1

i) Colour the shapes which are symmetrical and draw the lines of symmetry.

ii) Write the perimeter length (in grid units) below each shape.

2

These shapes are congruent. What has been done to Shape 1 to make Shape 2, Shape 2 to make Shape 3, and so on? Write it in your exercise book.

3

What has been done to Shape A to make Shape B, Shape B to make Shape C, and so on? Write it in your exercise book.

Write the area inside each shape.

4

Barry Bear is planning his route to visit Piggy, then Rabbit, then Goat.

He draws the possible paths he could take.

a) How many routes are possible? 60

b) What chance has Goat of guessing Barry's route? .................
1. How many unit cubes are needed to build each cuboid?

   a) \( a = 3 \) units  
   \( b = 2 \) units  
   \( c = 4 \) units  

   b) \( a = 8 \) units  
   \( b = 2 \) units  
   \( c = 8 \) units  

   c) \( a = 6 \) units  
   \( b = 4 \) units  
   \( c = 8 \) units

   Colour the cubes which are similar.

2. Find the points and join them up. Colour the shapes you make.

   Colour this shape black.
   (7, 8), (5, 8), (5, 10),
   (4, 11), (1, 11), (0, 10),
   (0, 7), (1, 6), (3, 6),
   (3, 2), (4, 3), (4, 6),
   (5, 7), (6, 7), (7, 6), (7, 8)

   Colour this shape red.
   (9, 2), (9, 3), (10, 3), (9, 2),
   (7, 0), (7, 1), (8, 1), (7, 0)

   Reflect all the shapes drawn and already given in the mirror line.

3. A group of children are standing in a circle to play a game. Each child has been given a number in order round the circle.

   If the child numbered 6 stands opposite the child numbered 15, how many children are playing the game?

   Trials:

   18

4. The Rabbit family grow their yearly supply of carrots in a rectangular garden. Its area is 180 m². How long is the garden if it is 15 m wide?

   12 m
**1**

_Snow White_ is painting a picture of the seven dwarfs.
The area of the rectangular canvas is 4500 cm².
How long is the canvas if its width is 500 mm?

\[
A = 4500 \text{ cm}^2 \quad \text{500 mm}
\]

**Answer:** 90 cm

---

**2**

Measure the sides of each polygon. Calculate the perimeter and the area.

**a)**

\[
P = 2(5 + 3) \text{ cm} = 16 \text{ cm} \\
A = 5 \times 3 \text{ cm} = 15 \text{ cm}^2
\]

**b)**

\[
P = 16 \text{ cm} \\
A = (3.5 \times 3) \text{ cm}^2 + (1.5 \times 1) \text{ cm}^2 = 12 \text{ cm}^2
\]

---

**3**

How many right angles are the angles shown by the arrows?

**a)**

\[
3
\]

**b)**

\[
\frac{1}{2}
\]

**c)**

\[
1\frac{1}{2}
\]

**d)**

\[
3\frac{1}{2}
\]

---

**4**

A cuboid is built from 72 unit cubes. How many units long can the edges be?

First factorise 72, then show the possibilities in the table.

\[
\begin{array}{c|c|c|c|c|c|c|c|c|c}
| & a & 1 & 1 & 1 & 1 & 1 & 2 & 2 & 2 & 3 & 3 & 3 \\
| b & 1 & 2 & 3 & 4 & 6 & 8 & 2 & 3 & 4 & 6 & 3 & 4 \\
| c & 72 & 36 & 24 & 18 & 12 & 9 & 18 & 12 & 9 & 6 & 8 & 6 \\
\end{array}
\]

---

**5**

Try to divide a square into 6 smaller squares. _Trials:_

![Trials](image.png)
The diagram shows the plan of a house in the middle of its garden. Divide up the garden into 4 congruent parts in different ways.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The perimeter of a triangle is 10 units. It has two equal sides. The length of each side is whole units. What is the length of each side?

Answer: 3, 3, 4 or 4, 4, 2

The diagram shows a 5-unit shape made from 12 equal sticks. Make another shape with 12 equal sticks which also has an area of 5 units.

Draw it here.

Draw 12 dots on a 6 × 6 grid so that there are exactly 2 dots in each row, column and diagonal.

E.g:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trials:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Six goblins live in 6 rooms, one goblin in each room. Make another plan of six congruent rooms but using 1 less stick.

Draw it here. E.g:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1

a) Colour the shapes which are symmetrical and draw the lines of symmetry.

b) Write the perimeter length (in grid units) below each shape.

c) Write the area (in grid squares) inside each shape.

What do you notice about the areas of the shapes? All 7 units.

d) On the grid below, draw 4 more shapes which are different from those above but which have the same area.

Draw any lines of symmetry. Write the perimeter length below each shape.

2

a) Find these points on the grid and join them up.

(6, 1), (5, 4), (2, 2),
(4, 5), (1, 6), (4, 7),
(2, 10), (5, 8), (6, 11).

b) Reflect your shape in the mirror line.

c) How many vertices has the shape you have drawn? 16

d) Is it convex or concave? Concave

e) What is its name? 8-pointed star
This graph shows how many people lived in Bananaville on the 1st of January in the years given.

Population

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>450</td>
<td>420</td>
<td>400</td>
<td>380</td>
<td>400</td>
<td>430</td>
<td>460</td>
<td>500</td>
<td>520</td>
<td>500</td>
<td>480</td>
</tr>
</tbody>
</table>

a) Collect the data from the graph and write it in this table.

b) i) When was the population highest? ........... 2000 ..................

ii) When was the population 500? ........... 1999 and 2001 ..........

iii) When was the population increasing? ........... 1995 to 2000 ..........

c) i) Write the population numbers in increasing order.

................ 380, 400, 400, 420, 430, 450, 460, 480, 500, 500, 520, 450 ..........

ii) Which number is the median (in the middle)? ........... 450 ..........

The table shows the number of pupils in the different years in a school.

<table>
<thead>
<tr>
<th>Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pupils</td>
<td>42</td>
<td>40</td>
<td>46</td>
<td>42</td>
<td>38</td>
<td>41</td>
</tr>
</tbody>
</table>

a) Show the data in the graph.

b) Write the pupil numbers in increasing order.

38, 40, 41, 42, 42, 46 ...........

\[
\frac{41 + 42}{2} = 41.5
\]

c) What is the median? ...........
This graph shows the highest point of some mountain ranges and the deepest point of some seas. Read the graph and fill in the approximate missing values.

1. Alps = 4900 m
2. Carpathian = 2500 m
3. Himalayas = 8900 m
4. Adriatic Sea = -1500 m
5. Mediterranean Sea = -4600 m
6. Atlantic Ocean = -9200 m
7. Indian Ocean = -8100 m
8. Pacific Ocean = -11600 m

a) Which is higher, the Alps or the Carpathian Mountains? Alps

b) Which sea is deeper, the Mediterranean or the Adriatic? Mediterranean

c) What is the difference between the highest mountain and the deepest sea? 20500 m

How many acorns did the Squirrel family collect each day? Complete the diagram.

