Maths Grade 3 Knowledge Organiser

3.1 Equivalent fractions, decimals & percentages

- **Percentage to decimal to fraction**

27% = 0.27 = $\frac{27}{100}$

7% = 0.07 = $\frac{7}{100}$

70% = 0.7 = $\frac{70}{100}$ = $\frac{7}{10}$

- **Decimal to percentage to fraction**

0.3 = 30% = $\frac{3}{10}$

0.03 = 3% = $\frac{3}{100}$

0.39 = 39% = $\frac{39}{100}$

- **Fraction to decimal to percentage**

$\frac{4}{5}$ = $\frac{80}{100}$ = 80% = 0.8

Change to 100

$\frac{3}{8}$ = 3 ÷ 8 = 0.375 = 37.5%

3.2 Increase/Decrease by a percentage

- **To increase £12 by 5%**

10% of £12 = £1.20

5% of £12 = £0.60(OR 0.05 x 12 = 0.6)

Increased amount=£12 + £0.60=£12.60

- **To decrease £50 by 15%**

10% of £50 =£5

5% of £50 = £2.50

15% of £50 = £7.50(OR 0.15x50=7.5)

Decreased amount = £50-£7.50=£42.50

3.3 Write & use ratio

- Ratio can be simplified by cancelling

e.g. 12 : 15

=> 4 : 5

e.g. 30cm : 1m

=> 30 : 100

=> 3 : 1

- Ratio can be written in form 1 : n

e.g. 2 : 5 (÷ both parts by 2)

=> 1 : 2.5

- Ratio can be used to solve problems

e.g. A model ship is made using scale 1 : 600

The model ship length is 40cm

Real length = 600 x 40cm = 12400cm

= 124m

3.3 Use proportional reasoning

- **Change an amount in proportion**

e.g. If 6 books cost £22.50

Find the cost of 11. *(find cost of 1 first)*

- **Change amounts to compare**

e.g. A pack of 5 pens cost £6.10

A pack of 8 pens cost £9.20

Which is the best buy? *(find cost of 40 of each or 1 of each)*

3.4 Use a calculation to work out another

24 x 36 = 864

864÷24=36 864 ÷36=24

24 x 36 = 864

2.4 x36=86.4 2.4x3.6=8.64

(Notice how the sum changes & so does the answer)

24 x 36 = 864

86.4÷24=3.6 8640 ÷36=240

(Notice how the sum changes & so does the answer)

24 x 36 = 864

864÷2.4=360 864 ÷360=2.4

(Notice how the sum changes & the answer does the opposite)

3.5 Calculate with fractions

- **Add & subtract fractions**

~Make the denominators the same

e.g. $\frac{1}{5} + \frac{7}{10}$

$= \frac{2}{10} + \frac{7}{10}$

$= \frac{9}{10}$

$\frac{4}{5} - \frac{2}{3}$

$= \frac{12}{15} - \frac{10}{15}$

$= \frac{2}{15}$

- **Multiply fractions**

~Write 7 as $\frac{7}{1}$

~Multiply numerators & denominators

e.g. $5 \times \frac{2}{3}$

$= \frac{5}{1} \times \frac{2}{3}$

$= \frac{10}{3} = 3\frac{1}{3}$

$\frac{4}{5} \times \frac{2}{3}$

$= \frac{8}{15}$

- **Divide fractions**

~Write 7 as $\frac{7}{1}$

~Flip numerator & denominator after ÷

~Multiply numerators & denominators

e.g. $5 \div \frac{2}{3}$

$= \frac{5}{1} \times \frac{3}{2}$

$= \frac{15}{2} = 7\frac{1}{2}$

$\frac{4}{5} \div \frac{2}{3}$

$= \frac{4}{5} \times \frac{3}{2}$

$= \frac{12}{10} = 1\frac{2}{10} = 1\frac{1}{5}$

- **Calculate fraction of quantity**

To find $\frac{4}{5}$ of a quantity → ÷ 5 x 4

e.g. $\frac{4}{5}$ of £20 = 20 ÷ 5 x 4 = £16

3.6 Expand a single bracket

Multiply everything inside the bracket by what is outside
Then collect like terms together

$2(x + 5) = 2x + 5$

$x(x - 5) = x^2 - 5x$

3.6 Factorise an expression

This is the opposite of expand – put bracket back in

$4y - 12 = 4(x - 3)$

$y^2 + 7y = y(y + 7)$

3.7 Solve linear equations

~Multiply out brackets first
~If there are letters on both sides get rid of the smaller first
~Do the same to both sides

e.g.

