

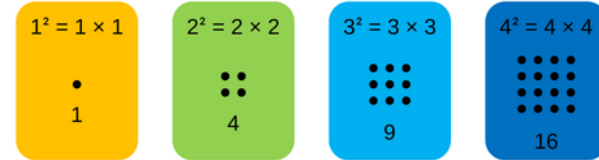
Year 7 - Mathematics - Summer Term: Helpful Hints



Key Word	Definition
Factor	A number that divides a given number exactly, leaving no remainder.
Multiple	The result of one number multiplied by another number.
Square Number	The answer when a number has been multiplied by itself.
Cube Number	The answer when a number is multiplied by itself and then by itself again.
Prime Numbers	A whole number that has exactly two factors.

Square Numbers:

1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...



The pattern of dots gives a clue as to where the name square numbers come from...

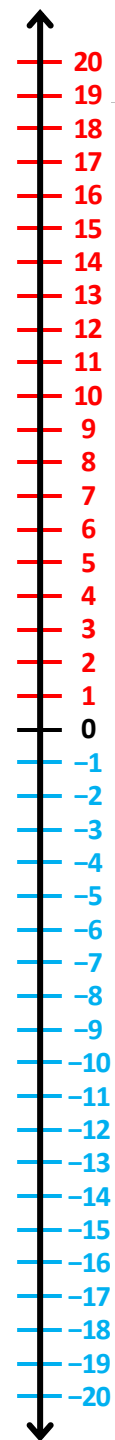
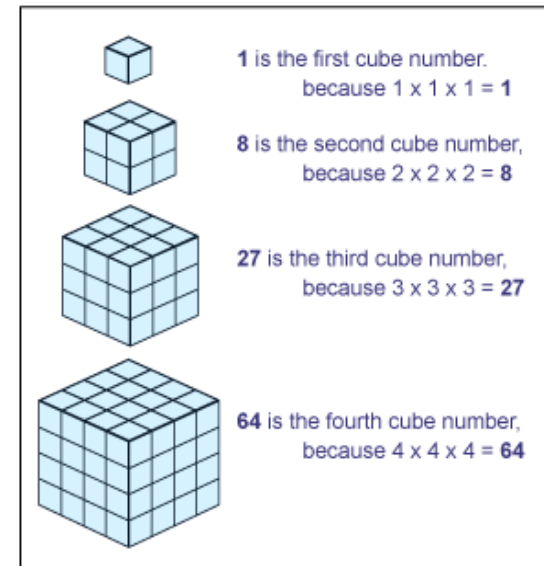
Multiplication Grid:

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100

Prime Number Grid:

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

Cube Numbers:

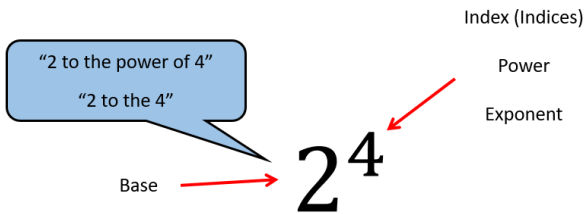


Year 7 - Mathematics - Summer Term: Number



Key Word	Definition
Index or Indices	A multiplicative relationship between values.
Root	Using common factors to divide all the numbers in a ratio until they cannot be divided further.
Percentage	a number or ratio that can be expressed as a fraction of 100

Powers



$$2 \times 2 \times 2 \times 2 = 16$$

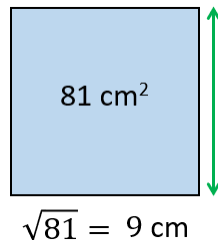
Roots

The reverse of a power. For example, the square roots is the inverse of squaring.

What number, multiplied by itself, equals 36?

$$\sqrt{36} = 6$$

We can think of this using Area. Finding a missing side in a square given its Area...



Fractions, Decimals and Percentages

Here are some common conversions you should **learn** off by heart...

