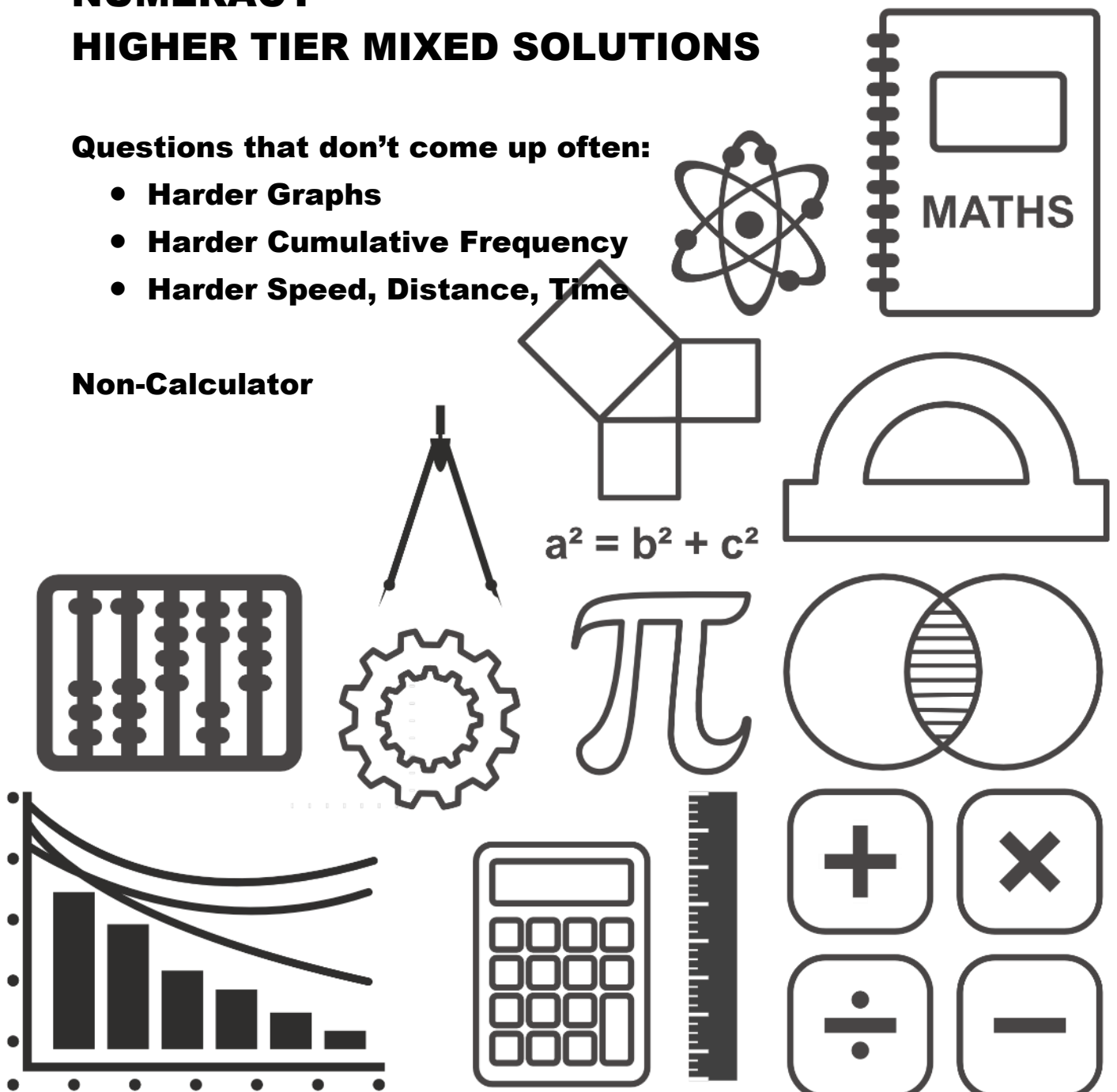


## GCSE TOPIC BOOKLET NUMERACY HIGHER TIER MIXED SOLUTIONS

Questions that don't come up often:

- Harder Graphs
- Harder Cumulative Frequency
- Harder Speed, Distance, Time

Non-Calculator



1. Carwyn owns a car and a motorcycle.

Carwyn bought the motorcycle for £9600.  
At the end of each year of owning the motorcycle, Carwyn had the motorcycle valued.



