OCR | H | Jun '25 | P6

1 A fair four-sided dice is numbered 3, 4, 5 and 6.
The dice is rolled twice and the two scores are multiplied together.

(a) Complete the table to show all the possible outcomes.

		First roll			
	×	3	4	5	6
Second roll	3	9	12	15	18
	4	12	16	20	24
	5	15	20	25	30
	6	18	24	30	36

✓

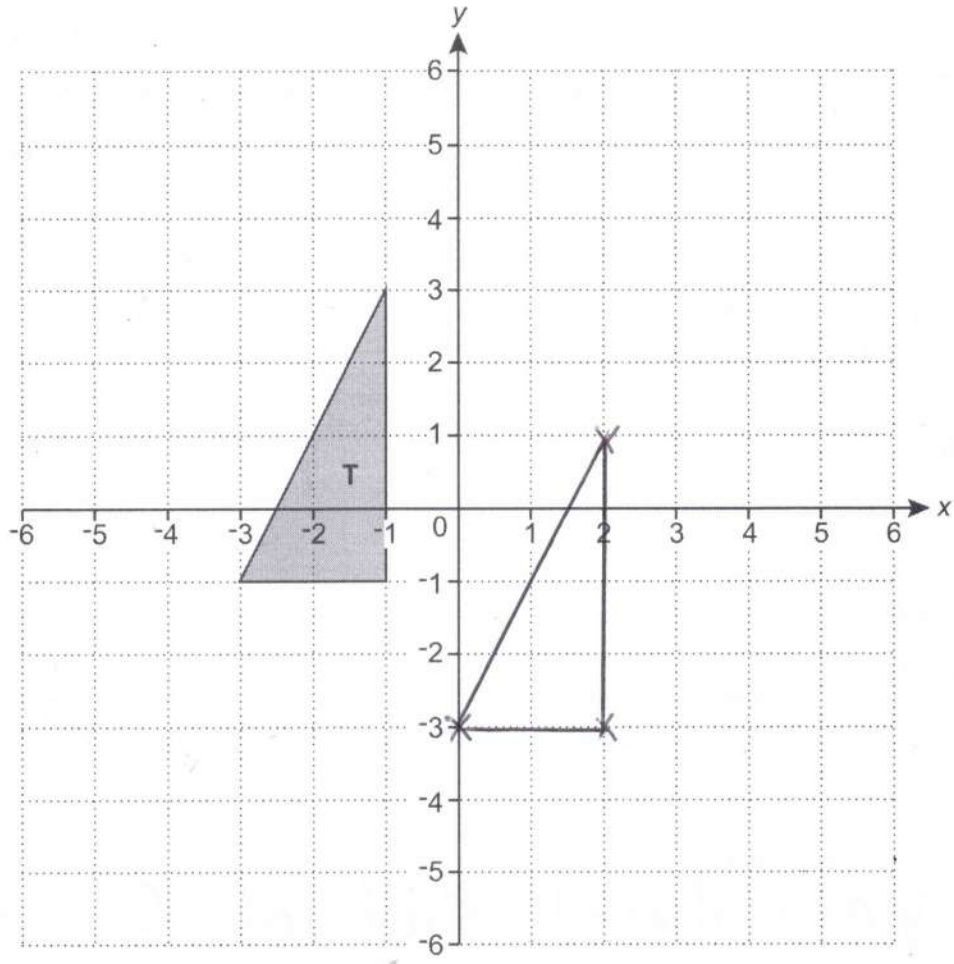
[1]

(b) Find the probability that the outcome is a multiple of 8.

3/16 ✓ ✓

(b) ..... **[2]**

2 Triangle **T** is drawn on a coordinate grid.



Translate triangle **T** by vector $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$.

→3 ✓ ↓2 ✓

[2]

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3 **(a)** The price of a laptop is reduced in a January sale from £450 to £382.50.