- 5 x 150 = 750
- 4 x 150 = 600
- 5 x 150 + 75 = 825
- 3 x 150 = 450
- 4 x 150 + 75 = 675
- 3 x 150 + 75 = 525
- 0

How many acorns did they collect altogether? 3825
1

a) Group the elements by 3. Make groups of 3 by drawing around them in red.
Then draw in green around every 3 red groups.
Then draw in blue around every 3 green groups.
E.g: Write the number of different groups and the remainder in the table.

<table>
<thead>
<tr>
<th>Number in each group</th>
<th>27</th>
<th>9</th>
<th>3</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of groups</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

b) Group the elements by 4 in a similar way. Fill in the table.

E.g: 

<table>
<thead>
<tr>
<th>Number in each group</th>
<th>16</th>
<th>4</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of groups</td>
<td>2</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

2

This tally chart shows the months in which 37 pupils in a class were born.

<table>
<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

a) Write the number of pupils in the bottom row of the table.
b) Draw a graph about the data.
c) Put the data in order.
0, 1, 2, 3, 3, 3, 3, 3, 3, 4, 4, 5, 6, ..., . . .
d) Which data are in the middle?
3, . . . and 3, . . . . .
e) Think of another 37 people. Would this statement about them be certain, possible or impossible?
At least 4 people were born in the same month. . . . . . . . . . . . . . . . . . . . . .

certain

3

60 pupils were given a choice of 4 activities. How many pupils chose each one and what fraction of them chose it? Use the pie chart to complete the table.

<table>
<thead>
<tr>
<th>Activities</th>
<th>M</th>
<th>S</th>
<th>T</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>M: Museum</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W: Walking</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T: Theatre</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S: Sports</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. of pupils</th>
<th>1/12</th>
<th>6/12</th>
<th>2/12</th>
<th>1/12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fraction</td>
<td>1/6</td>
<td>1/2</td>
<td>1/6</td>
<td>1/4</td>
</tr>
</tbody>
</table>
1. 4 children, \( \frac{1}{8} \) of the class, have a green school bag and \( \frac{3}{8} \) of the class have a blue bag. 8 children have a red bag and the rest have yellow bags.

Colour the pie chart to show the data. Complete the table.

<table>
<thead>
<tr>
<th>Colour of bag</th>
<th>Green</th>
<th>Blue</th>
<th>Red</th>
<th>Yellow</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pupils</td>
<td>4</td>
<td>12</td>
<td>8</td>
<td>8</td>
<td>32</td>
</tr>
<tr>
<td>Fraction</td>
<td>( \frac{7}{8} )</td>
<td>( \frac{3}{8} )</td>
<td>( \frac{7}{8} )</td>
<td>( \frac{7}{8} )</td>
<td>( \frac{8}{8} )</td>
</tr>
</tbody>
</table>

2. A chain of supermarkets made a pictogram of how many pies they had sold in a year. Each pie on the diagram means 1000 real pies.

<table>
<thead>
<tr>
<th>Month</th>
<th>Pies (1000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>3000</td>
</tr>
<tr>
<td>February</td>
<td>4000</td>
</tr>
<tr>
<td>March</td>
<td>3500</td>
</tr>
<tr>
<td>April</td>
<td>4250</td>
</tr>
<tr>
<td>May</td>
<td>3500</td>
</tr>
<tr>
<td>June</td>
<td>3000</td>
</tr>
<tr>
<td>July</td>
<td>2750</td>
</tr>
<tr>
<td>August</td>
<td>2000</td>
</tr>
<tr>
<td>September</td>
<td>2500</td>
</tr>
<tr>
<td>October</td>
<td>3250</td>
</tr>
<tr>
<td>November</td>
<td>4750</td>
</tr>
<tr>
<td>December</td>
<td>4125</td>
</tr>
</tbody>
</table>

a) Fill in the missing numbers and draw pies to show the numbers given.

b) Write the data in increasing order. 2000, 2500, 2750, 3000, 3000, 3250, 3300, 3500, 4000, 4125, 4250, 4750.

c) What is the difference between the 1st and last numbers? 2750.

d) Underline the two middle numbers. Which number is half-way between them? This is the median. 3375.

3. 67 scientists are at a conference. 47 speak French, 35 speak German and 23 speak both languages.

How many of them speak neither French nor German?

Complete the Venn diagram.

4. How many dictionaries would be needed to translate among these languages: English, German, French, Spanish?

Answer: Either 12 or 6 if dictionary is a reverse.
1. Andrew has £4 in cash and is £1 in debt. 
Bonny is £6 in debt and has no cash. 
Charlie has £4 in cash and is £4 in debt. 
Debbie has £10 in cash and is £5 in debt. 
Edward is £8 in debt and has £6 in cash.

a) Write the data and the balances in a table in your exercise book.
b) Make a graph to show their balances in your exercise book.
c) Write the balances in increasing order.
d) What is the difference between the first and last piece of data? 5 + 6 = 11.
e) What is the median (middle data)?

2. In a street, the houses have the following heights.

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (m)</td>
<td>6</td>
<td>14</td>
<td>5.4</td>
<td>13.6</td>
<td>6.5</td>
<td>15</td>
<td>5</td>
<td>14.5</td>
<td>5.8</td>
<td>14</td>
<td>5.2</td>
</tr>
</tbody>
</table>

a) Draw a graph in your exercise book. (Use the scale: 1 cm → 1 m)
b) List the heights in increasing order.
c) What is the difference between the smallest and greatest heights? 10 m.
d) What is the median? 6.5 m.

3. Some children were asked about their favourite fruit.
10 of them said strawberries, 20 said bananas,
20 said oranges and 30 said apples.

Make a pie chart to show the data.
Write the fraction in each part.

4. A cuboid is built from 60 unit cubes. How many units long can its edges be?

First factorise 60, then show the possibilities in the table.
a) Continue the list of 3-digit natural numbers with decreasing digits (to 500).
210; 310, 320, 321; 410, 420, 421, 430, 431, 432
b) Calculate the difference between the smallest and the greatest. 222.
c) Which are the two middle numbers? 410 and 420.

Jack is in training for a marathon. These were the distances he ran every day last week.

Monday: 2800 m
Tuesday: 4300 m
Wednesday: 3500 m
Thursday: 2.9 km
Friday: 3200 m
Saturday: 10 km
Sunday: 6800 m

a) Show the data in a graph.
b) List the distances in increasing order.

2800 m, 2900 m, 3200 m, 3500 m, 4300 m, 6800 m, 10 000 m
c) What is the difference between the smallest and greatest distance? 7200 m.
d) What is the median (the middle number)? 3500 m.

Among 67 scientists at a conference, 47 speak French, 35 speak German, 23 speak French and German, 20 speak Spanish, 12 speak French and Spanish, 11 speak German and Spanish, 5 speak all three languages.

a) Complete the Venn diagram.
b) How many scientists speak:
i) only French 17  ii) only German 6  iii) only Spanish? 2
c) How many scientists speak Spanish and German but not French? 6
d) How many scientists speak neither Spanish nor German nor French? 6
1

The graph shows how many people saw a certain play in each month over a year. The numbers have been rounded to the nearest 100.

Read the data from the graph and fill in the table.

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of people</td>
<td>4400</td>
<td>4600</td>
<td>4900</td>
<td>5000</td>
<td>5200</td>
<td>4900</td>
<td>4700</td>
<td>4000</td>
<td>4100</td>
<td>4000</td>
<td>3800</td>
<td>4000</td>
</tr>
</tbody>
</table>

2

We heated a pan of water and noted its temperature every minute. The temperature of the water rose steadily to 100°C, but did not go above it.

a) Complete the table.

