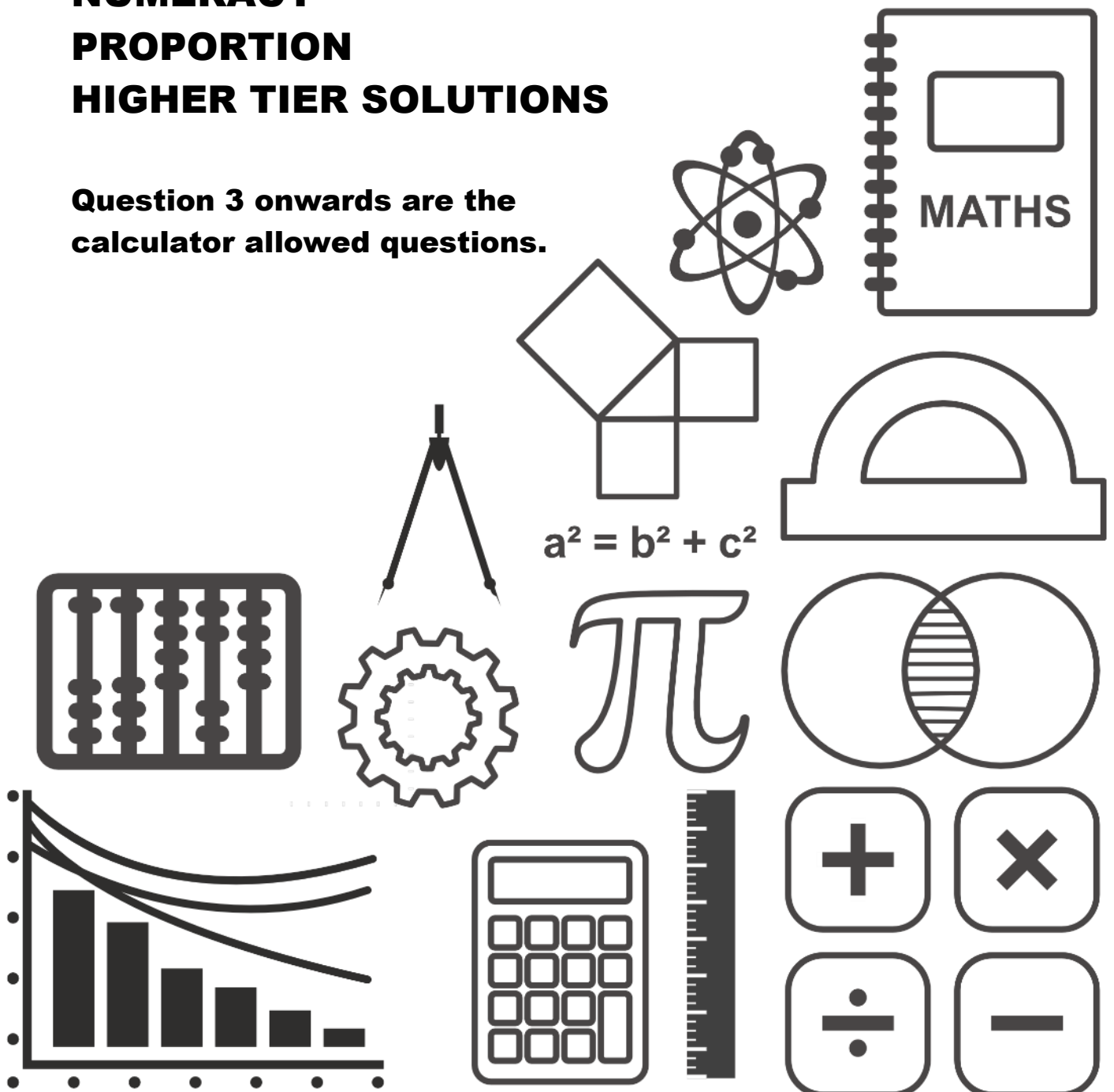


MATHSDIY

GCSE TOPIC BOOKLET NUMERACY PROPORTION HIGHER TIER SOLUTIONS

Question 3 onwards are the calculator allowed questions.



1. On a building site, 4 bricklayers were able to lay 2000 bricks in 8 hours.

To complete the work on time, bricklayers will need to lay 9000 bricks in 10 hours.



