Math Workbook
Year 6

Student Name: ________________________________

Class: ______________________________________

Teacher: ____________________________________
# Year 6 Math Workbook

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# Multiplying by 10, 100 and 1000

Write the missing numbers.

1. \( \times 10 = 43 \)
2. \( \times 100 = 560 \)
3. \( \times 100 = 720 \)
4. \( \times 10 = 84 \)

5. \( 9.7 \times \) = 97
6. \( 1.24 \times \) = 124

7. \( 1000 \times \) = 5230
8. \( 6.78 \times \) = 67.8

9. \( \times 100 = 85 \)
10. \( 1000 \times \) = 4060

11. \( \times 0.71 = 7.1 \)
12. \( 13.2 \times \) = 1320

13. \( \times 1000 = 12700 \)
14. \( 100 \times \) = 685

15. \( 10 \times \) = 112.7
16. \( 13.85 \times \) = 13850

17. \( 9.64 \times \) = 964
18. \( 10 \times \) = 127.5
Multiplying using doubling

\[
\begin{align*}
4.3 \times 200 &\quad 4.3 \times 400 &\quad 4.3 \times 800 \\
\text{Double 4.3 = 8.6} &\quad \text{Double 4.3 = 8.6} &\quad \text{Double 4.3 = 8.6} \\
8.6 \times 100 &\quad 8.6 \times 100 &\quad 8.6 \times 100 \\
\text{Double 8.6 = 17.2} &\quad \text{Double 8.6 = 17.2} &\quad \text{Double 17.2 = 34.4} \\
17.2 \times 100 &\quad 17.2 \times 100 &\quad 17.2 \times 100 \\
\text{Double 17.2 = 34.4} &\quad \text{Double 17.2 = 34.4} &\quad \text{Double 34.4 = 68.8} \\
34.4 \times 100 &\quad 34.4 \times 100 &\quad 34.4 \times 100
\end{align*}
\]

Use doubling for these multiplications.

1. \(0.34 \times 20 = \) 
2. \(2.76 \times 200 = \)
3. \(1.13 \times 40 = \)
4. \(1.7 \times 400 = \)
5. \(3.9 \times 80 = \)
6. \(3.6 \times 800 = \)
7. \(5.21 \times 2000 = \)
8. \(4.37 \times 200 = \)
9. \(1.04 \times 8000 = \)
10. \(6.32 \times 80 = \)
11. \(7.8 \times 4000 = \)
12. \(4.21 \times 400 = \)
Dividing by 10, 100 and 1000

Divide each number in the first place-value grid by the amount in the arrow. Write your answers in the empty grid.

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\[ \div 10 \]
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\[ \div 1000 \]
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Dividing using halving

To divide by 20, you can first halve the number, then divide by 10.
To divide by 80, divide by 8 by halving three times, then divide by 10.

68.8 ÷ 80
68.8 → 34.4 → 17.2 → 8.6
8.6 ÷ 10 = 0.86

1. 61.4 ÷ 20 = __________
2. 47.2 ÷ 40 = __________

3. 92.4 ÷ 80 = __________
4. 73.6 ÷ 200 = __________

5. 724 ÷ 400 = __________
6. 948 ÷ 800 = __________

7. 3842 ÷ 2000 = __________
8. 6488 ÷ 4000 = __________

9. 7608 ÷ 8000 = __________
10. 268 ÷ 40 = __________

11. 4780 ÷ 200 = __________
12. 842 ÷ 80 = __________
## Table facts

Complete the multiplications and divisions.

1. $8 \times 6 = \underline{\hspace{2cm}}$
2. $21 \div 3 = \underline{\hspace{2cm}}$
3. $4 \times 7 = \underline{\hspace{2cm}}$
4. $42 \div 6 = \underline{\hspace{2cm}}$
5. $32 \div 4 = \underline{\hspace{2cm}}$
6. $8 \times 3 = \underline{\hspace{2cm}}$
7. $56 \div 7 = \underline{\hspace{2cm}}$
8. $7 \times 7 = \underline{\hspace{2cm}}$
9. $9 \times 9 = \underline{\hspace{2cm}}$
10. $45 \div 5 = \underline{\hspace{2cm}}$
11. $72 \div 8 = \underline{\hspace{2cm}}$
12. $5 \times 4 = \underline{\hspace{2cm}}$
13. $8 \times 5 = \underline{\hspace{2cm}}$
14. $63 \div 9 = \underline{\hspace{2cm}}$
15. $24 \div 4 = \underline{\hspace{2cm}}$
16. $6 \times 6 = \underline{\hspace{2cm}}$
17. $6 \times 9 = \underline{\hspace{2cm}}$
18. $27 \div 9 = \underline{\hspace{2cm}}$
19. $35 \div 7 = \underline{\hspace{2cm}}$
20. $8 \times 8 = \underline{\hspace{2cm}}$
21. $3 \times 6 = \underline{\hspace{2cm}}$
22. $25 \div 5 = \underline{\hspace{2cm}}$
23. $30 \div 6 = \underline{\hspace{2cm}}$
24. $9 \times 4 = \underline{\hspace{2cm}}
Multiplying using table facts

Complete the multiplications.

1. $7 \times 30 = \underline{}$
2. $9 \times 40 = \underline{}$
3. $4 \times 60 = \underline{}$
4. $5 \times 70 = \underline{}$
5. $70 \times 7 = \underline{}$
6. $80 \times 3 = \underline{}$
7. $90 \times 7 = \underline{}$
8. $9 \times 60 = \underline{}$
9. $7 \times 400 = \underline{}$
10. $500 \times 4 = \underline{}$
11. $8 \times 800 = \underline{}$
12. $6 \times 800 = \underline{}$
13. $9 \times 3000 = \underline{}$
14. $8 \times 90 = \underline{}$
15. $700 \times 6 = \underline{}$
16. $90 \times 5 = \underline{}$
17. $3 \times 600 = \underline{}$
18. $600 \times 6 = \underline{}$
19. $3 \times 600 = \underline{}$
20. $80 \times 4 = \underline{}$
Remainders as fractions

Complete each division, writing the remainder as a fraction. Write each fraction in its simplest form.

1. \(28 \div 3 = \) 
2. \(47 \div 2 = \)

3. \(27 \div 4 = \)
4. \(52 \div 7 = \)

5. \(29 \div 6 = \)
6. \(66 \div 9 = \)

7. \(43 \div 5 = \)
8. \(38 \div 8 = \)

9. \(33 \div 2 = \)
10. \(32 \div 6 = \)

11. \(57 \div 8 = \)
12. \(19 \div 3 = \)

13. \(39 \div 4 = \)
14. \(36 \div 7 = \)

15. \(51 \div 9 = \)
16. \(28 \div 5 = \)

17. \(55 \div 6 = \)
18. \(45 \div 7 = \)
Remainders as decimals

Write the letter to match each division.

1. $41 \div 2$  2. $116 \div 5$
3. $208 \div 10$  4. $2460 \div 100$
5. $94 \div 4$  6. $57 \div 2$
7. $138 \div 5$  8. $239 \div 10$
9. $2590 \div 100$  10. $118 \div 4$
11. $53 \div 2$  12. $2910 \div 100$
13. $226 \div 10$  14. $142 \div 5$
15. $102 \div 4$  16. $289 \div 10$
17. $127 \div 5$  18. $43 \div 2$
Multiplying odds and evens

You need highlighter pens or coloured pencils. Colour all the numbers in the first multiplication chart that are a result of multiplying an even number by an even number. Colour the numbers in the other charts to match the labels. Use a different colour for each table.

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Use the results to write rules for multiplying odd and even numbers.
Odds and evens

Write ‘O’ for odd or ‘E’ for even for each calculation.

1. \( E - O = \)
2. \( O \times E = \)
3. \( O \times O = \)
4. \( E \times E = \)
5. \( E \times O \times E = \)
6. \( O \times (E + O) = \)
7. \( E \times (O + O) = \)
8. \( (E - O) \times O = \)
9. \( (O - O) \times E = \)
10. \( (O + O) \times (E - E) = \)
11. \( (O + E) \times (E - O) = \)
12. \( E \times (O - E) \times O = \)
13. \( (O \times E) + (E - E) = \)
14. \( (O \times O) - (O - E) = \)
15. \( (O \times E) + (E \times E) = \)
16. \( (E - O) - (O \times O) + E = \)
Write the missing numbers in each set of multiples.

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Smallest common multiples

In each box, write the smallest common multiple of the row heading and column heading. You do not need to fill in the shaded boxes!

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<th>5</th>
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<th>7</th>
<th>8</th>
<th>q</th>
<th>10</th>
<th>11</th>
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<td>5</td>
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<td>15</td>
<td>20</td>
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<td>q</td>
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<td>10</td>
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<tr>
<td>11</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quadrilaterals

Write the name of each quadrilateral. Choose from ‘parallelogram’, ‘trapezium’, ‘square’ and ‘rectangle’.

1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 
11. 
12. 
13. 
14. 
15. 
16.
Polygons

Draw each shape using the dots as vertices.

1. Equilateral triangle (1)
2. Equilateral triangle (2)
3. Isosceles triangle
4. Right-angled triangle
5. Scalene triangle
6. Rhombus
7. Trapezium
8. Kite
9. Rectangle
10. Arrowhead
11. Pentagon (with symmetry)
12. Pentagon (no symmetry)
13. Irregular hexagon (with symmetry)
14. Irregular hexagon (no symmetry)
15. Regular hexagon
16. Heptagon
Pictograms

Shuffle cards 2–10.

Take two cards at random and multiply these.

Record the event in the appropriate column on the frequency chart.

Replace the cards and repeat the process.

Do this 20 times.

Frequency Table

<table>
<thead>
<tr>
<th>Multiplication Total</th>
<th>1–15</th>
<th>16–30</th>
<th>31–45</th>
<th>46–60</th>
<th>61–75</th>
<th>76–90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of times it occurs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Draw a pictogram by following these instructions
- Continue to label both axes.
- Choose a symbol or picture to represent two multiplications.
- Record the information from the frequency chart on the pictogram using your chosen symbol.
- Give the pictogram a title.

Title: __________________________
Grouped data

Results of a spelling test

<table>
<thead>
<tr>
<th>Marks</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td></td>
</tr>
<tr>
<td>6-10</td>
<td></td>
</tr>
<tr>
<td>11-15</td>
<td></td>
</tr>
<tr>
<td>16-20</td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td></td>
</tr>
<tr>
<td>26-30</td>
<td></td>
</tr>
</tbody>
</table>

Which group of marks was scored by:
1. 11 children
2. 9 children
3. 19 children
4. 14 children

How many children had marks:
5. between 0 and 5
6. between 21 and 25
7. between 16 and 20
8. between 11 and 15
9. between 6 and 15
10. between 16 and 25
11. more than 15
12. less than 11
13. 11 or more
14. 20 or less
15. How many children took the test?
Grouped data

These are the times the goals were scored in 16 football matches on one Saturday.

<table>
<thead>
<tr>
<th>Team</th>
<th>Goals</th>
<th>Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAN. CITY</td>
<td>3</td>
<td>[22, 54, 67]</td>
</tr>
<tr>
<td>CHARLTON</td>
<td>2</td>
<td>[51, 61]</td>
</tr>
<tr>
<td>ASTON V.</td>
<td>1</td>
<td>[16]</td>
</tr>
<tr>
<td>NEWCASTLE</td>
<td>2</td>
<td>[2, 29]</td>
</tr>
<tr>
<td>ARSENAL</td>
<td>1</td>
<td>[90]</td>
</tr>
<tr>
<td>BOLTON</td>
<td>1</td>
<td>[12]</td>
</tr>
<tr>
<td>WIGAN</td>
<td>0</td>
<td>[30]</td>
</tr>
<tr>
<td>LIVERPOOL</td>
<td>1</td>
<td>[8]</td>
</tr>
<tr>
<td>CARDIFF</td>
<td>3</td>
<td>[18, 30, 68]</td>
</tr>
<tr>
<td>STOKE</td>
<td>0</td>
<td>[32, 59, 78, 82]</td>
</tr>
<tr>
<td>WATFORD</td>
<td>4</td>
<td>[30, 77]</td>
</tr>
<tr>
<td>COVENTRY</td>
<td>0</td>
<td>[19, 45]</td>
</tr>
<tr>
<td>WALSALL</td>
<td>2</td>
<td>[34, 48, 53]</td>
</tr>
<tr>
<td>SCUNTHORPE</td>
<td>2</td>
<td>[16, 81]</td>
</tr>
<tr>
<td>YORK</td>
<td>3</td>
<td>[89]</td>
</tr>
<tr>
<td>ALDERSHOT</td>
<td>2</td>
<td>[38]</td>
</tr>
<tr>
<td>SUNDERLAND</td>
<td>1</td>
<td>[2, 45, 68]</td>
</tr>
<tr>
<td>TOTTENHAM</td>
<td>1</td>
<td>[87]</td>
</tr>
<tr>
<td>MIDDLESBO.</td>
<td>3</td>
<td>[33]</td>
</tr>
<tr>
<td>CHELSEA</td>
<td>0</td>
<td>[62, 83]</td>
</tr>
<tr>
<td>PORTSMOUTH</td>
<td>1</td>
<td>[45]</td>
</tr>
<tr>
<td>MAN. UNITED</td>
<td>3</td>
<td>[82]</td>
</tr>
<tr>
<td>IPSWICH</td>
<td>2</td>
<td>[20, 53, 71, 84, 90]</td>
</tr>
<tr>
<td>BURNLEY</td>
<td>1</td>
<td>[68, 86]</td>
</tr>
<tr>
<td>LUTON</td>
<td>1</td>
<td>[27, 69, 82]</td>
</tr>
<tr>
<td>PRESTON</td>
<td>5</td>
<td>[53, 77]</td>
</tr>
<tr>
<td>INVERNESS</td>
<td>3</td>
<td>[27, 33]</td>
</tr>
<tr>
<td>KILMARNOCK</td>
<td>3</td>
<td>[27, 33]</td>
</tr>
<tr>
<td>WYCOMBE</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MANSFIELD</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Group the data, writing the frequency for each group of times. Then discuss the results with a partner.

<table>
<thead>
<tr>
<th>Minutes</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16–30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31–45</td>
<td></td>
<td></td>
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<tr>
<td>46–60</td>
<td></td>
<td></td>
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<tr>
<td>61–75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>76–90</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Centimetres and inches

You need eight objects that are each less than 1 metre in length. Start by estimating each length both in centimetres and in inches. Write your estimates in the table.

Next, measure each length using a ruler and write the accurate lengths in the table. How close are your estimates?

<table>
<thead>
<tr>
<th>Object</th>
<th>Length in centimetres</th>
<th>Length in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>estimated</td>
<td>measured</td>
</tr>
<tr>
<td></td>
<td>estimated</td>
<td>measured</td>
</tr>
<tr>
<td></td>
<td>estimated</td>
<td>measured</td>
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<tr>
<td></td>
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<td>measured</td>
</tr>
<tr>
<td></td>
<td>estimated</td>
<td>measured</td>
</tr>
</tbody>
</table>

1 inch is about 2 1/2 cm.
Kilometres and miles

Convert each distance into an approximate number of kilometres. Remember: 5 miles is approximate to 8 kilometres.

<table>
<thead>
<tr>
<th>Miles</th>
<th>Kilometres</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Manchester to Leeds</td>
<td>40</td>
</tr>
<tr>
<td>2. London to Southampton</td>
<td>77</td>
</tr>
<tr>
<td>3. Glasgow to Edinburgh</td>
<td>46</td>
</tr>
<tr>
<td>4. Leicester to Lincoln</td>
<td>51</td>
</tr>
<tr>
<td>5. Penzance to Aberystwyth</td>
<td>306</td>
</tr>
<tr>
<td>6. Oxford to Cambridge</td>
<td>82</td>
</tr>
<tr>
<td>7. Sheffield to Exeter</td>
<td>237</td>
</tr>
<tr>
<td>8. Inverness to Plymouth</td>
<td>664</td>
</tr>
<tr>
<td>9. Liverpool to Cardiff</td>
<td>165</td>
</tr>
<tr>
<td>10. Bristol to York</td>
<td>214</td>
</tr>
</tbody>
</table>
Parcel weights

Write each weight in grams.

1. \(2\frac{1}{2}\) kg \(\quad\) g
2. 1 kg 700 g \(\quad\) g
3. \(1\frac{1}{4}\) kg \(\quad\) g
4. 7.3 kg \(\quad\) g
5. 2.45 kg \(\quad\) g
6. 0.75 kg \(\quad\) g

Write each weight in kilograms.

7. 1500 g \(\quad\) kg
8. 750 g \(\quad\) kg
9. 4700 g \(\quad\) kg
10. 3600 g \(\quad\) kg
11. 5250 g \(\quad\) kg
12. 320 g \(\quad\) kg
Kilograms, grams, pounds, ounces

Write ‘<’, ‘>’ or ‘=’ between each pair of weights.

1. $1 \text{ kg}$ 1000 g 2. $\frac{1}{4} \text{ kg}$ 200 g
3. 300 g $\frac{1}{3} \text{ kg}$ 4. 400 g $\frac{2}{5} \text{ kg}$
5. 1 kg 2 lb 6. 1 lb 400 g
7. $\frac{1}{2} \text{ lb}$ 300 g 8. 1 lb $\frac{1}{2} \text{ kg}$
9. 2 lb 30 oz 10. 7 oz $\frac{1}{2} \text{ lb}$
11. $\frac{1}{4} \text{ lb}$ 3 oz 12. 500 g 16 oz
13. 50 oz 3 lb 2 oz 14. 1 lb 7 oz 25 oz
15. 72 oz $3 \frac{1}{2} \text{ kg}$ 16. 800 g 1 lb 6 oz
17. 100 oz $6 \frac{1}{4} \text{ lb}$ 18. 10 oz $\frac{1}{4} \text{ kg}$
Angles at a point

Write the missing angles.