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature (°C)</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

b) Continue drawing dots in the graph to show the data.

c) By how many °C does the temperature rise each minute before it reaches 100°C?

10 °C

d) When does the temperature reach 100°C?

after 7 mins

e) Is it correct to join up the dots?

Yes

3

There are 5 people at a party. Each person clinks glasses with each of the others. How many clinking of glasses will there be?

Work it out in your exercise book and write the answer.

4 + 3 + 2 + 1

10
Sammy Snail climbed up the wall at a steady speed. You can read from the table where he got to in the first 4 minutes.

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height (cm)</td>
<td>0</td>
<td>12</td>
<td>24</td>
<td>36</td>
<td>48</td>
<td>60</td>
<td>45</td>
<td>30</td>
<td>15</td>
<td>0</td>
</tr>
</tbody>
</table>

At the end of the 5th minute, Sammy turned and went back down the wall, again at a steady speed.

This time you can read from the graph where he got to in the last 5 minutes.

a) Complete the table and the graph.

b) Is it correct to join up the dots?
   . . Yes, time can have intervals . .

We ran water from a tap into a jug shaped like a cylinder and noted the water level at certain times.

We found that the relationship between the time and the water level is \( w = 2 \times t \) (where \( w \) is the water level in cm and \( t \) is the time in seconds).

a) Fill in the table using this rule.

<table>
<thead>
<tr>
<th>( t )</th>
<th>( 0 )</th>
<th>( 1 )</th>
<th>( 2 )</th>
<th>( 3 )</th>
<th>( 4 )</th>
<th>( 5 )</th>
<th>( 6 )</th>
<th>( 7 )</th>
<th>( 8 )</th>
<th>( 9 )</th>
<th>( 10 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( w )</td>
<td>( 0 )</td>
<td>( 2 )</td>
<td>( 4 )</td>
<td>( 6 )</td>
<td>( 8 )</td>
<td>( 10 )</td>
<td>( 12 )</td>
<td>( 14 )</td>
<td>( 16 )</td>
<td>( 18 )</td>
<td>( 20 )</td>
</tr>
</tbody>
</table>

b) Draw a graph by drawing dots on this grid and then joining them up.

c) We did the same experiment another day but this time the jug already had 5 cm of water in it when we started.

Draw a table in your exercise books to show the new set of data.

Write the rule. . . \( w = 2 \times t + 5 \) . .

Draw its graph line on this grid in red.
1. Find different rules to complete the table. Write each rule in different ways.

E.g:

\[
\begin{array}{|c|c|c|c|c|c|c|c|}
\hline
a & 20 & 200 & 2000 & 1260 & 1400 & 70 & 2470 & 8970 \\
\hline
b & 230 & 2030 & 1290 & 1430 & 100 & 2500 & 9000 \\
\hline
\end{array}
\]

Rule: \(b = a + 30\) \(a = b - 30\) \(b - a = 30\)

b)

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
x & 20 & 200 & 2000 & 1260 & 1400 & 40 & 1000 & 3600 \\
\hline
y & 50 & 500 & 5000 & 3150 & 3500 & 100 & 2500 & 9000 \\
\hline
\end{array}
\]

Rule: \(y = x \div 2 \times 5\) \(x = y \div 5 \times 2\)

c)

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
u & 20 & 200 & 2000 & 1260 & 1400 & 120 & 4920 & 17920 \\
\hline
v & 50 & 140 & 1040 & 670 & 740 & 100 & 2500 & 9000 \\
\hline
\end{array}
\]

Rule: \(v = u \div 2 + 40\) \(u = (v - 40) \times 2\)

2. Tammy Tortoise went for a walk from her house to the field and back again. The graph shows how far she was from home during that time.

![Graph showing distance from home vs. time]

a) How far away from home did Tammy go? \(120\) m
b) For how long was she away from home? \(21\) minutes
c) When did she start her return journey? after 15 minutes
d) How many times did Tammy stop to rest? twice

3. How many diagonals does a hexagon have? Show it by drawing a hexagon and its diagonals.

9 diagonals
Which equation can be the rule of each table? Colour the matching number and letter circles in the same colour.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>y</td>
<td>5</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>x</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>y</td>
<td>5</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>x</td>
<td>10</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>y</td>
<td>15</td>
<td>10</td>
<td>7</td>
</tr>
</tbody>
</table>

a) $x + y = 15$  

b) $x \times y = 50$  

c) $y = x - 5$

d) $y = x + 5$

e) $x + 15 = y - 10$

f) $y - 5 = x$

The valve was opened and water flowed out of the tank at the rate of 35 litres per minute.

<table>
<thead>
<tr>
<th>Time (minutes)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outflow (litres)</td>
<td>0</td>
<td>35</td>
<td>70</td>
<td>105</td>
<td>140</td>
<td>175</td>
<td>210</td>
<td>245</td>
<td>280</td>
<td>315</td>
</tr>
<tr>
<td>Water left (litres)</td>
<td>320</td>
<td>285</td>
<td>250</td>
<td>215</td>
<td>180</td>
<td>145</td>
<td>110</td>
<td>75</td>
<td>40</td>
<td>5</td>
</tr>
</tbody>
</table>

b) After how many minutes was the tank less than half full? . . . after 5 mins . . .

c) After how many minutes was the tank empty? . . . after 10 mins . . .

d) How much water flowed out of the tank in the last minute? . . . 5 litres . . .

Draw a line 7.5 cm long. Divide it up into fifths.
If we put a 3-volume encyclopedia back on the shelf without looking at the volume numbers, in what order might they end up? Show all the possibilities.

\[
\begin{array}{cccc}
1 & 2 & 3 \\
1 & 3 & 2 \\
2 & 1 & 3 \\
2 & 3 & 1 \\
3 & 1 & 2 \\
3 & 2 & 1 \\
\end{array}
\]

a) What chance is there of them being in the order 2 3 1? \[
\frac{1}{6} \]

b) What chance is there of these events happening?

i) The book on the left-hand side is Volume 1. \[
\frac{2}{6} \]

ii) The volume numbers are decreasing from the left. \[
\frac{1}{6} \]

---

Four children are playing a game with these cards. \[
0 \ 1 \ 2 \ 3 \ 4 \ 5
\]

**Rules of the game**

1. *Player 1* shuffles the cards, then lays them out face down on the table.
2. *Player 2* picks 2 cards and turns them face up. The first card is the tens digit and the 2nd card is the units digit. *Player 2* notes down his number. e.g. 0 and 3 \(\rightarrow\) 03
3. *Player 2* shuffles the cards for *Player 3* to choose a number, and so on.
4. Each player keeps a running total of their numbers and the first one to reach 100 is the winner.

BUT the 4 children made up their own extra rules for their game.

