's define the number 134.

Ps dictate definitions and class checks that they are correct and that the description is unique to 134.

(e.g. the 67th positive even number; $\frac{402}{3}$; $\frac{399}{3} + 1$; $10 \times 13 + 4$;

20% of 670; 67% of 200; 200% of 67; 200 – 66, etc.)

---

#### Problem 1

Listen carefully, note the data and think how you would work out the answer. Do it in your Ex. Bks if you have time.

a) **There are 20 marbles in a bag. Some are blue, some are yellow and some are pink. The ratio of blue to yellow to pink marbles is 5 : 2 : 3.**

*How many marbles of each colour are in the box?*

Who thinks that they know how to do it? P comes to BB to show solution and explain reasoning. Who agrees? Who would do it another way? etc. After agreement, T chooses a P to say the answer in a sentence.

e.g. BB: $\frac{\text{B}}{\text{B}} \frac{\text{B}}{\text{B}} \frac{\text{B}}{\text{B}} \frac{\text{Y}}{\text{Y}} \frac{\text{Y}}{\text{Y}} \frac{\text{P}}{\text{P}} \frac{\text{P}}{\text{P}} \frac{\text{P}}{\text{P}}$ (10 in each row, so 2 rows are needed to make 20 altogether)

or $B : Y : P = 5 : 2 : 3 = \frac{10}{4} : \frac{6}{6}$ ($\times 2$)

or $B = \frac{5}{10}$ of 20 = 10; $Y = \frac{2}{10}$ of 20 = 4; $P = \frac{3}{10}$ of 20 = 6

**Answer:** There are 10 blue marbles, 4 yellow marbles and 6 pink marbles in the bag.

b) **Show me the answers to these questions when I say. You can do the calculations in your Ex. Bks if you cannot do them in your head.**

*If you take out a marble from the bag with your eyes closed, what is the probability of it being:*

i) a blue marble $\frac{10}{20} = \frac{5}{10} = \frac{1}{2} \rightarrow 50\%$

ii) a yellow marble $\frac{4}{20} = \frac{2}{10} = \frac{1}{5} \rightarrow 20\%$

iii) a pink marble $\frac{6}{20} = \frac{3}{10} \rightarrow 30\%$

iv) **not blue** $\frac{10}{20} = \frac{5}{10} = \frac{1}{2} \rightarrow 50\%$, or $100\% - 50\%$

v) **not yellow** $\frac{16}{20} = \frac{8}{10} = \frac{4}{5} \rightarrow 80\%$, or $100\% - 20\%$

etc.

---

### Notes

Whole class activity

Reasoning, agreement, praising

At a good pace

Encourage creativity

Extra praise for unexpected but correct definitions

Whole class activity

T repeats slowly and chooses a P to repeat in own words to give Ps time to think and calculate.

Ps tell their ideas.

Reasoning, agreement, praising

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

Ps answering correctly explain reasoning to Ps who were wrong.

Accept any correct form but elicit the simplification and percentage if no P has shown them.

Also ask yellow or pink (same as 'not blue'), etc. and blue or yellow or pink.

\[
\frac{20}{20} = \frac{10}{10} = 1 \rightarrow 100\% \\
\text{Certain to happen!}
\]
Q.1 Read: Four children tossed a coin several times and wrote their results in this table. Write the answer to each question in the appropriate part of the table.

Deal with one part at a time or set a time limit. Ps do necessary calculations in Ex. Bks and write results in Pbs.

Review with whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly come to BB to fill in table and explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) How many tosses were there altogether?
   BB: \( (24 + 30 + 27 + 20) + (25 + 28 + 31 + 15) \)
   \( = 101 + 99 = 200 \)

b) How many: i) Heads ii) Tails were tossed altogether?
   i) No of Heads: 101  ii) No of Tails: 99

c) What is the ratio of each outcome to the total number of tosses:
   i) as a fraction
      \[ H : All = \frac{101}{200} \quad T : All = \frac{99}{200} \]
   ii) as a decimal
      \[ H : All = 101 \div 200 = 0.505 \]
      \[ T : All = 99 \div 200 = 0.495 \]
   iii) as a percentage?
      \[ H : All = 0.505 \rightarrow 50.5\% \]
      \[ T : All = 0.495 \rightarrow 49.5\% \]

Completed table:

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Alan</th>
<th>Becky</th>
<th>Carol</th>
<th>David</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>24</td>
<td>30</td>
<td>27</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.505</td>
</tr>
<tr>
<td>Tail</td>
<td>25</td>
<td>28</td>
<td>31</td>
<td>15</td>
<td>0.495</td>
</tr>
<tr>
<td></td>
<td>99</td>
<td></td>
<td></td>
<td></td>
<td>49.5%</td>
</tr>
</tbody>
</table>

What chance would you give of tossing a Head (Tail)? (\( \frac{1}{2} \) for each, as there are 2 possible outcomes, each with an equal chance of happening)

Which child's outcomes are closest to this prediction? Why?
[Alan, as he threw a coin 49 times, and 24 H and 25 T are each very close to half of 49 which is 24.5; or]

Ratio of: a Head: \( \frac{24}{49} = 0.49 \rightarrow 49\% \); a Tail: \( \frac{25}{49} = 0.51 \rightarrow 51\% \)

and both are very close to 50\%, which is what we would expect; or difference between no. of Heads and no. of Tails is smallest for Alan and we would predict that there should be no difference at all.]

Whole class activity
T asks several Ps what they think and why.
(or Ps could show initial letters of children's names on slates in unison)

Reasoning, agreement, praising
Who agrees? Who can think of another way to explain it?

Praising, encouragement only

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Possible outcomes
Ps have 3 different coins (real or toy) on desks, e.g. 10 p, 50 p and £1 coins.
a) What different outcomes are possible if we toss 2 different coins (e.g. 10 p and £1) at the same time? Ps toss the coins several times and note the outcomes in Ex. Bks.
Let’s list all the different outcomes you found in this table. Ps come to BB or dictate to T. Class agrees/disagrees or points out any missed. Encourage a logical listing.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>H</th>
<th>H</th>
<th>£1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 2 Heads</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) a Head and a Tail</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) 2 Tails?</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

b) What different outcomes are possible if we toss 3 coins at the same time? Ps toss the coins several times and note the outcomes in Ex. Bks.
Let’s list all the different outcomes in this table. BB:
Ps come to BB or dictate to T. Class agrees/disagrees or points out any missed.
Encourage a logical listing,
Elicit that there are 8 possible outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>H</th>
<th>H</th>
<th>£1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 3 Heads</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) 2 Heads and a Tail</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) a Tail and 2 Heads</td>
<td>(3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) 3 Tails?</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Check: | 1 + 2 + 1 = 4 |

Lesson Plan 134

Notes
Whole class activity
(If all Ps having coins on desks is not possible, T asks several Ps to come to front of class to toss the coins.)
Tables drawn on BB or use enlarged copy master or OHP
At a good pace
Agreement, praising

| Check: | 1 + 3 + 3 + 1 = 8 |

Use any 3 different coins
Allow a set time for tossing and praise Ps who did the most tosses in the given time.