1. 38°
2. 122°
3. 79°
4. 154°
5. 29°
Estimating angles

Estimate the size of each angle in degrees. Measure each angle carefully using a protractor. Write the difference between each estimate and the actual angle. What is your total difference?

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Estimated</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measured</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Total difference: __________
Angles in a triangle

Calculate the size of the shaded angles.

1. 38°
2. 28° and 71°
3. 47° and 63°
4. 127° and 28°
5. 48°
6. 68° and 60°
7. 56° and 118°
8. 59°
9. 37° and 51°
10. 46° and 32°
11. 28°
Row and column totals

Write the total of each row and column.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>5</td>
<td>9</td>
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<td>4</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>5</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>32</td>
<td>52</td>
<td>43</td>
</tr>
<tr>
<td>36</td>
<td>51</td>
<td>24</td>
<td>45</td>
</tr>
<tr>
<td>28</td>
<td>47</td>
<td>31</td>
<td>56</td>
</tr>
<tr>
<td>44</td>
<td>25</td>
<td>54</td>
<td>37</td>
</tr>
</tbody>
</table>

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>400</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>700</td>
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<td>300</td>
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<tr>
<td>600</td>
<td>100</td>
<td>200</td>
<td>400</td>
</tr>
<tr>
<td>300</td>
<td>700</td>
<td>500</td>
<td>600</td>
</tr>
</tbody>
</table>
Adding and subtracting

Complete the additions and subtractions.

1. \(8.2 + 1.1 = \) 
2. \(3.7 + 3.1 = \) 
3. \(4.6 - 2.1 = \) 
4. \(7.9 - 1.1 = \) 
5. \(5.2 + 0.9 = \) 
6. \(7.3 + 1.9 = \) 
7. \(6.8 + 2.9 = \) 
8. \(3.7 - 1.9 = \) 
9. \(4.8 - 0.9 = \) 
10. \(6.1 - 3.9 = \) 
11. \(7 - 4.9 = \) 
12. \(8 - 1.1 = \) 
13. \(5.0 + 3.9 = \) 
14. \(6.0 - 1.9 = \) 
15. \(1.35 + 0.9 = \) 
16. \(1.27 + 1.9 = \) 
17. \(2.85 + 3.9 = \) 
18. \(6.72 - 0.9 = \) 
19. \(3.85 - 1.9 = \) 
20. \(4.06 - 2.9 = \)
Differences

Complete the difference tables.

<table>
<thead>
<tr>
<th>18</th>
<th>38</th>
<th>83</th>
<th>74</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>62</td>
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</tr>
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<td>97</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>169</td>
<td>527</td>
<td>238</td>
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</tr>
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<td>93</td>
<td></td>
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<tr>
<td>471</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>532</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>615</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Subtracting

Use a set of number cards 0–9 and shuffle them before each question. Deal out numbers to fit the blanks. Choose your own strategy to complete each subtraction. Check your answers using a calculator.

1. 2001 – 

2. 1872 – 

3. 9473 – 

4. 2603 – 

5. 814 – 

6. 10000 – 

7. – 39 = 

8. – 8 = 

9. – 86 = 

10. – 103 = 

11. – 598 = 

12. – 987 =
Doubling and halving

Complete each grid.

47  83  28  →  94
67  74  34
91  56  53

double

86  138  66
114  98  152
46  176  78
halve

7.4  2.6  8.9
11.9  6.7  13.8
double

5.8  15.7  4.3

Half-price sale

These televisions are being sold at half-price. Write the new prices underneath.

1. £860
2. £410
3. £330
4. £950
5. £740
6. £290
7. £1230
8. £1080
9. £1570
10. £1830
11. £1170
12. £1460
Multiplying by doubling

Complete each line using doubling.

1. \(3 \times 7 = \), \(3 \times 14 = \), \(3 \times 28 = \)
2. \(5 \times 6 = \), \(5 \times 12 = \), \(5 \times 24 = \)
3. \(7 \times 8 = \), \(7 \times 16 = \), \(7 \times 32 = \)
4. \(4 \times 9 = \), \(4 \times 18 = \), \(4 \times 36 = \)
5. \(8 \times 4 = \), \(8 \times 8 = \), \(8 \times 16 = \)
6. \(6 \times 7 = \), \(\quad = \), \(\quad = \)
7. \(3 \times 9 = \), \(\quad = \), \(\quad = \)
8. \(6 \times 8 = \), \(\quad = \), \(\quad = \)
9. \(8 \times 9 = \), \(\quad = \), \(\quad = \)
10. \(9 \times 7 = \), \(\quad = \), \(\quad = \)
Multiplying by 23

Complete these $\times23$ facts using doubling.

1. $1 \times 23 = $
2. $2 \times 23 = $
3. $4 \times 23 = $
4. $8 \times 23 = $
5. $16 \times 23 = $
6. $32 \times 23 = $

Use the facts above to complete these multiplications.

7. $18 \times 23 = $  
8. $9 \times 23 = $  
9. $23 \times 11 = $  
10. $23 \times 17 = $  
11. $35 \times 23 = $  
12. $48 \times 23 = $  
13. $23 \times 21 = $  
14. $23 \times 7 = $  
15. $41 \times 23 = $  
16. $56 \times 23 = $
Mixed numbers and improper fractions

Write each mixed number as an improper fraction.

1. \(2 \frac{3}{4} = \frac{11}{4}\)
2. \(3 \frac{1}{3} = \frac{}{\}
3. \(4 \frac{2}{5} = \frac{}{\}
4. \(7 \frac{1}{4} = \frac{}{\}
5. \(1 \frac{5}{6} = \frac{}{\}
6. \(4 \frac{3}{7} = \frac{}{\}
7. \(5 \frac{2}{3} = \frac{}{\}
8. \(3 \frac{5}{8} = \frac{}{\}
9. \(2 \frac{4}{5} = \frac{}{\}
10. \(10 \frac{7}{10} = \frac{}{\}
11. \(7 \frac{2}{7} = \frac{}{\}
12. \(6 \frac{3}{4} = \frac{}{\}
13. \(9 \frac{2}{3} = \frac{}{\}
14. \(5 \frac{1}{5} = \frac{}{\}
15. \(8 \frac{3}{4} = \frac{}{\}
16. \(3 \frac{2}{9} = \frac{}{\}
17. \(2 \frac{4}{7} = \frac{}{\}
18. \(7 \frac{3}{8} = \frac{}{\}
19. \(6 \frac{5}{6} = \frac{}{\}
20. \(5 \frac{6}{7} = \frac{}{\} \)
Mixed numbers and improper fractions

Write ‘<’, ‘>’ or ‘=’ between each pair.

1. \( \frac{5}{4} \) \( \frac{3}{4} \)
2. \( \frac{17}{6} \) \( 3 \frac{1}{6} \)
3. \( 2 \frac{2}{3} \) \( \frac{11}{3} \)
4. \( 4 \frac{2}{3} \) \( \frac{14}{3} \)
5. \( 5 \frac{4}{5} \) \( \frac{27}{5} \)
6. \( \frac{17}{4} \) \( 4 \frac{3}{4} \)
7. \( 7 \frac{5}{8} \) \( \frac{61}{8} \)
8. \( 6 \frac{3}{7} \) \( \frac{41}{7} \)
9. \( \frac{42}{9} \) \( 4 \frac{5}{9} \)
10. \( \frac{21}{6} \) \( 3 \frac{5}{6} \)
11. \( 2 \frac{9}{10} \) \( \frac{31}{10} \)
12. \( 7 \frac{7}{9} \) \( \frac{68}{9} \)
13. \( \frac{27}{8} \) \( 3 \frac{5}{8} \)
14. \( \frac{51}{11} \) \( 4 \frac{7}{11} \)
15. \( 1 \frac{7}{12} \) \( \frac{17}{12} \)
16. \( 2 \frac{17}{20} \) \( \frac{69}{20} \)
Equivalent fractions game

This is a game for two or more players, each with a copy of this sheet. You need two sets of number cards 1–20, or four sets of number cards 1–10. Shuffle the cards and deal out five to each player. Place the remaining cards in a pile face down. Can you make a pair of equivalent fractions using four of your cards? If you can, place them on the blank spaces below. If not, swap one of your cards for another from the pile, then your partner has a go. Keep taking turns until one of you makes a pair of equivalent fractions.
Fractions in simplest form

Write each fraction in its simplest form.

1. $\frac{9}{15} = \underline{\quad}$
2. $\frac{4}{6} = \underline{\quad}$
3. $\frac{9}{12} = \underline{\quad}$

4. $\frac{28}{40} = \underline{\quad}$
5. $\frac{10}{25} = \underline{\quad}$
6. $\frac{9}{24} = \underline{\quad}$

7. $\frac{25}{30} = \underline{\quad}$
8. $\frac{12}{42} = \underline{\quad}$
9. $\frac{8}{10} = \underline{\quad}$

10. $\frac{3}{12} = \underline{\quad}$
11. $\frac{28}{63} = \underline{\quad}$
12. $\frac{35}{40} = \underline{\quad}$

13. $\frac{16}{24} = \underline{\quad}$
14. $\frac{9}{36} = \underline{\quad}$
15. $\frac{21}{49} = \underline{\quad}$

16. $\frac{6}{36} = \underline{\quad}$
17. $\frac{12}{32} = \underline{\quad}$
18. $\frac{15}{25} = \underline{\quad}$

19. $\frac{7}{28} = \underline{\quad}$
20. $\frac{12}{27} = \underline{\quad}$
21. $\frac{72}{80} = \underline{\quad}$

22. $\frac{30}{48} = \underline{\quad}$
23. $\frac{20}{35} = \underline{\quad}$
24. $\frac{45}{54} = \underline{\quad}$
Ordering fractions

Write each set of fractions in order smallest to largest.

Convert each set to equivalent fractions with the same denominator.

1. 

\[
\frac{1}{2}, \frac{4}{9}, \frac{17}{36}, \frac{3}{4}, \frac{5}{6}, \frac{2}{3}
\]

2. 

\[
\frac{7}{16}, \frac{3}{4}, \frac{5}{8}, \frac{17}{32}, \frac{1}{2}, \frac{3}{8}
\]

3. 

\[
\frac{3}{10}, \frac{1}{2}, \frac{3}{4}, \frac{7}{10}, \frac{3}{5}, \frac{13}{20}
\]

Solve these problems.

4. Sunil did half a day’s work. He was offered either \(\frac{8}{15}\) or \(\frac{17}{30}\) or \(\frac{3}{5}\) of the day’s wages of £30. Which fraction gives him the most money?

5. Of the 60 goals scored last season, Fred scored \(\frac{4}{15}\), Sally scored \(\frac{3}{10}\), Winston scored \(\frac{1}{6}\), Harry scored \(\frac{1}{5}\). How many were scored by the captain, Dinesh?

6. What proportion of November is the five days of half term holiday?
Ordering fractions

Re-write each pair of fractions with a common denominator. Write ‘<’ or ‘>’ between them.

1. \( \frac{3}{4} \) \( \frac{2}{3} \)
2. \( \frac{2}{5} \) \( \frac{1}{2} \)
3. \( \frac{4}{5} \) \( \frac{3}{4} \)
4. \( \frac{7}{10} \) \( \frac{3}{5} \)
5. \( \frac{2}{3} \) \( \frac{4}{5} \)
6. \( \frac{3}{4} \) \( \frac{5}{6} \)
7. \( \frac{5}{6} \) \( \frac{7}{8} \)
8. \( \frac{8}{9} \) \( \frac{5}{6} \)
Ordering and converting fractions

For each question, choose two fractions from this set and compare them.

Write the two fractions in order from smallest to largest.

Convert your fractions so that they all have the same denominator. Check if your order was correct.

\[
\frac{8}{10}, \quad \frac{1}{2}, \quad \frac{3}{5}, \quad \frac{4}{5}, \quad \frac{4}{10}, \quad \frac{5}{7}, \quad \frac{7}{10}, \quad \frac{14}{20}, \quad \frac{7}{8}, \quad \frac{8}{20}, \quad \frac{3}{8}, \quad \frac{1}{4}, \quad \frac{7}{9}, \quad \frac{16}{20}
\]

1. \(\frac{4}{5}\) and \(\frac{1}{2}\) → \(\frac{1}{2}\) → \(\frac{4}{5}\) → \(\frac{5}{10}\) → \(\frac{8}{10}\)
2. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
3. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
4. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
5. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
6. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
7. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
8. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
9. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
10. \(\quad\) and \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\) → \(\quad\)
Converting fractions

Change the fractions so they have the same denominator.

Add the two fractions.

Write the total as a mixed number where possible.

1. $\frac{2}{3}$ and $\frac{3}{4}$

2. $\frac{4}{8}$ and $\frac{5}{6}$

3. $\frac{1}{2}$ and $\frac{2}{9}$

4. $\frac{3}{5}$ and $\frac{5}{7}$

5. $\frac{2}{4}$ and $\frac{3}{8}$

6. $\frac{1}{3}$ and $\frac{7}{6}$

7. $\frac{7}{10}$ and $\frac{4}{5}$

8. $\frac{5}{6}$ and $\frac{1}{4}$

9. $\frac{8}{9}$ and $\frac{1}{7}$

10. $\frac{1}{4}$ and $\frac{3}{5}$

11. $\frac{3}{7}$ and $\frac{2}{8}$

12. $\frac{2}{5}$ and $\frac{5}{6}$
Rounding game

A game for two players, with one set of number cards 0–9, and a copy of this sheet each. Shuffle the cards and turn one over. Each choose which of the first four boxes on the left to write the number in. Repeat this three times so that you have each created a 4-digit number. Each round your number to the nearest thousand and record this in the four boxes on the right. Score points to match the number of thousands in your rounded number. For example, 5728 rounds to 6000 and scores 6 points. The winner is the player with more points after eight rounds!

Score

Total score
## Rounding table

Complete the table by rounding each number to its nearest thousand, hundred and ten.

<table>
<thead>
<tr>
<th>Number</th>
<th>Nearest thousand</th>
<th>Nearest hundred</th>
<th>Nearest ten</th>
</tr>
</thead>
<tbody>
<tr>
<td>4732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5684</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2938</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6047</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5308</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9732</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11259</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13468</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29527</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>186079</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>297483</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1586718</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Rounding decimals game

A game for two players, with one set of number cards 0–9, and a copy of this sheet each. Shuffle the cards and turn one over. Each choose which of the first three boxes on the left to write the number in. Repeat two more times so that you have each created a decimal number with two decimal places. Each round your number to the nearest whole number and record this in the box on the right. This is your score for the round. The winner is the player with more points after eight rounds!

Total score
Rounding decimals

Choose three of these four digits to make each decimal number. Each number must round to the number on its right, to the nearest tenth.

1. \[\square \cdot \square \square \rightarrow 7.2\]
2. \[\square \cdot \square \square \rightarrow 4.9\]
3. \[\square \cdot \square \square \rightarrow 2.5\]
4. \[\square \cdot \square \square \rightarrow 8.7\]
5. \[\square \cdot \square \square \rightarrow 4.7\]
6. \[\square \cdot \square \square \rightarrow 7.5\]
7. \[\square \cdot \square \square \rightarrow 8.3\]
8. \[\square \cdot \square \square \rightarrow 2.9\]
9. \[\square \cdot \square \square \rightarrow 7.8\]
10. \[\square \cdot \square \square \rightarrow 8.2\]
11. \[\square \cdot \square \square \rightarrow 4.8\]
12. \[\square \cdot \square \square \rightarrow 2.8\]
13. \[\square \cdot \square \square \rightarrow 8.5\]
14. \[\square \cdot \square \square \rightarrow 7.4\]
15. \[\square \cdot \square \square \rightarrow 2.7\]
16. \[\square \cdot \square \square \rightarrow 4.3\]
17. \[\square \cdot \square \square \rightarrow 7.3\]
18. \[\square \cdot \square \square \rightarrow 8.4\]
## Ordering

Write ‘<’, ‘>’, or ‘=’ between each pair.

<p>| | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>117/100</td>
<td>1.71</td>
<td>2</td>
<td>39/10</td>
<td>3.87</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>4.6</td>
<td>4.59</td>
<td>4</td>
<td>238/100</td>
<td>2.38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>7.9</td>
<td>7.09</td>
<td>6</td>
<td>51/100</td>
<td>5.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>311/100</td>
<td>3.1</td>
<td>8</td>
<td>0.4</td>
<td>41/100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>160/1000</td>
<td>1.6</td>
<td>10</td>
<td>275/1000</td>
<td>275/1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>18/1000</td>
<td>1/10</td>
<td>12</td>
<td>317/100</td>
<td>3164/1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>4.01</td>
<td>41/1000</td>
<td>14</td>
<td>2.35</td>
<td>2.348</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>1.706</td>
<td>1.71</td>
<td>16</td>
<td>19/1000</td>
<td>1.01</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Half-way numbers

Write the number that is exactly half-way between each pair.

1. 4.3   4.4
2. 1.7   1.9
3. 6     6.2
4. 7     7.3
5. 8.1   8.2
6. 0.5   0.6
7. 3.12  3.16
8. 5.2   5.24
9. 0.96  1
10. 1.22 1.4
11. 3.08 3.4
12. 4.5   5
13. 5.23  5.27
14. 6.14  6.15
15. 8.63  8.64
16. 7.128 7.13
17. 0.324 0.36
18. 5.278 5.3
Factor challenge

Create eight 2-digit numbers to complete the sentences below. You can use only the digits 1, 2, 4 and 5, and each digit must be used exactly four times.