To solve $5(x - 3) = 3x + 7$ (expand bracket)

$5x - 15 = 3x + 7$ (-3x from both sides)

$2x - 15 = + 7$ (+15 to each side)

$\frac{2x}{2} = \frac{22}{2}$ (÷2 both sides)

$x = 11$

3.8 Sequences

- **Understand term and term**

1 5 9 13

+4

Term to term rule = +4

So the sequence can be carried on

- **Generate terms of a sequence**

If the nth term is 5n + 1

1st term *(n=1)* = 5x1 + 1 = 6

2nd term *(n=2)* = 5x2 + 1= 11

3rd term *(n=3)* = 5x3 + 1 = 16

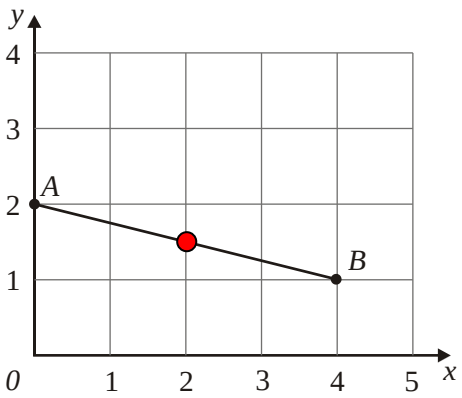
3.9 Plot graphs of linear equations

~Substitute values of x into the equation
~Plot the points in pencil
~Join the points with a ruler and pencil
~They should be in a straight line

e.g. y = 3x – 1

x	-2	-1	0	1	2
y	-7	-4	-1	2	5

3.10 Describe midpoint of a line segment



Find exactly half way and write down the coordinates

Midpoint of AB = (2, 1.5)

3.11 Use a formula

- Write down the formula
- Substitute the numbers given
- Work out the unknown quantity

e.g. v = u + at when v = 19, a = 7 and t = 2

19 = u + 7x2

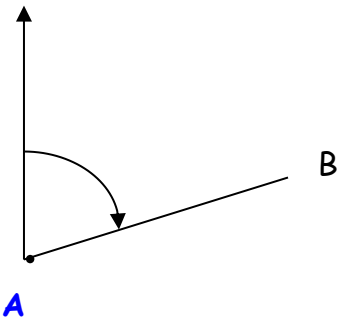
19 = u + 14

u = 5

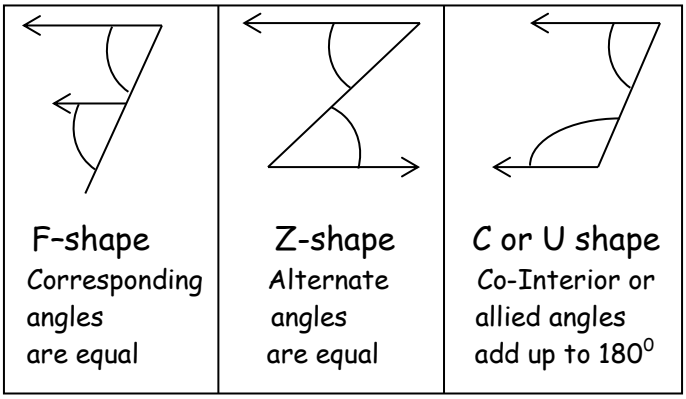
3.12 Know & use bearings

- A bearing is a direction measured as an angle clockwise from the North
- It needs 3 digits so may need a 0 in front e.g. 072^0
- Bearings are given from a fixed point so look for the fixed point after the word 'FROM'

e.g. A bearing of 072^0 from A to B

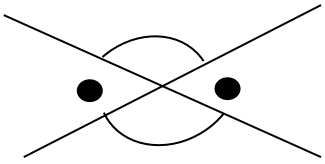


3.13 Angles associated with parallel lines



F-shape	Z-shape	C or U shape
Corresponding angles are equal	Alternate angles are equal	Co-Interior or allied angles add up to 180^0

