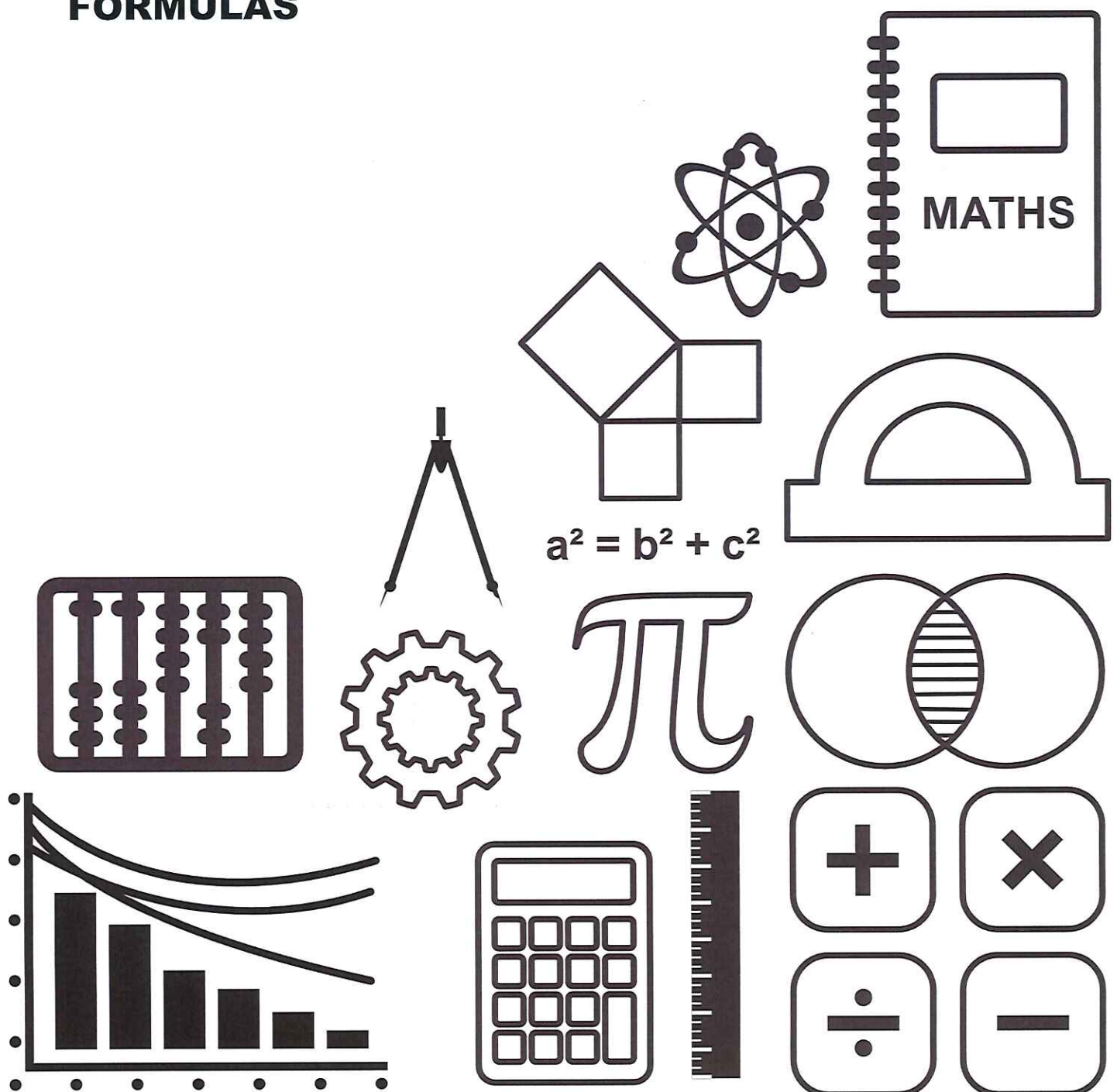


GCSE TOPIC BOOKLET FORMULAS



1.

