Grade 4 - 5 PROMPT sheet

C1 Understand & use proportionality

- To increase a quantity by 5%

Multiply the quantity by 1.05 (100+5 = 105)

- To decrease a quantity by 5%

Multiply the quantity by 0.95 (100-5) = 95

C2 Calculate using proportional change

To increase £240 by 15% (100+15 = 115)

= 1.15 x £240 = £276

To decrease £240 by 15% (100-15 = 85)

= 0.85 x £240 = £204

C2 Multiply & divide numbers 0-1

- **Multiply e.g. 0.2 x 0.4**

Ignore decimal points & multiply numbers

2 x 4 = 8

Count the number of decimal places (2)

The answer will have this many (2)

0.2 x 0.4 = 0.08 *(2 decimal places)*

- **Divide e.g. 8 ÷ 0.2**

Multiply both by 10

80 ÷ 2 = 40 *makes whole*

C2 4 rules of fractions

- **Add & subtract**

Denominators must be the same

- **Multiply**

Multiply numerators; multiply denominators

- **Divide**

Invert fraction after ÷

Multiply numerators; multiply denominators

C4 Round to one significant figure

These all have ONE significant figure

300
80
2
0.7
0.05
0.003

C4 Estimate answers to calculations

- Round each number to 1sf first

e.g. $\frac{423 \times 28}{568} = \frac{400 \times 30}{600} = \frac{12000}{600} = 20$

e.g. $\frac{3.26 \times 11.8}{0.58} = \frac{3 \times 10}{0.6} = \frac{30}{0.6} = \frac{300}{6} = 50$

e.g. $\frac{8.3 \times 35.6}{0.49} = \frac{8 \times 40}{0.5} = \frac{320}{0.5} = 640$

(÷0.5 = doubling the number being divided)

C5 Use a calculator efficiently

Know your keys

x^2 x^3 $x^{\blacksquare}$ $\sqrt{}$ $\sqrt[3]{}$ (-) $\frac{\blacksquare}{\blacksquare}$

C6 Expand brackets and simplify

Multiply everything inside the bracket by what is outside

Then collect like terms together

$3(x + 2) + 2(x - 5)$

$=3x + 6 + 2x - 10$

$=5x - 4$

Watch for the negative sign in front of the bracket

It changes the sign inside the bracket

$3(x + 2) - 2(x - 5)$

$=3x + 6 - 2x + 10$

$=x + 16$

C7 Draw a straight line graph

- **To draw a graph of x + y = 7**

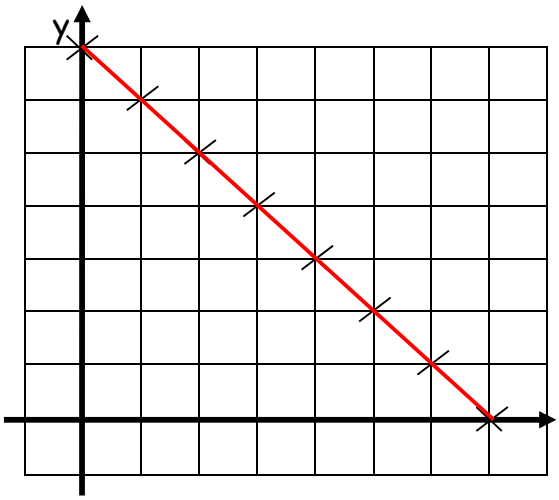
➢ Think of x and y coordinates that add to make 7

e.g. (4,3) (3,4) (2,5) (1,6) (0,7) (-1,8) ....

➢ These are usually put into a table:

x	-1	0	1	2	3	4
y	8	7	6	5	4	3

➢ Then the points are plotted and joined



- **To draw a graph of y = 2x -1**

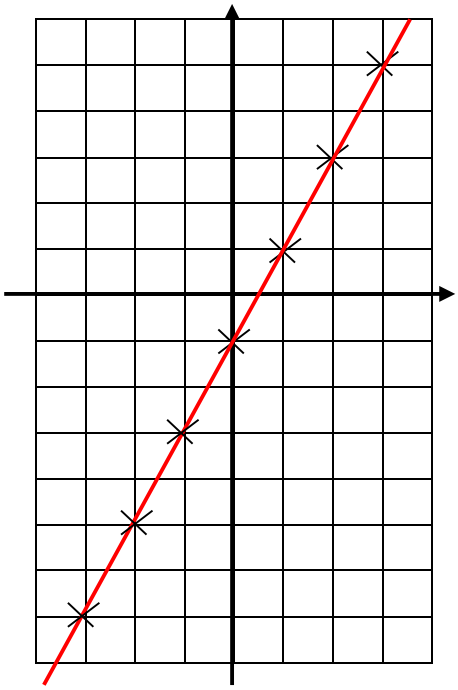
➢ Some coordinates are usually given in a table