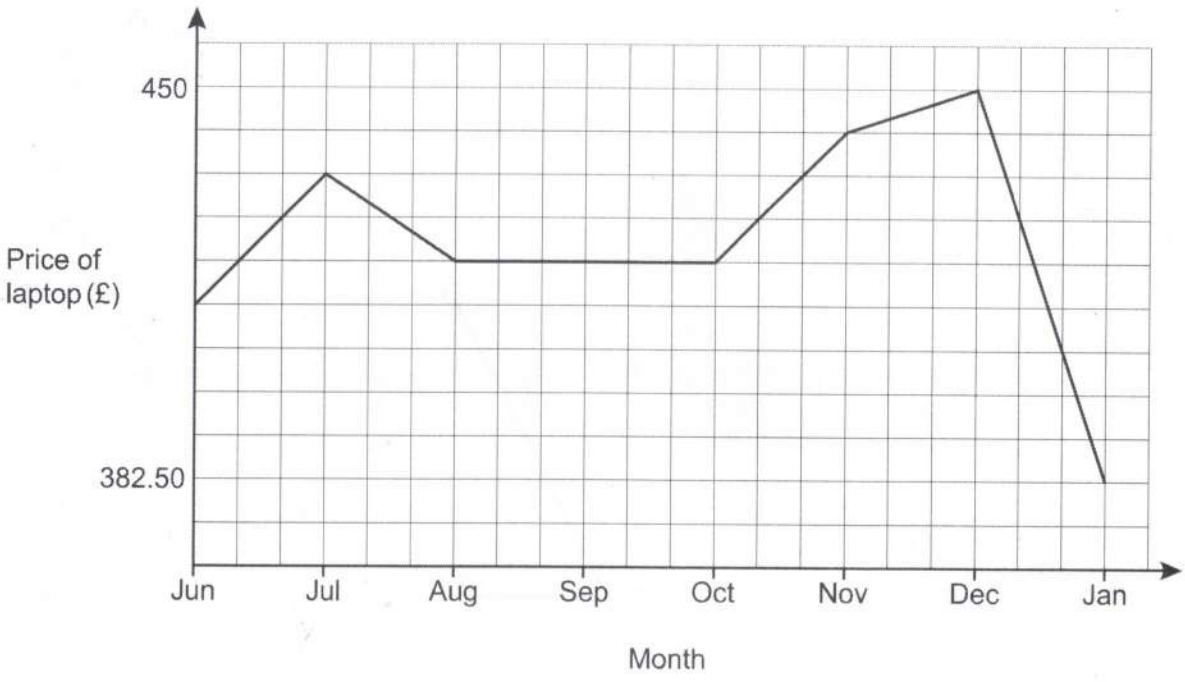
Work out the percentage reduction in the price of the laptop.

$$\frac{450 - 382.5}{450} \times 100$$ ✓✓

15 ✓

(a) ..... % **[3]**

(b) The graph shows the price of the laptop in the months before the January sale.



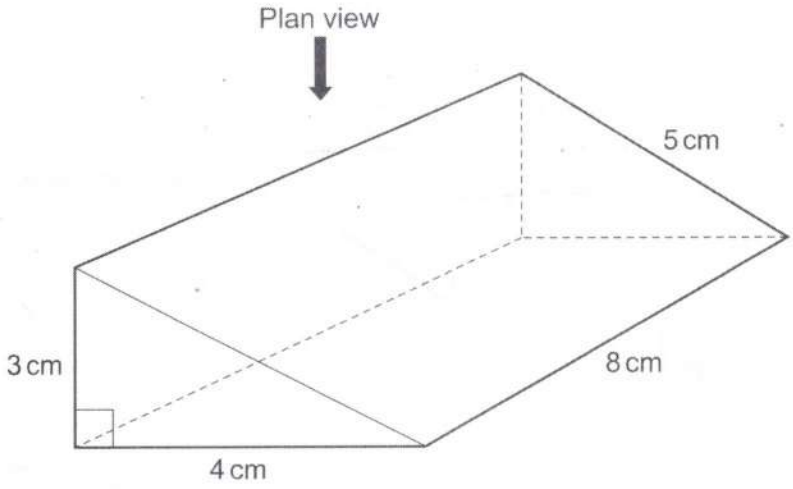
Explain why this graph is misleading.