2 is a factor of

3 is a factor of

4 is a factor of

5 is a factor of

6 is a factor of

7 is a factor of

8 is a factor of

9 is a factor of
### Numbers of factors

12 has six factors: 1, 2, 3, 4, 6, 12
10 has four factors: 1, 2, 5, 10
16 has five factors: 1, 2, 4, 8, 16

Choose up to 30 numbers and write them in the correct columns in the table.

<table>
<thead>
<tr>
<th>two factors</th>
<th>three factors</th>
<th>four factors</th>
<th>five factors</th>
<th>six factors</th>
<th>seven factors</th>
<th>eight factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>16</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Write about any patterns that you notice.
Multiplying

Shuffle a set of number cards 0–9 and place them face down in a pile. Turn over the first card, and write the number in the blank box in question 1. Repeat for questions 2 to 7. Complete the multiplications. Check your answers using a calculator.

1. □ \times 34 = (\_ \times 30) + (\_ \times 4)
   = \_ + \_ = \_

2. □ \times 28 = (\_ \times 20) + (\_ \times 8)
   = \_ + \_ = \_

3. □ \times 46 = (\_ \times 40) + (\_ \times 6)
   = \_ + \_ = \_

4. □ \times 53 = (\_ \times 50) + (\_ \times 3)
   = \_ + \_ = \_

5. □ \times 72 = (\_ \times 70) + (\_ \times 2)
   = \_ + \_ = \_

6. □ \times 97 = (\_ \times 90) + (\_ \times 7)
   = \_ + \_ = \_

7. □ \times 58 = (\_ \times 50) + (\_ \times 8)
   = \_ + \_ = \_
Multiplication challenge

Shuffle a set of number cards 2–9 and deal out three cards. Arrange the numbers in the first set of boxes. The aim is to get as close to the target as possible. Complete the multiplication on paper and write your answer in the table. Record the difference between your answer and the target in the last column. Reshuffle the cards and repeat. When you have completed the table, find your total difference. How close were you?

<table>
<thead>
<tr>
<th>Target</th>
<th>Multiplication</th>
<th>Product</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total difference ___________________________
Multiplying by nearly 50, 100...

In each cloud, use the answer to the top multiplication to find the answer to the bottom one.

1. \(38 \times 50 = 1900\)
   \(38 \times 49 = \underline{\hspace{2cm}}\)

2. \(26 \times 50 = 1300\)
   \(26 \times 51 = \underline{\hspace{2cm}}\)

3. \(19 \times 50 = 950\)
   \(19 \times 52 = \underline{\hspace{2cm}}\)

4. \(42 \times 50 = 2100\)
   \(42 \times 48 = \underline{\hspace{2cm}}\)

5. \(38 \times 100 = 3800\)
   \(38 \times 101 = \underline{\hspace{2cm}}\)

6. \(78 \times 100 = 7800\)
   \(78 \times 99 = \underline{\hspace{2cm}}\)

7. \(27 \times 100 = 2700\)
   \(27 \times 98 = \underline{\hspace{2cm}}\)

8. \(31 \times 100 = 3100\)
   \(31 \times 102 = \underline{\hspace{2cm}}\)

9. \(23 \times 80 = 1840\)
   \(23 \times 78 = \underline{\hspace{2cm}}\)

10. \(18 \times 40 = 720\)
    \(18 \times 38 = \underline{\hspace{2cm}}\)

11. \(19 \times 30 = 570\)
    \(19 \times 32 = \underline{\hspace{2cm}}\)

12. \(22 \times 70 = 1540\)
    \(22 \times 71 = \underline{\hspace{2cm}}\)
Closest to 4000

Twelve children each wrote a multiplication with an answer close to 4000. Complete each multiplication to find out which three are the closest.

1. Jessie  
   \[49 \times 81\]  
   \[50 \times 81 = 4050\]  
   \[49 \times 81 = 3969\]  

2. Raj  
   \[51 \times 83\]  

3. Wayne  
   \[98 \times 42\]  

4. Aleena  
   \[52 \times 78\]  

5. Sean  
   \[48 \times 82\]  

6. Tia  
   \[44 \times 97\]  

7. Petra  
   \[102 \times 39\]  

8. Jeda  
   \[47 \times 83\]  

9. Molly-May  
   \[99 \times 41\]  

10. Karim  
    \[51 \times 79\]  

11. Emma  
    \[103 \times 37\]  

12. Joshua  
    \[53 \times 76\]  

13. 1st  
    2nd  
    3rd
Coordinates

Write the coordinates of each point.

1. A: ( , )
2. B: ( , )
3. C: ( , )
4. D: ( , )
5. E: ( , )
6. F: ( , )
7. G: ( , )
8. H: ( , )
9. I: ( , )
10. J: ( , )
11. K: ( , )
12. L: ( , )
Coordinate game

This is a game for two players, each with a set of counters in your own colour. Make two dice by writing -2, -1, 0, 1, 2 on the faces of two cubes, leaving one face blank. Use a red pen for one dice and blue for the other. The red dice will give you the x-coordinate, and the blue dice will give you the y-coordinate.
Take turns to roll both dice and place one of your counters on the matching point. If you throw a blank, you can choose the coordinate.
You cannot place a counter on a point that already contains a counter.
The winner is the first player to have four counters in any straight line.
Octahedron

Make an octahedron from this net.
Rooftop puzzle

Trace the net below. Cut out both your net and the net below, fold along the lines and glue the tabs to create two 'rooftops'. The challenge is to arrange the two shapes so that they form a tetrahedron.

Make an open tetrahedral box to put your tetrahedron in.
Tennis courts

These are the approximate measurements of a tennis court, in metres.

24 m
11 m
6.5 m
8 m

Calculate the areas of the shaded parts of the court.

1. Area: ________ m²
2. Area: ________ m²
3. Area: ________ m²
4. Area: ________ m²
5. Area: ________ m²
6. Area: ________ m²
7. Area: ________ m²
8. Area: ________ m²
9. Area: ________ m²
Cubes

Centimetre cubes can be placed together to build larger cubes. Here eight of these cubes have been used to create a $2 \times 2 \times 2$ cube. Each face has an area of $4 \text{cm}^2$. The total surface area of the cube is: $6 \times 4 = 24 \text{cm}^2$. Complete the table for different sized cubes.

<table>
<thead>
<tr>
<th>Cube</th>
<th>Number of cubes</th>
<th>Surface area</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1 \times 1 \times 1$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$2 \times 2 \times 2$</td>
<td>8</td>
<td>$24 \text{cm}^2$</td>
</tr>
<tr>
<td>$3 \times 3 \times 3$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$4 \times 4 \times 4$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$5 \times 5 \times 5$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$6 \times 6 \times 6$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$10 \times 10 \times 10$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Describe any patterns.
Area of triangles

Use a ruler to measure the length of the sides, then calculate the areas of the triangles.

1. 

2. $A =$ __________

3. 

4. 

5. $A =$ __________

6. 

7. $A =$ __________
### Mean Averages

Calculate the mean of the numbers in each row.

<table>
<thead>
<tr>
<th>Mean</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2.</td>
</tr>
<tr>
<td>3.</td>
<td>4.</td>
</tr>
<tr>
<td>5.</td>
<td>6.</td>
</tr>
<tr>
<td>7.</td>
<td>8.</td>
</tr>
<tr>
<td>9.</td>
<td>10.</td>
</tr>
<tr>
<td>11.</td>
<td>12.</td>
</tr>
<tr>
<td>15.</td>
<td>16.</td>
</tr>
<tr>
<td>17.</td>
<td>18.</td>
</tr>
</tbody>
</table>

1. 4 8
2. 6 10
3. 12 16
4. 10 34
5. 4 6 5
6. 13 11 9
7. 8 7 15
8. 13 10 4
9. 20 40 90
10. 18 28 38
11. 3 4 7 6
12. 5 6 8 11
13. 9 2 4 1
14. 11 13 14 15
15. 2 7 5 9
16. 4 3 6 8
17. 9 13 14 2
18. 8 15 1 16
## Dice Averages

Roll a dice 10 times for each question, then calculate the mean, mode and median for each set of scores.

1. **Dice scores**
   - Mean = 
   - Mode = 
   - Median = 

2. **Dice scores**
   - Mean = 
   - Mode = 
   - Median = 

3. **Dice scores**
   - Mean = 
   - Mode = 
   - Median = 

4. **Dice scores**
   - Mean = 
   - Mode = 
   - Median = 

5. **Dice scores**
   - Mean = 
   - Mode = 
   - Median = 
Fahrenheit and Centigrade

The graph below converts between temperatures measured in Fahrenheit and temperatures measured in Centigrade.

Write these temperatures in °F.

1. 10°C 2. 40°C 3. 50°C
4. 15°C 5. 0°C 6. 25°C

Write these temperatures in °C.

7. 70°F 8. 120°F 9. 80°F
10. 50°F 11. 100°F 12. 75°F
13. 65°F 14. 105°F
Inches and centimetres

Find eight objects that are each less than 1 metre in length. Measure their lengths in centimetres and write them down on a separate piece of paper. Then use the graph to convert each length to inches.
Addition pyramids

The number in each block of the pyramid is the total of the numbers in the two blocks directly below it. Complete the pyramids.

1. 

\[
\begin{array}{cccc}
0.3 & 0.6 & 0.1 & 0.7 \\
\end{array}
\]

2. 

\[
\begin{array}{cccc}
1.4 & 1.3 & 0.9 & 0.8 \\
\end{array}
\]

3. 

\[
\begin{array}{cccc}
0.21 & 0.53 & 0.46 & 0.38 \\
\end{array}
\]

4. 

\[
\begin{array}{cccc}
0.93 & 0.2 & 0.71 & 0.4 \\
\end{array}
\]

5. 

\[
\begin{array}{cccc}
3.25 & 2.15 & 1.62 & 0.7 & 0.94 \\
\end{array}
\]
Difference pyramids

The number in each block of the pyramid is the difference between the numbers in the two blocks directly below it.
Complete the pyramids.

1. \[0.9 - 0.3 = 0.6, 0.8 - 0.4 = 0.4\]
2. \[1.6 - 0.7 = 0.9, 3.8 - 2.5 = 1.3\]
3. \[1.52 - 2.03 = -0.51, 0.75 - 1.62 = -0.87\]
4. \[3.8 - 2.71 = 1.09, 0.9 - 1.34 = -0.44\]
5. \[5.08 - 1.7 = 3.38, 6.39 - 4.88 = 1.51, 10.3\]
Addition game

A game for two or more players, each with a copy of this sheet. For each round, roll a dice eight times. After each throw, all players write the number in any one of their eight boxes. After the eighth throw, players add their two 4-digit numbers together, and check each other’s totals. The player with the largest total scores 5 points, the next largest 4 points, and so on. The winner is the player with the most points after four rounds.

Round 1

+ 

Score: 

Round 2

+ 

Score: 

Round 3

+ 

Score: 

Round 4

+ 

Score: 

Total score: 

PS
## Adding

Complete the additions, estimating first.

<p>| | | |</p>
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<td></td>
<td>+</td>
<td>+</td>
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<td></td>
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<td>+</td>
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<td></td>
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<tr>
<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>932</td>
<td>+</td>
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<td></td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>3812</td>
<td></td>
</tr>
</tbody>
</table>
Square numbers

Write the next square number after each of these numbers.

1. 8 →  
2. 17 →  
3. 23 →  
4. 5 →  
5. 86 →  
6. 29 →  
7. 43 →  
8. 57 →  
9. 94 →  
10. 33 →  
11. 68 →  
12. 47 →  
13. 102 →  
14. 140 →  
15. 180 →  
16. 260 →  
17. 330 →  
18. 420 →  
19. 370 →  
20. 290 →  
21. 160 →  
22. 540 →  
Square numbers

Estimate the square of each number. Use a calculator to find the exact answer. Write the difference between this and your estimate.

<table>
<thead>
<tr>
<th>Number</th>
<th>Estimated square</th>
<th>Calculated square</th>
<th>Difference</th>
</tr>
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<tr>
<td>63</td>
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<td></td>
</tr>
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<td>28</td>
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<td></td>
</tr>
<tr>
<td>92</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Triangle patterns

Can you work out how this triangular pattern of numbers is made? Complete the next three lines of numbers.

Can you see a line of triangular numbers? Write about any patterns that you see.
# Sequences

Continue each sequence.

1. 21 32 43 54
2. 72 81 90 99
3. 1 2 4 8
4. 204 185 166 147
5. 1 3 6 10 15
6. 4 9 16 25
7. 17 34 51 68
8. 9 5 1
9. 1 1 2 3 5 8
10. 2.5 2.75 3
11. 0.6 1.5 2.4
12. 3.8 4.1 4.4
Multiplying game

A game for two or more players, each with a copy of this sheet. For each round, roll a dice four times. After each throw, each write the number in any one of your boxes. After the fourth throw, each estimate your answer and complete your multiplication. Check your answers using a calculator. The player with the largest answer scores 5 points, the next largest 4 points, and so on. The winner is the player with the most points after four rounds.

Round 1

Round 2

Round 3

Round 4

Score

Score

Score

Score

Total score

PS
Roll a dice to find the multiplier for each question. If you roll a 1, throw again. Estimate the answers, and then complete the multiplications.

1. 2 3 5 6
   x

2. 1 4 7 9
   x

3. 3 0 8 6
   x

4. 4 2 6 3
   x

5. 2 9 0 7
   x

6. 1 8 7 6
   x
Multiplying

Complete the calculations.

1. $\frac{1}{5}$ of £40 = 
2. $\frac{2}{5}$ of £40 = 
3. $\frac{4}{5}$ of £40 = 
4. $\frac{3}{5}$ of £40 = 
5. $\frac{1}{8}$ of £72 = 
6. $\frac{5}{8}$ of £72 = 
7. $\frac{3}{8}$ of £72 = 
8. $\frac{7}{8}$ of £72 = 
9. $\frac{1}{10}$ of £350 = 
10. $\frac{7}{10}$ of £350 = 
11. $\frac{3}{10}$ of £350 = 
12. $\frac{9}{10}$ of £350 = 
13. $\frac{1}{7}$ of £210 = 
14. $\frac{5}{7}$ of £210 = 
15. $\frac{3}{7}$ of £210 = 
16. $\frac{6}{7}$ of £210 = 
17. $\frac{1}{9}$ of £360 = 
18. $\frac{2}{9}$ of £360 = 
19. $\frac{7}{9}$ of £360 = 
20. $\frac{5}{9}$ of £360 =
## Multiplying

Complete the table.

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<th>80</th>
<th>2000</th>
<th>600</th>
<th>800</th>
<th>1200</th>
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<td>$\frac{3}{10}$</td>
<td></td>
<td>24</td>
<td></td>
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</tr>
<tr>
<td>$\frac{2}{5}$</td>
<td></td>
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<td>800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{7}{100}$</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{9}{20}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{7}{10}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{3}{4}$</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{4}{5}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{11}{20}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{51}{100}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\frac{19}{20}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fractions and decimals

Write each fraction as a decimal.

1. \( \frac{3}{10} = \underline{0.3} \)
2. \( \frac{q}{100} = \underline{\ \ } \)
3. \( 1\frac{7}{10} = \underline{\ \ } \)
4. \( 3\frac{11}{100} = \underline{\ \ } \)
5. \( 2\frac{q}{100} = \underline{\ \ } \)
6. \( \frac{854}{1000} = \underline{\ \ } \)
7. \( 6\frac{127}{1000} = \underline{\ \ } \)
8. \( 8\frac{83}{1000} = \underline{\ \ } \)
9. \( 1\frac{1}{2} = \underline{\ \ } \)
10. \( 3\frac{19}{100} = \underline{\ \ } \)
11. \( \frac{2}{5} = \underline{\ \ } \)
12. \( \frac{20}{50} = \underline{\ \ } \)
13. \( 7\frac{1}{4} = \underline{\ \ } \)
14. \( 3\frac{3}{4} = \underline{\ \ } \)
15. \( 8\frac{4}{5} = \underline{\ \ } \)
16. \( \frac{11}{20} = \underline{\ \ } \)
17. \( 1\frac{q}{20} = \underline{\ \ } \)
18. \( \frac{37}{50} = \underline{\ \ } \)
19. \( \frac{21}{25} = \underline{\ \ } \)
20. \( 1\frac{7}{25} = \underline{\ \ } \)
Fractions and decimals

Use the four numbers in each circle to make a fraction and an equivalent decimal.

1. \[
\begin{array}{c}
30 \\
56
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

2. \[
\begin{array}{c}
86 \\
15
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

3. \[
\begin{array}{c}
09 \\
109
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

4. \[
\begin{array}{c}
94 \\
52
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

5. \[
\begin{array}{c}
136 \\
52
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

6. \[
\begin{array}{c}
14 \\
1014
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

7. \[
\begin{array}{c}
531 \\
26
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

8. \[
\begin{array}{c}
200 \\
48
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

9. \[
\begin{array}{c}
70 \\
2014
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]

10. \[
\begin{array}{c}
160 \\
540
\end{array} = \quad \begin{array}{c}
\square \\
\cdot \\
\square
\end{array}
\]
Divisibility

For each of these nine numbers, circle the digits by which it is divisible (3, 6, 9).