- **Vertically opposite angles are equal**



3.14 Angles and polygons

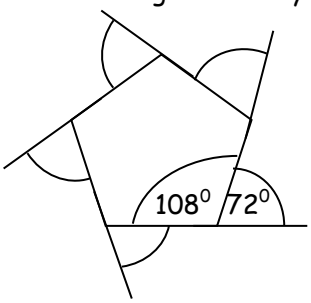
~Polygons have straight sides

~Polygons are named by the number sides

3 sides – triangle
4 sides – quadrilateral
5 sides – pentagon
6 sides – hexagon
7 sides – heptagon
8 sides – octagon
9 sides – nonagon
10 sides - decagon

~With ALL sides equal they are called REGULAR

~ Sum of exterior angles is always 360^0



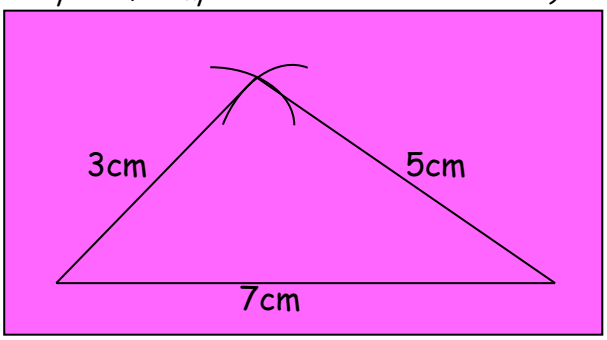
~ the interior & exterior angle add up to 180^0

~ the interior angles add up to:

Triangle = $1 \times 180^0 = 180^0$
Quadrialteral = $2 \times 180^0 = 360^0$
Pentagon = $3 \times 180^0 = 540^0$
Hexagon = $4 \times 180^0 = 720^0$ etc

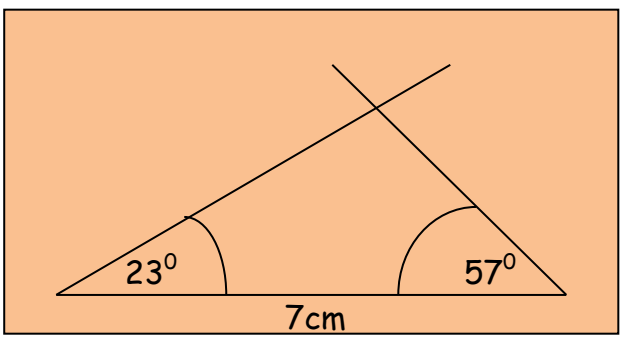
3.15 Construct triangle given 3 sides

(Use a pair of compasses and leave the arcs on)



- **Construct triangle given angles**

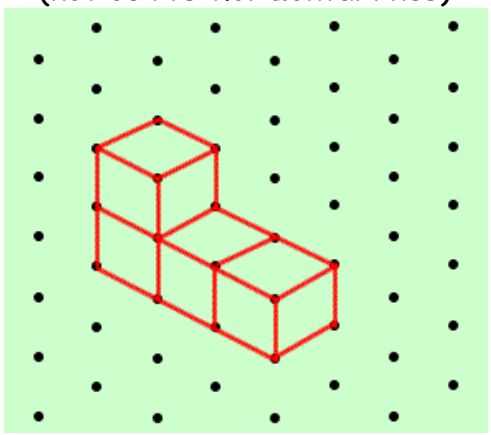
(Use a protractor)