Fraction	Decimal	Percentage
$\frac{1}{2}$	0.5	50%
$\frac{1}{4}$	0.25	25%
$\frac{1}{5}$	0.2	20%
$\frac{1}{3}$	0.3	33.3%
$\frac{2}{3}$	0.6	66.6%
$\frac{1}{10}$	0.1	10%
$\frac{1}{100}$	0.01	1%

Percentages

Use the following methods to work these key percentages **without** a calculator

Percentage	Non Calc Method
10%	$\div 10$
5%	$\div 10 \div 2$
1%	$\div 100$
25%	$\div 4$
50%	$\div 2$

Calculator Method

Use the following methods to work these key percentages **with** a calculator

$$\frac{\text{Percentage}}{100} \times \text{amount}$$

Example 1

Find 24% of 50

$$\frac{24}{100} \times 50 = 12$$

Example 2

Increase £120 by 36%

$$100\% + 36\% = 136\%$$

$$\frac{136}{100} \times 120 = \pounds 163.20$$

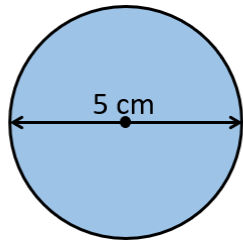


Year 7 - Mathematics - Summer Term: Geometry

Key Word	Definition
Circumference	The distance around the edge of a circle.
Area	The amount space inside a 2D shape.
Radius	The distance between the centre and the circumference of a circle (see diagram below).
Diameter	A straight line passing from side to side through the centre of the circle (see diagram below).
Volume	The amount of space inside a 3D object.
Surface Area	The total area of the 2D flat faces of a 3D object added together.

Circumference of a Circle

$$\text{Circumference} = \pi \times \text{Diameter}$$

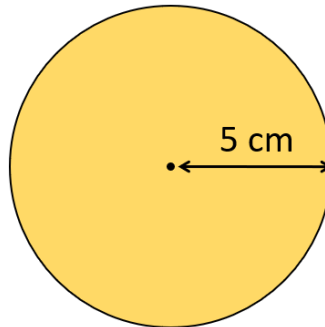


$$C = \pi \times 5$$

$$= 15.71 \text{ cm} \quad (2\text{dp})$$

Area of a Circle

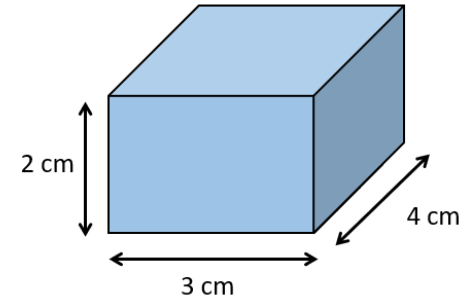
$$A = \pi r^2$$



$$A = \pi \times (5)^2$$

$$= 78.5 \text{ cm}^2$$

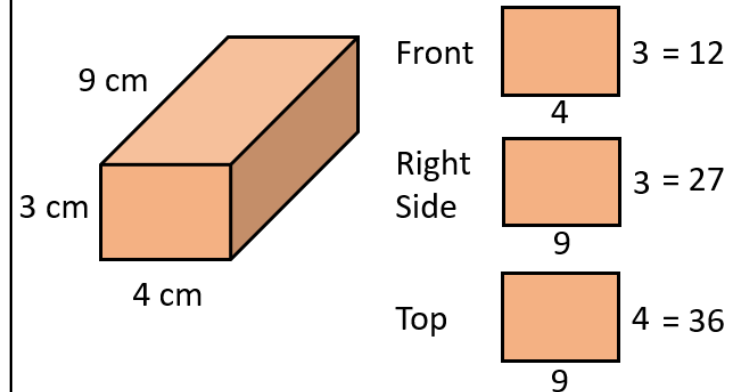
Volume



$$\text{Volume} = \text{length} \times \text{width} \times \text{height}$$

$$2 \times 3 \times 4 = 24 \text{ cm}^3$$

Surface Area



$$\text{Front \& Back} \\ (2 \times 12) = 24$$

$$\text{Right \& Left Side} \\ (2 \times 27) = 54$$

$$\text{Top \& Bottom} \\ (2 \times 36) = 72$$

$$\text{Total Surface Area} \\ = 150 \text{ cm}^2$$

Year 7 - Mathematics - Summer Term: Geometry



Key Word	Definition
Linear Graph	A straight line graph.
Gradient	How steep a line is.
Y Intercept	Where the graph crosses the Y-axis.
Translate	Moves a shape left, right, up, or down but does not turn.
Reflect	Where an object is flipped to create a mirror image.
Rotate	The motion of an object around a centre.
Enlarge	Where the original shape is made bigger or smaller by multiplying it by a scale factor.