- *Alan* misses a turn if the 2-digit number is even.
- *Becky* misses a turn if the 2-digit number is odd.
- *Callum* misses a turn if the 2-digit number is a whole 10.
- *Diana* misses a turn if the 2-digit number is divisible by 5.

a) List in your exercise book all the 2-digit numbers that could be chosen.

\[
(01, 02, 03, 04, 05) \ 10, 12, 13, 14, 15, 20, 21, 23, 24, 25, 30, 31, 32, 34, 35, 40, 41, 42, 43, 45, 50, 51, 52, 53, 54
\]

b) Who might complain because the extra rules are unfair? \[
\ldots 50, 51, 52, 53, 54
\]

All but Callum might complain as he has the least chance of missing a turn.

---

A marble is dropped into this maze and has an equal chance of falling to the left or to the right.

a) In how many ways can the marble come out at:

\[
A \ . \ 1 \ . \ B \ . \ 4 \ . \ C \ . \ 6 \ . \ D \ . \ 4 \ . \ E \ . \ 1 \ . \ ?
\]

b) Where is the marble most likely to come out? \[
C
\]

c) Write the ratio of the chance of where it comes out.

\[
A : B : C : D : E = 1 : 4 : 6 : 4 : 1
\]
Three boys, A, B and C, decided to have a race. We know that there was a tie but not for which place.

a) What could the finishing order be? Show all the possibilities.

<table>
<thead>
<tr>
<th>1st</th>
<th>2nd/3rd</th>
<th>1st/2nd</th>
<th>3rd</th>
<th>1st / 2nd / 3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>A, B</td>
<td>C</td>
<td>A, B, C</td>
</tr>
<tr>
<td>B</td>
<td>A</td>
<td>A, C</td>
<td>B</td>
<td>A, B, C</td>
</tr>
<tr>
<td>C</td>
<td>A</td>
<td>B, C</td>
<td>A</td>
<td>A, B, C</td>
</tr>
</tbody>
</table>

b) If each possible result has an equal chance of happening, what is the chance that there was a tie for 1st place? \( \frac{4}{7} \)

Predict the results for each outcome first, then do the experiment.

Put 2 red, 2 white and 2 green counters in a bag. Shake the bag to mix the counters, then close your eyes and take out 2 counters. Note the colours and put the counters back in the bag.

Repeat the experiment 15 times and note the results in this table.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Prediction</th>
<th>Experiment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both the same</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Both different</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1 red + 1 white</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2 green</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

What chance is there of you taking out of the bag:

From the experimental data above:

a) 2 counters of the same colour \( \frac{4}{15} \)

b) 2 counters of different colours \( \frac{11}{15} \)

c) a red and a white counter \( \frac{1}{15} \)

d) 2 green counters? \( \frac{1}{15} \)

How many squares which have vertices on the grid dots can you draw on this diagram?

Try it out in your exercise book. Answer: 20 squares

Which digits can be the last digits of the square numbers? Continue the list in your exercise book.

1 \( \times \) 1 \( \rightarrow \) 1, 2 \( \times \) 2 \( \rightarrow \) 4, 3 \( \times \) 3 \( \rightarrow \) 9, 4 \( \times \) 4 \( \rightarrow \) 6, 5 \( \times \) 5 \( \rightarrow \) 5, 6 \( \times \) 6 \( \rightarrow \) 6, 7 \( \times \) 7 \( \rightarrow \) 9, 8 \( \times \) 8 \( \rightarrow \) 4, 9 \( \times \) 9 \( \rightarrow \) 1, 10 \( \times \) 10 \( \rightarrow \) 0, 11 \( \times \) 11 \( \rightarrow \) 1

Is it true or false that in 7 different square numbers there are at least 2 in which:

a) the units digits are the same \( \text{T} \)

b) their difference is divisible by 10? \( \text{T} \)
1
Predict the results for each outcome first, then do the experiment.
Toss 2 coins one after the other 20 times and note how they land in this table.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Prediction</th>
<th>Tosses</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Heads</td>
<td>6</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1 Head + 1 Tail</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>1 Tail + 1 Head</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>2 Tails</td>
<td>7</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

What fraction of the tosses resulted in:
From the experimental data above:

a) 2 heads  b) 2 tails  c) a head and a tail  d) at least 1 head?

\[
\frac{5}{20} \quad \frac{6}{20} \quad \frac{9}{20} \quad \frac{14}{20}
\]

2
At the entrance to a wood there are 5 paths leading to the first clearing.
From the first clearing there are 6 paths leading to the 2nd clearing.
From the 2nd clearing there are 3 paths leading to the 3rd clearing.

a) Draw a diagram to show it in your exercise book.

b) How many routes could you take from the 1st clearing to the 3rd clearing?

\[6 \times 3 = 18\]

c) What chance would you have of guessing correctly a person's route from the entrance of the wood to the 3rd clearing?

\[5 \times 6 \times 3 = 90\]

3
Predict the results for each outcome first, then do the experiment.
Throw a dice 20 times and keep a tally of how it lands in this table.

<table>
<thead>
<tr>
<th>E.g.</th>
<th>Prediction</th>
<th>Tally of 20 throws</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>4</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>☐☐</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>☐☐☐</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>☐☐☐☐</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>☐☐☐☐</td>
<td>3</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>☐☐☐☐</td>
<td>3</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

How many times did you get:

a) a 2 or a 3 .6 . . .

b) less than 5 .13 . . .

c) not less than 5 .7 . . .

d) not more than 6 .20 . . .
e) more than 6? .0 . . .
1. **E.g.:** Throw 2 dice at the same time 36 times. Keep a tally of the outcomes here.

<table>
<thead>
<tr>
<th>1 and 1</th>
<th>2 and 2</th>
<th>3 and 3</th>
<th>4 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 and 2</td>
<td>2 and 3</td>
<td>3 and 4</td>
<td>4 and 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 and 3</td>
<td>2 and 4</td>
<td>3 and 5</td>
<td>4 and 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 and 4</td>
<td>2 and 5</td>
<td>3 and 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 and 5</td>
<td>2 and 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 and 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 and 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a) How many times were these numbers the **product** of the 2 numbers thrown?

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>12</th>
<th>15</th>
<th>16</th>
<th>18</th>
<th>20</th>
<th>24</th>
<th>25</th>
<th>30</th>
<th>36</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

b) How many times was the product of the 2 numbers even? What fraction is it of the 36 throws?

| 26 |

2. **Leslie threw a pyramid-shaped dice 100 times. It has 5 written on its square base and 1, 2, 3 and 4 written on its triangular sides.**

Leslie made this table to show how many times (frequency) the dice landed on each number (outcome). We say that it shows the frequency of each outcome.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>15</td>
<td>18</td>
<td>19</td>
<td>16</td>
<td>32</td>
</tr>
<tr>
<td>Relative Frequency</td>
<td>15/100</td>
<td>18/100</td>
<td>19/100</td>
<td>16/100</td>
<td>32/100</td>
</tr>
</tbody>
</table>

a) Write in the bottom row of the table what fraction of the 100 times each number was landed on.

This is called the relative frequency of an outcome happening.

b) How many times did Leslie throw:

i) at most a 3

| 52 |

ii) at least a 3?

| 67 |

3. **Possible outcomes**

<table>
<thead>
<tr>
<th>T: Tails, H: Heads</th>
</tr>
</thead>
<tbody>
<tr>
<td>T T T T H H H H</td>
</tr>
<tr>
<td>10 p coin</td>
</tr>
<tr>
<td>T T T H H H H H H</td>
</tr>
<tr>
<td>20 p coin</td>
</tr>
<tr>
<td>T T H T T T T H H</td>
</tr>
<tr>
<td>50 p coin</td>
</tr>
</tbody>
</table>

If we toss a 10 p, a 20 p and a 50 p coin at the same time just once, which sides could face up?