y-axis doesn't start at 0 ✓etc

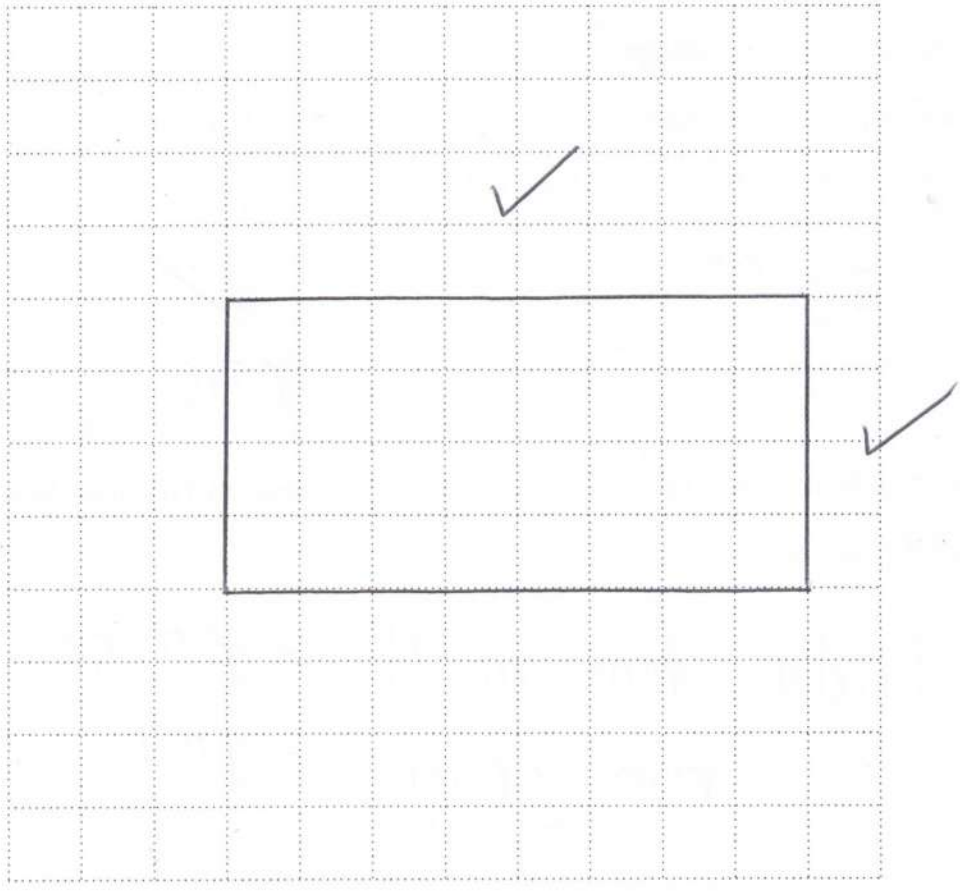
..... **[1]**

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4 The diagram shows a prism of length 8 cm.
The cross-section of the prism is a right-angled triangle.



Draw an accurate plan view of the prism on the one-centimetre grid below.



[2]

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5 A teacher asks their class which of the following values is the smallest.

2^{-1} 4^{-3} 10^{-2}

One student says

2^{-1} is the smallest because 2 is smaller than 4 and 10.

Explain the error made by the student in their **reasoning** and write down the smallest value.

$2^{-1} = \frac{1}{2}$ ✓

The error is: etc

.....

..... The smallest value is 10^{-2} ✓ **[2]**

6 A kitchen has space for a fridge.

(a) The width, w, of the space is 70 cm, correct to the nearest centimetre.