PbY5b, page 134

Q.2 Read: Predict the result for each outcome first, then do the experiment.
Toss a 10 p coin and a £1 coin at the same time.
Repeat the experiment 24 times and keep a tally of how they land in this table.
Ps write predictions. T asks several Ps what they predicted.
If possible, keep Ps together on the tosses. Ps count their tally marks and write the frequency for each outcome in their table.
P finished first could write his or her data in the table on BB.
T chooses some some Ps to report their data to the class and to compare their actual data with their predictions.

Read: Collect the data for the class and complete the right hand side of the table.
First agree on total number of tosses. (e.g. if 30 Ps in class, and 24 throws each, then number of throws: 24 × 30 = 720)
Ps dictate their results for each outcome and T writes on BB, while Ps keep a running total for each outcome in Ex. Bks.

Individual work, closely monitored, helped, corrected
Table drawn on BB or use enlarged copy master or OHP
Ps check that their predictions add up to 24.
At a fast pace
Ask Ps the reason for their predictions. Extra praise if they give a logical reasoning (4 possible outcomes, each with an equal chance, etc.)

Whole class activity
At a fast pace
4 Ps also keep running totals on calculators.
Lesson Plan 134

Notes

Ps use calculators to work out the decimals or T could set some calculations as individual work in Ex.Bks and check Ps’ results with a calculator.

Reasoning agreement, praising

At a good pace
Ps check that the total for each column is correct.

Discussion, agreement, praising

BB: \( \frac{1}{4} = 0.25 \rightarrow 25\% \)

[T could show computer simulation in Lesson 135.]

Discussion, argument, agreement, praising

Elicit all 3 forms.

Individual work, monitored, helped, corrected
Table drawn on BB or use enlarged copy master or OHP
Some Ps report their data and compare with their predictions.

Whole class collection of class data and calculation of ratios.
Reasoning, agreement, checking totals, praising

Elicit the expected probability and compare with actual data.

BB: \( \frac{1}{8} = 0.125 \rightarrow 12.5\% \)

Agree that % ratios in the table are very close to this.

Extension

What is the probability of throwing 1H + 2T in any order?

\[
\frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{3}{8} \rightarrow 37.5\% 
\]

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Revision, activities, consolidation
(Use computer programs to simulate tossing coins and throwing dice.)

PbY5b, page 135

Solutions:

Q.1  a) B : W = 6 : 10  b) W : B = 10 : 6
   c) i) W : \(\frac{10}{16} = \frac{5}{8}\)  ii) B : \(\frac{6}{16} = \frac{3}{8}\)

Q.2  a) I (but accept P from Ps who do not know that the World Cup in football is held every 4 years)
   b) C  c) P  d) I  e) P

Q.3  a) No. of red marbles: \(\frac{1}{4}\) of 40 = 40 \(\div\) 4 = 10
    No. of blue marbles: \(\frac{3}{4}\) of 40 = 40 \(\div\) 4 \(\times\) 3 = 30
    b) i) \(p\) (blue) = \(\frac{3}{4}\)  i) \(p\) (not blue) = 1 - \(\frac{3}{4}\) = \(\frac{1}{4}\)

Q.4  Ratio of red : blue : yellow is 3 : 2 : 1
   a) \(p\) (red) = \(\frac{3}{6}\) = \(\frac{1}{2}\) (= 0.5 = 50%)
   b) \(p\) (blue) = \(\frac{2}{6}\) = \(\frac{1}{3}\) (= 0.33 = 33.3%)
   c) \(p\) (yellow) = \(\frac{1}{6}\) (= 0.16 = 16.7%)
   d) \(p\) (not red) = 1 - \(\frac{1}{2}\) = \(\frac{1}{2}\) (= 0.5 = 50%)
      \(\text{or}\) \(\frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}\)
### Lesson Plan 136

**Notes**

Whole class activity
Ps draw factor tree on BB if necessary, but praise other reasoning too.
(e.g. 2 is a factor as 136 is even: 5 is not a factor as there is no 5 or zero in units column, etc.)

At a good pace
Agreement, praising
Extra praise for creativity!

### Activity

#### 1 Factorisation

a) Let's factorise 136 and list all its positive factors. Ps come to BB or dictate to T. Class agrees/ disagrees.

BB: \[ 136 = 2 \times 2 \times 2 \times 17 \] (prime factors)

All positive factors:

1, 2, 4, 8, 17, 34, 68, 136

b) Let's define the number 136.

Ps dictate definitions and class checks that they are correct and that the description is unique to 136.

(e.g. \( 8 \times 17 \); 80% of 170; \( \frac{17}{100} \) of 800; \( -64 + 200 \), etc.)

#### 2 Problem 1

Listen carefully, note the data and think how you would work out the answer. Do it in your Ex. Bks if you have time.

There are 36 marbles in a box. Some are blue, some are yellow and some are pink. The ratio of blue to yellow to pink marbles is 8 : 6 : 4.

a) How many marbles of each colour are in the box?

Who thinks that they know how to do it? P comes to BB to show solution and explain reasoning. Who agrees? Who would do it another way? etc. After agreement, T chooses a P to say the answer in a sentence.

BB: e.g. \( B : Y : P = 8 : 6 : 4 = 16 : 12 : 8 \) (\( \times 2 \))

or show in a table:

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>8</th>
<th>4</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>6</td>
<td>3</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>9</td>
<td>36</td>
<td></td>
</tr>
</tbody>
</table>

or \( B = \frac{8}{18} \) of 36 = 16; \( Y = \frac{6}{18} \) of 36 = 12; \( P = \frac{4}{18} \) of 36 = 8

Answer: There are 16 blue marbles, 12 yellow marbles and 8 pink marbles in the box.

b) Show me the answers to these questions as fractions when I say.

If you take a marble out of the box with your eyes closed, what is the probability of the marble being:

i) blue \( \left( \frac{16}{36} = \frac{4}{9} \right) \)

ii) yellow \( \left( \frac{12}{36} = \frac{1}{3} \right) \)

iii) pink \( \left( \frac{8}{36} = \frac{2}{9} \right) \)

iv) not yellow \( \left( \frac{24}{36} = \frac{2}{3} \right) \)

v) not pink \( \left( \frac{28}{36} = \frac{7}{9} \right) \)

or \( 1 - \frac{1}{3} = \frac{2}{3} \)

or \( 1 - \frac{2}{9} = \frac{7}{9} \)

Responses shown on scrap paper or slates in unison.

At a fast pace
Ps answering correctly explain to Ps who were wrong.
Reasoning, agreement, praising
Extra praise if Ps give decimals and percentages too.

Feedback for T
Possible outcomes: 2 dice
Ps have 2 different coloured dice on desks, e.g. 1 white and 1 red.

a) What different outcomes are possible if we throw 2 dice at the same time?
Ps throw the dice several times and note the outcomes.