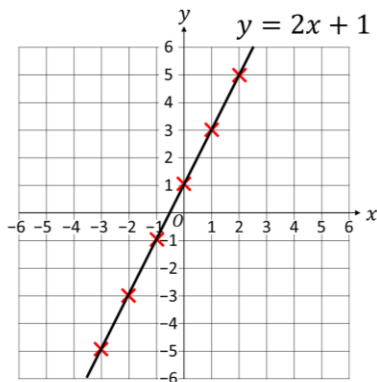
Linear Graphs

Draw the graph of:

$$y = 2x + 1$$

$$2 \times -3 + 1 = -5$$

x	-3	-2	-1	0	1	2	3
y	-5	-3	-1	1	3	5	7



Plot the above co-ordinates on the grid:

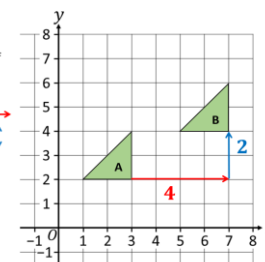
(-3, -5) (-2, -3) (-1, -1) (0, 1) (1, 3) (2, 5) (3, 7)

Transformations

Translation

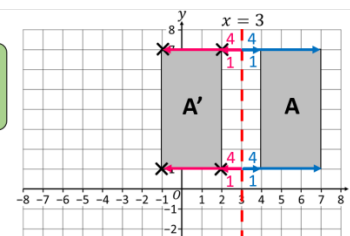
Describe the translation of A to B with a vector.

$$\begin{pmatrix} \text{Horizontal} \\ \text{Vertical} \end{pmatrix} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$$



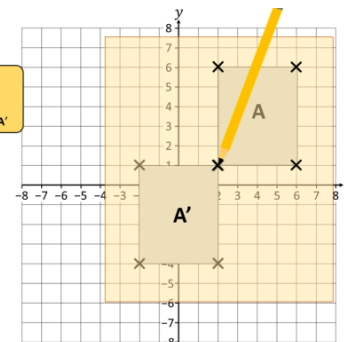
Reflection

Reflect shape A in the line $x = 3$. Label the new shape A'.



Rotation

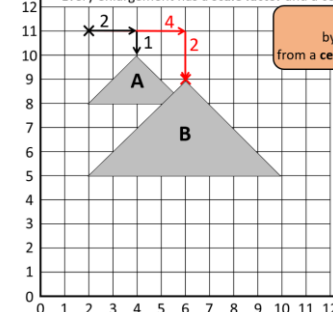
Rotate shape A 180° about (2, 1). Label the new shape A'.



Enlargement

Every enlargement has a scale factor and a centre of enlargement.

Enlarge Shape A by a scale factor of 2 from a centre of enlargement (2, 11).





Year 7 - Mathematics - Summer Term: Algebra

Key Word	Definition
Inequality	The relationship between two values that are not equal.
$<$	Less than. E.g. $2 < 3$ reads 2 is less than 3.
$>$	Greater than. E.g. $5 > 1$ reads 5 is greater than 1.
\leq	Less than or equal to. E.g. $-1 \leq 4$ reads -1 is less than or equal to 4.
\geq	Greater than or equal to. E.g. $12 \geq 6$ reads 12 is greater than or equal to 6.
Integer	A whole number.

Solving an Inequality.

Find the possible integer solutions to the following two inequalities:

Example 1:

$$\begin{array}{r}
 6 < x + 5 \\
 -5 \qquad -5 \\
 \hline
 1 < x
 \end{array}$$

x could take any value greater than 1. E.g. 2, 3, 4, 5, ...

Example 2:

$$\begin{array}{r}
 20 \leq 2x - 6 \\
 +6 \qquad +6 \\
 \hline
 26 \leq 2x \\
 \div 2 \qquad \div 2 \\
 \hline
 13 \leq x
 \end{array}$$

x could take any value greater than or equal to 13. E.g. 13, 14, 15, 16, ...