Each year the motorcycle lost  $\frac{1}{5}$  of its value at the start of the year.

- (i) Carwyn used the method  $9600 \times \frac{1}{5} \times \frac{1}{5}$  to calculate the value of the motorcycle after 2 years.

Explain why Carwyn's method is incorrect. [1]

$\frac{1}{5}$  is the 'lost' value, he should have used

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

$$\text{Method} = 9600 \times \frac{4}{5} \times \frac{4}{5}$$

or each year should be  $\frac{4}{5}$  of the previous year's value

- (ii) Write down a **formula** for the value  $V$ , in pounds, of Carwyn's motorcycle after he has owned the motorcycle for  $t$  years. [3]

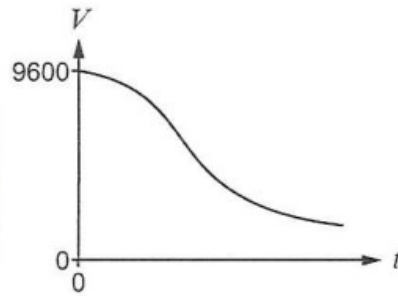
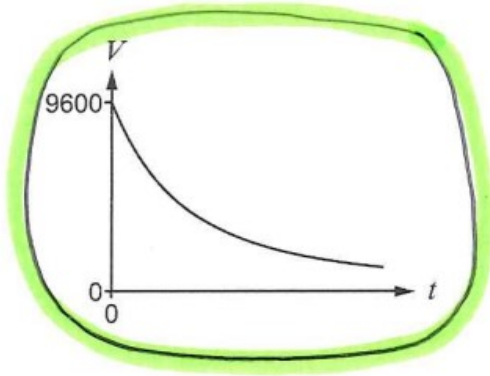
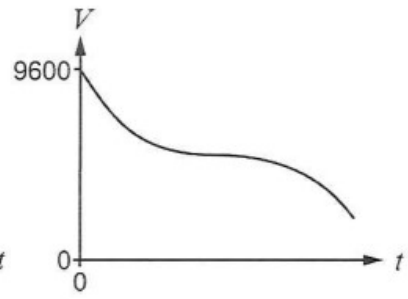
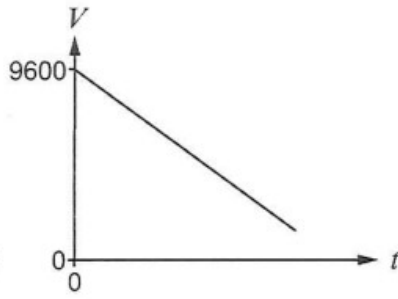
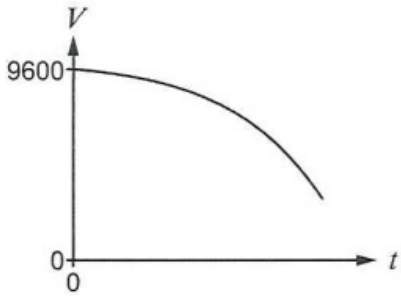
$$V = \left(\frac{4}{5}\right)^t \times 9600$$