Let’s list all the different possible outcomes in these tables. Ps come to BB or dictate to T. Class agrees/disagrees or points out any missed. Encourage a logical listing, as shown.

BB:

<table>
<thead>
<tr>
<th>white</th>
<th>red</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
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<td>3</td>
<td>1</td>
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<td>1</td>
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<td>4</td>
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<td>5</td>
<td>5</td>
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<td>5</td>
<td>6</td>
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<td>6</td>
<td>1</td>
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<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Elicit that there are 36 possible outcomes. (For each of the 6 possible numbers on the white dice there are 6 possible numbers on the red dice, i.e. \(6 \times 6 = 36\) possible outcomes.)

a) How many outcomes give:
   i) two 4s  \(= (1)\)
   ii) one 2 and one 4 \(= (2)\)
   iii) one 1 and one 6 \(= (2)\)
   iv) two 1s \(= (1)\)
   v) at least one 5? \(= (11)\)

b) What chance (probability) would you give to each of these outcomes?
Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. T shows Ps the notation for writing the probability of a certain outcome.

BB:

i) \(p\) (two 4s) = \(\frac{1}{36}\) (as 1 chance out of 36)

ii) \(p\) (one 2 and one 4) = \(\frac{2}{36} = \frac{1}{18}\) (as 2 chances out of 36)

iii) \(p\) (one 1 and one 6) = \(\frac{2}{36} = \frac{1}{18}\) (as 2 chances out of 36)

iv) \(p\) (two 1s) = \(\frac{1}{36}\) (as 1 chance out of 36)

v) \(p\) (at least one 5) = \(\frac{11}{36}\) (as 11 chances out of 36)

21 min
## Lesson Plan 136

### Activity 4

**PbY5b, page 136**

Q.1 Read: *Predict the result of each outcome first, then do the experiment.*

> Throw a white and a red dice at the same time and note how they land in this table. Repeat the experiment 72 times.

What do you notice about this table? (It shows all the 36 outcomes listed in the 6 tables in the previous activity.)

Set at a time limit for predicting, throwing the dice and recording the outcomes. Advise Ps to check that they have 72 tally marks before writing their totals. (P finished first could write his or her data in table on BB.)

T chooses some Ps to report on their predictions and outcomes, (i.e. how many times their outcome matched their prediction).

Read: *Collect the class data and complete the table.*

How many pupils are in the class? (e.g. 20) How many throws have we done altogether? (e.g. \(72 \times 20 = 1440\))

Ps dictate their outcomes to T, and class keeps a running total in Ex. Bks. (and/or Ps keep running totals on calculators). Ps who did not finish individual experiments do so now (with help of quicker Ps) and dictate their results as they finish.

Check that the class total is correct before writing the ratios.

Ps come to BB or dictate fractions, then calculate the decimals to 4 decimal places with a calculator. The percentages are easily obtained from the decimals by moving each digit 2 place-values to the left. (i.e. multiplying by 100, as % means 'out of 100').

*Sample table for a class of 20 Ps is shown on following page.*

What probability would you have predicted for each outcome? Ps give it as a fraction, decimal and percentage, explaining reasoning. Class agrees/disagrees.

**BB:** \(P (\text{each outcome}) = \frac{1}{36} = 0.027 \Rightarrow 2.78\%\)

Hopefully, the class ratios will be very close to this. If not, discuss what the reasons could be for the difference. (e.g. some dice might be biased, or some Ps might have recorded the data inaccurately; or if quite close, not enough data collected)

[If possible, T uses a computer simulation to demonstrate that the more times the experiment is done, the closer the ratios get to the probability.]

### Notes

- Individual (or paired) work, closely monitored, helped, corrected
- Table drawn on BB or use enlarged copy master or OHP

(Slower Ps can finish their experiment during collection of class data.)

- Or class compares their data with those in the table on BB.
- Whole class collection of class data and calculation of ratios

Reasoning, agreement, checking totals, praising

- Hopefully, there will be just a few different frequencies which occur several times, so necessary calculations will be limited.
- Ps write agreed ratios in tables in Pbs too (or could be set this work for homework)
- Discussion, reasoning, agreement, praising

Compare the actual outcomes with the expected outcomes or probability.
Activity 4

BB: e.g. for a class of 20 Ps

Although Ps might find it rather tedious to toss the dice 72 times and then to collect and calculate so much class data, they should complete the experiment to give them direct experience of what is involved (and to appreciate how much help a computer programme can be).

Encourage Ps to be 'good scientists' and to collect and record the data accurately, otherwise the experiment will not be worth doing!
Lesson Plan 137

Y5

Activity

1

Numbers
Let's define the number 137.
Ps dictate their definitions. Class agrees/disagrees. T could give some definitions too (some incorrect) and ask Ps if they are correct.
e.g. It is a prime number greater than 131 and less than 139; 140 – 3; 11 × 11 + 16; 1 third of 411; 137% of 100; 1H + 37U; 1.37 × 100; etc.

Displaying outcomes
Study this bar chart. What do you think it shows?
BB: (Labels for the axes added after discussion)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Ratio relative frequency</td>
<td>( \frac{a}{b} )</td>
<td>( \frac{6}{30} )</td>
<td>( \frac{5}{30} )</td>
<td>( \frac{7}{30} )</td>
<td>( \frac{4}{30} )</td>
<td>( \frac{4}{30} )</td>
</tr>
<tr>
<td>%</td>
<td>20%</td>
<td>16%</td>
<td>23%</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Elicit/tell that the bar chart shows the results obtained after throwing a dice several times. The horizontal axis shows the different outcomes and the vertical axis shows how many times they occurred (frequency).

How many times was the dice thrown? \((6 + 5 + 7 + 4 + 4 + 4 = 30)\)

Let's write the data in the table. Ps come to BB or dictate what T should write, using a calculator to work out the relative frequencies as percentages. (Divide numerator by denominator and multiply by 100).
(Change recurring decimals in percentages to fractions so that the relative frequencies are exact and will add up to 100% – it is easier to compare with the probability as a %) Class points out errors.

Are the frequencies in the table what we would expect? T asks several Ps what they think and why. e.g.

\[ BB: \text{Probability of each outcome:} \quad \frac{1}{6} \text{ (as 1 chance out of 6)} \]

so we would expect that out of 30 throws, each outcome would occur \((30 ÷ 6 = 5)\) times and only the ‘2’ was thrown 5 times.]

Show me the answer to these questions about the actual data when I say.

a) i) What is the frequency of an even number? \((5 + 4 + 4 = 13)\)
ii) What is the relative frequency? \(\frac{13}{30}\) \(\text{[or} \quad 43\frac{1}{3}\%]\)

Are they what you would expect? (No, we would expect:
frequency: \(5 + 5 + 5 = 15\); relative frequency: 1 half or 50%)
b) i) What is the frequency of a number > 2? \((7 + 4 + 4 + 4 = 19)\)
ii) What is the relative frequency? \(\frac{19}{30}\) \(\text{[or} \quad 63\frac{1}{3}\%]\)

Are they what you would expect? (No, we would expect:
frequency: \(5 + 5 + 5 + 5 = 20\); relative frequency: 2 thirds or 66\(\frac{2}{3}\)%)

Notes

Whole class activity
At a good pace
In good humour!
Checking, agreement, praising
Extra praise for creativity!