1. 12
   3 6 9
2. 27
   3 6 9
3. 54
   3 6 9
4. 39
   3 6 9
5. 102
   3 6 9
6. 84
   3 6 9
7. 237
   3 6 9
8. 32
   3 6 9
9. 621
   3 6 9

For each of these nine numbers, circle the digits by which it is divisible (2, 4, 8).

10. 16
    2 4 8
11. 48
    2 4 8
12. 44
    2 4 8
13. 56
    2 4 8
14. 70
    2 4 8
15. 84
    2 4 8
16. 126
    2 4 8
17. 384
    2 4 8
18. 272
    2 4 8
Divisibility

Create nine 2-digit numbers to complete the sentences below. In total you must use only two of each digit from 0 to 9.

☐  ☐ is divisible by 2
☐  ☐ is divisible by 3
☐  ☐ is divisible by 4
☐  ☐ is divisible by 5
☐  ☐ is divisible by 6
☐  ☐ is divisible by 8
☐  ☐ is divisible by 9
☐  ☐ is divisible by 10
☐  ☐ is divisible by 25
Positive and negative numbers

Write the difference between each pair of numbers.

1. 3 and -2  \( d = \ldots \)  
2. -7 and 3  \( d = \ldots \)

3. -1 and 4  \( d = \ldots \)  
4. -2 and -6  \( d = \ldots \)

5. 9 and -1  \( d = \ldots \)  
6. -6 and 2  \( d = \ldots \)

7. -5 and 4  \( d = \ldots \)  
8. -8 and 8  \( d = \ldots \)

9. 11 and -7  \( d = \ldots \)  
10. -7 and -12  \( d = \ldots \)

11. 3 and -3  \( d = \ldots \)  
12. -1 and -9  \( d = \ldots \)

13. -6 and -15  \( d = \ldots \)  
14. -13 and 14  \( d = \ldots \)

15. -11 and 9  \( d = \ldots \)  
16. -7 and 14  \( d = \ldots \)

17. -23 and 36  \( d = \ldots \)  
18. -37 and -18  \( d = \ldots \)

19. 42 and -56  \( d = \ldots \)  
20. -32 and 29  \( d = \ldots \)
Positive and negative numbers

Complete the difference tables.

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<tr>
<th>d</th>
<th>3</th>
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<td>-7</td>
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<td>6</td>
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</tr>
<tr>
<td>10</td>
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</tr>
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<td>-q</td>
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<table>
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<tr>
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<td>4.5</td>
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</tr>
<tr>
<td>-1.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Fractions as percentages

Write each fraction as a percentage.

1. \( \frac{3}{10} = \ldots \% \)
2. \( \frac{q}{10} = \ldots \% \)
3. \( \frac{11}{100} = \ldots \% \)
4. \( \frac{1}{4} = \ldots \% \)
5. \( \frac{1}{2} = \ldots \% \)
6. \( \frac{35}{100} = \ldots \% \)
7. \( \frac{3}{5} = \ldots \% \)
8. \( \frac{3}{4} = \ldots \% \)
9. \( \frac{74}{100} = \ldots \% \)
10. \( \frac{1}{5} = \ldots \% \)
11. \( \frac{1}{20} = \ldots \% \)
12. \( \frac{1}{10} = \ldots \% \)
13. \( \frac{1}{50} = \ldots \% \)
14. \( \frac{4}{5} = \ldots \% \)
15. \( \frac{13}{50} = \ldots \% \)
16. \( \frac{1}{25} = \ldots \% \)
17. \( \frac{19}{20} = \ldots \% \)
18. \( \frac{7}{20} = \ldots \% \)
19. \( \frac{49}{50} = \ldots \% \)
20. \( \frac{q}{25} = \ldots \% \)
**Percentages**

Complete the calculations.

1. 10% of £80 = __________
2. 1% of £400 = __________
3. 100% of £60 = __________
4. 50% of £80 = __________
5. 25% of £100 = __________
6. 20% of £60 = __________
7. 10% of £110 = __________
8. 50% of £30 = __________
9. 2% of £300 = __________
10. 3% of £200 = __________
11. 5% of £600 = __________
12. 75% of £32 = __________
13. 20% of £150 = __________
14. 3% of £210 = __________
15. 40% of £80 = __________
16. 4% of £900 = __________
17. 80% of £1 = __________
18. 90% of £2 = __________
19. 60% of £5 = __________
20. 40% of £3 = __________
Percentages

Write each percentage as a fraction. Find that fraction of the amount.

1. 25% of £82
   \[ \frac{1}{4} \]
   \[ \frac{1}{2} \text{ of } £82 = £41 \]
   \[ \frac{1}{4} \text{ of } £82 = £20.50 \]
   25% of £82 = £20.50

4. 20% of £45

5. 25% of £480

8. 33.3% of £135

7. 10% of £66

9. 50% of £91.50

3. 75% of £124

6. 75% of £720

The price of each book will be reduced by 25%. Write the new prices.

10. £6.80

25% of £6.80
\[ \frac{1}{4} \]
\[ \frac{1}{4} \text{ of } £6.80 = £1.70 \]

New Price:
£6.80 - £1.70 = £5.10
Multiplying

Complete the multiplications, estimating first.

1. \[136 \times 24\]
2. \[249 \times 18\]
3. \[306 \times 32\]
4. \[417 \times 16\]
5. \[532 \times 23\]
6. \[618 \times 31\]
7. \[279 \times 27\]
8. \[384 \times 36\]
9. \[526 \times 44\]
Multiplying

Roll a dice twice for each multiplication to find the multiplier. Complete the multiplications, estimating first.

1. 
   
   \[1 \quad 4 \quad 3\]
   
   \[\times\]

2. 
   
   \[2 \quad 3 \quad 7\]
   
   \[\times\]

3. 
   
   \[4 \quad 6 \quad 1\]
   
   \[\times\]

4. 
   
   \[8 \quad 4 \quad 7\]
   
   \[\times\]

5. 
   
   \[6 \quad 3 \quad 9\]
   
   \[\times\]

6. 
   
   \[8 \quad 2 \quad 8\]
   
   \[\times\]

7. 
   
   \[3 \quad 5 \quad 5\]
   
   \[\times\]

8. 
   
   \[6 \quad 0 \quad 9\]
   
   \[\times\]

9. 
   
   \[7 \quad 8 \quad 0\]
   
   \[\times\]
### Multiplying

Complete the multiplications, estimating first.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.  $3 \times 2.8$</td>
<td>2.  $4 \times 3.4$</td>
<td>3.  $5 \times 6.7$</td>
<td></td>
</tr>
<tr>
<td>$3 \times 2 = $</td>
<td>$4 \times 3 = $</td>
<td>$5 \times 6 = $</td>
<td></td>
</tr>
<tr>
<td>$3 \times 0.8 = $</td>
<td>$4 \times 0.4 = $</td>
<td>$5 \times 0.7 = $</td>
<td></td>
</tr>
<tr>
<td>$3 \times 2.8 = $</td>
<td>$4 \times 3.4 = $</td>
<td>$5 \times 6.7 = $</td>
<td></td>
</tr>
<tr>
<td>4.  $2 \times 8.71$</td>
<td>5.  $6 \times 4.23$</td>
<td>6.  $3 \times 5.16$</td>
<td></td>
</tr>
<tr>
<td>$2 \times 8 = $</td>
<td>$6 \times 4 = $</td>
<td>$3 \times 5 = $</td>
<td></td>
</tr>
<tr>
<td>$2 \times 0.7 = $</td>
<td>$6 \times 0.2 = $</td>
<td>$3 \times 0.1 = $</td>
<td></td>
</tr>
<tr>
<td>$2 \times 0.01 = $</td>
<td>$6 \times 0.03 = $</td>
<td>$3 \times 0.06 = $</td>
<td></td>
</tr>
<tr>
<td>$2 \times 8.71 = $</td>
<td>$6 \times 4.23 = $</td>
<td>$3 \times 5.16 = $</td>
<td></td>
</tr>
<tr>
<td>7.  $5 \times 4.26$</td>
<td>8.  $4 \times 3.77$</td>
<td>9.  $7 \times 8.64$</td>
<td></td>
</tr>
<tr>
<td>$5 \times = $</td>
<td>$4 \times = $</td>
<td>$3 \times = $</td>
<td></td>
</tr>
<tr>
<td>$5 \times = $</td>
<td>$4 \times = $</td>
<td>$3 \times = $</td>
<td></td>
</tr>
<tr>
<td>$5 \times = $</td>
<td>$4 \times = $</td>
<td>$3 \times = $</td>
<td></td>
</tr>
<tr>
<td>$5 \times = $</td>
<td>$4 \times = $</td>
<td>$3 \times = $</td>
<td></td>
</tr>
</tbody>
</table>
Adding decimals

Complete the additions, estimating first.

1. \[ \begin{array}{c}
4.62 \\
+ 1.75 \\
\hline
\end{array} \]

2. \[ \begin{array}{c}
5.32 \\
+ 7.47 \\
\hline
\end{array} \]

3. \[ \begin{array}{c}
8.28 \\
+ 6.37 \\
\hline
\end{array} \]

4. \[ \begin{array}{c}
5.36 \\
+ 1.09 \\
\hline
\end{array} \]

5. \[ \begin{array}{c}
4.72 \\
+ 5.38 \\
\hline
\end{array} \]

6. \[ \begin{array}{c}
6.47 \\
+ 7.35 \\
\hline
\end{array} \]

7. \[ \begin{array}{c}
8.32 \\
+ 9.59 \\
\hline
\end{array} \]

8. \[ \begin{array}{c}
4.78 \\
+ 1.62 \\
\hline
\end{array} \]

9. \[ \begin{array}{c}
3.07 \\
+ 5.96 \\
\hline
\end{array} \]

10. \[ \begin{array}{c}
11.35 \\
+ 5.94 \\
\hline
\end{array} \]

11. \[ \begin{array}{c}
8.64 \\
+ 12.39 \\
\hline
\end{array} \]

12. \[ \begin{array}{c}
4.58 \\
+ 5.96 \\
\hline
\end{array} \]
Addition game

This is a game for two or more players, each with a copy of this sheet. You will need a dice. Throw the dice six times. After each throw, each of you must write the dice number in one of your own six boxes. After the sixth throw, estimate the answer to your own addition. Then complete your addition. Check each other’s work. The player with the total nearest to 7 scores 5 points, the next nearest 4 points, and so on. Play four rounds. The player with the largest score is the winner!

Round 1

```
+   +  +  +
```

Round 2

```
+   +  +  +
```

Round 3

```
+   +  +  +
```

Round 4

```
+   +  +  +
```
Subtraction game

This is a game for two or more players, each with a copy of this sheet. You will need a dice.
Throw the dice eight times. After each throw, each of you must write the dice number in one of your own eight boxes. After the eighth throw, estimate the answer to your own subtraction. Then complete your subtraction. Check each other’s work. Your answer is your score. If the top number is smaller than the bottom number, you score 0 points.
Play four rounds. The player with the largest score is the winner!

Round 1

Round 2

Round 3

Round 4
Subtracting 4-digit numbers

Complete the subtractions, estimating first.

1. \[ \begin{array}{c} 5623 \\ - 3411 \end{array} \]
2. \[ \begin{array}{c} 4895 \\ - 2366 \end{array} \]
3. \[ \begin{array}{c} 4852 \\ - 1537 \end{array} \]
4. \[ \begin{array}{c} 9734 \\ - 3258 \end{array} \]
5. \[ \begin{array}{c} 8546 \\ - 1397 \end{array} \]
6. \[ \begin{array}{c} 2317 \\ - 1188 \end{array} \]
7. \[ \begin{array}{c} 6472 \\ - 2739 \end{array} \]
8. \[ \begin{array}{c} 5834 \\ - 1569 \end{array} \]
9. \[ \begin{array}{c} 4193 \\ - 1636 \end{array} \]
10. \[ \begin{array}{c} 5403 \\ - 2129 \end{array} \]
11. \[ \begin{array}{c} 7608 \\ - 4385 \end{array} \]
12. \[ \begin{array}{c} 5083 \\ - 1629 \end{array} \]
Subtracting decimals

Complete the subtractions, estimating first.

1. \[5.27 - 3.14 = \quad \]
2. \[8.73 - 4.26 = \quad \]
3. \[4.82 - 1.49 = \quad \]
4. \[9.51 - 4.16 = \quad \]
5. \[7.63 - 2.38 = \quad \]
6. \[5.23 - 1.79 = \quad \]
7. \[8.24 - 5.93 = \quad \]
8. \[5.46 - 2.63 = \quad \]
9. \[3.24 - 1.86 = \quad \]
10. \[7.03 - 5.94 = \quad \]
11. \[5.08 - 3.43 = \quad \]
12. \[4.12 - 1.99 = \quad \]
Subtraction game

This is a game for two or more players, each with a copy of this sheet. You will need a dice.

Throw the dice six times. After each throw, each of you must write the dice number in one of your own six boxes. After the sixth throw, estimate the answer to your own subtraction. Then complete your subtraction. Check each other’s work. Your answer is your score. If the top number is smaller than the bottom number, you score 0 points.

Play four rounds. The player with the largest score is the winner!

Round 1

\[
\begin{array}{c}
\phantom{0} \quad \phantom{0} \\
- \phantom{0} \quad \phantom{0} \\
\hline
\phantom{0} \quad \phantom{0} \\
\end{array}
\]

Round 2

\[
\begin{array}{c}
\phantom{0} \quad \phantom{0} \\
- \phantom{0} \quad \phantom{0} \\
\hline
\phantom{0} \quad \phantom{0} \\
\end{array}
\]

Round 3

\[
\begin{array}{c}
\phantom{0} \quad \phantom{0} \\
- \phantom{0} \quad \phantom{0} \\
\hline
\phantom{0} \quad \phantom{0} \\
\end{array}
\]

Round 4

\[
\begin{array}{c}
\phantom{0} \quad \phantom{0} \\
- \phantom{0} \quad \phantom{0} \\
\hline
\phantom{0} \quad \phantom{0} \\
\end{array}
\]
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1 l</td>
<td>500 ml</td>
<td>2.</td>
<td>⅓ l</td>
</tr>
<tr>
<td>3.</td>
<td>50 ml</td>
<td>⅓ l</td>
<td>4.</td>
<td>⅓ l</td>
</tr>
<tr>
<td>5.</td>
<td>1300 ml</td>
<td>1⅓ l</td>
<td>6.</td>
<td>1·3 l</td>
</tr>
<tr>
<td>7.</td>
<td>450 ml</td>
<td>0·4 l</td>
<td>8.</td>
<td>0·38 l</td>
</tr>
<tr>
<td>9.</td>
<td>1 gallon</td>
<td>1 litre</td>
<td>10.</td>
<td>10 gallons</td>
</tr>
<tr>
<td>11.</td>
<td>1 gallon</td>
<td>4000 ml</td>
<td>12.</td>
<td>1 gallon</td>
</tr>
<tr>
<td>13.</td>
<td>½ gallon</td>
<td>2500 ml</td>
<td>14.</td>
<td>4 pints</td>
</tr>
<tr>
<td>15.</td>
<td>8 pints</td>
<td>4 l</td>
<td>16.</td>
<td>1⅓ pints</td>
</tr>
<tr>
<td>17.</td>
<td>3000 ml</td>
<td>8 pints</td>
<td>18.</td>
<td>0·5 l</td>
</tr>
</tbody>
</table>
Probability

You will need a dice. From 24 throws of a dice, predict how many of each dice number you will throw. Record this in the ‘Prediction’ column of the table. Then throw the dice 24 times and complete the tallies and totals. Compare the results with your predictions.

<table>
<thead>
<tr>
<th>Number</th>
<th>Prediction</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<td>3</td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Repeat for 36 throws of the dice.

<table>
<thead>
<tr>
<th>Number</th>
<th>Prediction</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td></td>
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<td></td>
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<tr>
<td>4</td>
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<td></td>
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<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Dice probabilities

For each dice, write the probability of throwing each of the options shown.

1. a 2
2. a 6
3. an even number
4. an odd number
5. more than 2
6. more than 4

7. a 3
8. a 4
9. an odd number
10. an even number
11. more than 2
12. less than 4

13. a 4
14. a 5
15. more than 3
16. less than 5
17. an even number
18. an odd number
Pie charts

The pie charts show 16 children’s favourite types of film and TV programme.

Films
- horror
- comedy
- adventure
- sci-fi

TV programmes
- cartoons
- sport
- pop music
- soaps

What was the most popular type of:
1. film? 2. TV programme?

How many children preferred:
3. adventure films? 4. TV soaps?
5. pop music shows? 6. sci-fi films?
7. comedy films? 8. cartoons?

What proportion of children preferred:
Pie charts

You will need a dice.
Roll the dice 24 times, recording each throw in the table. Complete a pie chart to show the results.
Repeat for 36 throws.

<table>
<thead>
<tr>
<th>Number</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
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<td>4</td>
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<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number</th>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
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<tr>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discuss with a friend how the two charts are similar or different.
Perimeter

Calculate the perimeter of each shape.

1. 90 cm 70 cm 140 cm 120 cm
   P =

2. 100 cm 60 cm 60 cm 110 cm
   P =

3. 94 cm 78 cm 32 cm 58 cm
   P =

4. 84 cm 16 cm 65 cm 22 cm 26 cm
   P =

5. 26 cm 24 cm 7 cm 6 cm 13 cm
   P =

6. 48 cm 22 cm 64 cm 22 cm 17 cm
   P =

7. 13 cm 28 cm 40 cm 19 cm
   P =

8. 50 cm 56 cm 24 cm 12 cm 18 cm
   P =

9. 35 cm 21 cm 25 cm 38 cm 90 cm
   P =
Perimeter

Find the perimeter of each shape by measuring each length in centimetres and then adding. Use decimals, for example 5.4 cm. Begin by estimating each perimeter.