Complete the error interval for the width, w.

$\pm \frac{1}{2}$ cm ✓ ✓

(a) 69.5 $\leqslant w <$ 70.5 **[2]**

(b) A fridge is advertised as having a width of 69.5 cm, correct to 1 decimal place.

Show that this fridge may **not** fit in the space. **[2]**

Fridge max. width = 69.55 ✓

min space = 69.5

69.55 > 69.5 ✓

so fridge could be > space

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7 Each member of a tennis club is classed as a junior, an adult or a senior.

- 16% of the members are seniors.
- The ratio of the number of juniors to the number of adults is 9 : 5.
- There are 95 more juniors than seniors.

Work out the **total** number of members of the tennis club.
You must show your working.

J : A : S

0.84 : 0.16 ✓

9 : 5 ✓

$\frac{9}{14}$: $\frac{5}{14}$ ✓

$= 0.54$: $= 0.3$

$J - S = 0.38 = 95$ ✓

$1 = \frac{95}{0.38}$ ✓

250 ✓

..... [6]

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8 Construct the perpendicular from the point P to the line AB.
Show all of your construction lines.



[2]

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9 **(a)** Solve.

$8x - 11 = 6x + 3$

$2x = 14$ ✓✓

(a) $x =$ 7 ✓ **[3]**

(b) Solve by factorising.

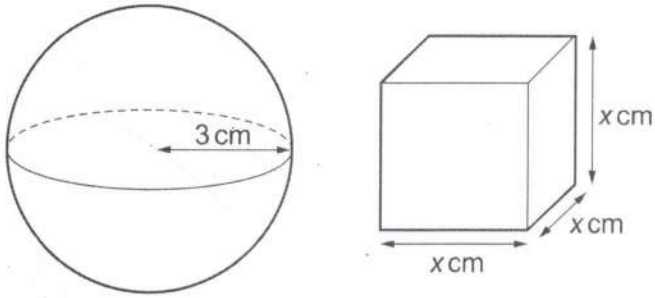
$x^2 + 15x - 16 = 0$

$(x + 16)(x - 1) = 0$ ✓✓

(b) $x =$ -16 or $x =$ 1 ✓ **[3]**

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10 The diagram shows a sphere with radius 3 cm and a cube with side length x cm.



The surface area of the sphere is equal to the surface area of the cube.

Work out the side length, x cm, of the cube.
You must show your working.

[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

$4 \times \pi \times 3^2 = 6 \times x \times x$ ✓

$36\pi = 6x^2$ ✓✓

$6\pi = x^2$

✓

$x = \sqrt{6\pi}$ or $4.34...$ ✓

..... cm **[5]**

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11 Amit invests some money at a rate of 4% per year compound interest.
After 2 years the value of Amit's investment is £1352.

Work out how much money Amit invested.

$x \times 1.04^2 = 1352$ ✓✓

$x = \dfrac{1352}{1.04^2}$ ✓

£ 1250 ✓ **[4]**

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12 You may use these kinematics formulae to answer this question.

$v = u + at$

$s = ut + \frac{1}{2}at^2$

where a is the constant acceleration, u is the initial velocity, v is the final velocity, s is the displacement and t is the time taken.

A particle has an initial velocity of 2 m/s.
After 6 seconds the particle has a velocity of 11 m/s.
The particle had constant acceleration.

Work out the distance the particle has travelled in the 6 seconds.