Three neighbours hired a cement mixer.
The cost of hiring the mixer is given by the following formula.

$$\text{total cost} = \text{£30 per day} + \text{insurance}$$

- (a) They hired the mixer for four days at a total cost of £144.
How much did they pay for the insurance?

[2]

$$144 = 30 \times 4 + \text{insurance}$$

$$144 = 120 + \text{insurance}$$

$$\text{Insurance} = 144 - 120$$

$$= \text{£24}$$

- (b) One of the neighbours said that he would pay $\frac{2}{3}$ of the total cost, as he would be using the mixer the most. The other two neighbours shared the remaining cost equally.

How much did each of these two neighbours pay?

[3]

$$\frac{1}{3} \text{ of } 144 = \frac{48}{3} = \text{£48}$$

$$\frac{2}{3} = \text{£48} \times 2 = \text{£96 paid by first neighbour}$$

The other two share the other £48

$$\text{£48} \div 2 = \text{£24}$$

$$\text{£24 each}$$

2.

You will be assessed on the quality of your written communication in this question. *explain carefully*

A window cleaner takes 15 minutes to clean each window in a large building.
He charges using the following formula:

$$\text{payment} = \text{£8} \times \text{number of hours worked} + \text{call-out charge}$$

Calculate the payment for cleaning 20 windows when the call-out charge is £12.

[6]

$$20 \text{ windows} = 20 \times \frac{1}{4} \text{ hour} \\ = 5 \text{ hours}$$

$$\text{Payment} = \text{£8} \times 5 + \text{£12} \\ = \text{£40} + \text{£12}$$

$$= \text{£52}$$

3.

A landscape gardener is asked by the owner of a caravan park to plant some trees on the site. To work out the total bill, the gardener uses the formula:

$$\text{total bill} = \text{time taken in hours} \times \text{£10} + \text{total cost of the trees.}$$

The gardener bought 24 trees at a price of £5 each.
It took the gardener a quarter of an hour to plant each tree.
Calculate the total bill.

$$\text{Cost of trees} = 24 \times 5 = 12 \times 10 = \text{£120}$$

$$24 \times \frac{1}{4} = 6 \text{ hours taken}$$

$$\begin{aligned} \text{Total bill} &= 6 \times \text{£10} + \text{£120} \\ &= 60 + 120 \\ &= \text{£180} \end{aligned}$$

[6]

4.

Each year the members of a youth club raise money for charity by staging a concert. The amount of money raised is given by the following formula.

$$\text{Amount raised} = \text{number of tickets sold} \times \text{price of each ticket} - \text{expenses}$$

- (a) Last year, 115 tickets were sold at £5 each. The expenses totalled £130.
What was the amount of money raised last year?

[2]

$$\begin{aligned} \text{Amount raised} &= 115 \times \text{£5} - \text{£130} \\ &= \text{£575} - \text{£130} \\ &= \text{£445} \end{aligned}$$

- (b) This year, the price of each ticket was £6.50 and the expenses totalled £290.
The amount of money raised was £581.

How many tickets were sold?

[2]

$$\begin{aligned} 581 &= \text{number of tickets} \times 6.50 - 290 \\ 581 + 290 &= \text{number of tickets} \times 6.50 \\ 871 &= \text{number of tickets} \times 6.50 \\ 871 \div 6.50 &= \text{number of tickets} \\ \text{number of tickets sold} &= 134 \end{aligned}$$

$$\begin{array}{r} 115 \\ \times 5 \\ \hline 575 \\ 2 \end{array}$$

5.



A plumber has a call out fee of £35.
He then charges £20 an hour.

- (a) Find the **total cost** if the plumber works for 4 hours.

$$\begin{aligned}\text{Total cost} &= £35 + 4 \times £20 \\ &= £35 + £80 \\ &= \underline{\underline{£115}}\end{aligned}$$

[2]

- (b) Write down a formula to work out the plumber's **total cost** for any number of hours.

$$\underline{\underline{\text{Total cost} = £20 \times \text{number of hours worked} + £35}}$$

[2]

6.