or  $V = 9600 \times \left(\frac{4}{5}\right)^t$

or  $V = 9600 \times 0.8^t$

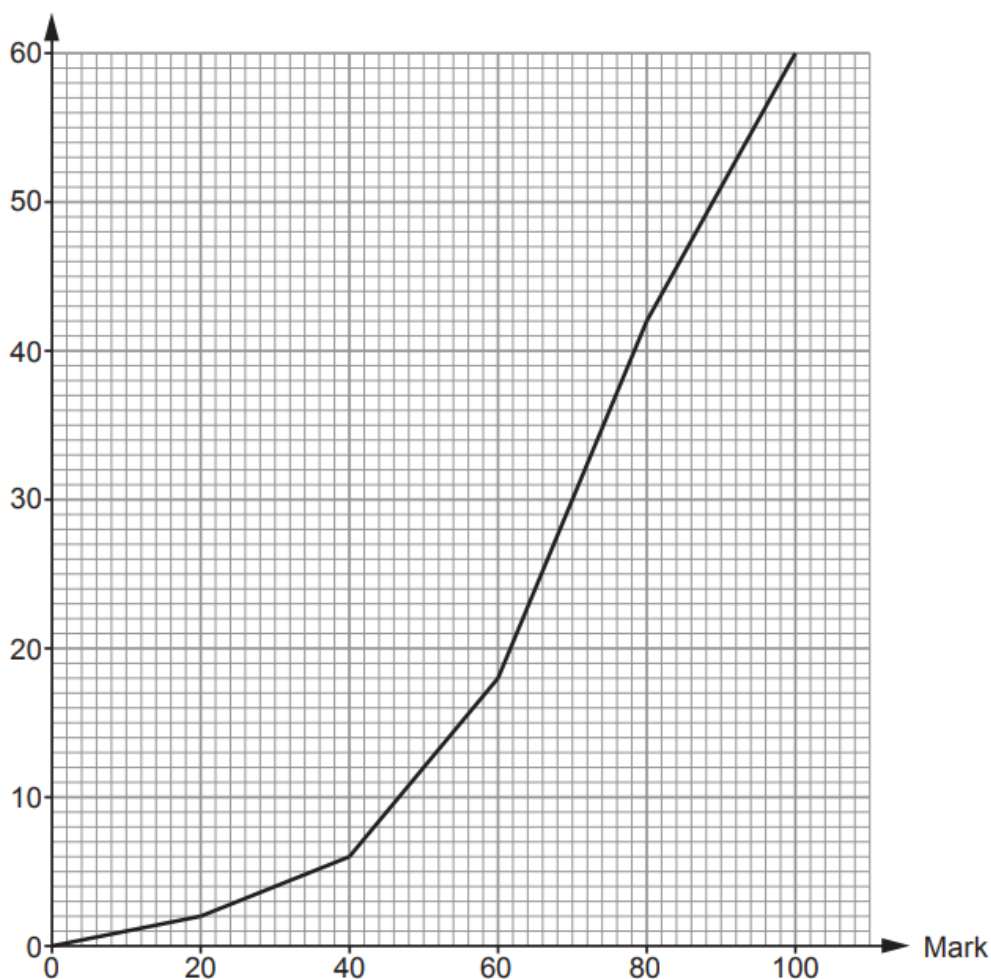
(iii) Which one of the following best represents the graph of  $V$  against  $t$ ?  
Circle your answer.

[1]



2. A group of pupils sat a mathematics test. The teacher grouped their marks using the intervals 1 to 20, 21 to 40, and so on. She then drew the following cumulative frequency diagram to display the results.

Cumulative frequency



- (a) Phoebe is one of the pupils who sat the test. Phoebe says, 'The cumulative frequency diagram shows that the median mark was 70.'

Explain why the median mark may not be 70.

[1]

Because the marks are grouped, the cumulative frequency diagram can only give an estimate.  
 or the 24 marks between 60 and 80 might not be evenly distributed  
 or the median could be anywhere between 60 and 80, etc.

(b) Consider the pupils who had a mark of 80 or less.

How many of these pupils would have needed to score more than 80 for Phoebe's estimate of the median to be 80?

Circle your answer.

[1]

10

12

18

5

20

42 pupils scored less than 80

If 30 scored less than 80, 80 would be the median.

We therefore would need 12 of these 42 to be > 80.

3. Matas knows the following information about the amount of fuel his car uses.

Speed	Miles per gallon
30 mph	54
50 mph	60
70 mph	50

During one journey, Matas drove at 50 mph for part of the time and at 70 mph for the rest of the time.

He drove for 3 hours at a speed of 50 mph.

For the whole journey, Matas used 4.6 gallons of fuel.

For how long did Matas travel at 70 mph?

You must show all your working.

[6]

3 hours at 50 mph = 150 miles

at this speed 60 miles / gallon

+ 120 miles / 2 gallons

30 miles / 1/2 gallon

150 miles = 2.5 gallons.

Total fuel used = 4.6 gallons

∴ During 70 mph stretch 4.6 - 2.5  
used 2.1 gallons

At 70mph 50 miles / gallon  
 100 miles / 2 gallons  
 5 miles /  $\frac{1}{10}$  gallon

$\therefore$  105 miles = 2.1 gallons

105 miles =  $1\frac{1}{2} \times 70$  miles = 1 1/2 hours