$u = 2$
$t = 6$
$v = 11$

$11 = 2 + 6a$ ✓
$9 = 6a$
$a = \frac{9}{6} = 1.5$ ✓

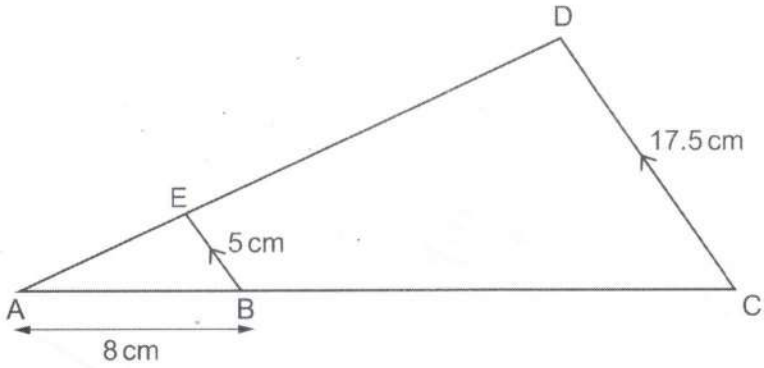
$s = 2 \times 6 + \frac{1}{2} \times 1.5 \times 6^2$ ✓
$= 12 + 27$

39 ✓

..... m **[4]**

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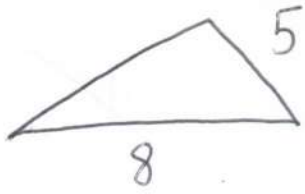
13 The diagram shows two similar triangles, AEB and ADC.

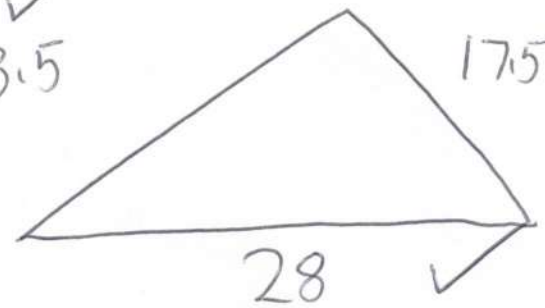


Not to scale

AB = 8 cm, BE = 5 cm and CD = 17.5 cm

Work out the length of BC.





28 − 8

BC = 20 .....cm **[3]**

14 $16\,807 = 7^5$.

Write 16 807 000 000 as a product of its prime factors.

$1\,000\,000 = 10^6 = 5^6 \times 2^6$

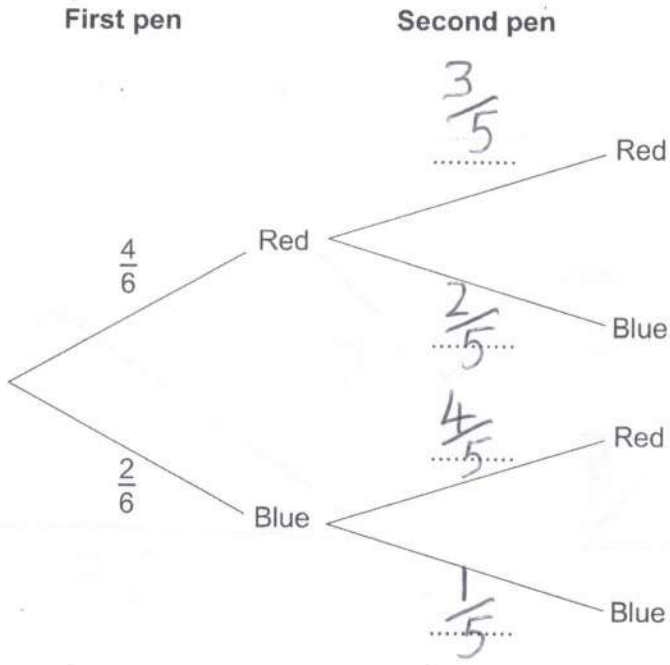
$7^5 \times 5^6 \times 2^6$ **[3]**

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15 A packet of 6 pens contains 4 red pens and 2 blue pens.

A pen is taken at random from the packet and is not replaced.
A second pen is then taken at random from the packet.

(a) Complete the tree diagram.



[2]

(b) Find the probability of taking two pens of the same colour.