➢ You have to fill in the rest by following the rule of the equation ' whatever x is, multiply by 3 then -2'

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

2x-2-1 2x0-1 2x2-1

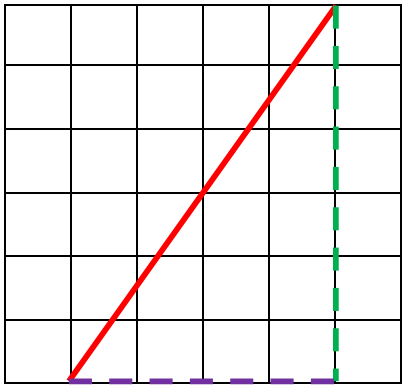
- Then the points are plotted and joined



- **To find the gradient of a line**

➢ The gradient of a line is its 'slope'

➢ It is measure by vertical ÷ horizontal



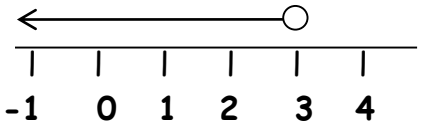
Gradient = 6 ÷ 4 = 1.5

C8 Solve inequalities in one variable

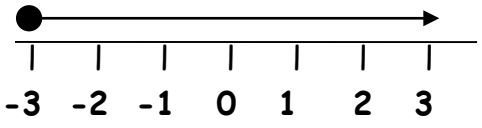
$a < b$ means a is less than b
$a \leq b$ means a is less than or equal to b
$a > b$ means a is greater than b
$a \geq b$ means a is greater than or equal to b

Inequalities can be treated like equations
The solution can be shown on a number line

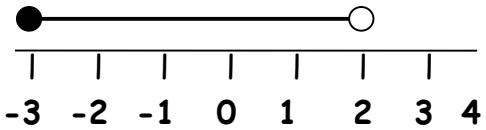
e.g.1 $2x - 4 < 2$ *(+4 to each side)*
$2x < 6$ *(÷2 each side)*
$x < 3$



e.g. 2 $2x - 7 \leq 5x + 2$ *(-2x each side)*
$-7 \leq 3x + 2$ *(-2 each side)*
$-9 \leq 3x$ *(÷3 each side)*
$-3 \leq x$ *(swap around)*
$x \geq -3$ *(swap inequality symbol)*



e.g. 3 $-7 \leq 2x - 1 < 3$ *(+1 to each part)*
$-6 \leq 2x < 4$ *(÷2 each side)*
$-3 \leq x < 2$



C9 Substitute numbers into expressions

Once numbers have replaced letters:

- Remember the order of operations BIDMAS
- Remember the rules for signs

- x - = +	-- = +
- x + = -	+- = -

C9 Rearrange a formula

- Use the same balancing steps as when you solve equations

e.g. Make 't' the new subject in:

$v = u + at$ *(-u from each side)*
$v - u = at$ *(÷a each side)*
$\frac{v - u}{a} = \frac{at}{a}$
$t = \frac{v - u}{a}$

C10 Find the nth term of a linear sequence

If the 1st difference is constant, it is linear

e.g. 3 7 11 15 19 23 ....
+4 +4 +4 +4 +4

The term to term rule is **+4**

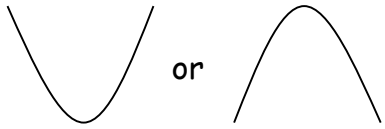
nth term = 4n -1

The nth term can be used to find the term in any position

e.g. 10^{th} term means n=10
10^{th} term = 4x10 - 1 = 39

C11 Plot quadratic functions

- Graphs of quadratic equations have x^2 in and look like this:



- **To draw the graph of $y = x^2 + 4$**

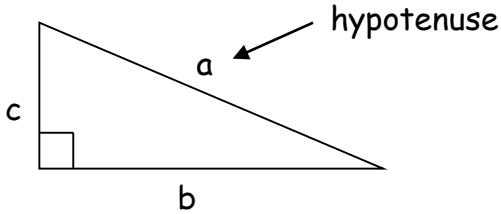
- Fill the table by following the rule
- Then join the points with a smooth curve

x	-3	-2	-1	0	1	2	3
y	13	8	5	4	5	8	13

$(-2)^2 + 4$ $2^2 + 4$

C12 Pythagoras Theorem

For this right angled triangle:



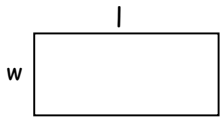
$a^2 = b^2 + c^2$

- If finding the hypotenuse
  ADD the squares of the other 2 sides
  Then square root
- If finding a shorter side
  SUBT the squares of the other 2 sides
  Then square root

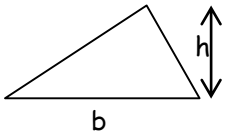
C13 Find lengths, areas & volumes

Formulae to learn:

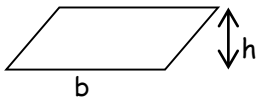
Area of rectangle = l x w



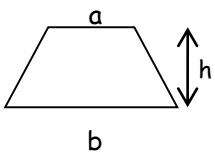
Area of triangle = $\frac{b \times h}{2}$



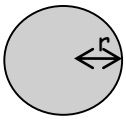
Area of parallelogram = b x h



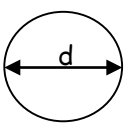
Area of trapezium = $\frac{1}{2}(a + b)xh$



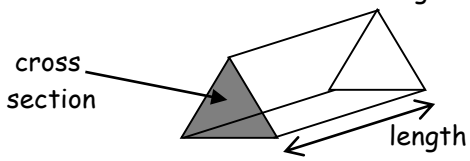
Area of circle = $\pi \times r^2$



Circumference = $\pi \times d$



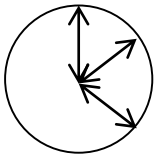
Volume = Area of cross-section x length



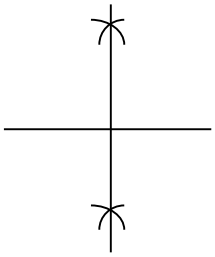
C14 Locus of point

LOCUS is the path or region a point covers as it moves according to a rule

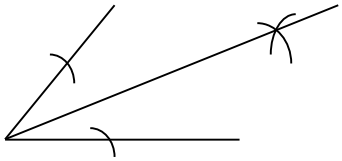
- Fixed distance from a point – circle



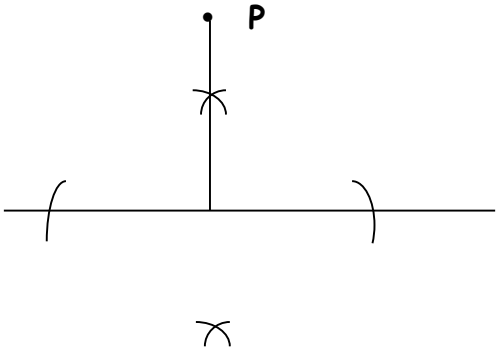
- Equal distance from two points
  perpendicular bisector



- Equal distance from two intersecting lines –
  angle bisector

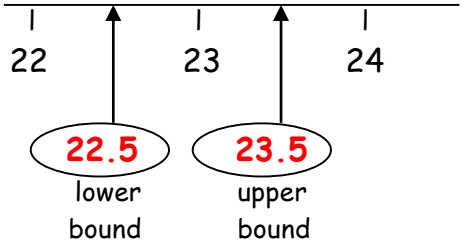


- Perpendicular from a point to a line



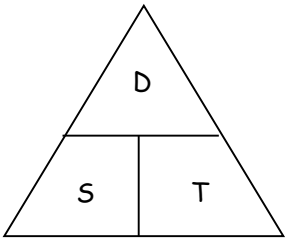
C15 Bounds of measurement

- If 23cm is rounded to nearest whole cm
- 23 is between the whole numbers 22 and 24

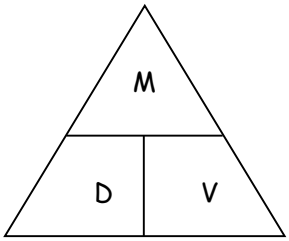


C16 Compound Measures

- These triangles are useful
- Cover the quantity you are trying to find
- What is uncovered is the formula to use



