

Grade C 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% ($100+15 = 115$)
 $= 1.15 \times \text{£}240 = \text{£}276$
 To decrease £240 by 15% ($100-15 = 85$)
 $= 0.85 \times \text{£}240 = \text{£}204$

C2 Multiply & divide numbers 0-1

- Multiply e.g. 0.2×0.4
Ignore decimal points & multiply numbers
 $2 \times 4 = 8$
Count the number of decimal places (2)
The answer will have this many (2)
 $0.2 \times 0.4 = 0.08$ (2 decimal places)

- Divide e.g. $8 \div 0.2$
Multiply both by 10
 $80 \div 2 = 40$ makes whole

C2 4 rules of fractions

- Add & subtract
Denominators must be the same
- Multiply
Multiply numerators; multiply denominators
- Divide
Invert fraction after \div
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. $\frac{8.3 \times 35.6}{0.49} = \frac{8 \times 40}{0.5} = \frac{320}{0.5} = 640$

($\div 0.5 =$ doubling the number being divided)

C5 Use a calculator efficiently

Know your keys

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

C6 Expand brackets and simplify

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

$$\begin{aligned} & 3(x+2) + 2(x-5) \\ & = 3x + 6 + 2x - 10 \\ & = \underline{5x - 4} \end{aligned}$$

Watch for the negative sign in front of the bracket
 It changes the sign inside the bracket

$$\begin{aligned} & 3(x+2) - 2(x-5) \\ & = 3x + 6 - 2x + 10 \\ & = \underline{x + 16} \end{aligned}$$

C7 Draw a straight line graph

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

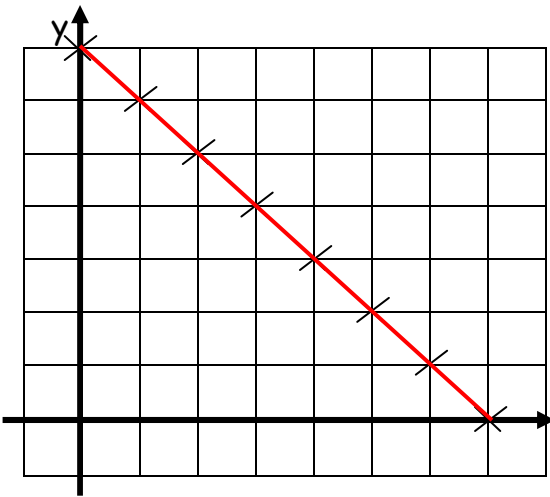
- Think of x and y coordinates that add to make 7

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



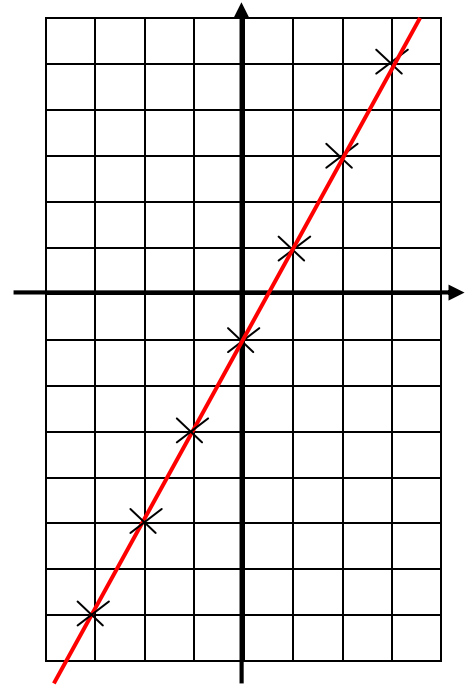
- To draw a graph of $y = 2x - 1$

- 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

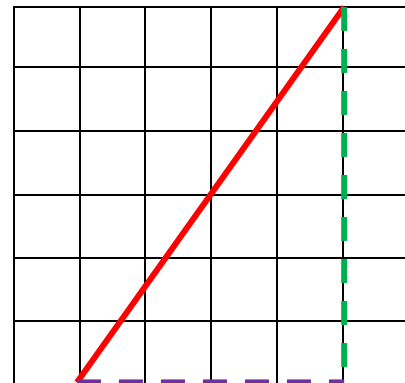
$2x - 2 - 1$ $2x0 - 1$ $2x2 - 1$

- 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



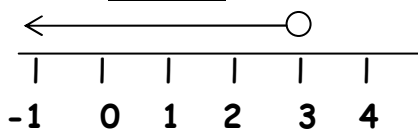
Gradient = $6 \div 4 = 1.5$

C8 Solve inequalities in one variable

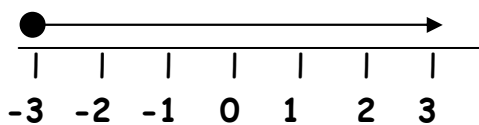
$a < b$ means a is less than b
 $a \leq b$ means a is less than or equal to b
 $a > b$ means a is greater than b
 $a \geq b$ means a is greater than or equal to b