Write T or H in the table.
1

Predict the results for each outcome first, then do the experiment.

Toss 3 coins (at the same time) 20 times and note how they land in this table.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Prediction</th>
<th>Tosses</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Heads</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Heads + 1 Tail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Head + 2 Tails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Tails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If you do the experiment again, which outcome do you think will be most likely?

2

If we put a set of 4 videos (A, B, C and D) back on the shelf without looking at their titles, in what order could they end up? Show all the possibilities.

A B C D
A B D C
A C B D
A C D B
A D B C
A D C B
B A C D
B A D C
B C A D
B C D A
B D A C
B D C A
C A B D
C A D B
C B A D
C B D A
C D A B
C D B A
D A B C
D A C B
D B A C
D B C A
D C A B
D C B A

What is the probability that:

a) the videos will be in the correct order

b) Video A will be on the left-hand side?

3

There are 12 biscuits in a tin and there are equal numbers of gingernuts, custard creams and chocolate wafers. If the 5 members of a family each took a biscuit out of the tin without looking, what is the probability that they will all have taken a chocolate wafer?

... Impossible, as there are only 4 chocolate wafers, ......
1. Calculate the product of the 7 smallest
   a) positive, even, whole numbers. \(2 \times 4 \times 6 \times 8 \times 10 \times 12 \times 14 = 645,120\)
   b) 1-digit numbers. \(0 \times 1 \times 2 \times 3 \times 4 \times 5 \times 6 = 0\)

2. Circle the natural numbers up to 100 which have only two factors.
   (e.g. the only factors of 7 are 7 and 1)

   
   1 2 3 4 5 6 7 8 9 10
   11 12 13 14 15 16 17 18 19 20
   21 22 23 24 25 26 27 28 29 30
   31 32 33 34 35 36 37 38 39 40
   41 42 43 44 45 46 47 48 49 50
   51 52 53 54 55 56 57 58 59 60
   61 62 63 64 65 66 67 68 69 70
   71 72 73 74 75 76 77 78 79 80
   81 82 83 84 85 86 87 88 89 90
   91 92 93 94 95 96 97 98 99 100

   We call these numbers **prime numbers**. List them in increasing order.


3. Practise calculation.

   a) 
   \[
   \begin{array}{c}
   6047 \\
   5928 \\
   + 314 \\
   \hline
   12289
   \end{array}
   \]

   b) 
   \[
   \begin{array}{c}
   4056 \\
   392 \\
   + 1007 \\
   \hline
   5455
   \end{array}
   \]

   c) 
   \[
   \begin{array}{c}
   12405 \\
   8043 \\
   + 4362 \\
   \hline
   592
   \end{array}
   \]

   d) 
   \[
   \begin{array}{c}
   592 \\
   137 \\
   \hline
   455
   \end{array}
   \]

   e) 
   \[
   \begin{array}{c}
   2803 \\
   \hline
   16818
   \end{array}
   \]

   f) 
   \[
   \begin{array}{c}
   99 \\
   9 \\
   \hline
   8991
   \end{array}
   \]

   g) 
   \[
   \begin{array}{c}
   1920 \\
   815362 \\
   + 74309 \\
   \hline
   615r
   \end{array}
   \]

   h) 
   \[
   \begin{array}{c}
   1920 \\
   815362 \\
   \hline
   74309
   \end{array}
   \]

4. A cuboid is built from 20 unit cubes. We know that the lengths of its edges are whole units and more than 1 unit. Work out the answers in your exercise book.

   a) How long are its edges? \(a = \ldots 2\) \(b = \ldots 2\) \(c = \ldots 5\)
   b) What is its surface area in unit squares? \(\ldots 48\) square units

5. Tom has ducks and pigs on his farm, 8 in total. They have 22 legs altogether. How many ducks and how many pigs does Tom have?

   Work out the answer in your exercise book.
1 Practise calculation. Do the operations in the correct order.

a) \[2756 - 1348 + 220 = 2756 - (1348 - 220) = 1628\]

b) \[2756 \times 4 + 1348 \times 4 = (2756 + 1348) \times 4 = 16416\]

c) \[(6315 - 1726) \times 3 = 13767\]
\[6315 \times 3 - 1726 \times 3 = 13767\]

d) \[10256 \div 4 - 2372 \div 4 = (10256 - 2372) \div 4 = 1971\]

e) \[2187 \div (9 \div 3) = 729\]
\[2187 \div 9 \div 3 = 81\]

f) \[2187 \times 9 \div 3 = 6561\]
\[2187 \times (9 \div 3) = 6561\]

2 Plan, estimate, calculate and check in your exercise book. Write the answers here.

a) In a large container there are 18 649 litres of water.
In a smaller container there are 12 450 litres less.
How much water is in the smaller container? \[6199\] litres.

b) Andrew has £6278 and James has £2327 more.
How much money will James have left after spending £1796? £6809.

c) A cruise to a certain holiday destination costs £875 per person.
   i) How much would it cost for a group of 4 people? £3500.
   ii) How much would it cost for a group of 8 people? £7000.
   iii) How much would it cost for each group if they travelled by plane for £400 less each? 4: £1900; 8: £3800.

3 Where could you put ‘+’ signs among the digits 1 to 7 so that the sum is 100?
(You must keep the digits in increasing order!) \[1 + 2 + 34 + 56 + 7 = 100\]
\[1 + 23 + 4 + 5 + 67 = 100\]

4 Point A stands for \(\frac{1}{5}\) and Point B stands for \(\frac{7}{10}\). Mark the positions of 0 and 1.

5 Check the results and correct the answer if it is wrong.

a) CLXXXVI \(\div\) III = LXII ✓
   \[186 \div 3 = 62\]

b) MMII – MCMXCIX = \(\checkmark\)
   \[2002 - 1999 = 5 \times \]
   \[2002 - 1999 = 3 = \text{III}\]
In your exercise book, write 2-term additions using the numbers in Set A, without repeating any number.

\[ A = \{-3, 2, 1, 0, -5, 6\} \]

a) How many different additions are possible? \[ \boxed{15} \]

b) How many of the results are: i) positive \[ \boxed{8} \] ii) negative? \[ \boxed{7} \]

Solve this problem in your exercise book. Write only the answer here.

If my father takes 20 paces forward, he covers a distance of 16 m.
If I take 10 paces forward, I cover a distance of 7 m.

How much longer is one of my father's paces than one of mine? \[ 10 \text{ cm} \]

The price of 0.7 litres of syrup is £5.60. How much would 1 litre of syrup cost? \[ £8.00 \]

8 = 2 \times 4 \quad \text{and} \quad 8 + 4 = 12 \quad \text{is exactly divisible by 3, as} \quad 3 \times 4 = 12

14 = 2 \times 7 \quad \text{and} \quad 14 + 7 = 21 \quad \text{is exactly divisible by 3, as} \quad 3 \times 7 = 21

Is this statement true or false? Give a reason for your answer.