1. estimate: cm

2. estimate: cm

3. estimate: cm

Draw your own polygon and estimate then measure its perimeter.
Days

Calculate the number of days between each pair of dates.

1. __________  
2. __________  
3. __________  

4. __________  
5. __________  
6. __________  

7. __________  
8. __________  
9. __________
Reflecting points

Write the coordinates of these points when reflected in the x axis.

1. A: ( , )
2. E: ( , )
3. C: ( , )
4. G: ( , )
5. B: ( , )
6. H: ( , )
7. D: ( , )
8. K: ( , )
9. F: ( , )

Write the coordinates of these points when reflected in the y axis.

10. I: ( , )
11. F: ( , )
12. B: ( , )
13. G: ( , )
14. J: ( , )
15. K: ( , )
16. D: ( , )
17. E: ( , )
18. A: ( , )
Reflecting shapes

Draw the reflection of each shape in the mirror line.
Write the coordinates of these points after these translations.

1. A: 3 down, 2 left
2. B: 6 left, 3 down
3. C: 7 down, 4 right
4. D: 5 left, 5 up
5. E: 4 right, 6 up
6. F: 8 up, 3 right
7. C: 5 right, 4 down
8. D: 4 up, 7 left
9. F: 8 right, 2 up
10. B: 14 left, 4 down, 3 right
Write the coordinates of point B after these rotations:

1. a rotation of 90° clockwise about C
2. a rotation of 90° clockwise about A
3. a rotation of 90° anticlockwise about C
4. a rotation of 90° clockwise about B
5. a rotation of 180° anticlockwise about C
6. a rotation of 180° clockwise about C
7. a rotation of 90° clockwise about D
8. a rotation of 90° anticlockwise about D
9. a rotation of 270° clockwise about C
10. a rotation of 270° clockwise about D
Dividing

Complete the divisions, estimating first.

1. 3\( \overline{462} \)
   
2. 4\( \overline{536} \)
   
3. 5\( \overline{643} \)

4. 4\( \overline{723} \)
   
5. 3\( \overline{549} \)
   
6. 6\( \overline{836} \)

7. 5\( \overline{875} \)
   
8. 7\( \overline{923} \)
   
9. 8\( \overline{936} \)
Dividing

Roll a dice to find the divisor for each division. If you roll a 1, roll again.

1. □ 632
   □

2. □ 741
   □

3. □ 426
   □

4. □ 816
   □

5. □ 927
   □

6. □ 458
   □
Dividing decimals

Complete the divisions, estimating first.

1. 2) 12.8

2. 3) 35.1

3. 4) 86.4

4. 5) 67.5

5. 4) 96.8

6. 3) 72.6

7. 6) 78.6

8. 5) 92.5

9. 8) 93.6
Proportion

For each grid, write the proportion of grey squares, and then the proportion of white squares. Write each fraction in its simplest form.

1. grey: ________
   white: ________

2. grey: ________
   white: ________

3. grey: ________
   white: ________

4. grey: ________
   white: ________

5. grey: ________
   white: ________

6. grey: ________
   white: ________

7. grey: ________
   white: ________

8. grey: ________
   white: ________

9. grey: ________
   white: ________
Proportion

In each set, colour the correct number of spots blue (B), green (G), red (R) and yellow (Y) to match the proportions shown.

1. \(\frac{1}{2}B \frac{1}{4}R \frac{1}{8}Y\)

2. \(\frac{4}{9}B \frac{1}{3}R\)

3. \(\frac{1}{2}B \frac{1}{5}R \frac{1}{10}Y\)

4. \(\frac{1}{4}B \frac{1}{3}R \frac{1}{6}Y \frac{1}{6}G\)

5. \(\frac{1}{10}B \frac{2}{5}R \frac{1}{4}Y \frac{1}{10}G\)

6. \(\frac{3}{16}B \frac{3}{8}R \frac{1}{4}Y \frac{1}{8}G\)

7. \(\frac{1}{6}B \frac{1}{4}R \frac{1}{3}Y \frac{1}{12}G\)

8. \(\frac{1}{4}B \frac{1}{4}R \frac{2}{7}Y\)

q. \(\frac{1}{3}B \frac{1}{4}R \frac{1}{6}Y \frac{2}{9}G\)
Write the ratio of the amounts in these pairs of purses.

1. A:B = __________________
2. B:C = __________________
3. C:D = __________________
4. D:E = __________________
5. D:B = __________________
6. C:A = __________________
7. A:D = __________________
8. B:E = __________________
9. E:C = __________________
10. E:A = _________________
11. B:F = __________________
12. C:F = __________________
13. A:F = __________________
14. D:F = __________________
Ratio

Shade the correct number of squares in each grid to make these ratios of shaded to non-shaded squares.

1. 1:2
2. 2:1
3. 1:3
4. 4:5
5. 5:4
6. 3:1
7. 1:4
8. 1:1
9. 2:3
10. 3:2
11. 5:1
12. 1:5
Prime numbers

Write the nearest prime number before and after each number.

1. 8
2. 14
3. 10
4. 20
5. 35
6. 18
7. 42
8. 54
9. 38
10. 62
11. 98
12. 76
13. 82
14. 88
15. 44
16. 95
Prime numbers

Here are all the prime numbers up to 1000.

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>11</td>
<td>13</td>
<td>17</td>
<td>19</td>
<td>23</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>37</td>
<td>41</td>
<td>43</td>
<td>47</td>
<td>53</td>
<td>59</td>
<td>61</td>
<td>67</td>
<td>71</td>
<td>73</td>
<td>79</td>
</tr>
<tr>
<td>83</td>
<td>89</td>
<td>97</td>
<td>101</td>
<td>103</td>
<td>107</td>
<td>109</td>
<td>113</td>
<td>127</td>
<td>131</td>
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</tr>
<tr>
<td>139</td>
<td>149</td>
<td>151</td>
<td>157</td>
<td>163</td>
<td>167</td>
<td>173</td>
<td>179</td>
<td>181</td>
<td>191</td>
<td>193</td>
</tr>
</tbody>
</table>

Can you find any patterns?
Prime factors

Use division to find the prime factors of these numbers.

1. 42
2. 38
3. 75
4. 24
5. 124
6. 136
7. 98
8. 125
9. 104
10. 102
11. 88
12. 212
Multiplying by 10, 100 and 1000 for 3 children

You need units, tenths and hundredths place-value cards. Shuffle the cards in their sets. Each take three cards from every pile. Use the cards to create three decimal numbers, each with two decimal places. Each draw a table like the one below and record in the first column all the numbers your group has made. Multiply each number by 10, then by 100, and then by 1000, and write your answers in the table.

<table>
<thead>
<tr>
<th>Number</th>
<th>×10</th>
<th>×100</th>
<th>×1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.32</td>
<td>43.2</td>
<td>432</td>
<td>4320</td>
</tr>
</tbody>
</table>

Multiplying by 10, 100 and 1000 for 2 children

You need a copy of the table on PCM 171, a dice and some cubes. Take turns to choose an amount from the left-hand column of the table and throw the dice. If you throw 1 or 2, multiply your amount by 10. If you throw 3 or 4, multiply your amount by 100. If you throw 5 or 6, multiply your amount by 1000. Write the product in the table in the appropriate space. If the space already contains an answer, take a cube. The winner is the player with fewer cubes once the table has been completed!

When you have completed the table, work together to find the amount which is closest to:

(a) £50  (b) £300
(c) £4000  (d) £20
(e) £10 000  (f) £10
(g) £100  (h) £1000

Circle the largest amount in the table and the smallest. Which amount is about half-way between the two?
Dividing by 100 by dividing by 10 twice

You need number cards 0–9, cubes, and an extra 0 card and a place-value grid (Th, H, T, U, th) each.
Each place your extra 0 card in the units column of your grid. Take turns to take a number card and place it on your grid in the thousands, hundreds or tens column. Repeat this three times so that you each have a 4-digit number. In turn, divide your number by 10, and then by 10 again, by moving your cards two places to the right. Each record your division, for example 3610 ÷ 100 = 36.1. Check each other’s answers. The player whose answer is nearest to 30 takes a cube. Shuffle the cards and play several rounds. The winner is the player with the most cubes.

\[
\begin{array}{c}
\div 10 \\
\div 10
\end{array}
= \quad \begin{array}{c}
\div 100
\end{array}
\]

<table>
<thead>
<tr>
<th>Th (thousands)</th>
<th>H (hundreds)</th>
<th>T (tens)</th>
<th>U (units)</th>
<th>t (tenths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Year 6 Block A1 • PCM II7b

Multiplying and dividing by 10, 100 and 1000

You need 16 counters.
Cover each of the numbers below with a counter. Take turns to reveal a number. Each write a multiplication or division which has this number as the answer. You must multiply or divide by 10, 100 or 1000.

\[
\begin{array}{c}
4360 \\
634000 \\
34.6 \\
43600 \\
346000 \\
46300 \\
43.6 \\
6340 \\
634000 \\
6.34 \\
3460 \\
4630 \\
63.4 \\
3.46 \\
4.36 \\
46.3
\end{array}
\]

Check each other’s answers. If your answer is correct and you are the only player with that calculation, you score 2 points. If your calculation is correct but the same as another player’s, you score 1 point. Keep playing until all the numbers are revealed. Who has the most points?
**Multiplications**

You need squared paper and eight different coloured pencils. Draw the outline of a 10 x 10 grid on squared paper. Follow these instructions using a different coloured pencil each time:

- write the x1 table across the top row and down the first column
- write the x2 table along the second row and down the second column
- write the x10 table along the bottom row and down the last column
- write the x9 table along the ninth row and down the ninth column
- write the x5 table along the fifth row and down the fifth column
- write the x3 table along the third row and down the third column.

Pause and compare your grids. How many numbers still need to be added? This shows that you already know most of the tables! Try some out, for example 3 x 8 is already on the grid as 8 x 3. Use different coloured pencils to:

- write the square numbers in a diagonal line, for example 16 (4 x 4)
- write the x4 table along the fourth row and down the fourth column.

Study your grids. The missing numbers are the hard table facts. Can you think of a way to learn these? Talk about your ideas together.

**Table facts**

You need number cards 2–11, blank multiplication charts (PCM 176) and a stopwatch.

One player is the timer. The other players each take a multiplication chart. Shuffle the cards and deal out five to use as the column headings, and five for the row headings. Copy these onto your charts.

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>5</th>
<th>11</th>
<th>9</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When the timer says Go, each complete as much of your multiplication chart as you can. After 2 minutes the timer should ask you to stop. Check each other’s answers. Swap roles and repeat the activity several times.

For an extra challenge, try reducing the time to 1 minute!
Table game

You need a multiplication chart, a set of counters in your own colour each, and a dice numbered 5–10.
Take turns to choose a number from the set below and say it aloud, for example Thirty-one. Throw the dice and count along that row on the multiplication chart. For example if you throw 6, count along the ×6 row. Stop at the number closest to but less than your chosen number, for example 30. Work out how many of the dice number there are in your chosen number and record the division, for example 31 ÷ 6 = 5 1/6. Check each other’s answers. If correct, cover the number with a counter. You may also choose a number that is already covered by a counter, and if correct your counter replaces the original! Who has the most counters on the board at the end of the game?

37  23  41  19  67
  17  31  29  47

Division game

You need a cube and counters in two colours. Make a dice by writing numbers 3–8 on the faces of the cube.
Take turns to choose a number on the grid and roll the dice. Both of you must divide the grid number by the dice number and write the division.

38 ÷ 7 = 5 3/7

Check each other’s answers. If the player who chose the number is correct, they cover the number with a counter in their colour. The winner is the first player to cover 10 numbers.
Odd and even differences

You need a dice.
Each throw the dice twice to create a 2-digit number. Work out the difference between the two numbers and check each other's answers.
One player keeps a record of the odd-number differences. The other player keeps a record of the even-number differences. Keep playing until you have both collected at least five numbers. Record your results in a table like the one below.

<table>
<thead>
<tr>
<th>Differences</th>
<th>odd</th>
<th>even</th>
</tr>
</thead>
<tbody>
<tr>
<td>odd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>even</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Odd products

Two numbers when multiplied together give an answer that is both:

between 100 and 150 and odd

Investigate what the two numbers could be. Once you find them, try to find three numbers which multiply together to give an answer that is both odd and between 100 and 200.
Venn diagrams for 2 children

Each draw a Venn diagram. Label each loop *Multiples of _* and fill in a different number for each. Decide together which two numbers to use. Discuss which numbers could go in each loop, which numbers could go in the section where the loops overlap, and which numbers could go outside the loops. Write six numbers in each of the four sections. Underline the lowest common multiple.

<table>
<thead>
<tr>
<th>Multiples of 3</th>
<th>Multiples of 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>9</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td>30</td>
<td>44</td>
</tr>
<tr>
<td>44</td>
<td>65</td>
</tr>
</tbody>
</table>

Repeat this activity, drawing a new Venn diagram and choosing a different pair of multiples.

Common multiples for 3 children

You need a dice. Take turns to roll the dice three times. Work out the smallest common multiple of the three numbers. Then multiply all three numbers together. Find out how many times the smallest common multiple divides into that total. Check each other’s answers.

Smallest common multiple is 12.

\[ 2 \times 3 \times 4 = 24 \]

\[ 24 \div 12 = 2 \]
Three-piece square

for 2 children

You need squared paper, a ruler and scissors. Draw a large square on the paper and mark two mid-points (middle of the lines) like the ones below. Use these mid-points to help you draw the lines inside the square, to create three shapes. Label the shapes A, B and C, just like the example, and cut them out. Explore making different shapes by joining equal sides of the pieces. For example, join pieces A and B to make a right-angled triangle. You can turn the pieces over.

Make a trapezium using:
1) A and B  
2) B and C  
3) A and C  
4) A, B and C

Investigate other shapes you can make using all three pieces.

Quadrilaterals with parallel sides

for 2 or 3 children

You need a 5 x 5 geo-board, a rubber band, and square dotty paper and a ruler each. Take turns to create different quadrilaterals on the geo-board using the rubber band. Each one must have at least one pair of parallel sides. Each draw the quadrilaterals on square dotty paper. Write the name of the shape beneath each one. How many different quadrilaterals of each type can you create?
Quadrilateral challenge

You need Post-it notes, an A3 piece of paper and a ruler.
Draw a large Carroll diagram on the paper like the one below. You will use the diagram to show the relationship between different quadrilaterals. Write square on a Post-it note and decide together where to place it on your diagram. Write the names of other quadrilaterals on Post-it notes. Talk together about where each one should go. How many quadrilaterals can you think of? Are you able to put them all in the correct places?

<table>
<thead>
<tr>
<th>1 pair of equal sides</th>
<th>2 pairs of equal sides</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 pair of parallel sides</td>
<td></td>
</tr>
<tr>
<td>2 pairs of parallel sides</td>
<td></td>
</tr>
</tbody>
</table>

Areas of kites

You need square dotty paper and a ruler.
Draw different-sized kite shapes on the dotty paper. Draw a table like the one below. Measure and record the lengths of the two diagonals for each kite. These are shown on the drawing below by dotted lines. Calculate the area of each kite by splitting them up into half-squares and half-rectangles.

<table>
<thead>
<tr>
<th>Kite</th>
<th>Diagonals</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2 cm, 4 cm</td>
<td>4 cm²</td>
</tr>
</tbody>
</table>
Hundredths of a second for 2 or 3 children

You need a digital stopwatch. Take turns to start and stop the stopwatch 50 times. On each stop, record the hundredths of a second. For example, the stopwatch below shows 29 hundredths of a second. Draw a frequency table like the one below and label the groups 00–09, 10–19, 20–29, 30–39, and so on up to 90–99. Complete the table using the data you have collected.

<table>
<thead>
<tr>
<th>Hundredths of a second</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>00–09</td>
<td></td>
</tr>
<tr>
<td>10–19</td>
<td></td>
</tr>
<tr>
<td>20–29</td>
<td></td>
</tr>
</tbody>
</table>

Repeat the activity, this time labelling the groups in the frequency table 00–19, 20–39, 40–59, and so on up to 80–99.

Science data for 2 children

Look at the scores out of 100 below, which children in a class achieved in their science test. Find and record the lowest and the highest score. Group the scores in 5-mark intervals, discussing what these should be. Draw up a frequency table using these groupings. Then draw a pair of axes: the horizontal axis labelled Children's scores, and marked in the grouped intervals, and the vertical axis labelled Frequency. Draw the bar graph and give it a title. Which score is the mode (most frequent score)?

<table>
<thead>
<tr>
<th>88</th>
<th>74</th>
<th>67</th>
<th>49</th>
<th>36</th>
<th>86</th>
<th>77</th>
<th>66</th>
<th>75</th>
<th>94</th>
<th>67</th>
<th>50</th>
<th>78</th>
<th>69</th>
</tr>
</thead>
<tbody>
<tr>
<td>84</td>
<td>50</td>
<td>39</td>
<td>58</td>
<td>79</td>
<td>37</td>
<td>70</td>
<td>52</td>
<td>90</td>
<td>79</td>
<td>97</td>
<td>75</td>
<td>98</td>
<td>55</td>
</tr>
<tr>
<td>77</td>
<td>64</td>
<td>69</td>
<td>82</td>
<td>71</td>
<td>65</td>
<td>68</td>
<td>84</td>
<td>73</td>
<td>58</td>
<td>78</td>
<td>75</td>
<td>89</td>
<td>54</td>
</tr>
<tr>
<td>91</td>
<td>62</td>
<td>72</td>
<td>52</td>
<td>74</td>
<td>81</td>
<td>79</td>
<td>81</td>
<td>86</td>
<td>78</td>
<td>90</td>
<td>81</td>
<td>69</td>
<td>38</td>
</tr>
</tbody>
</table>
Centimetres and inches

for 2 to 4 children

You need a collection of objects of different lengths and a ruler or tape measure marked in centimetres and inches. Each draw a table like the one below. Each estimate the length of the first object in centimetres and inches, and record this in your table. One person then measures the object accurately and the rest of the group check these measurements. Each add the measurements to your table. Record the number of centimetres to one decimal place, and the number of inches as a mixed number. Compare the results with your estimates. How close were you? Repeat for the other objects.

