How does
FORRESTER HIGH SCHOOL
Do Numeracy?

NUMERACY HANDBOOK
A guide for students, parents and staff
Introduction

What is the purpose of the booklet?

This booklet has been produced to give guidance and help to staff, students and parents. It shows how certain common Numeracy topics are taught in mathematics and throughout the school. It is hoped that using a consistent approach across all subjects will make it easier for students to progress.

How can it be used?

The booklet includes the Numeracy skills useful in subjects other than mathematics.

It is intended that staff from all departments will support the development of Numeracy by reinforcing the methods contained in this booklet. If this is not possible because of the requirements of your subject, please highlight this to students and inform a member of the Numeracy group, so that the booklet can be updated to include this information next session.

NOTE: $\frac{3}{4}$ means 3 parts out of a total of 4
$\frac{3}{4}$ also means $3 \div 4 = 0.75$

It should be noted that the context of the question, whether a calculator is permitted or not and the nature of the numbers involved has the potential to change the given level.

Why do some topics include more than one method?

In some cases (e.g. percentages), the method used will be dependent on the level of difficulty of the question, and whether or not a calculator is permitted.

For mental calculations, pupils should be encouraged to develop a variety of strategies so that they can select the most appropriate method in any given situation.
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**Mental strategies**

There are a number of useful mental strategies for addition. Some examples are given below.

**Example 1**  
Calculate $54 + 27$  
Level 2

**Method 1**  
Add tens, then add units, then add together

- $50 + 20 = 70$
- $4 + 7 = 11$
- $70 + 11 = 81$

**Method 2**  
Split up number to be added into tens and units and add separately.

- $54 + 20 = 74$
- $74 + 7 = 81$

**Method 3**  
Round up to nearest 10, then subtract

- $54 + 30 = 84$  
  but 30 is 3 too much so subtract 3;
- $84 - 3 = 81$
Addition

Written Method

When adding numbers, ensure that the numbers are lined up according to place value. Start at right hand side, write down units, carry tens.

Example 2  Add 3032 and 589

Level 2

\[
\begin{array}{c}
3032 \\
+ 589 \\
\hline
1
\end{array}
\quad \begin{array}{c}
3032 \\
+ 589 \\
\hline
21
\end{array}
\quad \begin{array}{c}
3032 \\
+ 589 \\
\hline
621
\end{array}
\quad \begin{array}{c}
3032 \\
+ 589 \\
\hline
3621
\end{array}
\]

\[
\begin{aligned}
2 + 9 &= 11 \\
3 + 8 + 1 &= 12 \\
0 + 5 + 1 &= 6 \\
3 + 0 &= 3
\end{aligned}
\]

When adding decimals we make sure all the decimal points are lined up.

Example 3  Add 43.8 + 4 + 23.76

Level 2

\[
\begin{array}{c}
43.80 \\
4.00 \\
+ 231.76 \\
\hline
71.56
\end{array}
\]

43.8 can be written as 43.80 and 4 as 4.00

Remember you can add as many numbers together in a single sum as you like.
Mental Strategies

There are a number of useful mental strategies for subtraction. Some examples are given below.

**Example 1** Calculate 93 - 56

**Level 2**

**Method 1** Count on

Count on from 56 until you reach 93. This can be done in several ways e.g.

![Count on diagram]

**Method 2** Break up the number being subtracted

e.g. subtract 50, then subtract 6

93 - 50 = 43

43 - 6 = 37

![Break up diagram]
Subtraction

Written Method (We do NOT “borrow and pay back”)

We use decomposition (borrowing) as a written method for subtraction (see below). Alternative methods may be used for mental calculations.

**Example 2**  
4590 - 386  
Level 2

<table>
<thead>
<tr>
<th>4590</th>
</tr>
</thead>
<tbody>
<tr>
<td>-386</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>4204</td>
</tr>
</tbody>
</table>

**Example 3**  
Subtract 692 from 14597  
Level 2

<table>
<thead>
<tr>
<th>14597</th>
</tr>
</thead>
<tbody>
<tr>
<td>692</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>13905</td>
</tr>
</tbody>
</table>

**Example 4**  
Find the difference between 327 and 5000  
Level 2

We need to “BUMP” our borrow 1 back to the end.

<table>
<thead>
<tr>
<th>5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>-327</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>4673</td>
</tr>
</tbody>
</table>

**Example 5**  
Subtract 8.36 from 20.9  
Level 2

20.9 can be written as 20.90

<table>
<thead>
<tr>
<th>20.90</th>
</tr>
</thead>
<tbody>
<tr>
<td>-8.36</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>12.54</td>
</tr>
</tbody>
</table>

Remember you can only have TWO numbers in a single subtraction calculation.
Multiplication

Mental Strategies

It is essential that all of the multiplication tables from 1 to 10 are known. These are shown in the tables square below.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<td>50</td>
<td>60</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>100</td>
</tr>
</tbody>
</table>

Example 1 Find 39 x 6

Method 1

30 x 6 = 180
9 x 6 = 54
180 + 54 = 234

Method 2

40 x 6 = 240
40 is 1 too many so take away 6 x 1
240 - 6 = 234
Multiplication

Multiplying by multiples of 10 and 100

To multiply by 10 you move every digit one place to the left.
To multiply by 100 you move every digit two places to the left.

Example 2
(a) Multiply 354 by 10

\[354 \times 10 = 3540\]

(b) Multiply 50.6 by 100

\[50.6 \times 100 = 5060\]

(c) 35 x 30

\[35 \times 3 = 105\]
\[105 \times 10 = 1050\]
\[35 \times 30 = 1050\]
So 35 x 30 = 1050

(d) 436 x 600

\[436 \times 6 = 2616\]
\[2616 \times 100 = 261600\]
\[436 \times 600 = 261600\]
So 436 x 600 = 261600

Example 3
(a) 30 x 60

\[3 \times 10 \times 6 \times 10 = 18 \times 10 \times 10 = 1800\]

(b) 20 x 700

\[2 \times 10 \times 7 \times 100 = 14 \times 10 \times 100 = 14000\]

We may also use these rules for multiplying decimal numbers.

Example 4
(a) 2.36 x 20

\[2.36 \times 2 = 4.72\]
\[4.72 \times 10 = 47.2\]
\[2.36 \times 20 = 47.2\]
So 2.36 x 20 = 47.2

(b) 38.4 x 50

\[38.4 \times 5 = 192.0\]
\[192.0 \times 10 = 1920\]
\[38.4 \times 50 = 1920\]
So 38.4 x 50 = 1920
**Multiplication**

**Written Method**

**Example 5**  Multiply 246 by 8

```
2 4 6  
x 8  
1 9 6 8
```

Remember to ADD the carry.