(a) Calculate how many bricklayers would be needed to lay 9000 bricks in 10 hours. You must show all your working. [4]

4 bricklayers 2000 bricks 8 hours
1 bricklayer 500 bricks 8 hours

$$1 \text{ bricklayer} = \frac{62.5}{8 \times 500 \div 4}$$

1 bricklayer = 62.5 bricks / hour

1 bricklayer = 625 bricks in 10 hours

$$\begin{array}{r} 9000 \div 25 = 360 \\ 625 \div 25 = 25 \end{array} \quad \begin{array}{r} 360 \div 5 = 72 \\ 25 \div 5 = 5 \end{array} \quad \begin{array}{r} 14.4 \\ 5 \overline{) 72.0} \end{array}$$

= 14.4 bricklayers \Rightarrow 15 bricklayers

(b) Give one assumption that you made in answering part (a). [1]

All of the bricklayers work at the same rate.

2. On a new housing estate, teams of painters paint the walls and ceilings of houses once they are built.

- (a) It takes a team of 5 painters 10 hours to paint a house that has a total wall and ceiling area of 500m².

A new house on the estate has a total wall and ceiling area of 600m². This house has to be painted in 8 hours.

Calculate the least number of painters needed.
You must show all your working.

[4]

$$5 \text{ painters} : 10 \text{ hours} : 500\text{m}^2$$

$$5 \text{ painters} : 2 \text{ hours} : 100\text{m}^2$$

$$5 \text{ painters} : 12 \text{ hours} : 600\text{m}^2$$

$$15 \text{ painters} : 4 \text{ hours} : 600\text{m}^2$$

$$7\frac{1}{2} \text{ painter} : 8 \text{ hours} : 600\text{m}^2$$

8 painters

- (b) What assumption have you made in answering part (a)?

[1]

eg,

- All painters work at the same rate
- They all paint 10m²/hour
- Each painter is equally efficient

3. Gary and Carys are fire officers.

Last week, they recorded that 5 engines were able to pump 26 000 gallons of water onto a fire in 3 minutes.



(a) Show that 9 engines would be able to pump 143 000 gallons of water in under 9 minutes 15 seconds. [4]

Engines	Gallons	Minutes
5	26,000	3
1	5,200	3
9	46,800	3
9	$46,800 \times \frac{143,000}{46,800}$	$3 \times \frac{143,000}{46,800}$
9	143,000	$\frac{55}{6}$
		$= 9 \frac{1}{6}$
		$= \underline{\underline{9 \text{ min } 10 \text{ secs}}}$

9 engines take less than 9 min 15 secs to pump 143,000 gallons

(b) Give one possible reason why the 9 engines **may not** be able to pump 143 000 gallons of water in under 9 minutes 15 seconds. [1]

- Eg
- Engines may not deliver water at same rate
 - May not have enough water available
 - Not enough room for 9 engines
 - Not enough water pressure available

4. The last time the cargo ship was unloading sand in port B, it took 3 cranes 45 hours to unload 250 000 tonnes of sand.



Port B now has 5 cranes.

Calculate the time it will take 5 cranes to unload 300 000 tonnes of sand.

You can assume that all cranes unload sand at the same rate, and that all other conditions remain the same.

Give your answer in **hours** and **minutes**.
You must show all your working.

[4]

$$3 \text{ cranes} : 45 \text{ hours} : 250,000 \text{ tonnes}$$

$$1 \text{ crane} : 3 \times 45 = 135 \text{ hours} : 250,000 \text{ tonnes}$$

$$5 \text{ cranes} : \frac{135}{5} = 27 \text{ hours} : 250,000 \text{ tonnes}$$

$$5 \text{ cranes} : \frac{27}{5} \text{ hours} : 50,000 \text{ tonnes}$$

$$5 \text{ cranes} : \frac{27}{5} \times 6 \text{ hours} : 300,000 \text{ tonnes}$$

$$= \underline{\underline{32.4 \text{ hours}}}$$

$$0.4 \text{ hours} = \frac{4}{10} \times 60 \text{ minutes} = 24 \text{ minutes}$$

Time it will take is 32 hours and 24 minutes