<table>
<thead>
<tr>
<th>Object</th>
<th>Length in centimetres</th>
<th>Length in inches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimated</td>
<td>Measured</td>
</tr>
<tr>
<td>Dictionary</td>
<td>23 cm</td>
<td>21.6 cm</td>
</tr>
<tr>
<td>Paintbrush</td>
<td>19 cm</td>
<td>15.9 cm</td>
</tr>
</tbody>
</table>

Inches to centimetres

for 2 children

You need squared paper and a ruler each. Each draw two axes on your squared paper. Label the horizontal axis *Inches* and the vertical axis *Centimetres*. Plot 1 inch as 2.5 centimetres. Then plot 2 inches as 5 centimetres (2 x 2.5). Continue in this way.

Conversion graph: inches and centimetres

Record some conversion values beneath your graph, for example 5 cm = 2 inches.
Kilograms to pounds

for 2 children

You need squared paper and a ruler each. Each draw two axes on your squared paper. Label the horizontal axis Kilograms and the vertical axis Pounds. Plot 1 kg as 2.2 pounds. Then plot 2 kg as 4.4 pounds (2 x 2.2). Continue in this way.

Conversion graph:
kilograms and pounds

<table>
<thead>
<tr>
<th>Kilograms</th>
<th>Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>2.2</td>
</tr>
<tr>
<td>2</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Record some conversion values beneath your graph, for example 10 kg = ? pounds.

Ounces and grams

for 2 to 4 children

You need lots of cubes of the same size and weighing scales that measure in grams and ounces. Each copy the table. Complete the table by weighing the number of cubes shown. Make sure that everyone in the group gets the chance to weigh cubes and read out the measurement.

<table>
<thead>
<tr>
<th>Cubes</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ounces</td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

Use your table and your own calculations to work out the weight of larger cubes built from: 2 x 2 x 2 cubes, 4 x 4 x 4 cubes, and so on up to 10 x 10 x 10 cubes. Record the weights in both ounces and grams.
Angles in a pentagon

for 2 or 3 children

You need a ruler and a protractor each. Each draw a pentagon using a ruler. Measure the five angles of your pentagon with a protractor and record these. Swap pentagons and check each other’s angles. Each add together the five angles in your pentagon. Compare your total with the rest of the group. Are the totals similar? Repeat this activity drawing different pentagons. Try hexagons. What do you find?

Exploring angles

for 2 children

You need lots of paper and a ruler and a protractor each. Each follow these instructions:

- take a piece of paper
- fold it once
- fold it a second time
- open the piece of paper
- use your ruler to draw pencil lines along the folds
- estimate the angles
- measure the angles using a protractor.

How close were your estimates?

Repeat this activity several times. Explore creating angles of different sizes by folding at different angles.
Angles in a triangle

You need number cards 20–100, and a protractor and a ruler each. Shuffle the number cards and deal out two, for example 68 and 37.

Each draw a long line with a ruler. Use a protractor to draw an angle to match the first number card at one end of the line, and an angle to match the second number card at the other. Continue the lines to create a triangle. Predict what you think the size of the third angle might be. Talk together about your predictions, then measure the third angle to see whether you were correct. Repeat this activity with different pairs of angles.

Mystery angles

You need a ruler and a protractor each. Each follow these instructions:

- draw a triangle
- extend one of its sides
- mark the angle outside the triangle
- estimate the size of this angle – help each other!
- measure the angle and record it.

When you are both ready, swap triangles. Measure the two angles in the triangle which are opposite the marked angle, as shown above. Add these two angles. Repeat this process several times with different triangles. Can you write a rule to describe what you have found out?
Countdown

You need blank cards or scraps of paper, a timer which measures seconds and a dice.
Each player writes five different amounts of money more than £1 on five cards. Put all the cards together, turn them over and shuffle. Take turns to reveal an amount and roll the dice to find an amount to be added or subtracted (see below). You have 10 seconds to give your answer.
Another player can monitor the time and tell you when to stop. If your answer is correct, you may take the card. If not, return it to the pile. Once all the cards have been collected, the winner is the player with the most!

+ 99p + £1.01 - 99p + 97p - £1.01 - 97p

Totals

You need number cards 0–9.
Spread the cards out face up. Select cards together, to create an addition of four 2-digit numbers. Record the addition and the total. Check the total is correct by adding the numbers in reverse order. Work together to rearrange the cards to make 20 different totals. Check the total each time by adding in reverse order. What is the largest total you can make?

3 5 + 6 4 + 9 0 + 8 7 = ???

1 6 + 5 3 + 7 2 + 4 9 = ???
Dice differences

You need a dice.
Each throw the dice three times and record the numbers thrown. Arrange
your numbers to create a 2-place decimal number, for example 3·14. Find
the difference between your two numbers by counting on. Check each
other’s answers and when you are both agreed, record the calculation.
Repeat this 12 times. Check some of your answers by adding. What is the
greatest difference? What is the smallest difference?

Differences

You need number cards 0–9.
Shuffle the cards and deal out two. Find out which decimal numbers
these match (see below). Each calculate the difference between the two
decimal numbers using a strategy of your choice, and write down your
answer. Check each other’s calculations. If correct, you score points to
match the whole-number part of the answer. For example, if the correct
answer is 1·73, you would score 1 point. Reshuffle the cards and repeat
many times. The winner is the player with the most points.
Number chains

Follow the instructions below to create a number chain.

- Each write down an even number with two or three digits, for example 146.
- Halve it, for example 73.
- Look at the answer. If it is even, halve it. If it is odd, add 11.
- Halve this number.
- Look at the answer. If it is even, halve it. If it is odd, add 11.
- Keep going like this until you reach 1 or get into a loop!

Compare your number chains. Were they the same length? Work together to explore different chains. Try to find which number makes the longest chain and which number makes the shortest chain. Which numbers create the same chains?

Doubles

You need number cards 0–9 and some counters to use as decimal points. Work together to use the number cards to make pairs of decimal numbers, where one number is double the other.

2 \cdot 7 \text{ and } 5 \cdot 4

6 \cdot 4 \text{ and } 1 \cdot 2 \cdot 8

Investigate how many different pairs you can make where one of the numbers is more than 10.
Multiplying by 50 and 25

You need 18 counters. Cover each circle with a counter. Take turns to reveal a number. Give your partner 1 minute to multiply this number by 50 by multiplying by 100, then halving. If correct, they score points to match the circled number. If not, place the counter back over the number. When all the counters have been removed, the winner is the player with the higher score.

Repeat the game, but this time multiply the numbers by 25 by multiplying by 100, then halving twice.

Decimal tables

Each write out the x5 table up to $12 \times 5 = 60$. Check each other’s work and make sure you both agree on the answers. Work together to create the x2.5 table by halving each answer.

Repeat the activity, this time using the x9 table to create the x4.5 table. Discuss which other odd tables you could halve to create decimal number tables. Choose one to create together.

\[
\begin{align*}
1 \times 5 &= 5 \\
2 \times 5 &= 10 \\
3 \times 5 &= 15
\end{align*}
\]

\[
\begin{align*}
1 \times 2.5 &= 2.5 \\
2 \times 2.5 &= 5 \\
3 \times 2.5 &= 7.5
\end{align*}
\]
**Improper fractions to mixed numbers** for 3 children

You need a dice, number cards 7–20, and lots of cubes. Take turns to throw the dice and take a card. Record the two numbers as an improper fraction, for example \( \frac{19}{3} \). Check each other’s fractions. Work together to change each improper fraction to a mixed number. Do this by counting out cubes to match the numerator (top number) and seeing how many towers of the denominator (bottom number) you can build with them. For example, \( \frac{19}{3} \) makes 6 towers of 3, with 1 left over. Record each mixed number alongside the improper fraction, for example \( \frac{19}{3} = 6\frac{1}{3} \).

Replace the three cards on the bottom of the pile and repeat the activity, throwing the dice again and taking a new card each.

---

**Mixed numbers** for 2 children

You need 24 counters. Take turns to choose an improper fraction from the grid and say it as an equivalent mixed number. For example, for \( \frac{37}{5} \) say Seven and two-fifths. Check each other’s answers. If correct, score points to match the whole-number part of the answer, for example 7, and cover the fraction with a counter. Continue taking turns until all the fractions on the grid are covered. The winner is the player with more points.

<table>
<thead>
<tr>
<th>23/3</th>
<th>9/4</th>
<th>11/3</th>
<th>18/5</th>
<th>41/7</th>
<th>22/6</th>
<th>42/5</th>
<th>30/7</th>
</tr>
</thead>
<tbody>
<tr>
<td>31/4</td>
<td>27/6</td>
<td>34/8</td>
<td>27/5</td>
<td>19/4</td>
<td>37/5</td>
<td>29/8</td>
<td>17/3</td>
</tr>
<tr>
<td>18/7</td>
<td>17/8</td>
<td>29/3</td>
<td>39/6</td>
<td>13/7</td>
<td>29/5</td>
<td>27/4</td>
<td>31/6</td>
</tr>
</tbody>
</table>
Equivalent fraction game

for 2 or 3 children

You need number cards 2–10. Shuffle the cards and deal out two to make a proper fraction. Make sure you use the larger number as the denominator and the smaller number as the numerator. Each player writes two fractions which are equivalent to the fraction shown by the cards. Check each other's answers. Score 2 points for each fraction which is correct and has not been used by another player. Score 1 point for each fraction which is correct but not unique.

\[
\begin{array}{cc}
3 & 6 \quad 12 \\
16 & 32 \\
8 & 9 \quad 15 \\
24 & 40 \\
\end{array}
\]

Play eight rounds. Who has scored the most points?

---

Equivalent fractions

for 2 children

Write down one fraction each, for example \( \frac{2}{3} \) and \( \frac{3}{4} \). Make sure the two fractions have a different denominator. Compare the fractions. Work together to find a way to change the fractions so that they both have the same denominator.

\[
\frac{2}{3} \text{ could be written as } \frac{8}{12} \\
\frac{3}{4} \text{ could be written as } \frac{9}{12}
\]

Add the two fractions and record the addition. Can the answer also be written as a mixed number? If it is possible, record the mixed number.

\[
\frac{8}{12} + \frac{9}{12} = \frac{17}{12} = 1 \frac{5}{12}.
\]

Repeat for at least six pairs of fractions.
Converting fractions

Each choose a fraction from the set below. Compare your fractions and write them in order from smallest to largest. Each convert your own fraction, so that all the chosen fractions have the same denominator. Compare your fractions again: was your order correct?

\[
\begin{array}{cccccc}
\frac{7}{10} & \frac{1}{2} & \frac{4}{5} & \frac{5}{7} & \frac{2}{5} & \frac{13}{20} \\
\frac{5}{6} & \frac{9}{20} & \frac{3}{7} & \frac{3}{4} & \frac{3}{10} & \frac{17}{20}
\end{array}
\]

Repeat this activity nine times.

Half-way fractions

Choose two of the fractions in circles below. Work together to find a fraction that is exactly half-way between them.

You can do this by changing them to equivalent fractions with the same denominator.

\[
\frac{1}{2} \text{ and } \frac{3}{4} \rightarrow \frac{4}{8} \text{ and } \frac{6}{8} \\
\text{Half-way } = \frac{5}{8}
\]

Repeat this activity for lots of different pairs. Each draw a table of your results.
Rounding for 3 children

You need thousands, hundreds, tens and units place-value cards and cubes.
Shuffle the cards in their sets and deal one of each type to every player.
Each arrange your cards to make a 4-digit number. Round your number to the nearest thousand. The player whose number is nearest to 5000 wins a cube. Then each round your original number to the nearest hundred. The player whose last three digits are nearest to 500 wins a cube. Finally each round your original number to the nearest ten. The player whose last two digits are nearest to 50 wins a cube. Replace the cards and continue playing in this way. Who has the most cubes at the end of the game?

nearest thousand = 5000
nearest hundred = 5200
nearest ten = 5150

Rounding for 3 children

You need thousands, hundreds, tens and units place-value cards and counters.
Shuffle the cards in their sets. Use them to create nine different 4-digit numbers. Decide who will round each number to the nearest thousand, who will round to the nearest hundred and who will round to the nearest ten. Start with the first number. When each player has rounded the number, check each other’s answers. If correct, take a counter. Repeat for each number in turn.
Reshuffle the cards, change roles and repeat the activity twice, so that each of you has a turn at rounding in each way.
Who has the most counters?

5152

6000 5800 5850

4738

5000 4700 4740

PS
Rounding

You need a selection of coins. Take turns to take a handful of coins and record the amount. Then each round your amount to the nearest pound. When you are all ready, add your rounded amounts together. Compare this to the total when all the coins are combined. Repeat 10 times.

£1.27 → £1.00  £1.64 → £2.00  £0.91 → £1.00
Rounded = £4.00  Exact = £3.82

Try rounding each amount to the nearest 10p. Does this make the rounded addition closer to the actual total?

Rounding decimals

You need a calculator. Each draw a table like the one below to record in as you go. Each write a 2-place decimal number less than 10. Each estimate the product of the two decimals, by rounding the two numbers to the nearest whole number, for example 8.62 × 4.34 becomes 9 × 4. Take turns to use a calculator to work out the exact product, then round the answer to the nearest whole number. How close was your estimate? Repeat this activity five times.

<table>
<thead>
<tr>
<th>Multiplication</th>
<th>Estimated product</th>
<th>Calculated product</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.62 × 4.34</td>
<td>36</td>
<td>37.4108 → 37</td>
</tr>
</tbody>
</table>

Try this for five pairs of numbers between 10 and 100.
Exploring decimals

You need number cards 0–9 and a counter to use as a decimal point. Work together to make lots of 3-place decimal numbers using the cards. Each number must have consecutive digits, for example 1.234 or 4.321. Write down each number you find. Try to answer these questions:

- How many have a 9 in the tenths place?
- How many have a 9 in the hundredths place?
- How many have a 9 in the thousandths place?
- What is the smallest possible number?
- What is the largest possible number?

6 7 8 9

Each write down all the numbers you have found in order. Check each other's answers. Can you be sure you have found all the possible numbers?

Ordering decimals

You need Post-it notes or small pieces of card or paper. Each take three Post-it notes and write a different decimal number on each. The decimal numbers must be between 0 and 10, with one, two or three decimal places. Reveal your numbers and work together to put all the numbers in order. Discuss the correct positions for the numbers and when you are all agreed, each write them down in the correct order.

1.73 1.964 3.82 3.9 5.081 6.74 9.314

Try this activity again, first for numbers between 2 and 3, and then for numbers between 8.5 and 8.6.
**Factor search**

You need a 100-square (PCM 183). Work together to find all the numbers up to 100 which have exactly six factors. Check the numbers on your 100-square and circle the ones with six factors. Put a dot next to the numbers with fewer than or more than six factors.

Find numbers with an odd number of factors and underline these. What type of numbers are they? Try to find all the numbers with eight factors and draw a square around each one. Can you find numbers with 10 factors or more?

**Factor chains**

Create factor chains where the total of the number’s factors (excluding the number itself) gives the next number in the chain.

Factors of 22 (except 22) are: 1, 2, 11

Factors of 14 (except 14) are: 1, 2, 7

Factors of 10 (except 10) are: 1, 2, 5

Factors of 8 (except 8) are: 1, 2, 4

Factors of 7 (except 7) are: 1

22 → 14 → 10 → 8 → 7 → 1

How many chains can you make? Can you link any chains together?
Multiplication investigation for 2 children

Each work out 123 × 4, by multiplying the hundreds first, then the tens and then the units. Record your answer using brackets. Check each other’s work and agree on an answer.

\((100 \times 4) + (20 \times 4) + (3 \times 4)\)

\(? + ? + ? = ?\)

Work out the multiplications below in the same way.

\[234 \times 5\]
\[321 \times 4\]
\[432 \times 5\]

Explore different ways in which the digits 1, 2, 3, 4 and 5 can be used to make \[\square \times \square\] multiplications. Which arrangement gives the largest total? Which arrangement gives the smallest total? Which two different arrangements give the closest totals? Explore other patterns and record any that you find.

Multiplication patterns for 2 children

Write down a 2-digit multiple of 11. Multiply it by 9. Repeat this for five more multiples of 11. Talk together about what you notice. Record any patterns that you find.

Try this activity again, this time multiplying 2-digit multiples of 11 by 8. What patterns can you see?

\[22 \times 9\]
\[33 \times 9\]
\[44 \times 9\]
\[66 \times 9\]
\[77 \times 9\]
\[99 \times 9\]

Explore multiplying 2-digit multiples of 11 by other 1-digit numbers of your choice. Write down any patterns that you find.
Root patterns

Choose a times table between \( \times 1 \) and \( \times 10 \). Write out the table up to \( 12 \times \) the number. Add the digits of each answer until you get a single digit (the digital root). Write all the digital roots for your chosen times table. Look for a pattern. What do you notice?