**Example 6**  Multiply 4367 by 50

```
4 3 6 7  
x 5 0  
2 1 8 3 5 0
```

x 50 is the same as \(\times 5 \times 10\)

Put the 0 into the answer first \((\times 10)\)

then multiply by 5

**Example 7**  Multiply 472 by 300

```
4 7 2   
x 3 0 0  
1 4 1 6 0 0
```

x 300 is the same as \(\times 3 \times 100\)

Put two 0’s into the answer first \((\times 100)\)

then multiply by 3

**Long Multiplication**

We can multiply by a 2 or 3 digit number by combining the above methods.

**Example 8**  Multiply 5246 by 52

```
5 2 4 6  
x 5 2  
1 0 4 9 2
+ 2 6 2 3 0 0  
2 7 2 4 9 2
```

We can multiply by 52 if we split \(\times 52\) into \(\times 2\) and \(\times 50\).

To get the final answer add the two previous answers together. \((50 + 2 = 52)\)

Alternatively we could set it out as follows:

```
5 2 4 6  
x 2  
1 0 4 9 2
+ 2 6 2 3 0 0  
2 7 2 4 9 2
```

```
5 2 4 6  
x 3  
1 0 4 9 2
```

```
5 2 4 6  
x 5 0  
2 6 2 3 0 0
```

```
1 0 4 9 2  
x 5 2  
2 7 2 4 9 2
```
Multiplication

To multiply decimals we ignore the decimal point(s) until after we multiply. The point(s) are not necessarily lined up when setting the question out. The decimal point gets placed in the answer after multiplication is complete.

Example 9  23.76 x 6
Level 2

\[
\begin{array}{c}
23.76 \\
\times \quad 6 \\
\hline
142.56
\end{array}
\]

Start by working out 2376 x 6
2 digits after point
0 digits after point

The decimal point goes in 2 places from the end of the answer.

Example 10  134.9 x 0.3
Level 3

\[
\begin{array}{c}
134.9 \\
\times \quad 0.3 \\
\hline
30.38
\end{array}
\]

Start by working out 1349 x 3
1 digits after point
1 digits after point

The decimal point goes in 2 places from the end of the answer.

Example 11  132.8 x 3.4
Level 3

\[
\begin{array}{c}
132.8 \\
\times \quad 3.4 \\
\hline
440.84
\end{array}
\]

Start by working out 1328 x 34
2 digits after point
1 digits after point

The decimal point goes in 3 places from the end of the answer.
**Division**

**Dividing by multiples of 10 and 100**

To divide by **10** you move every digit **one** place to the right.  
To divide by **100** you move every digit **two** places to the right.

**Example 1**

(a) 8450 ÷ 10  
(b) 37.9 ÷ 100

<table>
<thead>
<tr>
<th>Level 2</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>Th</th>
<th>H</th>
<th>T</th>
<th>U</th>
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</thead>
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<td>8</td>
<td>4</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

8450 ÷ 10 = 845  
37.9 ÷ 100 = 0.379

<table>
<thead>
<tr>
<th>Level 3</th>
<th>(c) 440 ÷ 40</th>
<th>(d) 85.6 ÷ 200</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>To divide by 40, divide by 4, then by 10.</td>
<td>To divide by 200, divide by 2, then by 100.</td>
</tr>
<tr>
<td>440 ÷ 4 = 110</td>
<td>85.6 ÷ 2 = 42.8</td>
<td></td>
</tr>
<tr>
<td>110 ÷ 10 = 11</td>
<td>42.8 ÷ 100 = 0.428</td>
<td></td>
</tr>
<tr>
<td>So, 440 ÷ 40 = 11</td>
<td>So, 85.6 ÷ 200 = 0.428</td>
<td></td>
</tr>
</tbody>
</table>
Division

Written Method

Example 2  There are 192 pupils in first year, shared equally between 8 classes. How many pupils are in each class?

\[
\begin{array}{c|c}
8 & 192 \\
\hline
24 & \\
\end{array}
\]

There are 24 pupils in each class.

Example 3  Divide 4.74 by 3

\[
\begin{array}{c|c}
3 & 4.74 \\
\hline
1 & 58 \\
\end{array}
\]

When dividing a decimal by a whole number, the decimal points must stay in line.

Example 4  A jug contains 2.2 litres of juice. If it is poured evenly into 8 glasses, how much juice is in each glass?

\[
\begin{array}{c|c}
8 & 2.275 \\
\hline
0.275 & \\
\end{array}
\]

If you have a remainder at the end of a calculation, add a zero onto the end of the decimal and continue with the calculation. 2.20 is the same as 2.2. Continue to add 0’s as required.

Each glass contains 0.275 litres.

Example 5  Divide 575 by 4

\[
\begin{array}{c|c}
4 & 575 \\
\hline
143.75 & \\
\end{array}
\]

If there is no decimal point then put the point in place before you add the first zero. 575.0 is the same as 575. Continue to add 0’s as required.
When dividing we want to divide by as small a number as possible without turning it into a decimal. NEVER divide by a decimal.

**Example 6**  \[467400 \div 40\]

Level 3

\[
\begin{array}{c}
467400 \div 40 \\
46740 \div 4 \\
\hline
1 1 6 8 5 \\
4 \underline{4 6 74 0} \\
\end{array}
\]

So \(467400 \div 40 = 11685\)

**Example 7**  \[238.2 \div 300\]

Level 3

\[
\begin{array}{c}
238.2 \div 300 \\
238.2 \div 3 \\
\hline
0. 7 9 4 \\
3 \underline{2 .3 2 8 1 2} \\
\end{array}
\]

So \(238.2 \div 300 = 0.794\)

**Example 8**  \[357.9 \div 0.6\]

Level 3

\[
\begin{array}{c}
357.9 \div 0.6 \\
3579 \div 6 \\
\hline
0. 5 9 6 .5 \\
6 \underline{3 5 7 3 9 .3 0} \\
\end{array}
\]

So \(357.9 \div 0.6 = 596.5\)
We CAN divide by a 2 or 3 digit number without a calculator.

**Example 9**  
3741 ÷ 32  

**Method 1**

\[
\begin{array}{c|c}
32 & 37408 \\
-32 & -32 \\
\hline
54 & 54 \\
-32 & -32 \\
\hline
22 & 22 \\
-192 & -192 \\
\hline
288 & 288 \\
-288 & -288 \\
\hline
0 & 0 \\
\end{array}
\]

Possibly an easier way may be to treat the long division as a normal divide calculation and list the tables at the side.