Whole class activity
Drawn on BB or use enlarged copy master or OHP

Table completed later (see below)

Discussion, agreement, praising
T writes agreed labels on bar chart.
Reasoning, agreement, praising
At a good pace
(e.g. \(\frac{5}{30} = \frac{1}{6} = 0.16\)
\(\Rightarrow 16.\% = \frac{2}{3}\%\))

T helps with reasoning if necessary.
Agreement, praising
(but the others are quite close)
Responses written on scrap paper or slates and shown in unison.
Ps answering correctly explain to Ps who were wrong.

Because in:
a) ii):
\[ p \text{ (even number)} = \frac{15}{30} = \frac{1}{2} \]
b) ii):
\[ p \text{ (number > 2)} = \frac{20}{30} = \frac{2}{3} \]
Q.1 Read: A dice was thrown 60 times. The number of times (frequency) each of the numbers 1 to 6 (outcome) was thrown is shown in the chart below.

Complete the table and answer the questions.

Talk about the chart and table first to make sure that Ps understand what to do. Set a time limit. Ps read data from the chart and write in correct places in the table.

Review and correct any mistakes in table before allowing Ps to answer the questions. If necessary, calculate the percentages with the whole class (using calculators).

Set another time limit for answering the questions, or deal with one question at a time and Ps show results on scrap paper or slates on command. Ps answering correctly explain at BB to Ps who were wrong. Mistakes discussed and corrected.

Solution:

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>9</td>
<td>12</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>Ratio</td>
<td>(\frac{9}{60})</td>
<td>(\frac{12}{60})</td>
<td>(\frac{10}{60})</td>
<td>(\frac{11}{60})</td>
<td>(\frac{8}{60})</td>
<td>(\frac{10}{60})</td>
</tr>
<tr>
<td>%</td>
<td>15%</td>
<td>20%</td>
<td>16% (\frac{2}{3})</td>
<td>18%</td>
<td>13%</td>
<td>16% (\frac{2}{3})</td>
</tr>
</tbody>
</table>

a) Which outcome occurred:
   i) most frequently \((\text{throwing a 2})\)
   ii) least frequently? \((\text{throwing a 5})\)

b) Which frequency exactly fits the expected frequency for each outcome?
   (Expected frequency: 1 sixth of 60 = 10)

c) What was the frequency of the outcome ‘less than 6’?
   \((9 + 12 + 10 + 11 + 8 = 50)\)
   \([\text{Relative frequency: } \frac{50}{60} = \frac{5}{6} \rightarrow 83\frac{1}{3}\%]\)

d) What was the frequency of the outcome ‘odd’?
   (Frequency: 9 + 10 + 8 = 27)
   \([\text{Relative frequency: } \frac{27}{60} = \frac{9}{20} \rightarrow 45\%]\)
**Lesson Plan 137**

**Notes**

Individual work, monitored closely, helped

Drawn on BB or use enlarged copy master or OHP

Initial discussion to make sure that Ps understand what to do. Elicit that the horizontal line already drawn in the chart is not long enough and needs to be extended.

(Ps may use calculators to work out the percentages.)

Discussion, reasoning, agreement, self-correction, praising

Extension done as a whole class activity, with Ps saying what to do first and how to continue.

Praising, encouragement only

---

**Y5**

**Activity**

4  *PbY5b, page137*

Q.2  Read: Two coins were tossed 60 times. The frequency of each outcome is shown in the table.

   a) Complete the chart.
   b) Calculate the ratio for each outcome and complete the table.
   c) What is the frequency of tossing a Head and a Tail?

What does the chart have to do with the table? Ps come to BB to explain to class. T helps where necessary.

Deal with one part at a time or set a time limit. More able Ps could also be asked to give the ratios as percentages.

Review with whole class. Ps come to BB to draw horizontal lines on the chart and to write the ratios in the table, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

In c), compare the actual outcome with the expected outcome.

**Solution:**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Frequency</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>H H</td>
<td>14</td>
<td>(\frac{14}{60} = 23.3%)</td>
</tr>
<tr>
<td>H T</td>
<td>15</td>
<td>(\frac{15}{60} = 25%)</td>
</tr>
<tr>
<td>T H</td>
<td>16</td>
<td>(\frac{16}{60} = 26.7%)</td>
</tr>
<tr>
<td>T T</td>
<td>15</td>
<td>(\frac{15}{60} = 25%)</td>
</tr>
</tbody>
</table>

---

5  *Fortune wheel*

Ideally, T acts as a fortune teller and chooses Ps to come to front of class to spin the wheel. (T could have brief fortunes prepared for each number. e.g. 1: 'you will be happy'; 2: 'you will not be rich'; 3: 'you will have a secret admirer'; etc. or Ps could make them up beforehand.)

If the pointer comes to rest on a diagonal, the P must spin the wheel again.

How many possible outcomes are there? (8) What chance would you give to each number? T asks several Ps what they think. Extra praise if Ps give each of them an equal chance.

Let's see if you are right! Ps come to front of class to spin the wheel 40 times and rest of class keep a tally for each number in *Ex Bks*. Agree on the totals, then write in the table. Then Ps calculate the relative frequencies as fractions, decimals and percentages, using calculators where necessary. Compare the actual with the expected outcomes.

---

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(Continued)

### Activity 5

**BB:**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ratio relative frequency</th>
<th>fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>decimal</td>
<td>%</td>
</tr>
<tr>
<td>0.1 0.125 0.075 0.15 0.125 0.125 0.15 0.125 0.15</td>
<td>10% 12.5% 7.5% 15% 12.5% 15% 12.5% 15%</td>
</tr>
</tbody>
</table>

Agree that if the wheel is fair (unbiased):

**BB:** probability for each outcome is: \( \frac{1}{8} = 0.125 \rightarrow 12.5\% 

If we assume that the wheel is unbiased, what probability would you give to these outcomes? (Ps could show on slates on command.)

What is the probability of the pointer resting on:

- a) an odd number? 
- b) a number less than 6?

\[
\frac{4}{8} = \frac{1}{2} = 0.5 \rightarrow 50\% \quad \text{and} \quad \frac{5}{8} = 0.625 \rightarrow 62.5\% 
\]

### Extension

Let's compare the actual outcomes with the expected probability. Elicit that if the wheel is unbiased, each outcome has an equal chance, so the probability for:

- each colour: \( \frac{1}{4} = 0.25 \rightarrow 25\% 
- \text{pink or blue}: \quad \frac{2}{4} = \frac{1}{2} = 0.5 \rightarrow 50\% 
- \text{pink or white or green}: \quad \frac{3}{4} = 0.75 \rightarrow 75\% 

Tell me an outcome which would have a probability of 1 (100%).

\[
p (\text{green or pink or white or blue}) = 1 \quad \text{(Certain to happen)}
\]

\[
p (\text{yellow}) = 0 \quad \text{(Impossible!)}
\]

**Lesson Plan 137**

**Notes**

Discussion on the data compared with what is expected and what the reasons could be for an outcome not matching the expected probability.