$\left(\frac{4}{6} \times \frac{3}{5}\right) + \left(\frac{2}{6} \times \frac{1}{5}\right)$

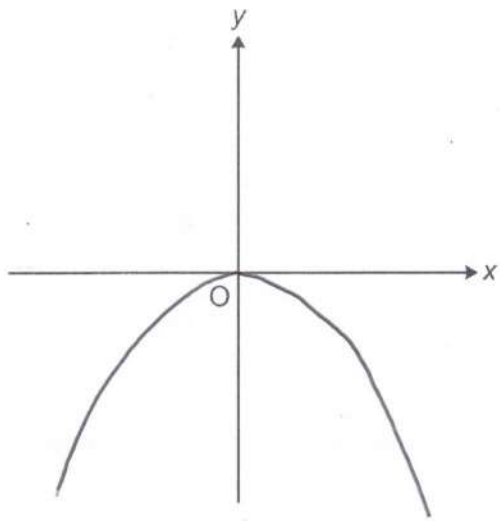
$\frac{12}{30} + \frac{2}{30}$

$\frac{14}{30}$ OE

(b) ..... **[3]**

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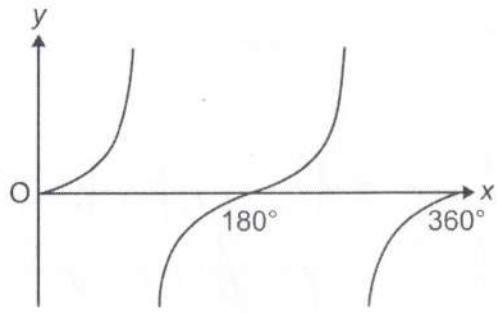
16 **(a)** On the axes below, sketch the graph $y = -x^2$.



✓✓

[2]

(b) Write down a possible equation for the graph sketched below.

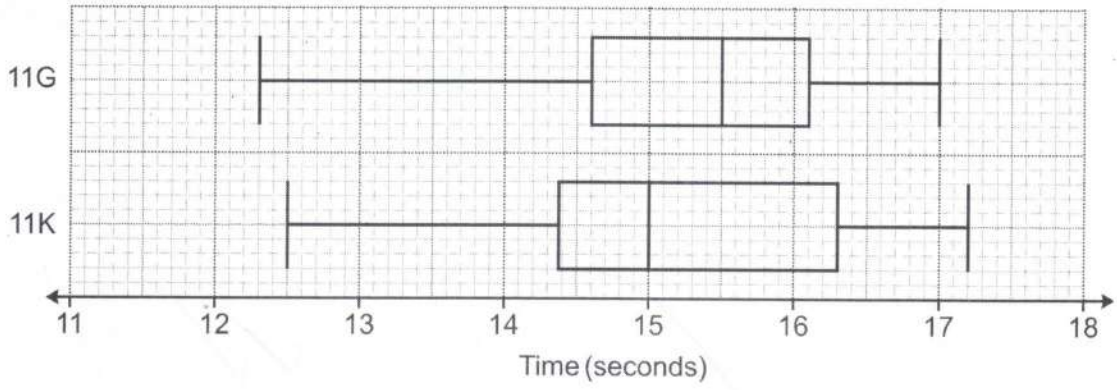


(b) $y =$ $y = \tan x$ ✓ **[1]**

or $y = 2 \tan x$
etc

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17 Two Year 11 classes, 11G and 11K, record their times for a race.
The box plots show the distribution of the times, in seconds, for each class.



(a) Write down the percentage of students in **11G** who took longer than 14.6 seconds.

(a) 75 ✓ % **[1]**

(b) Which class, 11G or 11K, was fastest on average?
Include values to support your decision.

Class 11K because their median = 15 which is less than 11G's median of 15.5

[2]

✓ ✓

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18 Sasha creates a four-digit passcode.

They use four digits from 0 to 9.
They do not use any digit more than once.

Work out how many of the possible four-digit passcodes are even.