**Method 2**

\[
\begin{array}{c|c}
32 & 37408 \\
-32 & -32 \\
\hline
64 & 64 \\
-64 & -64 \\
\hline
96 & 96 \\
-96 & -96 \\
\hline
128 & 128 \\
-128 & -128 \\
\hline
160 & 160 \\
-160 & -160 \\
\hline
192 & 192 \\
-192 & -192 \\
\hline
224 & 224 \\
-224 & -224 \\
\hline
256 & 256 \\
-256 & -256 \\
\hline
288 & 288 \\
-288 & -288 \\
\hline
0 & 0 \\
\end{array}
\]

We only list the 32 times table as far as we need to go. We can add to it if we need to. The list length will only ever be a maximum of 9 numbers.

**Example 10** 357.4 ÷ 4.6

**Level 3**

\[
\begin{array}{c|c}
46 & 3574220 \\
-46 & -46 \\
\hline
0.776 & 0.776 \\
-76 & -76 \\
\hline
100 & 100 \\
-98 & -98 \\
\hline
2 & 2 \\
-2 & -2 \\
\hline
0 & 0 \\
\end{array}
\]

357.4 ÷ 4.6 = 0.78

We never want to divide by a decimal. Change the calculation and balance it.

When we have a never ending decimal as our answer we have to decide when to stop dividing and round appropriately (see rounding).
Order of Calculation (BODMAS)

Consider this: What is the answer to $2 + 5 \times 8$?

Is it $7 \times 8 = 56$ or $2 + 40 = 42$?

The correct answer is 42.

Calculations which have more than one operation need to be done in a particular order. The order can be remembered by using the mnemonic BODMAS. The higher the level the higher the priority.

The BODMAS rule tells us which operations should be done first.

BODMAS represents:

- (B)rackets: Top level
- (O)f: Middle level
- (D)ivide: Middle level
- (M)ultiply: Middle level
- (A)dd: Bottom level
- (S)ubtract: Bottom level

Scientific calculators use this rule, some basic calculators may not, so take care in their use.

**Example 1**

$15 - 12 \div 6$

BODMAS says divide first,

Level 2

$= 15 - 2$

then subtract

$= 13$

**Example 2**

$(9 + 5) \times 6$

Brackets first

Level 4

$= 14 \times 6$

then multiply.

$= 84$

**Example 3**

$18 + 6 \div (5 - 2)$

Brackets first

Level 4

$= 18 + 6 \div 3$

then divide

$= 18 + 2$

now add

$= 20$

**Example 4**

$16 + 5^2$

Level 3

multiply first ($5 \times 5$)

$= 16 + 25$

then add

$= 41$

**Example 5**

$(4 + 2)^2$

brackets first

Level 4

$= 6^2$

then multiply ($6 \times 6$)

$= 36$
To find the value of a variable in a formula, we must substitute all of the given values into the formula, then use BODMAS rules to work out the answer.

### Example 1
Use the formula $P = 2L + 2B$ to evaluate $P$ when $L = 12$ and $B = 7$.

- Step 1: write formula
- Step 2: substitute numbers for letters
- Step 3: start to evaluate (BODMAS)
- Step 4: write answer

$$P = 2L + 2B$$
$$P = 2 \times 12 + 2 \times 7$$
$$P = 24 + 14$$
$$P = 38$$

### Example 2
Use the formula $I = \frac{V}{R}$ to evaluate $I$ when $V = 240$ and $R = 40$.

- Step 1: write formula
- Step 2: substitute numbers for letters
- Step 3: start to evaluate (BODMAS)
- Step 4: write answer

$$I = \frac{V}{R}$$
$$I = \frac{240}{40}$$
$$I = 6$$

### Example 3
Use the formula $F = 32 + 1.8C$ to evaluate $F$ when $C = 20$.

- Step 1: write formula
- Step 2: substitute numbers for letters
- Step 3: start to evaluate (BODMAS)
- Step 4: write answer

$$F = 32 + 1.8C$$
$$F = 32 + 1.8 \times 20$$
$$F = 32 + 36$$
$$F = 68$$
We can extend our number line to include numbers below zero. The numbers below zero are called NEGATIVE numbers. (We NEVER use the word MINUS as this is used for subtraction).

Example 1  Compare the following pairs of numbers.
Level 3
a) 3 and -4  b) -6 and 4  c) -8 and -3

3 > -4  -6 < 4  -8 < -3

Example 2  Calculate:
Level 3
7 - 9 = -2

Example 3  Calculate:
Level 3
-5 + 8 = 3

When we ADD a positive number we move RIGHT on our number line.
When we SUBTRACT a positive number we move LEFT on our number line.

The further LEFT we go the SMALLER we get
The further RIGHT we go the BIGGER we get

START
To subtract move left
To add move right
Estimation : Rounding

Numbers can be rounded to give an approximation.

The number to the right of the place value to which we want to round tells us how to round.

**Example 1**

Level 2

2652 rounded to the nearest 10 is 2650.

2 is to the right of the 10’s column. Round down.

2652 rounded to the nearest 100 is 2700.

5 is to the right of the 100’s column. Round up.

2652 rounded to the nearest 1000 is 3000.

6 is to the right of the 1000’s column. Round up.

When rounding numbers that lie exactly in the middle it is convention to ALWAYS round UP.

**Example 2**

345 to the nearest 10

345 = 350 to the nearest 10

In general, to round a number, we must first identify the place value to which we want to round. We must then look at the next digit to the right (the “check digit”).

If the “check digit” is less than 5 (0, 1, 2, 3, 4) round down. If the “check digit” is 5 or more (5, 6, 7, 8, 9) round up.
Estimation: Rounding

The same principle applies when rounding decimal numbers.

**Example 1**  Round 1.5739 to 1 decimal places (1.d.p.)

1.5\(\overline{7}\)39 = 1.6  (1.d.p.)

**Example 2**  Round 6.4721 to 2 decimal places (2.d.p.)

6.4\(\overline{7}\)21 = 6.47  (2 d.p.)

**Example 3**  Round 19.49631 to 2 decimal places (2.d.p.)

19.4\(\overline{9}\)631 = 19.50  (2.d.p.)

Some students need a bit more visual help. You could also use a mini number line.

**Example 1**  1.5\(\overline{7}\)39 = 1.6  (1.d.p.)

**Example 2**  6.4\(\overline{7}\)21 = 6.47  (2 d.p.)

The number lies between 19.49 and 19.50. 6 to the right means we round up. We must include the 0 at the end as we require 2 numbers after the point.
**Estimation : Calculation**

Using rounded numbers in calculations to check an answer allows us to judge whether our answer is sensible or not.

**Example 1**

Tickets for a concert were sold over 4 days. The number of tickets sold each day was recorded in the table below.

How many tickets were sold in total?