(Unfair, i.e unbalanced or weighted wheel, or if quite close, not enough data.)

[T could show a computer simulation for large number of spins in Lesson 140.]

Reasoning, agreement, praising

Individual work, monitored, helped
Table drawn on BB or use enlarged copy master or OHP
Differentiation by time limit.
If no P reaches the last two columns, do them with the whole class.
Reasoning, agreement, self-correction, praising

Feedback for T

Whole class activity
Ps come to BB or dictate what T should write. Class agrees/disagrees.
Discussion, reasoning, agreement, praising

In good humour!
Praising
Lesson Plan 138

Week 28

Y5

Activity

1

Numbers

a) Let's factorise 138 and list all its positive factors. Ps come to BB or dictate to T. Class agrees/disagrees.

BB: \[ 138 = 2 \times 3 \times 23 \] (prime factors)

All positive factors:
1, 2, 3, 6, 23, 46, 69, 138

b) Let's define the number 138.

Ps dictate definitions and class checks that they are correct and that the description is unique to 138.
(e.g. \( 6 \times 23 \); 138% of 100; \( 13.8 \times 10 \); \(-12 + 150, 690 \div 5 \); etc.)

8 min

2

Probability scale

On the radio one morning during the weather forecast, the presenter made these remarks. What did he mean?

a) There is a 50% chance of rain in the South-West.

(There is an equal chance of it raining as not raining.)

What other way could you say it? (e.g. half-in-half chance, or fifty-fifty chance, or even chance)

b) There is a 20% chance of rain in the South-East.

(Rain is possible but is rather unlikely.)

c) There is an 80% chance of rain in the North.

(It is very likely to rain, but it is not certain.)

Have you ever heard of a 0% chance of rain, or a 100% chance of rain?

(No, as a 0% chance means that it is impossible for it to rain and a 100% chance means that it is certain to rain – but we cannot control the weather!)

Let's draw a probability scale. T draws a horizontal line on the BB and Ps draw one in Ex. Bks. What should we mark on it? (0 at one end and 1 at the other) Should we extend the line below zero and beyond 1? (No, as a probability cannot be less than zero, or more than 1.)

What other mark could we make on it? (Half-way mark, where the probabilities of not happening and happening are equal.)

Elicit what each part of the probability scale actually means and that the greater the probability, the more chance something has of happening.

BB:

<table>
<thead>
<tr>
<th>Impossible (0%)</th>
<th>50%</th>
<th>Certain (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>low chance</td>
<td>high chance</td>
<td></td>
</tr>
</tbody>
</table>

Ask Ps to think of examples from real life and to show where they would be on the probability scale. (T should also have some in mind in case Ps cannot think of any.) Class agrees/disagrees.

16 min

Notes

Whole class activity
Ps draw factor tree on BB but praise other reasoning too.
(e.g. 2 is a factor as 138 is even; 5 is not a factor as no 5 or zero in units column, etc.)

At a good pace
Agreement, praising
Extra praise for creativity!

Whole class activity
Discussion involving as many Ps as possible
Elicit alternative statements: e.g.

a) There is a 50% chance of no rain in the South-West.

b) There is an 80% chance of no rain in the South-East.

c) There is a 20% chance of no rain in the North.

Agreement, praising

T works on BB and Ps work in Ex. Bks.

While Ps are suggesting examples, T quickly checks all Ps' probability scales, correcting where necessary.

Extra praise for clever examples.
### Lesson Plan 138 - Week 28

#### Activity

**3**  
**Probability game**  
Let’s play a game. Everyone stand up! I will say a probability as a ratio or a fraction or a decimal or a percentage and you must show me what it means with actions. e.g.  
If you think it is:
- **certain**, raise both arms above your head
- **likely but not certain**, hold your ears  
- **as equally likely as unlikely**, bow  
- **unlikely but possible**, fold your arms  
- **impossible**, sit down.

T says a probability, then says, 'Show me . . . now!' Ps with different responses explain reasoning and class decides which response is correct. e.g.  
\[
\begin{align*}
\frac{1}{10} & \text{ (unlikely), } \\
\frac{70}{100} & \text{ (likely), } \\
1 & \text{ (certain), } \\
0.26 & \text{ (unlikely), } \\
85\% & \text{ (likely), } \\
0\% & \text{ (impossible), } \\
50\% & \text{ (equally likely as unlikely), etc.}
\end{align*}
\]

**Notes**  
Whole class activity  
Ps could choose the actions.  
T might have actions written on BB as a reminder, or Ps have a short practice first.  
At speed, in good humour!  
Actions done in unison.  
Praising, encouragement only

**4**  
**Tossing a coin**  
If we toss an unbiased coin, how many different outcomes are there?  
(2) What are they? (a head or a tail) Which is more likely? (They each have an equal chance, or are equally likely.)  
I will say an outcome and you must show me (on scrap paper or slates) what you think its probability is when I say. e.g.  

- **a)** We toss a Head.  
- **b)** We toss a Head or a Tail.  
- **c)** We toss neither a Head nor a Tail.  
- **d)** We toss a Head and a Tail.  
- **e)** We toss a tail.  

\[
\begin{align*}
a) & \quad \frac{1}{2} \text{ or } 0.5 \text{ or } 50\% \\
b) & \quad 1 \text{ or } 100\% \quad \text{[Certain]} \\
c) & \quad 0 \text{ or } 0\% \quad \text{[Impossible]} \\
d) & \quad 0 \text{ or } 0\% \quad \text{[Impossible]} \\
e) & \quad \frac{1}{2} \text{ or } 0.5 \text{ or } 50\%
\end{align*}
\]

**Notes**  
Whole class activity  
Responses shown in unison.  
Demonstrate and/or show on probability scale if necessary.  
Elicit the other forms too.  
T (Ps) writes each on BB in a mathematical way. e.g.  