<table>
<thead>
<tr>
<th>Table</th>
<th>Digital roots</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 1 \times 8 = 8 )</td>
<td>8</td>
</tr>
<tr>
<td>( 2 \times 8 = 16 )</td>
<td>( 1 + 6 = 7 )</td>
</tr>
<tr>
<td>( 3 \times 8 = 24 )</td>
<td>( 2 + 4 = 6 )</td>
</tr>
</tbody>
</table>

Digital roots of the \( \times 8 \) table are: 8, 7, ...

Try this activity using other tables. Search for patterns in the sequence of digital roots. Which tables have the same sequence of digital roots? Try some teens tables, for example the \( \times 14 \) table. Which tables match their digital root patterns? Can you generate a rule?

Quick multiplication

Work together to find quick methods for doing each kind of multiplication below. Discuss different methods you might use and test them out to see which you find the quickest. Do you prefer the same methods as each other?

- Multiply 2-digit numbers by 101
- Multiply 2-digit numbers less than 50 by 102
- Multiply 2-digit even numbers by 51
- Multiply 2-digit even numbers less than 50 by 52

Investigate and record some quick multiplication methods of your own.
Changing coordinates

You need coloured pencils and a -10 to 10 coordinate grid (PCM 207) each. Each plot the points below on your grids. Check that you have both plotted each point correctly.

\((-3, -7)\) \(\text{(3, 5)}\) \((0, -1)\) \((1, 1)\) \((-2, -5)\) \((5, 9)\) \((-4, -9)\) \((-1, -3)\) \((2, 3)\)

Join all of the points. What do you notice? Choose three of these points. Add 3 to each of the x-coordinates. Use a different coloured pencil to join these three new points to each other. Talk together about what you notice. Choose three different points from the original list. Subtract 3 from each x-coordinate. Join these using a third colour. What happens? Try subtracting or adding to the y-coordinate of three of the original points. Then explore adding to both the x- and y-coordinates.

Coordinates

You need coloured pencils and a -4 to 4 coordinate grid (PCM 205) each. Each use a coloured pencil to mark all the points on your grid where the x-coordinate is smaller than the y-coordinate. What do you notice about the positions of the points? Record your findings beneath the grid.
Repeat this activity on the same grid with a different colour, this time marking all the points where the x-coordinate is larger than the y-coordinate.
Open cubes

You need squared paper, scissors and a ruler each. Each draw the net shown here of an open cube, made using five squares. What other arrangements of five squares will also make a net for an open cube? Explore different arrangements together. Cut them out to check that they do fold to create an open cube.

How many different possible arrangements of five squares are there that fold to make an open cube? How can you demonstrate that you have found all the possible ones?

Cube nets

You need squared paper, a ruler, scissors, coloured pencils and sticky tape.

Work together to draw some different nets of cubes. Look at each net and talk about which faces you think would be parallel if the cube was made. Use three different coloured pencils to shade the faces of each cube, so that parallel faces are the same colour.

Try building the cubes from your nets to check whether your shading is correct. You may find it easier to build the cubes by making the nets larger. Are parallel sides the same colour?
**Compound rectangles**

You need squared paper and a ruler each.
Each draw an L-shape on squared paper. Discuss together which unit of length you will use to measure the sides of your shapes. Add realistic measurements to your shape. Calculate the area of your L-shape, then swap shapes so you can calculate each other's area. Compare areas. Did you agree? Draw a new L-shape each and repeat the activity.

**Patio and flowerbeds**

You need squared paper and a ruler.
You are designing a garden that measures 20 m by 16 m. It can have one flowerbed or more, and the rest is a stone patio. The patio must have an area of 224 m².

Work together to investigate different designs for the garden. Show the measurements for each garden you draw. Illustrate your drawings to show which parts of each garden are patio and which are flowerbeds.
**From rectangles to triangles**

for 2 children

You need squared paper, a ruler and scissors each.  
Each draw a rectangle on squared paper. Mark a point on the top side 
and join it to each of the bottom corners. Find the area of the triangle by multiplying half the length of the base by the height. Check each other’s calculations. Cut off the corners of your rectangle and lay them over the triangle to demonstrate that the area of the triangle is half the area of the rectangle. Write out the formula to remind yourselves how we do this: 
\[ \text{Area} = \frac{1}{2} b \times h. \]
Repeat this activity several times with different rectangles, using points in different places on the top side.

\[ 3.5 \text{ cm} \times 4 \text{ cm} = 14 \text{ cm} \]

---

**Areas of hexagons and octagons**

for 2 children

You need a regular hexagon and a regular octagon (PCM 232) and a ruler each, and a calculator. 
Each use a ruler to divide the hexagon into rectangles and right-angled triangles. Find the area of each part, using a calculator if necessary. Add the separate areas together to find the total area of the hexagon. Check you both got the same answer.

Repeat this activity for the regular octagon.
Interpreting data

Study the graph below. Decide together which is the largest litter size and which is the smallest. The difference between them is the range of the data. Next find and record the mode value of litter size. Calculate the mean value by finding the total number of kittens and dividing it by the total number of litters. Write some questions together about the graph.

Litter size of cats in Abacus village

Means, medians and modes

You need two dice. Roll one dice 20 times and record the scores. Each predict the mean, median and mode. Work together to calculate these three averages from the dice rolls. How close were your predictions? Repeat the activity, but this time roll two dice and record the total.

Finally, try the activity again, this time rolling two dice and recording the difference between them.
Pounds to yen

You need an electrical goods catalogue or a sheet of prices (PCM 199). Study the graph together. Choose items from your catalogue or the price sheet and use the graph to work out approximately how much each one would cost if you were buying it in Japanese yen. Record the name of each item, the cost in pounds and the cost in yen.

Miles and kilometres

You need squared paper and a ruler each, and a road atlas or a distance chart (PCM 200). Each draw a conversion graph like the one below. Use the relationship 50 miles = 80 kilometres to plot the line on your graph. Use the road atlas to find some distances between cities in miles (or use PCM 200), then use your graphs to convert the distances to kilometres. Record each distance in both miles and kilometres.
Adding amounts

You need a selection of coins including £1 and £2 coins. Take one handful of coins each and record the amount, for example £3.42. Show each other the amount you recorded. Each person adds the three amounts by partitioning, adding the pounds first, then the tens and then the units. Check each other's calculations. Did you all get the same answer? Replace the coins and repeat the activity until you have recorded 10 calculations.

£3.42  +  £1.25  +  £2.17

£3.00 + £1.00 + £2.00 = £6.00
40p + 20p + 10p = 70p
2p + 5p + 7p = 14p
£6.00 + 70p + 14p = £6.84

The next whole number

You need units, tenths and hundredths place-value cards. Shuffle the cards in their sets. Each take four cards from every pile, so you can each make four decimal numbers. Work out what needs to be added to each of your numbers to make the next whole number, and write these down. Check each other's answers. For each correct answer, score points to match the tenths digit of the number you added on.

4.76  +  1.69
2.14  +  5.38

4.76 + 0.24 = 5

Score 2 points

Reshuffle the cards and repeat. The winner is the player with more points after two rounds.
How close?

Choose a pair of numbers from the set below which you estimate will have a total near to 3000. Talk together about which two numbers to choose. Add your chosen numbers together, then find the difference from 3000. How close were you?

1358  3129  6453  4582
2436  4279  8217  3746  1279  5631

Repeat the activity, finding additions with answers close to 4000, then 5000, and so on up to 15000.

Addition challenge

You need number cards 0–9. Lay out the cards where you can both see them. Work together to write down three 3-digit numbers which make a multiple of 1000 when they are added together. You may use the same number more than once. Find several examples.

Then try arranging the cards to make three 3-digit numbers which add up to a multiple of 1000, but you can only use each card once in the addition part of the calculation!
**Difference patterns**

You need some cubes. Work together to use the cubes to make the first five square numbers: 1, 4, 9, 16 and 25. Record these numbers in a list. Work together to make the next seven square numbers up to $12 \times 12$. Next, find the difference between each consecutive pair of square numbers. Record these in a new list.

Square numbers

<table>
<thead>
<tr>
<th>1</th>
<th>4</th>
<th>9</th>
<th>16</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>5</td>
<td>？</td>
<td>？</td>
<td></td>
</tr>
</tbody>
</table>

Differences

Look carefully at your list of differences. Talk about any patterns that you notice. Use the pattern of differences to generate the square numbers up to $25 \times 25$.

---

**Sneaky numbers**

Choose a 2-digit number less than 100. Find the square of each digit. Find the difference between the two square numbers. If the answer is a single digit, stop there. If it has two digits, square each digit and find the difference between the squares. Continue until you reach a single digit. If the single digit is 0, then the number you started with is 'sneaky'! Repeat for many numbers less than 100.

49

$q^2 - 4^2 = 81 - 16 = 65$

65

$6^2 - 5^2 = 36 - 25 = 11$

11

$1^2 - 1^2 = 1 - 1 = 0$
**Multiplication patterns**

You need circles with numbers 0–9 marked around the circumference (PCM 233).

Write out the multiples of 4 in a list up to $12 \times 4$. Then write out their units digits in a separate list. Look at your list of units digits. What do you notice? Take the sequence of units digits and mark them on one of your circles by joining the points. Label the circle $\times 4$.

Multiples of 4: 4, 8, 12, 16, …
Units digits: 4, 8, 2, 6, …

Repeat this activity choosing a different times table each time. Remember you can also try teens times tables. Decide together which tables to try and discuss what kind of patterns you think each one will make.

**Square and triangular numbers**

Investigate numbers that are both square and triangular. Start by making a list of the first 20 triangular numbers.

1, 3, 6, …

Then list the first 20 square numbers.

1, 4, 9, …

Compare your two lists and highlight any numbers which appear in both. For example, 1 is both a square number and a triangular number. How many others can you find?
Multiplying by 9

for 2 children

Each work out 1234 \times 9, by multiplying first the thousands, then the hundreds, then the tens, and then the units. Check each other's work and agree on an answer. Calculate 2345 \times 9 in the same way. Then 3456 \times 9, 4567 \times 9, and so on. What patterns can you see?

\[
\begin{array}{c}
1234 \\
\times 9
\end{array}
\]

Try varying the order of the digits in the number. For example, 4321 \times 9, then 5432 \times 9, and so on.
Explore other patterns when multiplying by 9, for example 2222 \times 9, then 3333 \times 9, and so on.

---

Five multiplications

for 2 to 5 children

You need thousands, hundreds, tens and units place-value cards, number cards 2–9, five cards labelled A–D and a calculator.
Use the place-value cards to create five different 4-digit numbers. Use the number cards to create a multiplier to go with each 4-digit number. Label the multiplications using the letter cards.
Each predict the order of the answers, from smallest to largest, and write this down. Each complete multiplication A and then check your answers together. If necessary, use a calculator to check. Repeat this for the remaining multiplications. Place the cards in the correct order. How does this compare with your estimated order?

\[
\begin{array}{c}
4327 \\
\times 6
\end{array}
\]

\[
\begin{array}{c}
1894 \\
\times 4
\end{array}
\]
Finding tenths for 2 or 3 children

You need a dice. Take turns to choose a number from the list below and roll the dice. The number on the dice will tell you how many tenths of your chosen number you need to find. Check each other’s answers. When you have all had a turn, compare your results. The player whose answer is nearest to 50 receives 10 points. Continue playing in this way. The first player to reach 100 points is the winner!

\[
\frac{3}{10} \text{ of } 95 = 3 \times 9.5 = 28.5
\]

Fractions of £120 for 2 children

You need 14 counters. Cover each circle with a counter. Take turns to reveal a fraction. Your partner then has to calculate this fraction of £120. Check each other’s answers. If correct, you may keep the counter. If not, give the counter to your partner. Keep playing until all the fractions have been revealed. The winner is the player with more counters.

Repeat the game, finding fractions of £180.
Fractions to decimals

for 2 children

You need a calculator.
Write these fractions as decimals: \( \frac{1}{2}, \frac{1}{4}, \frac{1}{3}, \frac{1}{5}, \frac{1}{10} \). Compare the decimals and write them in order, smallest to largest. Next write \( \frac{1}{6}, \frac{1}{7}, \frac{1}{8} \) and \( \frac{1}{9} \) as decimals. Do this by using a calculator to divide the denominator (bottom number) into the numerator (top number). Add these to the list of decimals, keeping them in order from smallest to largest.

Now try a numerator of 2. Write \( \frac{2}{3}, \frac{2}{5}, \frac{2}{7} \) and \( \frac{2}{9} \) as decimals. You can miss out \( \frac{2}{4}, \frac{2}{6}, \frac{2}{8} \) and \( \frac{2}{10} \) because you already have these in your list. Add these new decimals to the list, keeping them in order. Next try 3 as the numerator, converting \( \frac{3}{4}, \frac{3}{5}, \frac{3}{7} \) and so on, missing out those you already have, like \( \frac{3}{6} \). Continue in the same way, adding \( \frac{4}{5} \), then \( \frac{5}{6} \), and so on. What patterns do you notice in the decimal numbers? Talk about this together and record your ideas.

If you have time, continue to include the \( \frac{1}{11} \) and \( \frac{1}{12} \) families of fractions. Then try \( \frac{1}{15} \) and so on. Explore patterns and describe any that you find.

Decimals to fractions

for 2 to 4 children

You need tenths, hundredths and thousandths place-value cards. Start by using the tenths and hundredths cards only. Shuffle the cards and create nine different 2-place decimal numbers. Write each number as a fraction, simplifying them if possible. Work together to put the nine fractions in order from smallest to largest.

\[
\begin{align*}
0.63 & = \frac{63}{100} \\
0.48 & = \frac{48}{100} = \frac{24}{50} = \frac{12}{25}
\end{align*}
\]

Repeat this activity using the tenths, hundredths and thousandths place-value cards.
Divisibility tests

for 3 children

You need number cards 0–9.
Shuffle the cards and place them in a pile face down. Take three cards each, to make a 3-digit number. Work together to consider each number and check for divisibility. Score points according to the list below.

4 6 2
divisible by 3 and 6
1 + 2 = 3 points

divisible by 3 → score 1 point
divisible by 4 → score 2 points
divisible by 5 → score 2 points
divisible by 6 → score 2 points
divisible by 9 → score 3 points
divisible by 10 → score 3 points

Record your scores, reshuffle the cards and continue playing in this way. Which numbers score the most points? The winner is the player with the most points at the end of the game.

Divisibility

for 2 or more children

You need hundreds, tens and units place-value cards.
Shuffle the cards in their sets. Each take one card of each type to make a 3-digit number. Test to find out whether your number is divisible by 2, 3, 4, 5, 6, 8 or 9.

If your number is divisible by 2, score 2 points; if it is divisible by 3, score 3 points; and so on up to 9 points. Check each other’s scores. The player with the most points wins the round.

4 3 5
divisible by 3 and 5
3 + 5 = 8 points

Reshuffle the cards and play again.
Positives and negatives

You need number cards 0–9, a different coloured counter each, some cubes and a number track from −10 to +10.
Place your counters on 0 on the number track. Shuffle the cards and place them face down. Take turns to take a card. If the number is even, move down the track that number of squares (in a negative direction). If the number is odd, move up the track that number of squares (in a positive direction). Each time you move, record the calculation.

4 0 − 4 = −4
5 −4 + 5 = 1

If you land exactly on 0, take a cube. If your counter goes off either end of the track, record your calculation as normal, but return your counter to 0 (without taking a cube). Continue playing in this way. How many calculations were you able to record? Who received the most cubes?

Ordering

You need integer cards −10−+10.
Take turns to shuffle and deal out five cards. Arrange them in order from smallest to largest. Look at the difference between numbers which are next to each other. The highest difference you can find is your score for the round. Other players check your order and score.
Play several rounds. Who wins the most points?
**Percentages**

You need number cards 10–100 (even numbers only). Shuffle the cards and place them in a pile face down. Take the first card from the pile. Work together to find 10% of the card value. When you are agreed, write this down then follow the instructions below.

- The first player finds 20% of the card value.
- The second player finds 5% of the card value.
- They add these two amounts together.
- The third player finds 2.5% of the card value by halving the 10% amount twice.

Compare your answers. Swap roles and repeat this activity several times, taking a new card each time. What do you notice? Can you explain this?

<table>
<thead>
<tr>
<th>Card</th>
<th>10%</th>
<th>20%</th>
<th>5%</th>
<th>20% + 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>2.8</td>
<td>5.6</td>
<td>1.4</td>
<td>?</td>
</tr>
</tbody>
</table>

Half of 2.8 = 1.4
Half of 1.4 = 0.7
2.5% = 0.7

---

**VAT (Value Added Tax)**

You need a shopping catalogue with prices that do not include VAT, or a sheet of prices (PCM 225).

Take turns to choose an item from the catalogue or price sheet. Each record the name of the item and its price. Customers must pay 17.5% VAT on top of the price shown. Work out and record how much VAT they pay on the item by:

1. finding 10%
2. halving this to find 5%
3. halving again to find 2.5%
4. combining the three amounts.

Record the cost of the item including VAT by adding the VAT to the original price.

Repeat this for 10 items.
**Multiplication investigation** for 2 children

\[
\begin{align*}
(9 \times 1) + 1 &= \quad (9 \times 123) + 3 &= \quad (9 \times 12345) + 5 &= \quad (9 \times 1234567) + 7 = \\
(9 \times 12) + 2 &= \quad (9 \times 1234) + 4 &= \quad (9 \times 123456) + 6 &= \quad (9 \times 12345678) + 8 = \\
\end{align*}
\]

Decide which of the calculations above to work on in your pair. Everyone should do at least three! Share your results with the rest of the class. What patterns do you notice?