<table>
<thead>
<tr>
<th></th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>486</td>
<td>205</td>
<td>197</td>
<td>321</td>
</tr>
</tbody>
</table>

Estimate: \( 500 + 200 + 200 + 300 = 1200 \)

Calculate: \[
\begin{align*}
486 \\
205 \\
197 \\
+ 321 \\
\hline 1209
\end{align*}
\]

Answer = 1209 tickets
(reasonable when compared to estimate).

**Example 2**

A bar of chocolate weighs 42g. There are 48 bars of chocolate in a box. What is the total weight of chocolate in the box?

Estimate = \( 50 \times 40 = 2000g \)

Calculate: \[
\begin{align*}
42 \\
x 48 \\
\hline 336 \\
1680 \\
\hline 2016
\end{align*}
\]

Answer = 2016g
(reasonable when compared to estimate).
It is essential to know the number of months, weeks and days in a year, and the number of days in each month.

Time may be expressed in 12 or 24 hour notation.

12-hour clock
Time can be displayed on a clock face, or digital clock.

When writing times in 12 hour clock, we need to add a.m. or p.m. after the time.

a.m. is used for times between midnight and 12 noon (morning)
p.m. is used for times between 12 noon and midnight (afternoon / evening).

5.15 am or 5.15pm?

24-hour clock
In the 24 hour clock, the hour is written as a 2 digit number between 00 and 24. Midnight is expressed as 00 00, or 24 00. After 12 noon, the hours are numbered 13, 14, 15 ... etc.

Examples
Level 2

<table>
<thead>
<tr>
<th>12 hr</th>
<th>24 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.55 am</td>
<td>09 55 hours</td>
</tr>
<tr>
<td>3.35 pm</td>
<td>15 35 hours</td>
</tr>
<tr>
<td>12.20 am</td>
<td>00 20 hours</td>
</tr>
<tr>
<td>2.16 am</td>
<td>02 16 hours</td>
</tr>
<tr>
<td>8.45 pm</td>
<td>20 45 hours</td>
</tr>
</tbody>
</table>
It is important to be able to change between units of time. Hours to minutes and minutes to hours.

Students should recognise everyday equivalences.

<table>
<thead>
<tr>
<th>MINUTES</th>
<th>HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 mins</td>
<td>15/60 hr</td>
</tr>
<tr>
<td>30 mins</td>
<td>30/60 hr</td>
</tr>
<tr>
<td>45 mins</td>
<td>45/60 hr</td>
</tr>
</tbody>
</table>

**Example 1**  
Change minutes into hours  

Divide by 60

20 mins = \(\frac{20}{60}\) = 0.333333... hrs = 0.33 hrs (2.d.p.)

12 mins = \(\frac{12}{60}\) = 0.2 hrs

55 mins = \(\frac{55}{60}\) = 0.916666... hrs = 0.92 hrs (2.d.p)

2hrs 18 mins = 2.3hrs

18 mins = \(\frac{18}{60}\) = 0.3 hrs

**Example 2**  
Change hours into minutes  

Multiply by 60

0.6 hrs = 0.6 \times 60 = 36 mins

0.35 hrs = 0.35 \times 60 = 21 mins

2.8 hrs = 2hrs 48 mins

= 168 mins

0.8 hrs = 0.8 \times 60 = 48 mins

2 hrs = 2 \times 60 = 120 mins

0.8 hrs = 0.8 \times 60 = \frac{48}{168} mins

or

2.8 hrs = 2.8 \times 60 = 168 mins
Time

Distance, Speed and Time.

For any given journey, the distance travelled depends on the speed and the time taken. If we consider speed to be constant, then the following formulae apply:

\[
\text{Distance} = \text{Speed} \times \text{Time}
\]

\[
\text{Speed} = \frac{\text{Distance}}{\text{Time}}
\]

\[
\text{Time} = \frac{\text{Distance}}{\text{Speed}}
\]

**Example 3**  
Calculate the speed of a train which travelled 450 km in 5 hours  
Level 3

\[
D = 450 \text{ km} \quad T = 5 \text{ hrs}
\]

\[
S = \frac{D}{T} = \frac{450}{5} = 90 \text{ km/h}
\]

The distance was in km and the time taken was in hours. The speed therefore should be given as km/h.

**Example 4**  
How long did it take for a car to travel 209 miles at an average speed of 55 mph?  
Level 4

\[
D = 209 \text{ miles} \quad S = 55 \text{ mph}
\]

\[
T = \frac{D}{S} = \frac{209}{55} = 3.8 \text{ hrs}
\]

\[
0.8 \text{ hrs} = 0.8 \times 60 = 48 \text{ mins}
\]

\[
T = 3 \text{ hrs} 48 \text{ mins}
\]
What is a Fraction?

The top of a fraction is called the NUMERATOR

\[
\begin{array}{c}
\frac{3}{5}
\end{array}
\]

The bottom of a fraction is called the DENOMINATOR

3 parts shaded out of a total of 5 equal pieces \( \frac{3}{5} \)

\[
\begin{array}{c}
1 = \frac{8}{8}
\end{array}
\]

If the numerator and the denominator are the same number we have 1 whole.

Equivalent Fractions

Equivalent fractions are fractions that represent the SAME AMOUNT. To find an equivalent fraction we multiply or divide both the numerator and the denominator of a fraction by the SAME number.

Example 1
Find equivalent fractions

(a) \[
\begin{array}{c}
\frac{20}{25} = \frac{4}{5}
\end{array}
\]

(b) \[
\begin{array}{c}
\frac{2}{3} = \frac{16}{24}
\end{array}
\]

Simplifying Fractions

When we DIVIDE to find an equivalent fraction, it is called SIMPLIFYING. We can simplify (divide) repeatedly until the fraction is in its SIMPLEST FORM.

Example 2
Write \( \frac{56}{72} \) in its simplest form

\[
\begin{array}{c}
\frac{56}{72} = \frac{28}{36} = \frac{14}{18} = \frac{7}{9}
\end{array}
\]

or

\[
\begin{array}{c}
\frac{56}{72} = \frac{28}{36} = \frac{7}{9}
\end{array}
\]

or

\[
\begin{array}{c}
\frac{56}{72} = \frac{7}{9}
\end{array}
\]
Fractions

**Improper Fractions**

A top heavy fraction is called an IMPROPER fraction and is greater than 1. A MIXED NUMBER has a whole number part and a fraction part.

**Example 3**  Change the improper fraction \( \frac{32}{6} \) to a mixed number.

Level 3

\[
32 \div 6 = 5 \text{ remainder } 2
\]

\[
\frac{32}{6} = 5 \frac{2}{6} = 5 \frac{1}{3}
\]

\[
\frac{6}{6} = 1 \text{ so how many 6's can we get from 32}
\]

Always write fractions in their simplest form.