- **a)** \[ p(H) = \frac{1}{2} = 0.5 \rightarrow 50\% \]  
- **b)** \[ p(H \text{ or } T) = 1 \rightarrow 100\% \]  
- **c)** \[ p(H \text{ nor } T) = 0 \rightarrow 0\% \]  

\[ \text{etc.} \]

**5**  
**PbY5b, page 137**  
Q.1 Read: *When we throw an unbiased dice, there are 6 possible outcomes, each equally likely: 1, 2, 3, 4, 5, or 6. Show the probability of each of these outcomes by joining it to the correct point on the probability scale.*  
Elicit that the vertical probability scale ranges from 0 to 1 and is divided into 6 equal parts, with a tick at every sixth.  
Set a time limit or deal with one at a time. Advise Ps to find the correct point on the scale first then join it to the matching question, rather than the other way round, as it is more accurate.  
Review with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

**Notes**  
Individual work, monitored, helped  
Written on BB or use enlarged copy master or OHP

Differentiation by time limit and extension work.  
Discussion, reasoning, agreement, self-correction, praising
Y5

**Activity** 5

(Continued)

Q.1 **Solution:**

- a) Throwing a 2
- b) Throwing a number less than 3
- c) Throwing a number not less than 3
- d) Throwing a 7
- e) Throwing a number less than 1
- f) Throwing a number greater than 0
- g) Throwing a number greater than 5

T reviews:

When we have 6 possible outcomes, each with equal probability, the sum of their probabilities is the certain outcome, 1.

---

**Lesson Plan 138**

**Notes**

**Extension**

Elicit decimals and percentages.

- a), g) \( \frac{1}{6} = 0.16 \rightarrow 16 \frac{2}{3} \%
- b) \( \frac{2}{6} = \frac{1}{3} = 0.3 \rightarrow 33 \frac{1}{3} \%
- c) \( \frac{4}{6} = \frac{2}{3} = 0.6 \rightarrow 66 \frac{2}{3} \%
- d), e) \( \frac{0}{6} = 0 \rightarrow 0 \%
- f) \( \frac{6}{6} = 1 \rightarrow 100 \%

Ps repeat in unison.

---

**Activity** 6

**PbY5h, page 138**

Q.2 **Read:** Seven children draw lots in the hope of winning a prize. If each child has an equal chance of winning, what is the probability of each of these outcomes happening?

Join the outcomes to the matching points on the probability scale.

Discuss the problem first to ensure that Ps understand the context. Ps give names to the 7 children. (e.g. Ann, Bob, Charlie, etc.)

What do you notice about the probability scale? (Divided into 7 equal parts, with a tick at every seventh)

Set a time limit. Ps find the correct point on the scale and join it to the matching question, writing the fraction too.

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

**Solution:**

- a) C wins.
- b) A or D wins.
- c) G or E or C or A wins.
- d) B and F win.
- e) G does not win.
- f) Neither D nor E wins.

T reviews, then Ps repeat in unison.

When we have 7 possible outcomes, each with equal probability, the sum of their probabilities is the certain outcome, 1.

---

**Notes**

**Extension**

Elicit decimals and percentages.

- a) \( \frac{1}{6} = 0.16 \rightarrow 16 \frac{2}{3} \%
- b) \( \frac{2}{6} = \frac{1}{3} = 0.3 \rightarrow 33 \frac{1}{3} \%
- c) \( \frac{4}{6} = \frac{2}{3} = 0.6 \rightarrow 66 \frac{2}{3} \%
- d), e) \( \frac{0}{6} = 0 \rightarrow 0 \%
- f) \( \frac{6}{6} = 1 \rightarrow 100 \%

Ps repeat in unison.

---

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Use names of Ps in class if possible.

Discussion, reasoning, agreement, self-correction, praising

Show details on BB:

- a) \( \frac{1}{7} \)
- b) \( \frac{1}{7} + \frac{1}{7} = \frac{2}{7} \)
- c) \( \frac{1}{7} + \frac{1}{7} + \frac{1}{7} + \frac{1}{7} = \frac{4}{7} \)
- d) Impossible, as only one winner!
- e) \( 1 - \frac{1}{7} = \frac{6}{7} \)
- f) \( 1 - \frac{2}{7} = \frac{5}{7} \)
PbY5b, page 138, Q.3

Read: Let’s suppose that when the fortune teller spins her lucky number wheel, any of the numbers has an equal chance of coming to rest in front of the arrow.

Also, the wheel has been fixed so that it cannot stop with the arrow pointing to a line between two numbers.

What is the probability of these outcomes happening?

What can you tell me about this wheel? (Divided into 20 equal parts; labelled with the numbers 1 to 20 in a random order.)

Deal with one part at a time. T reads the outcome and Ps show its probability on scrap paper or slates on command. Ps with different responses explain reasoning to class. Class decides who is correct. Ps write agreed fraction in Pbs. Elicit decimals and percentages too if no P has shown them.

Solution:
The number is:

a) 17 \( \left( \frac{1}{20} \right) \) \( \left( \frac{5}{100} \right) = 0.05 \rightarrow 5\% \)

b) less than 17 \( \left( \frac{16}{20} \right) \) \( \left( \frac{4}{5} = \frac{80}{100} = 0.80 \rightarrow 80\% \) \)

c) not greater than 17 \( \left( \frac{17}{20} \right) \) \( \left( \frac{85}{100} = 0.85 \rightarrow 85\% \) \)

d) not less than 17 \( \left( \frac{4}{20} \right) \) \( \left( \frac{1}{5} = \frac{20}{100} = 0.20 \rightarrow 20\% \) \)

e) even \( \left( \frac{10}{20} \right) \) \( \left( \frac{1}{2} = 0.5 \rightarrow 50\% \) \)

f) divisible by 4 \( \left( \frac{5}{20} \right) \) \( \left( \frac{1}{4} = \frac{25}{100} = 0.25 \rightarrow 25\% \) \)

g) not divisible by 4 \( \left( \frac{15}{20} \right) \) \( \left( \frac{3}{4} = \frac{75}{100} = 0.75 \rightarrow 75\% \) \)

h) either even or odd \( \left( \frac{20}{20} = 1 \right) \) \( \left( \rightarrow 100\% \) Certain! \)

i) neither even nor odd \( \left( \frac{0}{20} = 0 \right) \) \( \left( \rightarrow 0\% \) Impossible! \)

Which outcomes are likely but not certain to happen? [b), c) and g)]

T reviews:

When we have 20 possible outcomes, each with equal probability, the sum of their probabilities is the certain outcome, 1.

Extra praise if a P notices that the probabilities of f) and g) sum to 1.

Agreement, praising

Ps repeat in unison.

 Whole class activity (or individual trial first if Ps wish and there is time, monitored, helped)

Elicit the possible numbers:

b) 1 to 16
c) 1 to 17
d) 17, 18, 19, 20
e) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
f) 4, 8, 12, 16, 20
g) 1, 2, 3, 5, 6, 7, 9, 10, 11, 13, 14, 15, 17, 18, 19
h) 1 to 20 (All)
i) none

Responses shown in unison.

Discussion, reasoning, agreement, (self-correction), praising

Extension

Which outcomes are likely but not certain to happen? [b), c) and g)]
### Activity

#### 1 Numbers

a) Let’s factorise 139 and list its positive factors.

Ps try the prime numbers in increasing order, explaining reasoning with logic, as below. Class agrees/disagrees.

- 2 is not a prime 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 no prime number more than 11 is possible either. e.g. 13:

BB: 13 \times 13 = 130 + 39 = 169, and 169 > 139

Agree that 139 is a prime number and its only factors are 1 and 139.

b) Let’s define 139 in different ways.