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

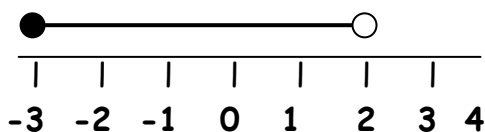
e.g.1 $2x - 4 < 2$ (+4 to each side)
 $2x < 6$ ($\div 2$ each side)
 $x < 3$



e.g.2 $2x - 7 \leq 5x + 2$ ($-2x$ each side)
 $-7 \leq 3x + 2$ (-2 each side)
 $-9 \leq 3x$ ($\div 3$ 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)
 $-6 \leq 2x < 4$ ($\div 2$ 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:
- $$v = u + at \quad (-u \text{ from each side})$$
- $$v - u = at \quad (\div a \text{ each side})$$
- $$\frac{v - u}{a} = \frac{at}{a}$$
- $$t = \frac{v - u}{a}$$

C10 Find the nth term of a linear sequence

If the 1st difference is constant, it is linear

e.g. $3 \quad 7 \quad 11 \quad 15 \quad 19 \quad 23 \dots$
 $+4 \quad +4 \quad +4 \quad +4 \quad +4$

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

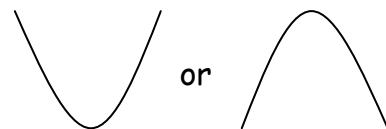
nth term = $4n - 1$

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

e.g. 10th term means $n=10$
 $10^{\text{th}} \text{ term} = 4 \times 10 - 1 = 39$

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

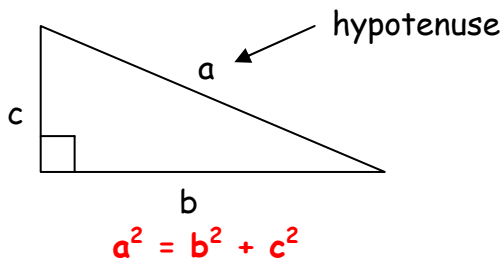
x	-3	-2	-1	0	1	2	3
y	13	8	5	4	5	8	13

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

\uparrow
 $2^2 + 4$

C12 Pythagoras Theorem

For this right angled triangle:

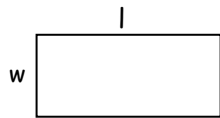


- If finding the hypotenuse
ADD the squares of the other 2 sides
Then square root
- If finding a shorter side
SUBT the squares of the other 2 sides
Then square root

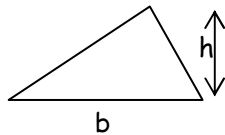
C13 Find lengths, areas & volumes

Formulae to learn:

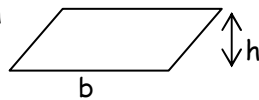
Area of rectangle = $l \times w$



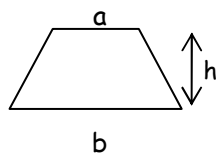
Area of triangle = $\frac{b \times h}{2}$



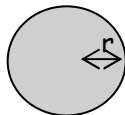
Area of parallelogram = $b \times h$



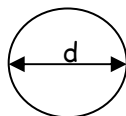
Area of trapezium = $\frac{1}{2}(a + b) \times h$



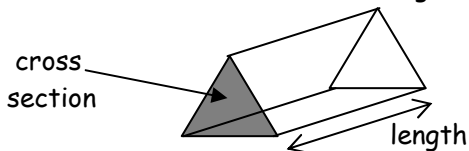
Area of circle = $\pi \times r^2$



Circumference = $\pi \times d$



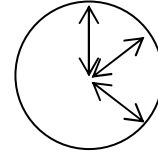
Volume = Area of cross-section \times length



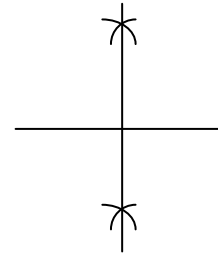
C14 Locus of point

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

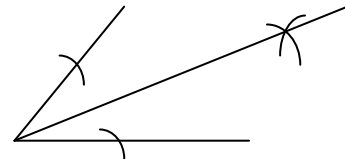
- Fixed distance from a point - **circle**