**Example 4**  Change the mixed number \( 3 \frac{5}{7} \) to an improper fraction.

Level 3

\[
3 \frac{5}{7} = \frac{26}{7}
\]

\[
\frac{3 \frac{5}{7}}{7} = \frac{3 \times 7 + 5}{7} = \frac{26}{7}
\]

A Fractions of a Quantity

To find the fraction of a quantity:
- divide by the denominator (bottom).
- multiply by the numerator (top).

**Example 5**  Find \( \frac{1}{5} \) of £150

Level 2

\[
\frac{1}{5} \text{ of £150} = \frac{150}{5} = £30
\]

If the numerator is 1 then we only:
- \( \div \) by the bottom.

**Example 6**  Find \( \frac{3}{4} \) of 48

Level 2

\[
\frac{3}{4} \text{ of } 48 = 48 \times \frac{3}{4} = 12 \times 3 = 36
\]

\[
\times \text{ by the top.}
\]

\[
\div \text{ by the bottom.}
\]
Percentages: Non-Calculator

Percent means out of 100. The symbol for percent is: %
A percentage can be converted to an equivalent fraction or decimal.

Level 2

36% means \(\frac{36}{100}\)

\[
36\% = \frac{36}{100} = \frac{9}{25} = 0.36
\]

Common Percentages

Some percentages are used very frequently. It is useful to know these as fractions and decimals.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Fraction Simplest Form</th>
<th>Decimal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1%</td>
<td>(\frac{1}{100})</td>
<td>(\frac{1}{100})</td>
</tr>
<tr>
<td>10%</td>
<td>(\frac{10}{100})</td>
<td>(\frac{1}{10})</td>
</tr>
<tr>
<td>20%</td>
<td>(\frac{20}{100})</td>
<td>(\frac{1}{5})</td>
</tr>
<tr>
<td>25%</td>
<td>(\frac{25}{100})</td>
<td>(\frac{1}{4})</td>
</tr>
<tr>
<td>33(\frac{1}{3})%</td>
<td>(\frac{33\frac{1}{3}}{100})</td>
<td>(\frac{1}{3})</td>
</tr>
<tr>
<td>50%</td>
<td>(\frac{50}{100})</td>
<td>(\frac{1}{2})</td>
</tr>
<tr>
<td>66(\frac{2}{3})%</td>
<td>(\frac{66\frac{2}{3}}{100})</td>
<td>(\frac{2}{3})</td>
</tr>
<tr>
<td>75%</td>
<td>(\frac{75}{100})</td>
<td>(\frac{3}{4})</td>
</tr>
<tr>
<td>100%</td>
<td>(\frac{100}{100})</td>
<td>1</td>
</tr>
</tbody>
</table>
There are many ways to calculate percentages of a quantity. Some of the common ways are shown below.

### Non-Calculator Methods

**Method 1** Using Equivalent Fractions (use table on previous page)

**Example 1** Find 25% of £48

25% of £48 = \( \frac{1}{4} \) of 48
= \( \frac{48}{4} \)
= £12

**Method 2** Using 1% (1% - 9%)

In this method, first find 1% of the quantity (by dividing by 100), then multiply to give the required value.

**Example 2** Find 9% of 200g

1% of 200g = \( \frac{1}{100} \) of 200
= \( \frac{200}{100} \)
so 9% of 200g = 9 x 2g
= 18g

**Method 3** Using 10% (10% and multiples of 10%)

This method is similar to the one above. First find 10% (by dividing by 10), then multiply to give the required value.

**Example 3** Find 70% of £35

10% of £35 = \( \frac{1}{10} \) of 35
= \( \frac{35}{10} \)
so 70% of £35 = 7 x £3.50
= £24.50

If we use a more complicated number then the level would go up to 3.
Percentages: Non- Calculator

Non- Calculator Methods

Combining Methods

The previous 2 methods can be combined so allowing us calculate any percentage.

**Example 4**  Find 23% of £15000

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% of £15000</td>
<td>£1500</td>
<td></td>
</tr>
<tr>
<td>20% of £15000</td>
<td>2 x £1500</td>
<td>£3000</td>
</tr>
<tr>
<td>1% of £15000</td>
<td>£150</td>
<td></td>
</tr>
<tr>
<td>3% of £15000</td>
<td>3 x 150</td>
<td>£450</td>
</tr>
<tr>
<td>23% of £15000</td>
<td>£3000 + £450</td>
<td>£3450</td>
</tr>
</tbody>
</table>

10% = 1/10, divide by 10
20% = 2 x 10%, multiply by 2
1% = 1/100, divide by 100
3% = 3 x 1%, multiply by 3
23% = 20% + 3%

**Example 5**  Calculate the sale price of a computer which costs £650 and has a 15% discount

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Calculation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% of £650</td>
<td>£65</td>
<td></td>
</tr>
<tr>
<td>5% of £650</td>
<td>£32.50</td>
<td></td>
</tr>
<tr>
<td>so 15% of £650</td>
<td>£65 + £32.50</td>
<td>£97.50</td>
</tr>
<tr>
<td>Total price</td>
<td>£650 - £97.50</td>
<td>£552.50</td>
</tr>
</tbody>
</table>

10% = 1/10, divide by 10
20% = 2 x 10%, multiply by 2
1% = 1/100, divide by 100
3% = 3 x 1%, multiply by 3
23% = 20% + 3%

15% = 10% + 5%
Percentages: Calculator

**Calculator Method**

To find the percentage of a quantity using a calculator, change the percentage to a decimal, then multiply.

**Example 1**  Find 23% of £15000  

![Image](image.png)

We NEVER use the % button on calculators. The methods taught in the mathematics department are all based on converting percentages to decimals.

**Example 2**  House prices increased by 19% over a one year period. What is the new value of a house which was valued at £236000 at the start of the year?

Increase = 19% of £236 000  
= \( \frac{19}{100} \times 236000 \)  
= 0.19 x £236 000  
= £44 840

Value at end of year = original value + increase  
= £236 000 + £44 840  
= £280 840

The new value of the house is £280 840
Percentages: One Quantity as a % of Another

Finding the percentage

To find one quantity as a percentage of another:
Make a FRACTION then multiply the fraction by 100

\[ \frac{a}{b} \times 100 \Rightarrow \% \]

**Example 1**
Level 3
There are 30 pupils in Class 3A3. 18 are girls. What percentage of class 3A3 are girls?

18 out of 30 are girls

\[ \frac{18}{30} \times 100 \]
\[ = 0.6 \times 100 \]
\[ = 60\% \text{ of 3A3 are girls} \]

**Example 2**
Level 3
James scored 36 out of 44 his biology test. What is his percentage mark?

Score = \[ \frac{36}{44} \times 100 \]
\[ = 0.81818... \times 100 \]
\[ = 81.818...\% \]
\[ = 82\% \text{ (see rounding)} \]

**Example 3**
Level 3
In class 1X1, 14 pupils had brown hair, 6 pupils had blonde hair, 3 had black hair and 2 had red hair. What percentage of the pupils were blonde?