D~Distance
S~Speed
T~Time



M~Mass
D~Density
V~Volume

Examples

Speed = $\frac{\text{Distance}}{\text{Time}}$ Time = $\frac{\text{Distance}}{\text{Speed}}$

Distance = Speed x Time

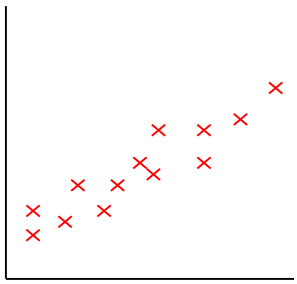
C17 Plan a Statistical Enquiry

- Questions should be simple
- The answers need to be 'yes or 'no' or a 'number' or from a choice of answers
- Tick boxes are useful
- Avoid responses open to interpretation
- Avoid leading questions
- Avoid open-ended questions
- Avoid biased questions
- Ensure the sample is large enough
- Ensure the sample will give valid results

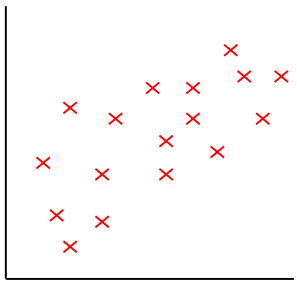
C18 Graphical representation

Scatter diagrams – used to investigate correlation

e.g. Positive Correlation

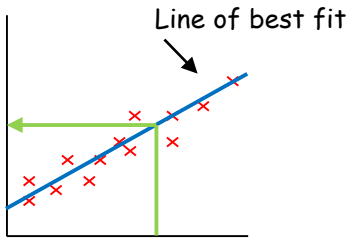


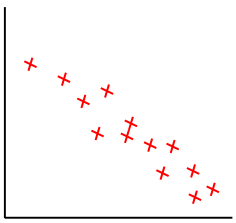
Strong positive



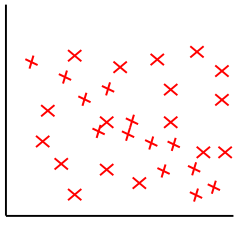
Weak positive

If it shows correlation , draw a line of best fit on it
Points which do not fit the trend are called OUTLIERS and should be ignored
The line can be used to predict data



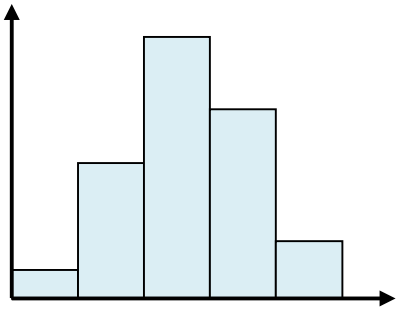


Negative

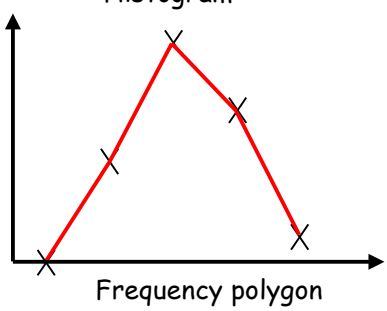


No correlation

Frequency polygon – plot mid-points of bars & join



Histogram



Frequency polygon

C19 Estimate mean

Time (t sec)	x	f	fx
$60 < t \leq 70$	65	12	780
$70 < t \leq 80$	75	22	1650
$80 < t \leq 90$	85	23	1955
$90 < t \leq 100$	95	24	2280
$100 < t \leq 110$	105	19	1995
		$\Sigma f = 100$	$\Sigma fx = 8660$

Mean = $\frac{\Sigma fx}{\Sigma f} = \frac{8660}{100} =$ **86.6sec**

Modal class = **$90 < t \leq 100$**

(because this class interval has the largest frequency i.e. 24)

Median = $\frac{1}{2}(100 + 1)^{th} = 50.5^{th}$

= **$80 < t \leq 90$**

C20 Compare distributions

- Compare an average using mean, median or mode.
- Compare spread using the range *(the higher the range, the bigger the spread of data)*
- Frequency polygons and stem & leaf diagrams are often used to compare 2 distributions on the same diagram

C21 Understand relative frequency

This is the name given to an estimate of probability from an experiment or a survey

Relative probability = $\frac{\text{No. times an outcome occurs}}{\text{Total number of trials}}$

C22 Examine results of an enquiry Justify choice of presentation

A scatter diagram would be used to find out if there is any correlation or relationship between two sets of data
A frequency polygon would be used to compare two sets of data