A washing machine engineer takes 1 hour 15 minutes to service a machine.

The cost is found using the following formula:

$$\text{Cost} = £40 \times \text{number of hours worked} + \text{total cost of parts}$$

Calculate the cost for servicing 6 washing machines when the **total cost of parts** is £87. [4]

$$\begin{aligned}\underline{\underline{\text{Number of hours worked}}} &= 6 \times 1\frac{1}{4} \\ &= \underline{\underline{7.5}}\end{aligned}$$

$$\begin{aligned}\underline{\underline{\text{Cost}}} &= £40 \times 7.5 + £87 \\ &= \underline{\underline{£300 + £87}} = \underline{\underline{£387}}\end{aligned}$$

7.

Jeremy and Susie visit a local car racing track. They see three cars being driven on the track. Each car needs to stop at some stage to refuel.



Before stopping to refuel,

the 1st car travels a distance of 192 kilometres at an average speed of 160 kilometres per hour,

the 2nd car travels a distance of 120 kilometres at an average speed of 150 kilometres per hour,

the 3rd car travels a distance of 110 kilometres at an average speed of 125 kilometres per hour.

Using the formula,

$$\text{Time} = \text{Distance} \div \text{Average Speed}$$

use a calculator for this one definitely

find which car travelled for the shortest length of time before having to stop to refuel.

1st car

$$\text{Time} = 192 \div 160 = 1.2 \text{ hours}$$

2nd car

$$\text{Time} = 120 \div 150 = 0.8 \text{ hours}$$

3rd car

$$\text{Time} = 110 \div 125 = 0.88 \text{ hours}$$

The second car travelled for the shortest length of time before stopping to refuel

Tip:

make sure you actually remember to answer the question!

[3]



Arwel needs to hire a mini-digger in order to clear the plot of land before building the house.
DiggersRUs advertise the costs for hiring a mini-digger as:

Standard Price	
Cost for first day	Cost per day after the first day
£95	£85

Special Offer
Cost to hire from Monday to Friday
£328

5 days

Must explain carefully

- (i) You will be assessed on the quality of your written communication in this part of the question.
Arwel needs the mini-digger for 4 days between Monday to Friday.
How much cheaper is it to hire the mini-digger using the special offer, than it is to hire it for 4 days? [6]

$$\begin{aligned} \text{Standard price 4 day hire} \\ &= £95 + 3 \times £85 \\ &= £350 \end{aligned}$$

$$\text{Special offer price} = £328$$

$$\text{Difference} = £350 - £328 = \underline{\underline{£22}}$$

It is £22 cheaper to hire the mini-digger using the special offer

- (ii) The special offer is no longer available.
Which of the following formulae represents the total cost, T in pounds, of hiring a mini-digger for n days?
Circle your answer. [1]

$T = 95(n - 1) + 85$

$T = (n - 1) + 95 \times 85$

$T = 95 + 85n$

$T = 95 + 85(n - 1)$

$T = 0.95 + 0.85(n - 1)$

9.

Pay is calculated according to the following formula.

$\text{Pay} = \text{£}9 \times \text{number of hours worked} + \text{bonus}$

- (a) Calculate the pay for David who worked for 35 hours and had a bonus of £25. [2]

$$\begin{aligned} \text{Pay} &= \text{£}9 \times 35 + \text{£}25 \\ &= \text{£}315 + \text{£}25 = \text{£}340 \end{aligned}$$

- (b) Emma's pay was £401 including a bonus of £32.
For how many hours did Emma work? [2]

$$\begin{aligned} \text{£}401 &= \text{£}9 \times \text{number of hours worked} + \text{£}32 \\ \text{£}401 - \text{£}32 &= \text{£}9 \times \text{number of hours worked} \\ \text{£}369 &= \text{£}9 \times \text{number of hours worked} \\ \text{£}369 \div 9 &= \text{number of hours worked} \end{aligned}$$

Number of hours worked = 41