Total number of pupils = 14 + 6 + 3 + 2 = 25
6 out of 25 were blonde.

\[ \frac{6}{25} \times 100 \]
\[ = 0.24 \times 100 \]
\[ = 24\% \text{ were blonde} \]
A ratio allows us to compare amounts.
When writing a ratio we usually use “ : ”, 1 : 3
When reading a ratio we use the word “to”, 1 to 3
The order of the numbers in a ratio matters,
1 : 3 is NOT the same as 3 : 1

Example 1
Level 3
The ratio of beads is 3 : 4
4 : 3
3 to 4
4 to 3

Example 2
Level 3
To make a fruit drink, 4 parts water is mixed with 1 part of cordial.
The ratio of water to cordial is 4 : 1
The ratio of cordial to water is 1 : 4

Example 3
Level 3
In a bag of balloons, there are 5 pink, 7 blue and 8 yellow balloons.
The ratio of pink : blue : yellow is 5 : 7 : 8

Simplifying Ratios
Ratios which describe the same proportion are known as equivalent ratios. Ratios can be simplified in much the same way as fractions.

Example 4
Level 3
Purple paint can be made by mixing 10 tins of blue paint with 6 tins of red. The ratio of blue to red can be written as 10 : 6

Blue : Red
\[
\frac{10}{6} \div 2 = \frac{5}{3}
\]
Simplifying Ratios

Example 5
Simplify each ratio:

(a) 4 : 6  
(b) 24 : 36  
(c) 6 : 3 : 12

\[ \frac{4}{2} : \frac{6}{2} = 2 : 3 \]  
\[ \frac{24}{12} : \frac{36}{12} = 2 : 3 \]  
\[ \frac{6}{2} : \frac{3}{2} : \frac{12}{2} = 3 : 1 : 6 \]

Example 6
A ruler costs £1.20 and a pencil costs 40p. What is the ratio of the cost of a pencil to the cost of a ruler?

\[ \text{pencil : ruler} \]  
\[ \frac{40}{120} \]

\[ \frac{40}{120} \div 40 : 120 \div 4 = 1 : 3 \]

Example 7
On a map 1cm represents 500m. Write this as a ratio.

\[ 1 \text{cm} : 500 \text{m} \]  
\[ 1 \text{cm} : 50000 \text{cm} \]

Ratio \[ 1 : 50000 \]

Using ratios

Example 8
The ratio of fruit to nuts in a chocolate bar is 3 : 2. If a bar contains 15g of fruit, what weight of nuts will it contain?

\[ \text{Fruit : Nuts} \times 5 \]  
\[ \frac{3}{5} : \frac{2}{5} \]

\[ \frac{15}{5} : \frac{?}{5} \]

Whatever you do to one side you do the same to the other side. (\( \times 5 \))

The chocolate bar contains 10g of nuts.
Sharing in a given ratio

Example

Lauren and Sean earn money by washing cars. By the end of the day they have made £90. As Lauren did more of the work, they decide to share the profits in the ratio 3:2.

How much money did each receive?

Step 1

Total number of parts = 3 + 2
= 5

Using the ratio 3 : 2 add up the numbers to find the total number of parts.

Step 2

1 part = \(\frac{90}{5}\)
= £18

Divide the total by the total number of parts (step 1) to find the value of 1 part.

\[\begin{align*}
3 : 2 \\
3 \times 18 : 2 \times 18 \\
\£54 : \£36
\end{align*}\]

Multiply each side of the ratio by the value found in Step 2.

Step 4

\(\£54 + \£36 = \£90\) ✓

CHECK: add the answers to get back to the total.

Lauren received £54 and Sean received £36
Proportion

Two quantities are said to be in direct proportion if when one doubles the other doubles etc. We can use proportion to solve problems.

It is often useful to make a table when solving problems involving proportion.

**Example 1**  
A car factory produces 1500 cars in 30 days. How many cars would they produce in 90 days?

<table>
<thead>
<tr>
<th>Days</th>
<th>Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>1500</td>
</tr>
<tr>
<td>90</td>
<td>4500</td>
</tr>
</tbody>
</table>

We can change 30 into 90 if we multiply by 3. So, multiply 1500 by 3 also.

The factory would produce 4500 cars in 90 days.

**Example 2**  
The Davidson’s are off to France. The exchange rate is 1.4 euros for a £1. How many euros do they get for £500?

<table>
<thead>
<tr>
<th>£</th>
<th>Euros</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>500</td>
<td>700</td>
</tr>
</tbody>
</table>

They get 700 euros for £500

**Example 3**  
5 apples cost £2.25. How much do 8 apples cost?

<table>
<thead>
<tr>
<th>Apples</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>2.25</td>
</tr>
<tr>
<td>1</td>
<td>0.45</td>
</tr>
<tr>
<td>8</td>
<td>3.60</td>
</tr>
</tbody>
</table>

We can’t change 5 directly into 8 but if we reduce 5 to 1 we can then find the cost of any amount of apples.

8 apples cost £3.60
Information Handling : Tables

Example 1
The table below shows the average maximum temperatures (in degrees Celsius) in Barcelona and Edinburgh.

<table>
<thead>
<tr>
<th></th>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>17</td>
<td>20</td>
<td>24</td>
<td>27</td>
<td>27</td>
<td>25</td>
<td>21</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>6</td>
<td>6</td>
<td>8</td>
<td>11</td>
<td>14</td>
<td>17</td>
<td>18</td>
<td>18</td>
<td>16</td>
<td>13</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>

The average temperature in June in Barcelona is 24°C

Example 2
Homework marks for Class 4B

27 30 23 24 22 35 24 33 38 43 18 29 28 28 27
33 36 30 43 50 30 25 26 37 35 20 22 24 31 48

<table>
<thead>
<tr>
<th>Mark</th>
<th>Tally</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 - 20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 - 25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 - 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 - 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>36 - 40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 - 45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>46 - 50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each mark is recorded in the table by a tally mark. Tally marks are grouped in 5’s to make them easier to read and count.
Bar graphs are often used to display data. The horizontal axis should show the categories or class intervals, and the vertical axis the frequency. All graphs should have a title, and each axis must be labelled.

**Example 1**  
How do pupils travel to school?

When the horizontal axis shows categories, rather than grouped intervals, it is common practice to leave gaps, of equal size, between the bars. All bars should be of equal width. Numbers on the vertical axes should go up evenly.