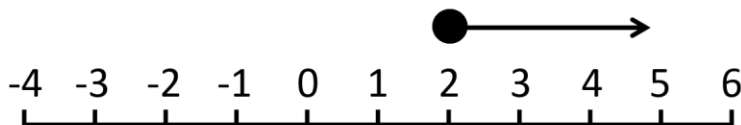
Representing an inequality on a number line:

When we represent (plot) **inequalities**, we **must** show whether they **include** or **exclude** the starting number.

$$x \geq 2$$

x is greater or equal to 2

- includes
- excludes

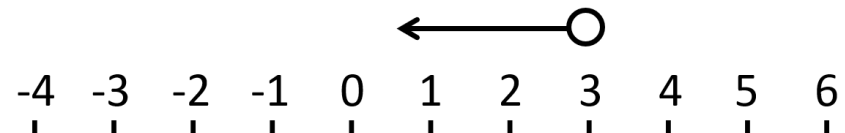


When we represent (plot) **inequalities**, we **must** show whether they **include** or **exclude** the starting number.

$$x < 3$$

x is less than 3

- includes
- excludes





Year 7 - Mathematics - Summer Term: Data

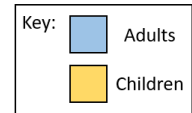
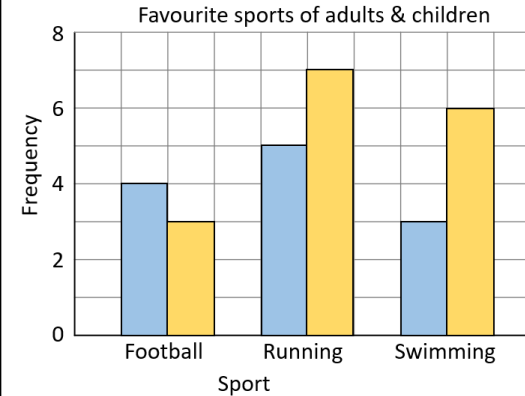
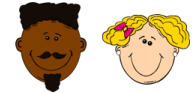
Key Word	Definition
Bar Chart	A diagram in which the numerical values of frequency are represented by the height each bar.
Dual Bar Chart	A bar chart that shows a comparison between two or more sets of data, for example adults and children.
Pictogram	A chart which uses icons and images to represent frequency.
Frequency	The frequency of a particular data is the number of times the data value occurs.

Dual Bar Chart

Adults (18+) and children were asked about their favourite sport.

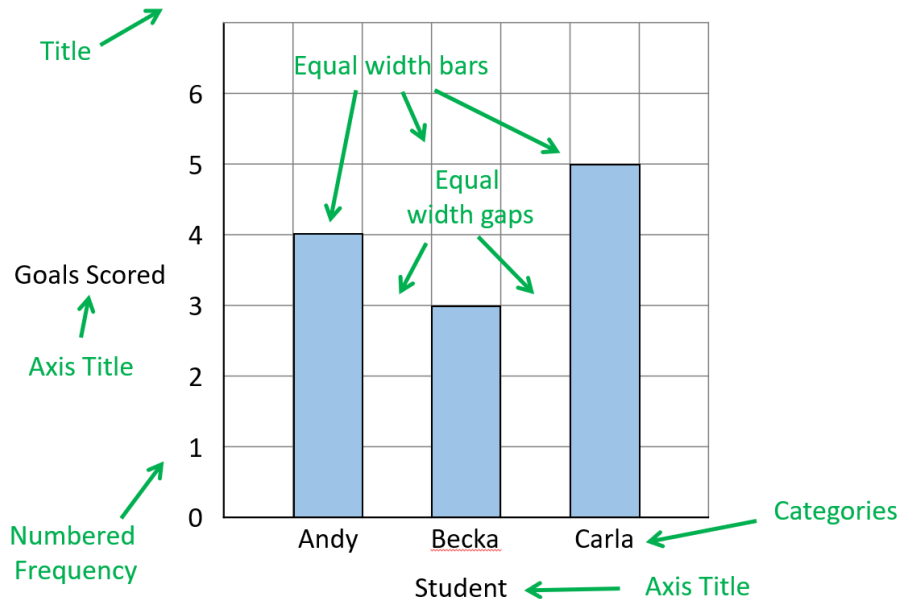
	Football	Running	Swimming
Adults	4	5	3
Children	3	7	6

Complete the dual bar chart with this information.



What makes a good bar chart?

Goals scored in the March football tournament



Pictogram

Pay close attention to the key to help read the pictogram...

Goals scored by Year 8 boys.





Year 7 - Mathematics - Summer Term: Probability

Key Word	Definition
Probability	Probability is a number between 0 and 1 that describes the chance that a stated event will occur.
Mutually Exclusive Events	Two events which cannot both happen at the same time. The probabilities of mutually exclusive events always add to 1.