Ps dictate definitions and class checks that they are correct and that the description is unique to 139.

(e.g. 1000 – 961; 139% of 100; 1.39 \times 100; 1H + 39U, 556 \div 4; etc.)

#### 2 Probability 1

T has probability scale drawn on BB.

BB:

Let’s think of outcomes for each of these probabilities. If necessary, T helps with the context, but Ps think of the appropriate outcomes. e.g.

a) In a lottery, one number is drawn from the numbers 1, 2, 3 and 4. Each of the numbers has an equal chance of being drawn.

Ps: The probability of ’drawing 1’ is \( \frac{1}{4} \). (same for 2, 3 and 4)

The probability of ’drawing 1 or 2’ is \( \frac{1}{2} \). (or ’an odd number’)

The probability of ’not drawing 1’ is \( \frac{3}{4} \). (or ’1 or 2 or 3’)

The probability of ’drawing 5’ is 0. (or ’drawing 1 and 2’, etc.)

The probability of ’drawing a number not greater than 4’ is 1.

b) In an international summer camp, there are 100 children; 25 are from Denmark, 50 are from England, and 25 are from France. All their names are put into a computer and the computer picks 1 name at random for a special task.

Ps: e.g. The probability that the child is:

- Danish is \( \frac{1}{4} \) (25%)
- English is \( \frac{1}{2} \) (50%)
- French \( \frac{3}{4} \) (75%)
- Russian is 0 (0%)
- Danish or English or French is 1 (100%)

Elicit also if an outcome is impossible, unlikely, likely or certain to happen.


### Activity 3

**Probability 2**

In a number card game, the numbers 1, 2, 3, 4 and 5 are placed face down on the table and mixed around, then a player picks up 2 cards at random.

Let’s suppose that each number has an equal chance of being picked.

a) **How many possible outcomes are there, if the order in which they are picked up does not matter?**

If possible, Ps try it first, either in pairs on desks, or at front of class, and note the different outcomes in their Ex. Bks.

Then they dictate the outcomes to T who writes on BB in a logical order. Class points out any missed.

\[
\begin{array}{cccccc}
1, 2 & 2, 3 & 3, 4 & 4, 5 & 5, 6 \\
1, 3 & 3, 4 & 4, 5 & 5, 6 & 6, 7 \\
1, 4 & 4, 5 & 5, 6 & 6, 7 & 7, 8 \\
1, 5 & 5, 6 & 6, 7 & 7, 8 & 8, 9 \\
\end{array}
\]

Agree that there are 10 possible outcomes.

b) **What are the probabilities of these outcomes?**

i) The two numbers picked up are the 5 and the 2. \( \frac{1}{10} \) or 10%

ii) One of the numbers picked up is the 3. \( \frac{4}{10} \) or 40%

iii) One of the numbers picked up is the 5 or the 2 \( \frac{7}{10} \) or 70%

### Extension

What if the order did matter? How many outcomes would there be? What would the probabilities be then?

Elicit that there would be 20 possible outcomes (the 10 shown above and then each pair reversed) but the probabilities would be the same.

**21 min**

### Activity 4

**Outcomes**

This time, the same cards: 1, 2, 3, 4 and 5 are placed face down on the table and mixed around. Then the player picks up one card at random, notes its number and puts it back face down on the table. The cards are mixed around, then the player picks up the 2nd card at random and notes the number.

a) **How many possible outcomes are there, if the order does not matter?**

Ps try to dictate the different outcomes to T in a logical order without doing the experiment. Class points out any missed.

\[
\begin{array}{cccccc}
1, 1 & 2, 2 & 3, 3 & 4, 4 & 5, 5 \\
1, 2 & 2, 3 & 3, 4 & 4, 5 & 5, 6 \\
1, 3 & 2, 4 & 3, 5 & 4, 6 & 5, 7 \\
1, 4 & 2, 5 & 3, 6 & 4, 7 & 5, 8 \\
1, 5 & 2, 6 & 3, 7 & 4, 8 & 5, 9 \\
\end{array}
\]

Agree that there are 15 possible outcomes.

b) **How many possible outcomes are there if the order does matter?**

\[
\begin{array}{cccccc}
1, 1 & 2, 1 & 3, 1 & 4, 1 & 5, 1 \\
1, 2 & 2, 2 & 3, 2 & 4, 2 & 5, 2 \\
1, 3 & 2, 3 & 3, 3 & 4, 3 & 5, 3 \\
1, 4 & 2, 4 & 3, 4 & 4, 4 & 5, 4 \\
1, 5 & 2, 5 & 3, 5 & 4, 5 & 5, 5 \\
\end{array}
\]

Agree that there are 25 possible outcomes.

(but not equal probability, as there are two ways of getting, e.g. 1 and 2 (1, 2) and (2, 1) but only one way of getting, e.g. 1, 1)

**27 min**

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### Lesson Plan 139

#### Notes

Individual work, monitored, helped
T stresses that the 2 numbers are drawn at the same time.

Discussion, reasoning, agreement, self-correction, praising
Feedback for T

More able Ps can be asked for decimals and percentages too.

**Extension** (for quicker Ps)

iv) Neither of the two numbers is 1 or 3.

\[
1 - \frac{5}{6} = \frac{1}{6}
\]

Agreement, praising

---

<table>
<thead>
<tr>
<th>Activity</th>
<th>PbY5b, page 139</th>
</tr>
</thead>
</table>
| 4        | Q.1 Read: *In a lottery game, two numbers are drawn from the numbers {1, 2, 3, and 4}.* *Let’s suppose that each number has an equal chance of being drawn.*

Deal with part a) first, then parts b) and c). Set a time limit. Ps read questions themselves and write the answers in Pbs. Review with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

**Solution:**

a) **List the possible outcomes if the order of the two numbers does not matter.**

(1, 2), (1, 3), (1, 4), (2, 3), (2, 4), (3, 4) [6 outcomes]

b) **What is the probability of these outcomes?**

i) The numbers are 1 and 3.

\[
\frac{1}{6}
\]

ii) One of the numbers is 2.

\[
\frac{3}{6} = \frac{1}{2}
\]

iii) One of the numbers is either 1 or 3.

\[
\frac{5}{6}
\]

c) **List the possible outcomes if the order of the two numbers does matter.**

(1, 2), (1, 3), (1, 4); (2, 1); (2, 3), (2, 4);

(3, 1), (3, 2), (3, 4); (4, 1), (4, 2), (4, 3) [12 outcomes]

What are the probabilities of the outcomes in b)?

(The same: i) \[
\frac{2}{12} = \frac{1}{6}
\]

ii) \[
\frac{6}{12} = \frac{1}{2}
\]

iii) \[
\frac{10}{12} = \frac{5}{6}
\]

33 min

---

<table>
<thead>
<tr>
<th>Activity</th>
<th>PbY5b, page 139</th>
</tr>
</thead>
</table>
| 5        | Q.2 Read: *This time the numbers 1, 2, 3 and 4 are written on cards and put into a bag.*

A pupil takes out one card with his eyes shut, notes the number and puts it back into the bag again. Then the pupil takes out a 2nd card in the same way and notes the number.

a) **List the possible outcomes if the order of the two numbers does not matter.**

b) **List the possible outcomes if the order of the two numbers does matter.**

Deal with one part at a time. Set a time limit. Encourage logical listing. Review with whole class. Ps come to BB or dictate to T. Class points out any missed combination. Mistakes corrected.