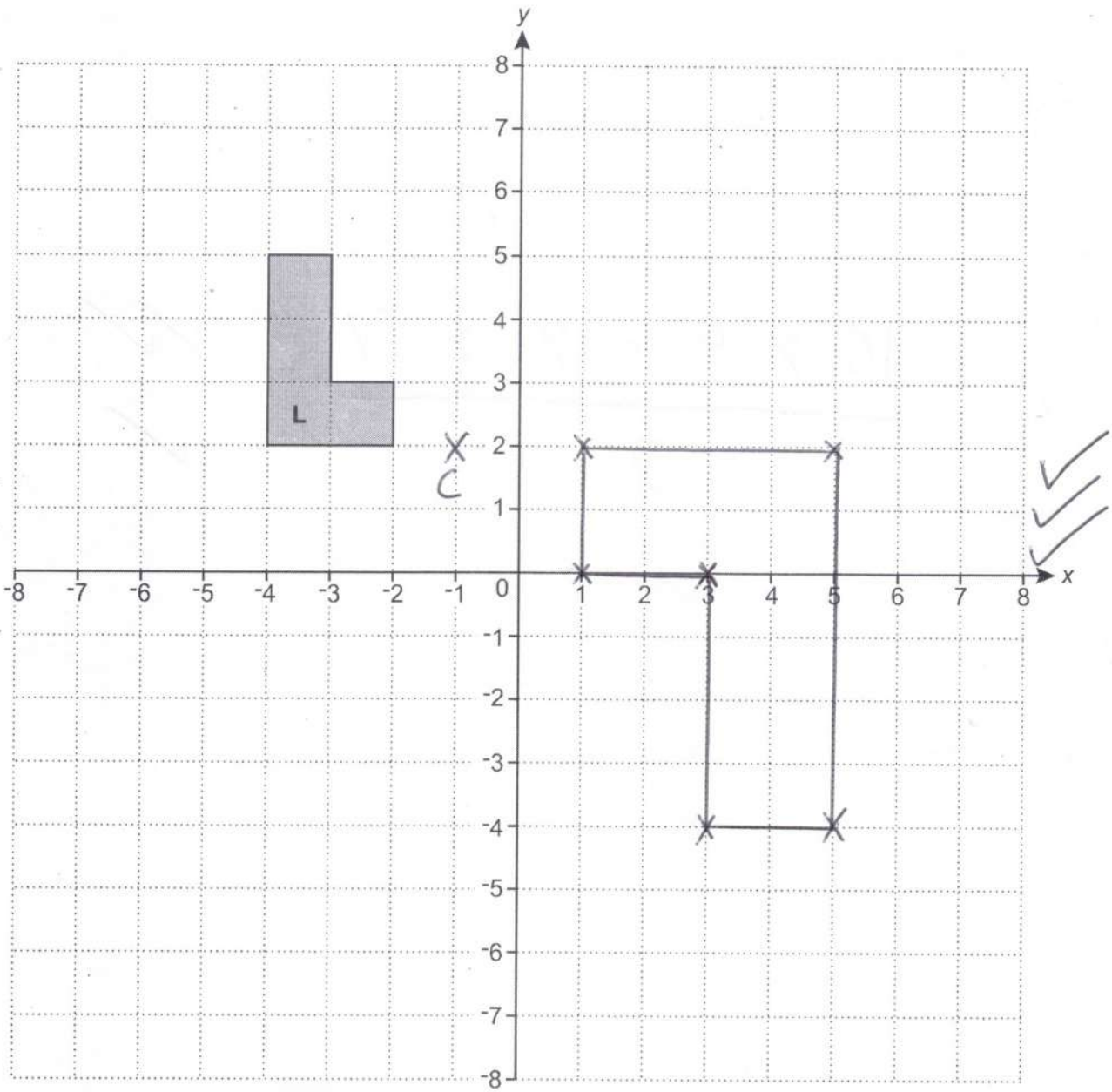
$$\frac{10 \times 9 \times 8 \times 7}{2}$$ ✓✓ ✓

2520 ✓

..... **[4]**

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19 Shape **L** is drawn on the grid.