**Example 2**  
The graph below shows the homework marks for Class 4B.

All bars should be of equal width. Numbers on the vertical axes should go up evenly.
Information Handling : Line Graphs

Line graphs consist of a series of points which are plotted, then joined by a line. All graphs should have a title, and each axis must be labelled. The trend of a graph is a general description of it.

Example 1
Level 2

The graph below shows Heather’s weight over 14 weeks as she follows an exercise programme.

The graph shows a decreasing trend.
Her weight has decreasing over the course of the 14 weeks.
Numbers on the both axes should be spaced evenly.

Example 2
Level 2

Graph of temperatures in Edinburgh and Barcelona.

Numbers and/or categories on the axes should be spaced evenly.
A scatter diagram is used to display the relationship between two variables. A pattern may appear on the graph. This is called a correlation.

**Example 1**

Level 4 and beyond

The table below shows the height and arm span of a group of first year boys. This is then plotted as a series of points on the graph below.

<table>
<thead>
<tr>
<th>Arm Span(cm)</th>
<th>Height(cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>153</td>
</tr>
<tr>
<td>157</td>
<td>155</td>
</tr>
<tr>
<td>155</td>
<td>145</td>
</tr>
<tr>
<td>142</td>
<td>152</td>
</tr>
<tr>
<td>153</td>
<td>157</td>
</tr>
<tr>
<td>143</td>
<td>152</td>
</tr>
<tr>
<td>140</td>
<td>141</td>
</tr>
<tr>
<td>145</td>
<td>145</td>
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<tr>
<td>144</td>
<td>148</td>
</tr>
<tr>
<td>150</td>
<td>151</td>
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<td>148</td>
<td>151</td>
</tr>
<tr>
<td>160</td>
<td>145</td>
</tr>
<tr>
<td>150</td>
<td>165</td>
</tr>
<tr>
<td>156</td>
<td>152</td>
</tr>
<tr>
<td>136</td>
<td>154</td>
</tr>
</tbody>
</table>

The graph shows a general positive (slopes up from left to right) trend. As the arm span increases, the height also increases. This graph shows a positive correlation between arm span and height.

The line of best fit can be used to provide estimates. For example, a boy of arm span 150cm would be expected to have a height of around 151cm.
A pie chart can be used to display information. Each sector (slice) of the chart represents a different category. The size of each category can be worked out as a fraction of the total using the number of divisions or by measuring angles.

**Example 1**  
Level 2
30 pupils were asked the colour of their eyes. The results are shown in the pie chart below.

![Pie Chart](image)

How many pupils had brown eyes?

The pie chart is divided up into ten parts, so pupils with brown eyes represent \( \frac{2}{10} \) of the total.

\[
\frac{2}{10} \text{ of } 30 \\
= \frac{30 \times 2}{10} \\
= 6 \text{ so 6 pupils had brown eyes.}
\]

If no divisions are marked, we can work out the fraction by measuring the angle of each sector.

Level 3
The angle in the brown sector is 72°.  
so the fraction of pupils with brown eyes is \( \frac{72}{360} \)

\[
\frac{72}{360} \text{ of } 30. \\
= \frac{72}{360} \times 30 \\
= 6 \text{ pupils}
\]

If you find a number of pupils for each eye colour using the same method as above the total should be 30 pupils.
Information Handling : Pie Charts

Drawing Pie Charts

On a pie chart, the size of the angle for each sector is calculated as a fraction of 360°.

Example 2
Level 3

In a survey about television programmes, a group of people were asked what was their favourite soap. Their answers are given in the table below. Draw a pie chart to illustrate the information.

<table>
<thead>
<tr>
<th>Soap</th>
<th>Number of people</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastenders</td>
<td>28</td>
</tr>
<tr>
<td>Coronation Street</td>
<td>24</td>
</tr>
<tr>
<td>Emmerdale</td>
<td>10</td>
</tr>
<tr>
<td>Hollyoaks</td>
<td>12</td>
</tr>
<tr>
<td>None</td>
<td>6</td>
</tr>
</tbody>
</table>

Total number of people = 80

Eastenders = \(\frac{28}{80} \times 360° = 126°\)

Coronation Street = \(\frac{24}{80} \times 360° = 108°\)

Emmerdale = \(\frac{10}{80} \times 360° = 45°\)

Hollyoaks = \(\frac{12}{80} \times 360° = 54°\)

None = \(\frac{6}{80} \times 360° = \frac{27°}{360°}\)

Check that the total is 360° by adding up all the answers

Use a protractor to measure the angles you worked out remembering to label each sector or draw a key at the side.
Information Handling : Averages

To provide information about a set of data, the average value may be given. There are 3 ways of finding the average value - the MEAN, the MEDIAN and the MODE.

Mean
The mean is found by adding all the data together and dividing by the number of values.

Median
The median is the MIDDLE value when all the data is written in numerical order (if we have middle pair of values, the median is half-way between these values).

Mode
The mode is the value that occurs MOST often.

Range
The range of a set of data is a measure of spread.
Range = Highest value - Lowest value

Example 1
Class 1R2 scored the following marks for their homework assignment. Find the mean, median, mode and range of the results.

7, 9, 7, 5, 6, 7, 10, 9, 8, 4, 8, 5, 8, 10

Mean
Mean = \( \frac{7+9+6+5+6+7+10+9+8+4+8+5+8+10}{14} \)
= \( \frac{102}{14} \)
= 7.28571 ...
= 7.3 (1.d.p.)

Median - middle
Ordered values: 4, 5, 5, 6, 6, 7, 7, 8, 8, 8, 9, 9, 10, 10
Median = \( \frac{7 + 8}{2} \)
= \( \frac{15}{2} \)
= 7.5

Mode - most popular
8 is the most frequent mark, so Mode = 8

Range
Range = 10 - 4 = 6
Probability

Probability is a measure of how likely or unlikely an event is of happening. It is measured on a scale of 0 (impossible) to 1 (certain).

<table>
<thead>
<tr>
<th>Impossible</th>
<th>Evens (50/50 chance)</th>
<th>Certain</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>unlikely</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>likely</td>
<td>1</td>
</tr>
</tbody>
</table>

Level 2

Example 1
What is the probability of rolling a 4?

\[ P(4) = \frac{1}{6} \]

Example 2
What is the probability of rolling an even number?

\[ P(\text{even number}) = \frac{3}{6} = \frac{1}{2} \]

Example 3
What is the probability of rolling number greater than 2?

\[ P(>2) = \frac{4}{6} = \frac{2}{3} \]

Example 4
What is the probability of a tail when you toss a coin?

\[ P(\text{tail}) = \frac{1}{2} = 0.5 \]

Probabilities can be expressed as a FRACTION or a DECIMAL and even if we want as a percentage.