Individual work, monitored, (helped)
Demonstrate the game with a P at front of class if necessary.

Discussion, reasoning, agreement, self-correction, praising

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### Activity 5 (Continued)

**Solution:**

- **a)**
  
  \[
  1, 1, 2, 2, 3, 3, 4, 4 \quad (10 \text{ possible outcomes, but not equal probabilities})
  
  \[
  1, 2, 2, 3, 3, 4
  
  \[
  1, 3, 2, 4
  
  \[
  1, 4
  
  \]

- **b)**
  
  \[
  1, 1, 2, 1, 3, 1, 4, 1 \quad (16 \text{ possible outcomes, with equal probabilities})
  
  \[
  1, 2, 2, 3, 2, 4, 2
  
  \[
  1, 3, 2, 3, 3, 4, 3
  
  \[
  1, 4, 2, 4, 3, 4, 4, 4
  
  \]

### Extension

Using the listing in b), what are the probabilities of these outcomes?

- **i)** The two cards are 1 and 3.  \[ \frac{2}{16} = \frac{1}{8} \]
- **ii)** There is at least one 2.  \[ \frac{7}{16} \]
- **iii)** The two cards are 1 or 3.  \[ \frac{12}{16} = \frac{3}{4} \]
- **iv)** The two cards are 2 and 2.  \[ \frac{1}{16} \]

### Notes

- **Lesson Plan 139**

  T elicits/explains the unequal probability in the listing in a).
  
  [There is only one way of getting, e.g. 1 and 1, but there are 2 ways of getting, e.g. 1 and 2 in any order, (1, 2) and (2, 1), so the outcome '1 and 2' is more likely than the outcome '1 and 1'.
  
  [If possible, use a computer simulation to show it.]

  Whole class activity
  
  (Ps could show on slates or scrap paper in unison.)

  Ps with different responses explain reasoning.

  Class decides on correct probability.

  Extra praise if Ps give % too.

### Y5

<table>
<thead>
<tr>
<th>Lesson Plan 139</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Notes</strong></td>
</tr>
<tr>
<td>T elicits/explains the unequal probability in the listing in a).</td>
</tr>
<tr>
<td>[There is only one way of getting, e.g. 1 and 1, but there are 2 ways of getting, e.g. 1 and 2 in any order, (1, 2) and (2, 1), so the outcome '1 and 2' is more likely than the outcome '1 and 1'.]</td>
</tr>
<tr>
<td>[If possible, use a computer simulation to show it.]</td>
</tr>
<tr>
<td>Whole class activity</td>
</tr>
<tr>
<td>(Ps could show on slates or scrap paper in unison.)</td>
</tr>
<tr>
<td>Ps with different responses explain reasoning.</td>
</tr>
<tr>
<td>Class decides on correct probability.</td>
</tr>
<tr>
<td>Extra praise if Ps give % too.</td>
</tr>
</tbody>
</table>

### 6 PbY5b, page 139

**Q.3** Read: *Eight children have written their names on a wheel of fortune. The fortune teller spins the wheel to see who is to be chosen to have their fortunes told. Let's suppose that each letter has an equal chance of coming to rest in front of the arrow and that the wheel cannot stop on the lines between the letters.*

*What is the probability of each of these outcomes?*

Set a time limit. Review with whole class. Ps could show responses on scrap paper or slates on command. Ps answering correctly explains to Ps who were wrong. Mistakes discussed and corrected.

Show each probability on a probability scale and ask Ps to express them as a decimal and percentage too.

**Solution:**

- **a)** A wins. \[ \frac{1}{8} \] \[ \Rightarrow 0.125 \rightarrow 12.5\% \]
- **c)** B and G win. \[ 0 \] \[ \Rightarrow \text{Impossible!} \]
- **d)** F does not win. \[ \frac{7}{8} \] \[ \Rightarrow 0.875 \rightarrow 87.5\% \]
- **e)** C or H wins. \[ \frac{1}{4} \] \[ \Rightarrow 0.25 \rightarrow 25\% \]
- **f)** Neither C nor H wins. \[ \frac{3}{4} \] \[ \Rightarrow 0.75 \rightarrow 75\% \]
- **i)** E either wins or doesn't win. \[ 1 \] \[ \Rightarrow 100\% \] Certain!

**Extension**

- **g)** after C in the alphabet; i.e. D, E, F, G, H \[ \frac{5}{8} \] \[ \Rightarrow 0.625 \rightarrow 62.5\% \]
- **h)** before C in the alphabet; i.e. A, B \[ \frac{1}{4} \] \[ \Rightarrow 0.25 \rightarrow 25\% \]
Y5

Activity

Tables and calculation practice, revision, activities, consolidation

PbY5b, page 140

Solutions:

Q.1  
  a) Throwing a 6
  b) Throwing a number less than 6
  c) Throwing a number not less than 6
  d) Throwing a number greater than 2
  e) Throwing a number less than 1
  f) Throwing an odd number
  g) Throwing a natural number

Q.2  
  a) \(\frac{1}{8}\)  
  b) \(\frac{1}{8}\)  
  c) \(\frac{4}{8} = \frac{1}{2}\)  
  d) \(\frac{7}{8}\)  
  e) 0  
  f) 1

Q.3  
  a) 1, 2  
  2, 3  
  3, 4  
  4, 5  
  1, 3  
  2, 4  
  3, 5  
  1, 4  
  2, 5  
  1, 5  
  (10 possible outcomes with equal probability)
  b) i) \(p\) (1 and 2) = \(\frac{1}{10}\)  
      [\(= 0.1 \rightarrow 10\%\)]
  ii) \(p\) (one number is 1) = \(\frac{4}{10} = \frac{2}{5}\)  
      [\(= 0.4 \rightarrow 40\%\)]
  iii) \(p\) (one number is either 1 or 2) = \(\frac{7}{10}\)  
      [\(= 0.7 \rightarrow 70\%\)]

Q.4  
  \(R : B : G = 4 : 5 : 6 = \frac{4}{15} : \frac{5}{15} : \frac{6}{15}\) (\(\times 2\), as \(15 \times 2 = 30\))
  or Red: \(\frac{4}{15}\) of 30 = \(30 ÷ 15 \times 4 = 2 \times 4 = \frac{8}{15}\) (pencils)
  Blue: \(\frac{5}{15}\) of 30 = \(\frac{1}{3}\) of 30 = \(30 ÷ 3 = \frac{10}{3}\) (pencils)
  Green: 30 – (10 + 8) = 30 – 18 = \(\frac{12}{3}\) (pencils)