If we add a natural number and its double, then the sum is exactly divisible by 3.
\[ x + 2x = 3x \quad \text{... Yes, divisible by 3} \]

Factorise these numbers.

a) \[ 720 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \]

b) \[ 8 \times 8 - 7 \times 7 = 64 - 49 = 15 = 3 \times 5 \]

c) \[ 10 \times 10 - 1 = 100 - 1 = 99 = 3 \times 3 \times 11 \]

Factorise 1250 and 175 in your exercise books.

What is: i) the greatest ii) the smallest natural number which is a factor of both numbers? i) \[ 25 \] ii) \[ 1 \]

a) Factorise 1250 and 175 in your exercise books. \[ \frac{1250}{5} \times 5 \times 5 \times 5 \quad \frac{175}{5} \times 5 \times 7 \]

b) Factorise 68 and 170 in your exercise books.

What is: i) the greatest ii) the smallest natural number which is a factor of both numbers? i) \[ 34 \] ii) \[ 1 \]
The rectangle is the plan of a garden. 1 mm on the diagram means 1 m in real life. Measure the sides and complete the table.

<table>
<thead>
<tr>
<th>On diagram</th>
<th>In real life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side $a$</td>
<td>40 mm</td>
</tr>
<tr>
<td>Side $b$</td>
<td>30 mm</td>
</tr>
<tr>
<td>Perimeter</td>
<td>140 mm</td>
</tr>
<tr>
<td>Area</td>
<td>1200 mm$^2$</td>
</tr>
</tbody>
</table>

The square is the plan of a table. 1 mm on the diagram means 3 cm in real life. Measure a side and complete the table.

<table>
<thead>
<tr>
<th>On diagram</th>
<th>In real life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side $a$</td>
<td>30 mm</td>
</tr>
<tr>
<td>Perimeter</td>
<td>120 mm</td>
</tr>
<tr>
<td>Area</td>
<td>900 mm$^2$</td>
</tr>
</tbody>
</table>

On the outside of a measuring cylinder, there are marks at every 10 cl. Join up the quantities to the corresponding marks.

Change the units of measure, then round them to the nearest whole unit required.

a) i) $678$ m = $0$ km $678$ m = $1$ km
   ii) $15240$ m = $15$ km $240$ m = $15$ km
   iii) $5648$ mm = $5$ m $648$ mm = $6$ m

b) i) $3518$ ml = $3$ litres $518$ ml = $4$ litres
   ii) $3518$ cl = $35$ litres $18$ cl = $35$ litres
   iii) $18450$ ml = $18$ litres $450$ ml = $18$ litres
1. a) A cuboid is built from 30 unit cubes. What are the possible lengths of its edges? List them in the table.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td>1</td>
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<td>3</td>
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<tr>
<td>30</td>
<td>15</td>
<td>10</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>

b) If all its edges are more than 1 unit long, what lengths must its edges be? .... 2, 3, 5, ....

c) What is the area of its longest side? .... 5 × 3 = 15 (units)

2. a) Factorise 360 in your exercise book. What are its prime factors? 2 × 2 × 2 × 3 × 3 × 5

b) Factorise 768 in your exercise book. What are its prime factors? 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3

c) What is the greatest natural number which is a factor of both 360 and 768? 24

3. Point A stands at \( \frac{1}{4} \) and Point B stands at \( \frac{7}{8} \). Mark the positions of 0 and 1.

\[
\begin{array}{cccccc}
& 0 & A & & B & 1 \\
\frac{0}{8} & & \frac{1}{8} & \cdots & \frac{7}{8} & \left( \frac{\frac{3}{4}}{8} \right)
\end{array}
\]

4. Check that the results are correct. Correct the answer if it is wrong.

a) CDLX × VII = MMMCCXX
\[\frac{460 \times 7}{3210} \]
b) MMCXII – MCMXV = XCVII
\[2112 – 1915 = 97 \]
c) MMMLXIX ÷ IX = CCCXL
\[\frac{3069 \div 9}{340} \]
d) CCCCLXXXVII + MCCXIII = MCD
\[387 + 1213 = 1400 \]

a) Should be MMMCCXXX (3220)
b) Should be CXCVII (197)
c) Should be CCCXLI (341)
d) Should be MDC (1600)

5. To make enough fruit punch for a party of 12 people needs:

- 1 \( \frac{3}{4} \) litres of orange juice, 500 ml of lemon juice, 2 \( \frac{1}{2} \) litres of pineapple juice,
- 1.5 litres of white wine and 4.75 litres of lemonade.

How many 2 litre jugs in which to serve the punch will be needed?

Answer: 6 jugs - but the last jug will contain only 1 litre of punch.
1. A gang of workmen repaired 5 km 300 m of road in the 1st week of March, 8 km 60 m in the 2nd week and 4 km 700 m in the 3rd week. What length of road did the gang repair in the 3 weeks?

\[18 \text{ km 60 m}\]

2. There were 5 litres 400 ml of syrup in a container. Another 680 ml were poured in. How much syrup is in the container now?

\[6 \text{ litres 80 ml}\]

3. In a granary, there are 14 650 kg of grain. 8750 kg is wheat, 230 kg is rye and the rest is oats. How many kg of oats are in the granary?

\[5670 \text{ kg}\]

4. Draw around the whole rectangle if the shaded area is:

a) \(\frac{1}{2}\) b) \(\frac{2}{3}\) c) \(\frac{3}{4}\)

d) \(\frac{1}{2}\) e) \(\frac{4}{5}\) f) \(\frac{8}{10}\)

5. Fill in the missing numbers.

\[1 \text{ hour } = 60 \text{ minutes}\]

a) \(\frac{1}{4}\) hour = 15 minutes \(\frac{3}{4}\) hour = 45 minutes

b) 0.5 hour = 30 minutes 0.7 hour = 42 minutes

c) \(\frac{1}{3}\) hour = 20 minutes \(\frac{2}{3}\) hour = 40 minutes

d) \(\frac{1}{6}\) hour = 10 minutes \(\frac{5}{6}\) hour = 50 minutes

e) \(\frac{1}{5}\) hour = 12 minutes 0.6 hour = 36 minutes
Do the calculations in your exercise book. Write the answers here.

1. a) 1 m of material costs £6.70. How much do 8 m cost? £53.60
   b) 7 kg of apples cost £13.30. How much does 1 kg cost? £1.90
   c) 5 litres of oil cost £16.50. How much do 7 litres cost? £23.10

2. Kate had 360 pennies. On Friday she spent \( \frac{7}{9} \) of them on stamps.
   a) How much did the stamps cost? 280 p
   b) What part of her money was left? \( \frac{2}{9} \)

3. Danny has already run 900 m, which is \( \frac{3}{5} \) of the distance he has to run.
   a) What distance is he running? 1500 m
   b) i) What part of the distance does he still have to run?
       ii) How many metres does he still have to run? 600 m

4. a) How much does Peter have if \( \frac{1}{2} \) of his money is 50 p more than \( \frac{1}{4} \) of it? £2
   b) \( \frac{2}{5} \) of Veronica's money is 120 p less than \( \frac{3}{5} \) of it. How much money does Veronica have? £6
   c) Wendy spent half of her money on Monday, half of what was left on Tuesday and she had 40 p left. How much money did Wendy have at first? £1.60