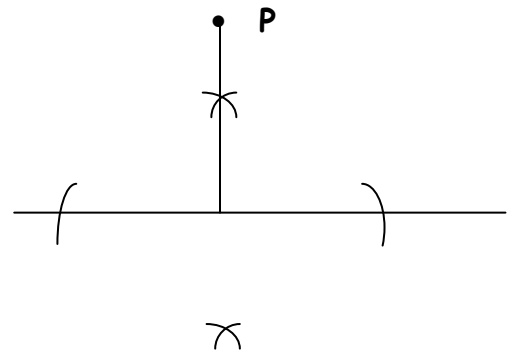
- Equal distance from two points
perpendicular bisector



- Equal distance from two intersecting lines -
angle bisector

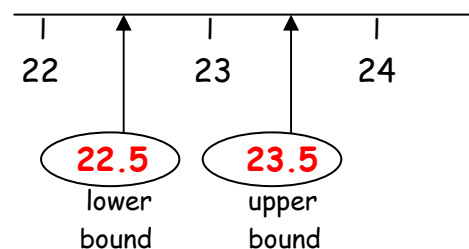


- Perpendicular from a point to a line



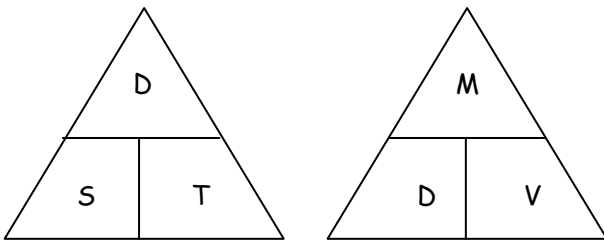
C15 Bounds of measurement

- 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

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

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

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

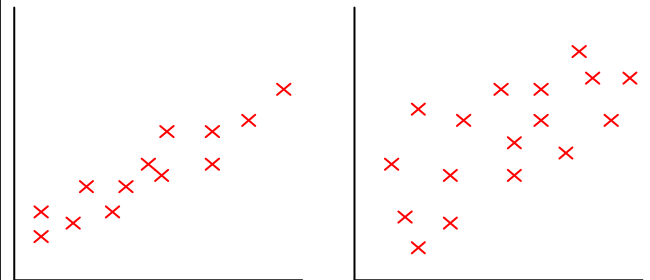
C17 Plan a Statistical Enquiry

- 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

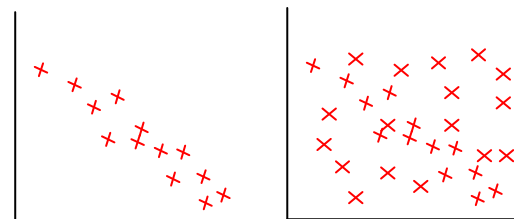
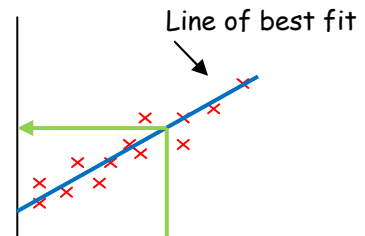


Strong positive

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

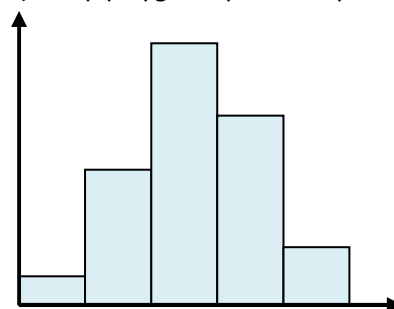
The line can be used to predict data



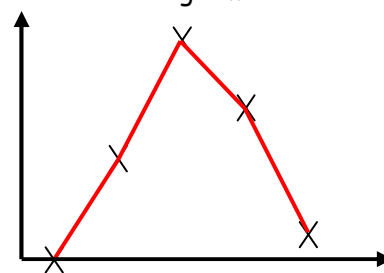
Negative

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

$$\Sigma f = 100 \quad \Sigma fx = 8660$$

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

Modal class = $90 < t \leq 100$
(because this class interval has the largest frequency i.e. 24)

$$\text{Median} = \frac{1}{2} (100 + 1)^{\text{th}} = 50.5^{\text{th}} \\ = \underline{\underline{80 < t \leq 90}}$$

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

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

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