Calculating a Probability

A probability is always a value between 0 and 1. It can be written as a fraction, decimal or percentage. Often the easiest way is to write a probability as a fraction (see below).

$$P(\text{outcome}) = \frac{\text{number of ways the outcome can happen}}{\text{total number of possible outcomes}}$$

10 cards are numbered 1-10 & one card is picked at random.

What is...



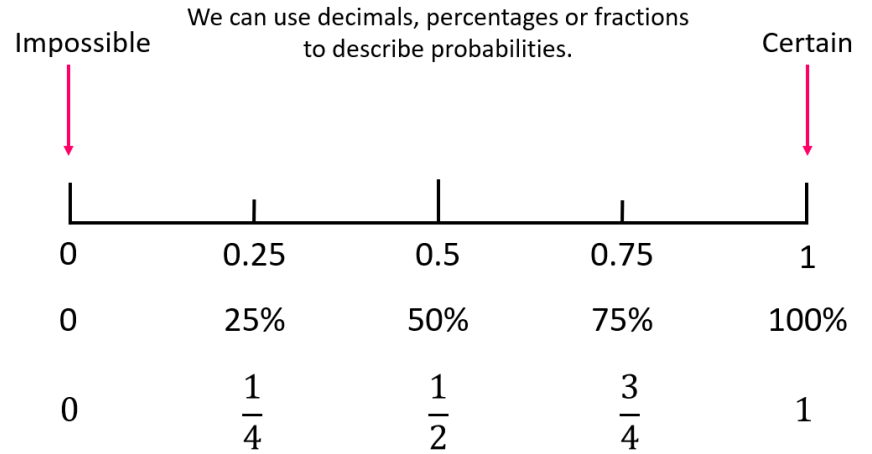
$$P(\text{odd}) = \frac{5}{10} = \frac{1}{2}$$

$$P(\text{prime}) = \frac{4}{10} = \frac{2}{5}$$

$$P(\text{multiple of 3}) = \frac{3}{10}$$

$$P(\text{even or 7}) = \frac{6}{10} = \frac{3}{5}$$

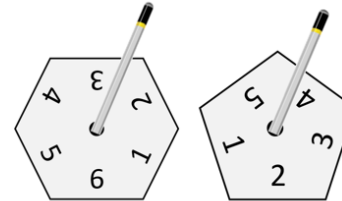
Probability Scale



Sample Space Diagrams

These enable us to see all the possible outcomes of an experiment and calculate the probability of each one happening.

A student makes a hexagonal spinner (1-6) and a pentagonal spinner (1-5).



a) Complete the Sample Space Diagram for spinning both and adding their scores.

Calculate:

$$\text{b) } P(11) = \frac{1}{30}$$

$$\text{c) } P(7) = \frac{1}{6}$$

$$\text{d) } P(8 \text{ or more}) = \frac{1}{3}$$

$$\text{e) } P(4 \text{ or } 9) = \frac{1}{5}$$

$$\text{f) } P(\text{the same number on both spinner}) = \frac{1}{6}$$

		1 st Spinner					
		1	2	3	4	5	6
2 nd Spinner	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
		Total Score					

Year 7 - Mathematics - Summer Term: Calculator Skills



Important buttons on your calculator:

- **Equals button** →
 - **Power of 2** – e.g. $3^2 = 9$ →
 - **Any power** – e.g. $2^3 = 8$ →
 - **Square root** – e.g. $\sqrt{16} = 4$ →
 - **Any root** – e.g. $\sqrt[3]{27} = 3$ →
 - **Fraction button** – e.g. $\frac{3}{4}$ →
 - **Pi button** – e.g. π →
- (This one is in blue above the number 7 so we must press the blue shift button first!)

Helpful Hints

- Convert your answer to a decimal use the **FORMAT** button and select “**decimal.**” →
- Use the delete button to remove a mistake rather than deleting the whole thing. →
- Use the keypad to move the cursor around the calculation you have typed in on the screen. →

Check

Can you type these questions in your calculator and get the following answers...

1) $8.3^3 = 571.787$

2) $\frac{7.5^2 - 1.2}{5} = 11.01$

3) $\sqrt{37} - 1.71 = 4.37276253$

Use the QR code to watch a short video on how to use your calculator



Any Power → x^y button

Power of 2 → x^2 button

Delete button → \times button

Equals button → EXE button

Square root → $\sqrt{\square}$ button

Fraction button → $\frac{\square}{\square}$ button

Pi button (shift first) → π button (via SHIFT)

To convert to a decimal → FORMAT button