Try swapping the first 9 in the multiplications above for an 8 and repeating the investigation. For example, \((8 \times 1) + 1 =\), \((8 \times 12) + 2 =\), and so on. Talk together about any patterns that you find. What patterns do you think you might find if you were to swap the first 9 in the multiplications for a 7? Try this out. Choose some other patterns to explore together.

---

**Multiplying and doubling** for 2 to 3 children

You need number cards 0–9. Shuffle the cards and deal out three to make a 3-digit number. Each multiply the number by 18. Check each other's answers. Next each multiply the card number by 36. Check that this answer is double your first answer. What answer would you get if you multiplied the card number by 72? Use doubling to help you predict the answer. Check whether you were correct by completing the multiplication.

\[
\begin{align*}
5 &\quad 7 &\quad 2 \\
\times 18 &\quad \times 36 &\quad \times 72 \\
\end{align*}
\]

Reshuffle the cards and repeat the activity with a new number. This time multiply by 14, 28 and 56. Then try repeating the activity using similar multiplications of your own choice.
Multiplying amounts

You need a selection of coins including £1 and £2 coins. Take a handful of coins each, put them together and record the total amount. One of you multiplies the amount by 8, using the method practised in class. The other doubles the amount three times.

\[ 8 \times £3.58 \]

\[ 8 \times 3 = 24 \quad \text{Double £3.58 = £7.16} \]
\[ 8 \times 0.5 = 4.0 \quad \text{Double £7.16 = £14.32} \]
\[ 8 \times 0.08 = 0.64 \quad \text{Double £14.32 = £28.64} \]
\[ 8 \times 3.58 = £28.64 \]

Compare your answers. They should be the same! Repeat this activity 10 times. Make sure you swap roles each time.

Ordering multiplications

You need units, tenths and hundredths place-value cards and number cards 2-9. For this activity, work in two pairs. Shuffle the cards in their sets then deal out one of each type. Use the cards to create a multiplication of a 2-place decimal number by a 1-digit number.

\[ 3.48 \times 5 \]

Repeat this five times to create six multiplications in total. Each pair writes down the order you think the multiplications should go in, starting with the multiplication you think will have the largest answer, down to the multiplication you think will have the smallest answer. When both pairs are ready, all work together to calculate the answers to the multiplications, and put the cards in order. How close were your estimated orders?
Column addition

Work together to add 64p + 64p + £1.28 using vertical column addition. Check that your answers agree. Add £1.28 + £1.28 + £2.56 in the same way, and then £2.56 + £5.12.

Continue like this, adding twice the third amount in the previous addition, to the answer of the previous addition. What pattern do you notice? Compare each total with the third number in the addition. Talk about how these numbers relate.

Try starting with a different amount, adding it to itself and to its double. What patterns emerge?

Addition game

You need counters in two different colours. Take turns to choose two of the circled numbers below and add them together. If the answer appears on the grid, cover it with a counter in your colour. You cannot place a counter on top of another counter. The winner is the first player to have three counters in any one row.
**Subtraction challenge**

You need number cards 1–9. Shuffle the cards and place them in a pile face down. Take four cards each. Arrange these to make two 4-digit numbers. Each work separately to subtract the smaller number from the larger. Compare your answers and help each other to find any mistakes. Replace the cards and repeat the activity. Try to arrange the cards to give differences as close as possible to 1000.

```
5 8 6 2
---
3 7 4 1
```

---

**Subtraction game**

You need two sets of number cards 0–9. Play this game in teams of two. Shuffle all the number cards together. Deal out eight cards to each pair so they can make two 4-digit numbers. The aim of the game is to create numbers which have a difference as close to 3550 as possible. When you have made your numbers, subtract the smaller number from the larger and record the difference. Swap subtractions so you can check each other’s answers. The pair whose answer is closest to 3550 wins the round.

```
6733
---
2919
```

```
8145
---
4872
```

Play seven rounds. Who won more rounds?
Subtraction checking

for 2 children

You need number cards 4–9 and a dice. Player one rolls the dice four times to create a \[ \_\_\_\_ \cdot \_ \] number, for example 334·2. Player two uses number cards 4–9 to create a \[ \_ \cdot \_\_\_\_ \] number, for example 6·58. Player one subtracts the smaller number from the larger. Player two checks this subtraction by adding the answer to the smaller number. Do you arrive back at the larger number? Repeat this activity 10 times, swapping roles each time.

\[
\begin{align*}
334·20 & \quad 327·62 \\
- 6\cdot58 & \quad + 6\cdot58 \\
327·62 & \quad 334·20
\end{align*}
\]

Subtraction game

for 2 children

You need units, tenths and hundredths place-value cards. Shuffle the cards in their sets. Turn over one card from each set to make a decimal number. Repeat to create three more decimal numbers. Put the numbers into two pairs so that their totals will have a small difference. Find the totals of your two pairs of decimals.

Find the difference between the two totals by subtracting the smaller total from the larger. This is your score. Repeat the activity and see if you can get a smaller score.
Drinks in a day

Talk together about how much liquid you think you drink in a day. Try to work out the approximate amount by making a list of all the drinks you have and the approximate times you drink them. Estimate the capacity of each drink in litres and millilitres. Add up the amounts. Approximately how much do you each drink?

One tablespoon holds 15 ml. Calculate how many tablespoons of liquid you each drink in a day.

One teaspoon holds 5 ml. Calculate how many teaspoons of liquid you each drink in a day.

Comparing capacities

You need a gallon container, a measuring jug marked in millilitres and a measuring jug marked in pints and fluid ounces. Work together to investigate how many millilitres will fill a gallon container. Demonstrate how you can achieve a really accurate answer.

Repeat this to find out how many fluid ounces there are in a litre. Use the fact that there are 20 fluid ounces in a pint. Draw a scale to show the relationship between fluid ounces and millilitres.
Dice chances
for 2 or 3 children

You need a dice. Each copy the tally chart below. The dice will be thrown 30 times. Predict the totals for each category in the chart. One of you rolls the dice 30 times, and another records the scores in the tally chart. Compare your predictions with the totals. How close were you?

<table>
<thead>
<tr>
<th>Tally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>even number</td>
<td></td>
</tr>
<tr>
<td>3 or 5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Swap roles and repeat the activity, this time using the categories ‘1’, ‘between 2 and 5’ and ‘6’.

Probability game
for 2 children

You need 40 cubes and number cards 1–30. Shuffle the cards and place them in a pile face down. Take 20 cubes each. This is your bank. Place two cubes each in the centre. This is the kitty. The first player turns over the top card. The second player thinks about the probability of the number on the next card being larger, and chooses one of the following options:

a) If they think that there is a less than even chance that the next card will be larger, they can say No play and player one takes the kitty.

b) If they think there is a better than even chance that the next card will be larger, they put another cube in the kitty and turn over the next card.

If the card number is not larger, then player one takes the kitty. If it is larger, player one looks at the new card, thinks about the probability of the next card being larger and chooses between options a) and b), and so on. Once someone has won the kitty, put the used cards on a separate pile and play again. Think very carefully about how likely it is that the next card will be larger before making each choice. The winner is the player who ends up with more cubes.
Comparing pie charts

You need number cards 1–10 and a blank pie chart (PCM 205) each. Shuffle the cards and place them in a pile face down. Take turns to take two cards at random from the pile. Add the numbers and record the total. Replace the cards in the pile. Keep taking turns until you have each recorded 12 totals. Draw a pie chart of the results. Compare pie charts. Can you explain the results?

\[\begin{align*}
2 + 7 &= 9 \\
6 + 10 &= 16 \\
1 + 4 &= 5 \\
9 + 8 &= 17 \\
4 + 6 &= 10 \\
3 + 5 &= 8 \\
9 + 3 &= 12 \\
6 + 5 &= 11 \\
1 + 3 &= 4 \\
5 + 8 &= 13 \\
7 + 1 &= 8 \\
4 + 2 &= 6
\end{align*}\]

Pie chart

You will need a pair of compasses and a ruler each. Each draw a blank pie chart like the one below. Make a small mark on the circumference every 30° so you have 12 evenly spaced marks altogether. Imagine carrying out a survey where you asked 36 people to choose their favourite sport out of football, tennis, swimming and running. Make up the results and show them on your pie chart. Write about all the information you can get from the pie chart.
Perimeters

You need squared paper and a ruler each. Copy this shape onto squared paper and check that your drawing has a perimeter of 34 cm. Then create more shapes which have the same perimeter. Work out the area of each shape you draw. Are all the areas the same?

Compound shapes

You need squared paper and a ruler each. Each draw an L-shape on squared paper. Each pass your L-shape to the person on your left, who writes the lengths of the sides. When everyone is ready, pass each shape round to the next person who works out the perimeter and writes this below the shape. Pass each shape back to the person who originally drew it. Check the perimeter of your shape – is it correct?

Repeat this activity five more times, drawing a different shape each time, for example a U-shape. Use the same piece of paper if you can. When you have checked all the perimeters, look at the area of each shape. How might you draw shapes with large perimeters and small areas? Talk about this together.
How many days until...?

Each think of an event you are looking forward to. For example, your next birthday, the cup final, Christmas, a holiday, and so on. Between you, think of at least six different events. Work out exactly how many days it is until each event you are looking forward to. Make sure your calculations are exact!

My birthday 19th April
New Year's Eve 31st December
Sports day 11th July

Hint: It may help to write out the number of days in each month!

Times around the world

You need a time zones map (PCM 233). Reena lives in Edinburgh in the UK. Here are some of the key events and times in Reena's day, using the 24-hour clock:

Wake up 06:35
Arrive at school 08:30
Lunch time 12:00
Going home time 15:25
Bed time 20:30

In Singapore, the time is 8 hours ahead of the time in Edinburgh. Write down what the time would be in Singapore for each of the events in Reena's day. Record the times using the 24-hour clock.

In Brazil, the time is 3 hours behind the time in Edinburgh. Repeat the activity, recording what the times would be in Rio de Janeiro. Then investigate the time differences between where you live and other parts of the world.
Reflecting triangles

You need squared paper and a ruler each.
Each draw a coordinate grid with four quadrants. Plot three points in the top-right quadrant and join them to make a triangle. Pass your grid to the person on your left. Reflect the triangle in the x axis and write the coordinates of the new (reflected) triangle. When ready, pass the grid to the next person. Reflect the triangle in the y axis and record the new coordinates. Pass the grid on. Reflect this new triangle in the x axis and draw it in the last quadrant. Record the coordinates. Pass it on again – each person should now be holding their original grid!

Repeat this activity starting with a different set of three points.

Reflecting letters

You need squared paper and a ruler each.
Each draw two lines of symmetry at right angles on squared paper. Draw the capital letter A in one quadrant by joining points on the grid. Then draw the reflection of the letter in both lines of symmetry.

Repeat this activity using other capital letters. How many can you do altogether?
**Rotating, translating and reflecting**

for 3 children

You need squared paper, some patterned squares (PCM 218) and a ruler each.
Choose one patterned square between you. Each draw a $4 \times 4$ grid so that the square fits in one space. Copy the pattern into the top left-hand square (1). Each choose one of the following sets of instructions.

a) Rotate the patterned square by $90^\circ$ and draw it in square 2. Repeat this to fill square 3 and square 4.
b) Translate the pattern by sliding it across to square 2, down to square 3 and across to square 4.
c) Reflect the pattern into square 2, reflect it again into square 3 and reflect it again into square 4.

Compare your three patterns. Try this with other patterned squares, remembering to swap roles each time.

---

**Translations**

for 2 children

You need squared paper and a ruler each.
Each draw a coordinate grid with axes labelled -5 to 5.

Take turns to draw a rectangle on your grid using horizontal and vertical lines. Tell your partner the coordinates of the four vertices so they can draw a rectangle in the same position on their grid. Then secretly translate your rectangle, using both a horizontal and vertical translation. Tell your partner the new coordinates of one of the vertices. They must try to work out the other three coordinates by asking questions. Were you both able to discover your partner’s translation?
£1 a day

Imagine you are given £1 for each day of the year. If this was given to you in three amounts, how much would be paid each time? Divide 365 by 3 to find out. Give your answers in pounds and pence and round to the nearest penny.

What if it was given in four amounts? Divide 365 by 4 to find out. Try five amounts, then six! Check each other’s answers.

Suppose you were given £1 for every day of two years, given in seven amounts. How much would you get each time? Remember to give your answer in pounds and pence and round to the nearest penny.

Division game

You need hundreds, tens and units place-value cards and number cards 13–25 (except 20). Shuffle the place-value cards and turn over one of each type to create a 3-digit number. Then shuffle the number cards and deal one to each player. Each divide the 3-digit number by your card number.

491 18

Check each other’s divisions. Score points to match the remainder in your answer. If your answer is exact with no remainder, score 25 points! Play several rounds, shuffling the cards each time. Who scores the most points?
Division game

You need four sets of number cards 0–9, three counters and some cubes. Shuffle the cards and deal out four each. Arrange your cards to make an amount in pounds and pence, using a counter as a decimal point. Divide your amount by 3, recording the calculation.

\[
\begin{array}{c}
\text{£} & 2 & 3 & \cdot & 8 & 2 \\
3) & 23.82 \\
\text{-} & 21 & 7 & \times 3 \\
\text{=} & 2.82 \\
\text{-} & 2.7 & 0.9 & \times 3 \\
\text{=} & 0.12 \\
\text{-} & 0.12 & 0.04 & \times 3 \\
\text{=} & 0.04 \\
7.94 \times 3 = \£23.82
\end{array}
\]

Check each other’s divisions by multiplying the answers by 3. Any player with no remainder may take a cube. The winner is the first player to collect 10 cubes. If you have time, play again!

Secret number game

You need units, tenths and hundredths place-value cards and number cards 2–9.
Player one secretly creates a 2-place decimal number using the place-value cards. Player two turns over a number card. Secretly, player one multiplies their number by the card number and shows player two the answer. Player two divides the answer by the number on the number card. Player one reveals the secret number! Check that player two’s answer matches it.

\[
\begin{array}{c}
4.78 \times 7 = 33.46 \\
33.46 \div 7 = 4.78
\end{array}
\]

Repeat this activity several times. Make sure you swap roles each time.
Studying television

You need a newspaper or magazine containing a television guide. Choose one day in the guide to study together. Work out the total number of hours of TV on that day. Don’t include cable and satellite stations!
Find and record the number of hours that are:
  • films
  • news programmes
  • children’s programmes.

Work out the proportion of each of these types of TV viewing.
Repeat this process for two different days in the guide.
Look at the information you have collected and discuss what it shows.
Work together to write down some general conclusions on what you found out.

Names beginning with vowels

Each estimate as a percentage the proportion of children’s names that begin with a vowel.
Find out what the proportion is for your class. Write this as a percentage.

Aysha
Evan
Jenny
Tarik
% of names?

Extend this to other classes in your school until you have included a round total of either 50, 100 or 150 names in your survey. Can you write the proportion as a percentage? How does this compare with your estimates?
Repeat the survey to find the proportion of children whose names have less than five letters.
Dice ratios

You need squared paper and a dice each. Each throw your dice 12 times. Record the numbers thrown, for example three 6s, two 5s, one 4, three 3s, one 2, two Is. Compare your results and record all the information in a tally chart.

Work in pairs to work out the ratio of:
- 1s : total throws (e.g. if there were eight 1s, the ratio is 8 : 48 or 1 : 6)
- 2s : total throws, 3s : total throws, and so on up to 5s : total throws
- 1s : 6s (e.g. if there were nine 1s and five 6s, the ratio is 9 : 5)
- odd numbers : even numbers
- numbers 3 or less : total throws
- numbers more than 3 : total throws
- square numbers : total throws.

Discuss other ratios you could write using this data.

Colour ratios

You need 60 cubes in different colours. Find the proportion of red cubes and write this down. Then write the ratio of red cubes to other cubes.

Repeat this for each colour in turn.

Try investigating the ratio of red cubes to blue cubes, then repeating for other pairs of colours.
Prime number search

You need a multiplication chart.

Cross out all of the following numbers on your multiplication chart:

- 1
- all the multiples of 2, except for 2 itself
- all the multiples of 3, except for 3 itself
- all the multiples of 5, except for 5 itself
- all the multiples of 7, except for 7 itself.

Write down all the remaining numbers - these are prime numbers!

Use this process to find prime numbers which are above 100, also crossing out multiples of 11 and 13.

---

Adding prime numbers

Many numbers can be written as the total of two prime numbers.

\[ 13 = 2 + 11 \]
\[ 34 = 11 + 23 \]

Investigate together which numbers up to 50 can be written as the total of two prime numbers, and which cannot. For those that cannot, investigate whether they can be written as the total of three prime numbers.

\[ 35 = 5 + 13 + 17 \]
Prime factors

You need a multiplication chart each. Each use the standard method shown in class to find prime factors for all the multiples of 12 up to 144. Write each result as a multiplication, for example $2 \times 2 \times 3 = 12$.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

$2 \times 2 \times 3 = 12$

Compare your results together.

Prime factors

Look at the prime numbers below.

2 2 3 3 5 5 7 7

Explore which numbers can be made by multiplying these prime factors.

$25 = 5 \times 5$

$12 = 2 \times 2 \times 3$

$210 = 2 \times 3 \times 5 \times 7$

You cannot use any more digits than the ones listed. For example, this means you couldn’t include $250 = 2 \times 5 \times 5 \times 5$ because you only have two 5s available. How many numbers can you make?