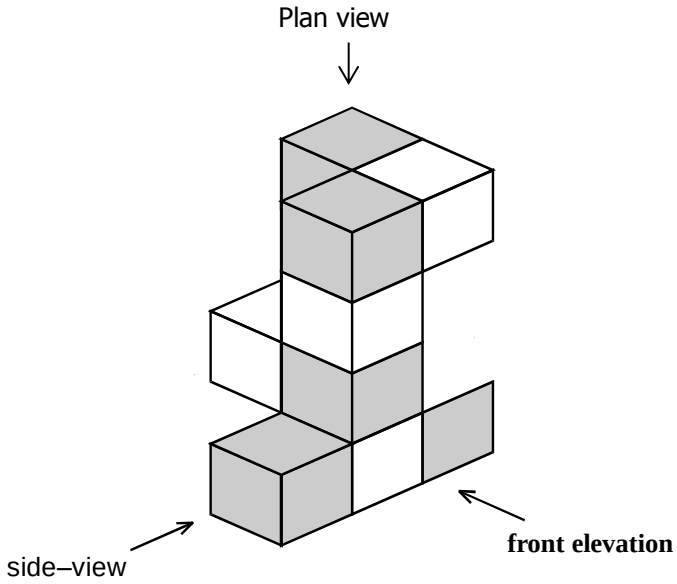
3.16 2D representations of 3D shapes

- **3D drawing on isometric paper**

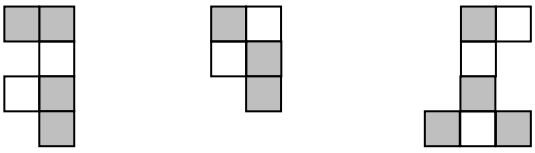
(notice NO horizontal lines)



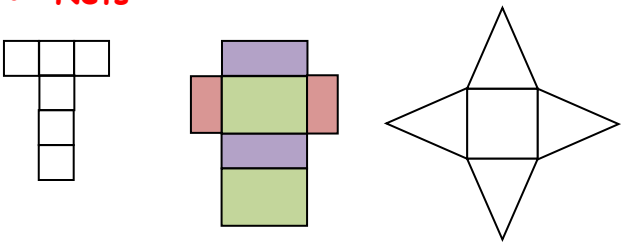
- **3 views of a 3D shape**



Side view | Plan view | Front elevation



- **Nets**

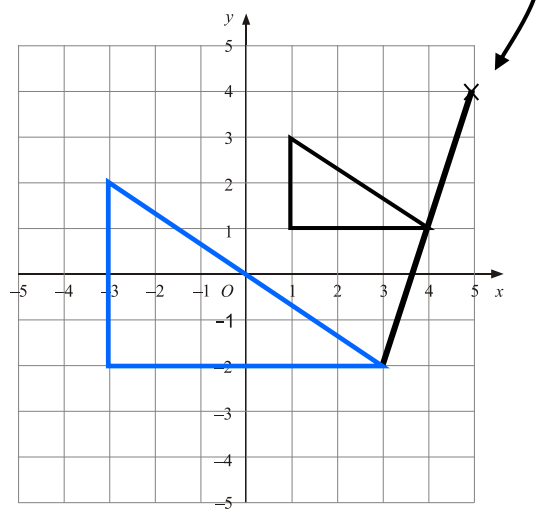


Cube | Cuboid | Square based pyramid

3.17 Enlarge a shape

You need to know:

- Centre e.g. (5, 4)
- Scale factor e.g. 2



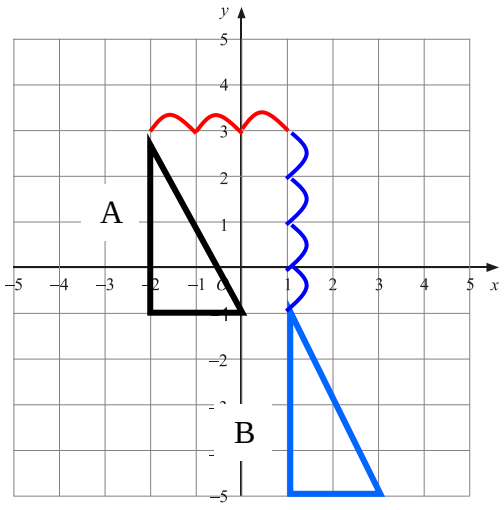
3.18 Translate, rotate & reflect a shape

USE TRACING PAPER TO HELP

- **Translate a shape**

You need to know:

- How to move it e.g. **3 Right 4 Down**



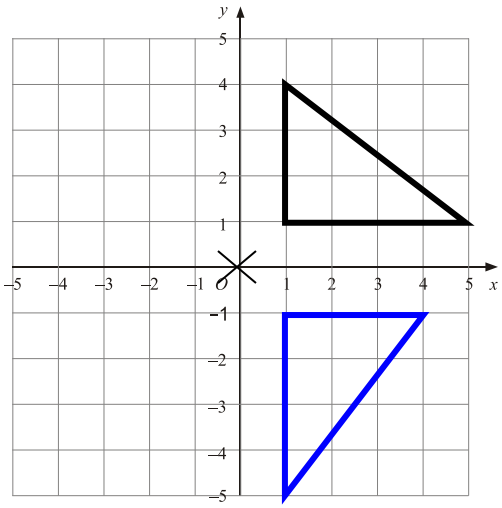
Notice:

- The new shape stays the same way up
- The new shape is the same size

- **Rotate a shape**

You need to know:

- **Angle e.g. 90^0**
- **Direction e.g. clockwise**
- **Centre of rotation e.g.(0,0)**



- **Reflect a shape in a line**

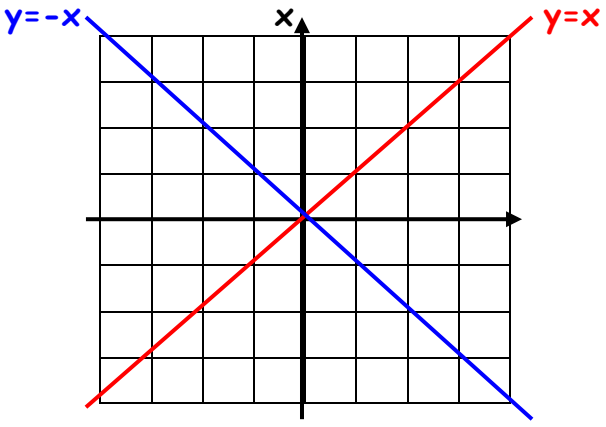
The line could be vertical, horizontal or diagonal

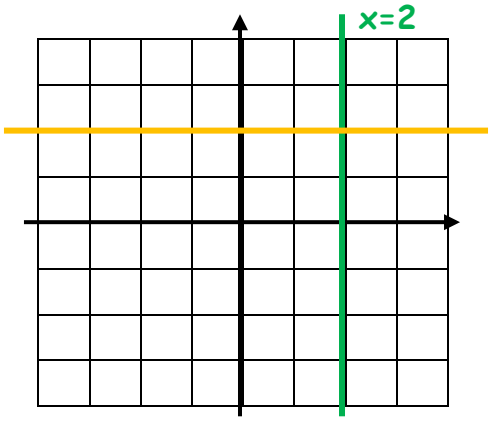
On a grid:

The vertical line would be called x = ?

The horizontal line would be called y = ?

The diagonal line would be called y = x or y = -x





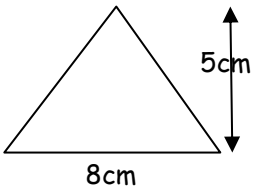
3.19 Know & use formulae for areas

- **Area of triangle**

Area of triangle = $\frac{b \times h}{2}$

$= \frac{8 \times 5}{2}$

$20cm^2$

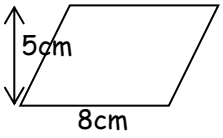


- **Area of parallelogram**

Area of parallelogram = b x h

= 8 x 5

= $40cm^2$

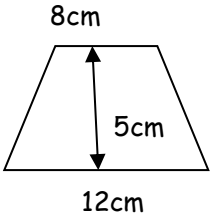


- **Area of trapezium**

Area of trapezium = $\frac{(a + b) \times h}{2}$

$= \frac{(8 + 12) \times 6}{2}$

= $60cm^2$



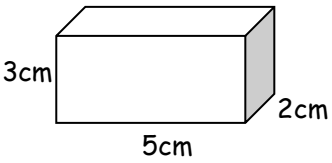
3.20 Know & use formulae for volume & surface area of simple solids

- **Volume of cuboid**

Volume = l x w x h

= 5 x 3 x 2

= $30cm^3$



- **Surface area of cuboid**

Front = 5x3 = 15
Back = 5x3 = 15
Top = 5x2 = 10
Bottom = 5x2 = 10
Side = 3x2 = 6
Side = 3x2 = 6