5. Solve the equations and inequalities in your exercise book.
   a) \( 3 \cdot a - 410 = 4690 \)  
   b) \( 4 \cdot b + 40 = 3 \cdot b + 110 \)
   c) \( 5 \cdot c + 2000 < 7400 \)  
   d) \( 87 < 6 \cdot d - 320 < 13 \)
   \[ a = \frac{4690 - 410}{5100} = \frac{4180}{5100} \approx 0.8176 \]  
   \[ b = \frac{110 - 40}{70} = \frac{70}{70} = 1 \]  
   \[ c < (7400 - 2000) \div 5 \]
   \[ d: 68, 69, 70, 71, 72 \]
   when \( d \) is a natural number
What rule has been used to group the natural numbers?

| 5, 25, 100, 10, 75, 975, 570 | 1, 6, 21, 1201, 66, 96, 61, 831 | 2, 7, 42, 5317, 72, 87, 172, 657 | 3, 8, 63, 4218, 38, 13, 648, 903 | 4, 9, 99, 1644, 54, 49, 359, 184 |

Rule used: E.g:
1st set: numbers with units digits 5 or 0
2nd set: numbers with units digits 1 or 6
3rd set: numbers with units digits 2 or 7
4th set: numbers with units digits 3 or 8
5th set: numbers with units digits 4 or 9

Write these numbers in the correct set.
10, 72, 38, 13, 54, 96, 61, 87, 75, 49, 172, 359, 648, 975, 831, 570, 903, 184, 657

Write the numbers 1, 2, 3, 6, 9 and 18 in the suitable circles if the arrows point towards the multiples.

Complete the missing arrows.

It takes 45 minutes for 7200 litres of water to flow out of the dam.
How much water would flow out after these times? Fill in the missing numbers.

a) 15 minutes: 2400 litres
b) 5 minutes: 800 litres
c) 3 minutes: 480 litres
d) 1 minute: 160 litres
e) 30 minutes: 4800 litres
f) 1 hour: 9600 litres

Solve the problems in your exercise book. Write only the answer here.

a) Lennie Lion eats about 16 kg of meat every day. About how much meat does Lennie Lion eat in a year? 5840 kg

b) In one year, Ellie Elephant drinks about 150 times. Each time, she drinks about 200 litres of water. How much water does Ellie Elephant drink in a year? 30 000 litres

c) Daisy Dragonfly flies around for 2 and a half hours. How far does she fly if she covers 625 m per minute? 93 750 m
1 Solve the problems in your exercise book.

a) A point on the Equator turns on the Earth's axis at a speed of 465 m per second. How many metres does it turn every minute? 27900 m

b) During a thunderstorm, 30 mm of rain fell. It means that 30 litres of rain fell on an area of 1 square metre.

After the same thunderstorm, how many litres of rain fell on a rectangular garden which is 30 m wide and 50 m long? 45000 litres

c) 1 centimetre cube of gold has mass 19.3 g. What would be the mass of a cuboid made of gold if it is 20 cm long, 10 cm wide and 9 cm high? 34 kg 740 g

2 Practise calculation.

a) \[ \begin{array}{c}
1 & 2 & 4 & 3 & 5 \\
+ & 3 & 0 & 7 & 2 \\
\hline
1 & 5 & 5 & 0 & 7 \\
\end{array} \]  

b) \[ \begin{array}{c}
2 & 3 & 4 & 0 & 8 \\
- & 1 & 0 & 5 & 0 & 7 \\
\hline
1 & 2 & 9 & 0 & 1 \\
\end{array} \]  

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

d) \[ \begin{array}{c}
6 & 2 & 8 & 2 & 1 & 8 \\
\end{array} \]  

e) \[ \begin{array}{c}
1 & 0 & 9 & 5 & 6 \\
7 & 6 & 6 & 9 & 2 \\
\hline
8 & 6 & 6 & 9 & 2 \\
\end{array} \]  

f) \[ \begin{array}{c}
8 & 7 & 4 & 3 & 0 \\
2 & 3 & 5 & 1 & 0 \\
\hline
6 & 3 & 9 & 2 & 0 \\
\end{array} \]  

g) \[ \begin{array}{c}
2 & 6 & 1 & 0 & 0 \\
7 & 8 & 3 & 0 & 0 \\
\hline
9 & 7 & 6 & 7 \\
\end{array} \]  

h) \[ \begin{array}{c}
9 & 8 & 7 & 9 & 0 & 3 \\
\end{array} \]  

3 List the natural numbers about which this statement is true.

It is a multiple of 8, the sum of its digits is 7 and the product of its digits is 6. 16, 1312, 3112

4 Three travellers met on a road. One of them had 3 loaves of bread, another had 5 loaves of bread and the third had no food at all. They shared the bread equally.

The third person then offered 8 coins to the others to pay for his food. How can the other two travellers share the money fairly?

\[ \begin{array}{c|c|c}
| Bread | Coins |
\hline
A & \[ \begin{array}{c}
3 & 3 & 3 \\
\end{array} \] & A
B & \[ \begin{array}{c}
2 & 2 & 2 \\
\end{array} \] & B
\end{array} \]  

A gave \( \frac{2}{3} \)  B gave \( \frac{1}{3} \)

5 27 players took part in a knockout singles tennis competition. The winner from each pair went through to the next round and the person without an opponent qualified automatically. How many matches were played before the winner was decided? 26
Practise calculation.

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

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

c)
\[
\begin{array}{c}
3 & 5 & 2 & 8 \\
\hline
1 & 7 & 6 & 5 \\
\end{array}
\]

d)
\[
\begin{array}{c}
9 & 0 & 3 & 2 \\
8 & 1 & 2 & 8 & 8 \\
\hline
9 & 8 & 1 & 2 & 8 & 8
\end{array}
\]

e)
\[
\begin{array}{c}
6 & 5 & 9 & 0 \\
\hline
2 & 8 \\
\hline
5 & 2 & 7 & 2
\end{array}
\]

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

g)
\[
\begin{array}{c}
1 & 4 & 0 & 3 & 5 \\
\hline
1 & 9 & 8 & 2 & 4 & 5
\end{array}
\]

h)
\[
\begin{array}{c}
2 & 5 & 2 & 6 \\
4 & 1 & 0 & 1 & 0 & 4
\end{array}
\]

How could you put these numbers into sets? Label each set, then write the numbers in the correct places.