When making choices we need to consider:

- the element of risk,
- the probability of the event happening and
- the consequences of the event happening.
Example 5
If I were to roll a die 300 times, how many 5’s should I expect to get?

\[
P(5) = \frac{1}{6}
\]

\[
\text{Expected number of 5's} = \frac{1}{6} \times 300 = \frac{300}{6} = 50
\]

I should expect to roll a 5 fifty times.
### Mathematical Dictionary (Key words):

<table>
<thead>
<tr>
<th><strong>Term</strong></th>
<th><strong>Definition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Add; Addition (+)</strong></td>
<td>To combine 2 or more numbers to get one number (called the sum or the total). Example: 12 + 76 = 88</td>
</tr>
<tr>
<td><strong>a.m.</strong></td>
<td>(ante meridiem) Any time in the morning (between midnight and 12 noon).</td>
</tr>
<tr>
<td><strong>Approximate</strong></td>
<td>An estimated answer, often obtained by rounding to nearest 10, 100 or decimal place.</td>
</tr>
<tr>
<td><strong>Axis</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Calculate</strong></td>
<td>Find the answer to a problem. It doesn't mean that you must use a calculator!</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td>A collection of information (may include facts, numbers or measurements).</td>
</tr>
<tr>
<td><strong>Denominator</strong></td>
<td>The bottom number in a fraction (the number of parts into which the whole is split).</td>
</tr>
<tr>
<td><strong>Difference (−)</strong></td>
<td>The answer to a subtraction calculation (amount between 2 numbers). Example: The difference between 50 and 36 is 14 (50 - 36 = 14)</td>
</tr>
<tr>
<td><strong>Digit</strong></td>
<td>A single number. The digits are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.</td>
</tr>
<tr>
<td><strong>Discount</strong></td>
<td>Amount of money you save on an item.</td>
</tr>
<tr>
<td><strong>Division (÷)</strong></td>
<td>Sharing a number into equal parts. 24 ÷ 6 = 4</td>
</tr>
<tr>
<td><strong>Double</strong></td>
<td>Multiply by 2.</td>
</tr>
<tr>
<td><strong>Equals (=)</strong></td>
<td>Makes or has the same amount as.</td>
</tr>
<tr>
<td><strong>Equivalent fractions</strong></td>
<td>Fractions which have the same value. Example (\frac{6}{12}) and (\frac{1}{2}) are equivalent fractions</td>
</tr>
<tr>
<td><strong>Estimate</strong></td>
<td>To make an approximate or rough answer, often by rounding.</td>
</tr>
<tr>
<td><strong>Evaluate</strong></td>
<td>To work out the answer.</td>
</tr>
<tr>
<td><strong>Even</strong></td>
<td>A number that is divisible by 2. Even numbers end with 0, 2, 4, 6 or 8.</td>
</tr>
<tr>
<td><strong>Factor</strong></td>
<td>A number which divides exactly into another number, leaving no remainder. Example: The factors of 15 are 1, 3, 5, 15.</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>How often something happens. In a set of data, the number of times a number or category occurs.</td>
</tr>
<tr>
<td><strong>Greater than (&gt;)</strong></td>
<td>Is bigger or more than. Example: 10 is greater than 6. 10 &gt; 6</td>
</tr>
<tr>
<td><strong>Gross Pay</strong></td>
<td>The amount of money you earn before any deductions are taken.</td>
</tr>
<tr>
<td><strong>Histogram</strong></td>
<td>A bar chart for continuous numerical values.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Increase</td>
<td>An amount added on.</td>
</tr>
<tr>
<td>Least</td>
<td>The lowest number in a group (minimum).</td>
</tr>
<tr>
<td>Less than (&lt;)</td>
<td>Is smaller or lower than. Example: 15 is less than 21. 15 &lt; 21.</td>
</tr>
<tr>
<td>Maximum</td>
<td>The largest or highest number in a group.</td>
</tr>
<tr>
<td>Mean</td>
<td>The arithmetic average of a set of numbers (see p32)</td>
</tr>
<tr>
<td>Median</td>
<td>Another type of average - the middle number of an ordered set of data (see p32)</td>
</tr>
<tr>
<td>Minimum</td>
<td>The smallest or lowest number in a group.</td>
</tr>
<tr>
<td>Minus (-)</td>
<td>To subtract.</td>
</tr>
<tr>
<td>Mode</td>
<td>Another type of average - the most frequent number or category (see p32)</td>
</tr>
<tr>
<td>Most</td>
<td>The largest or highest number in a group (maximum).</td>
</tr>
<tr>
<td>Multiple</td>
<td>A number which can be divided by a particular number, leaving no remainder. Example: Some of the multiples of 4 are 8, 16, 48, 72</td>
</tr>
<tr>
<td>Multiply (x)</td>
<td>To combine an amount a particular number of times. Example: 6 x 4 = 24</td>
</tr>
<tr>
<td>Negative Number</td>
<td>A number less than zero. Shown by a minus sign. Example: -5 is a negative number.</td>
</tr>
<tr>
<td>Numerator</td>
<td>The top number in a fraction.</td>
</tr>
<tr>
<td>Odd Number</td>
<td>A number which is not divisible by 2. Odd numbers end in 1, 3, 5, 7, or 9.</td>
</tr>
<tr>
<td>Operations</td>
<td>The four basic operations are addition, subtraction, multiplication and division.</td>
</tr>
<tr>
<td>Order of operations</td>
<td>The order in which operations should be done. BODMAS (see p9)</td>
</tr>
<tr>
<td>Per annum</td>
<td>Per year.</td>
</tr>
<tr>
<td>Place value</td>
<td>The value of a digit dependent on its place in the number. Example: in the number 1573.4, the 5 has a place value of 100.</td>
</tr>
<tr>
<td>p.m.</td>
<td>(post meridiem) Any time in the afternoon or evening (between 12 noon and midnight).</td>
</tr>
<tr>
<td>Prime Number</td>
<td>A number that has exactly 2 factors (can only be divided by itself and 1). Note that 1 is not a prime number as it only has 1 factor.</td>
</tr>
<tr>
<td>Product</td>
<td>The answer when two numbers are multiplied together. Example: The product of 5 and 4 is 20.</td>
</tr>
<tr>
<td>Quotient</td>
<td>The answer to a divide calculation. Usually we also have a remainder.</td>
</tr>
<tr>
<td>Remainder</td>
<td>The amount left over when dividing a number.</td>
</tr>
<tr>
<td>Share</td>
<td>To divide into equal groups.</td>
</tr>
<tr>
<td>Sum</td>
<td>The answer to an add calculation (Total of a group of numbers).</td>
</tr>
<tr>
<td>Total</td>
<td>The sum of a group of numbers (found by adding).</td>
</tr>
</tbody>
</table>