} Total Surface Area = $62cm^2$

Volume(any prism) = Area of cross-section x length

3.21 Formulae for circle

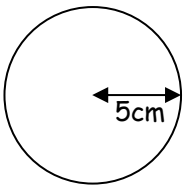
- **Area of circle**

Area of circle = $\pi \times r^2$

= $\pi \times r^2$

= $\pi \times 5^2$

= $78.5cm^2$

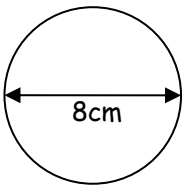


- **Circumference of circle**

Area of circle = $\pi \times d$

= $\pi \times 8$

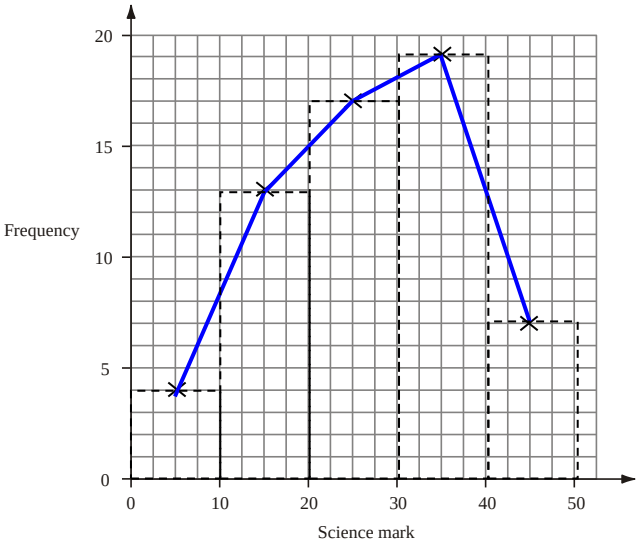
= 25.1cm



3.22 Presentation of data

- **Construct a frequency polygon**

(points plotted at the midpoint of grouped data)



- **Two-way tables**

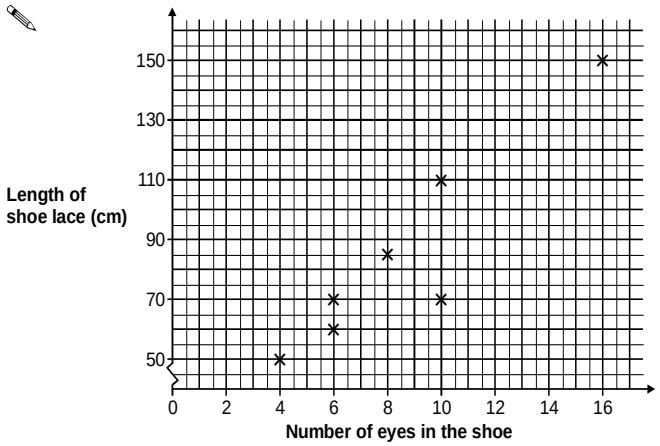
To sort data by category

e.g. how students travel to school

	Bus	Walk	Cycle	Total
Boys				
Girls				
Total				

3.23 Construct a scatter graph

Read scale carefully when plotting the points



3.23 Stem & leaf diagram

- Data must be in order
- Add a key

0	8 8 9
1	1 2 3 4 4 8 9
2	0 3 5 5 7 7 8
3	2 2 3 3 6 6 8 8
4	1 2 3 3 5

Key: 1 | 3 = 13

3.24 Find averages and range from a table

Mark(x)	Frequency(f)	fx
7	1	1x7=7
8	6	8x6=48
9	5	9x5=45
10	8	10x8=80
	Σf= 22	Σfx = 180

- Mean = Σfx ÷ Σf
  = 180 ÷ 22
  = 8.2 marks
- Mode = 10 marks
- Median = 22+1 = 23 (23÷2=11.5th mark)
  = 9 marks
- Range = 10-7=3 marks

3.25 Compare distributions using a measure of average and a measure of spread

- Compare an average of each distribution

e.g. mean, median, mode

- Compare the spread of each distribution

e.g. range

- Make sure comments relate to the context

e.g. the boys are taller on average than the girls since the mean is larger for the boys

3.26 Sum of mutually exclusive outcomes =1

- **If 2 outcomes cannot occur together, They are mutually exclusive**
- **If 2 outcomes A and B are mutually exclusive**
  P(A) + p(B) = 1
- **If 3 outcomes A B and C are mutually exclusive**
  P(A) + p(B) + p(C) = 1

e.g. If outcomes A, B and C are mutually exclusive and

p(A) = 0.47

p(B) = 0.31

p(C) = 1 – (0.47 + 0.31)

= 1 – 0.78

= 0.22