Set $A = \{11, 7, 14, 23, 1, 25, 49, 70, 15, 45, 3, 100, 47, 19, 2\}$

E.g:

\[
\begin{array}{c}
1 & 2 & 14 \\
\hline
\end{array}
\]

Multiples of 5

Prime Numbers

Square Numbers

Fill in the missing numbers.

a) i) 360 min = ______ hours ii) 25 min = ______ hour

b) i) 36 hours = ______ days ii) 2 days = ______ week

c) i) 700 g = ______ kg ii) \(\frac{2}{10} = \frac{1}{5}\) kg = 200 g

d) i) 40 cm = ______ m ii) \(\frac{3}{20}\) m = ______ cm

e) i) 250 m = ______ km ii) \(\frac{2}{1} = \frac{1}{2}\) km = 2500 m

f) i) 200 cl = ______ litre ii) 200 ml = ______ litre
1. How many routes lead from A to K, L, M, N and O if you can only move down to the left or to the right?
   - A to K: ABDGK
   - A to L: ABDGL, ABDHL, ABEHL, ACEHL
   - A to M: ABDHM, ABEHM, ABEIM, ACEHM, ACEIM, ACFIM
   - A to N: ABEIN, ACEIN, ACFIN, ACFJN
   - A to O: ACFJO

2. Colour the shapes on the grid and fill in the missing numbers if the sum of the numbers in each shape is 10 000.

<table>
<thead>
<tr>
<th>4000</th>
<th>2900</th>
<th>3500</th>
<th>1700</th>
<th>2800</th>
<th>1700</th>
</tr>
</thead>
<tbody>
<tr>
<td>3100</td>
<td>2600</td>
<td>5100</td>
<td>2000</td>
<td>4300</td>
<td>4200</td>
</tr>
<tr>
<td>4400</td>
<td>2700</td>
<td>9300</td>
<td>1000</td>
<td>1200</td>
<td>5800</td>
</tr>
<tr>
<td>3500</td>
<td>1400</td>
<td>2300</td>
<td>2600</td>
<td>2800</td>
<td>3900</td>
</tr>
</tbody>
</table>

3. Write the missing numbers in the puzzles if the sum of the 3 numbers along each side is 15 000. Choose from:
   a) 4200, 4000, 5200, 5400, 5600, 5800
   b) 5400, 5600, 5800, 4800, 5000, 5200, 4000, 4600

4. Fill in the missing numbers.
   a) $900 \cdot 2 \quad 2700 \cdot 4$
   b) $8000 \div 2 \quad 40000 \div 4$
1. a) List the natural numbers up to 100 which have an odd number of factors.
   \[1, 4, 9, 16, 25, 36, 49, 64, 81, 100\]
   b) What are these numbers called? \[\text{Square numbers}\]

2. a) How many zeros are at the end of the number which is the result of
   \[10 \times 11 \times 12 \times 13 \times 14 \times 15?\]
   b) Check your answer on a calculator. Write the product in words.
   \[\text{Three million, six hundred and three thousand and six hundred}\]

3. The product of the ages of my children is 1664. The youngest is half the age of
   the oldest. I am 50 years old.
   How many children do I have and what are their ages?
   3 children aged are 8, 16 and 13 years

4. Two positive whole numbers have these factors in common: 1, 2, 3 and 6.
   If we combine their factors we get this set:
   \[\{1, 2, 3, 4, 6, 9, 12, 18\}\]
   Write the factors in the correct set if:
   \[A = \{\text{factors of the 1st number}\}\]
   \[B = \{\text{factors of the 2nd number}\}\]
   What are the two numbers?
   \[12\] and \[18\]

5. List the positive integers up to 100 which are exactly divisible by 2, 3, 4, and 5.
   \[60\]

6. I am thinking of a positive number.
   Its half is 15 more than its third.
   What is the number?
   \[90\]

7. In how many different orders can you put these shapes?
   \[\text{30}\]
   (See Lesson Plan for full answer.)
1. The perimeter of a triangle is 10 cm and the length of each side is a whole cm. Are these statements true or false? Write a ✔ if true and a ✗ if false.
   a) The triangle has only one side which is 1 cm long. ✗
   b) The triangle could have only one side which is 2 cm long. ✔
   c) The triangle has only one side which is 3 cm long. ✗
   d) The triangle has only one side which is 5 cm long. ✗

2. We want to rearrange some books on two bookshelves.
   At the moment, there are 156 books on the bottom shelf and on the top shelf there are 30 books more than there are on the bottom shelf.
   Rearrange the books so that there are:
   a) the same number of books on both shelves ......17! and ......17!
   b) one shelf has twice as many books as the other. ......114! and ......228!

3. The children are making up gift boxes for a large party.
   a) If they put 4 sweets in each box, they can make 139 boxes and 2 sweets will be left over. How many sweets did they have?

   Answer . .558 sweets

   b) How many gift boxes would they make if they put 9 sweets in each box?

   Answer . .62 gift boxes

4. Three children in a family made a flower garden, 6 m wide and 12 m long.
   David said that he would look after 3 times more of it than his younger sister, Ann. George, who was the eldest, said that he would work on as much of the garden as his brother and sister together.
   What area of the garden did each child take care of?

   D: . .27 m² ............. A: . .9 m² ............. G: . .36 m² .............
1. Sue spent half of her money. Then she spent another £20 and had £80 left. How much money did Sue have at first?

**Answer:** £200

2. Which positive integer can be written instead of the letter \( x \) so that the inequality is true?

\[
48 + x < 52 - x
\]

\[x = 1\]

3. An antiques dealer bought a vase for £700, then sold it for £800. Then he bought the vase back again for £900 and sold it for £1000. Did the antiques dealer make a profit or a loss?

**Answer:** profit of £200

4. What is half of double the greatest 2-digit number?

**Answer:** 99

5. On a sheet of paper there are these 4 statements. Tick the only true one.

   1. On this sheet there is exactly one false statement.
   2. On this sheet there are exactly two false statements.
   3. On this sheet there are exactly three false statements.
   4. On this sheet there are exactly four false statements.

   \( \sqrt{3} \) is the true statement.

6. At the market in *Hobbitland*, they offered 4 roosters for 2 geese or 2 roosters for 4 chickens.

How many roosters did *Mrs Hobbit* get for 1 goose and 2 chickens?

**Answer:** 3 roosters

7. We want to cut out a cross from a square piece of material which has sides of length 7 cm.

The width of each arm of the cross is 1 cm.

How much material will be wasted?

**Answer:** 36 cm² wasted
Fill in the missing numbers.

**Horizontal Clues**

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
<th>f</th>
<th>g</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td></td>
<td>7</td>
<td>8</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>56Th + 7H + 5T + 3U</td>
<td>518 ÷ 4</td>
<td>Difference between the smallest 3-digit number and the smallest natural number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Vertical Clues**

<table>
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<tr>
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<th>b</th>
<th>c</th>
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<th>e</th>
<th>f</th>
<th>g</th>
<th>h</th>
<th>i</th>
<th>j</th>
<th>k</th>
<th>l</th>
</tr>
</thead>
<tbody>
<tr>
<td>18975 ÷ 5</td>
<td>1 quarter of 100</td>
<td>65 000 + 1872</td>
<td>\left( \frac{2}{5} \right) \cdot (140 \div 20)</td>
<td>A 3-digit number with all its digits the same</td>
<td>A 3-digit number with all its digits the same</td>
<td>10 000 – 9163</td>
<td>( \frac{1}{4} ) of 2000 + ( \frac{1}{4} )</td>
<td>518 ÷ 4</td>
<td>Difference between the smallest 3-digit number and the smallest natural number</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fill in the missing letters.

**Horizontal clues only**

1 6-sided plane shape
2 3-D shape with many plane faces
3 To make bigger
4 Plane shape with no straight sides
5 Opposite of multiply
6 A triangle has 3 of them
7 A shape has this if one half is a mirror image of the other half
8 The same shape but not necessarily the same size

The word highlighted is what you deserve after all your hard work! Holidays

What is twice the half of two and a half?

\[ 2 \frac{1}{2} \]