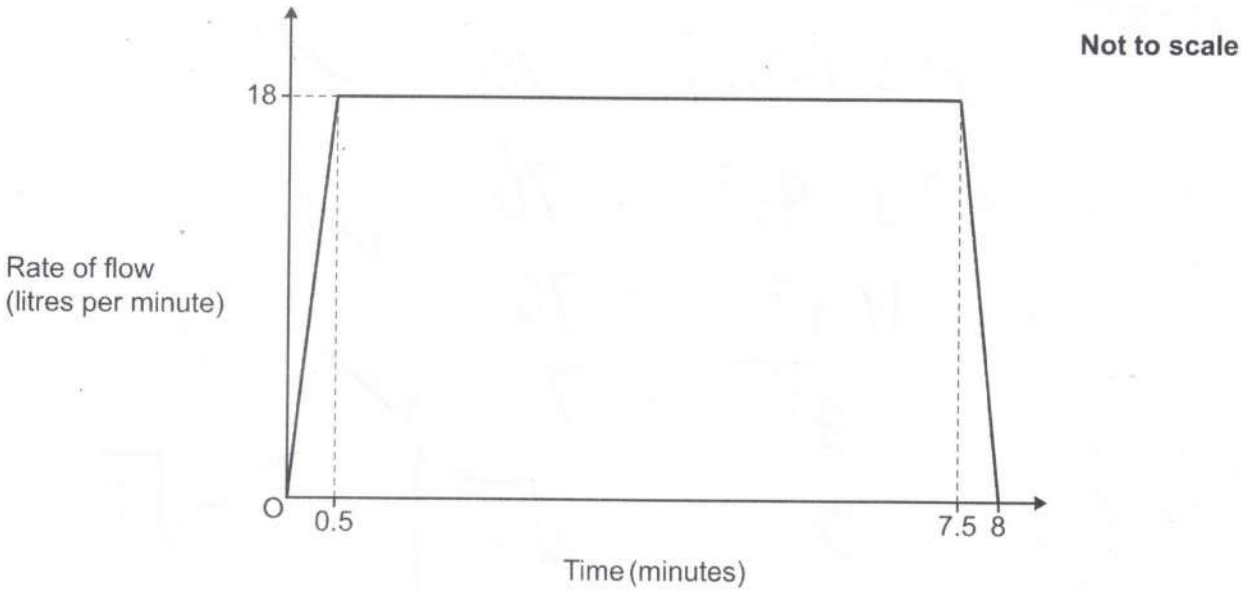


Enlarge shape **L** with scale factor -2 and centre of enlargement at $(-1, 2)$. **[3]**

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20 A container takes 8 minutes to be filled with water.

The graph shows the rate of flow, in litres per minute, of the water into the container during the 8 minutes.



(a) Show that 126 litres of water flows into the container between 0.5 minutes and 7.5 minutes. **[1]**

$(7{\cdot}5-0{\cdot}5) \times 18 = 126$ ✓

(b) Work out the average rate of flow, in litres per minute, of water into the container during the 8 minutes.

Total $= 126 + \left(\frac{1}{2} \times 0{\cdot}5 \times 18\right) \times 2 = 135$ ✓✓

Ave rate $= \frac{135}{8}$ ✓

(b) 16·875 ✓ litres per minute **[4]**

or 16·88 or 16·9

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21 The graph of $y = -3x$ intersects the graph of $x^2 + y^2 = 70$ at two points.

Work out the exact coordinates of the two points.
You must show your working.

$x^2 + (-3x)^2 = 70$ ✓

$x^2 + 9x^2 = 70$ ✓

$10x^2 = 70$

$x^2 = 7$ ✓

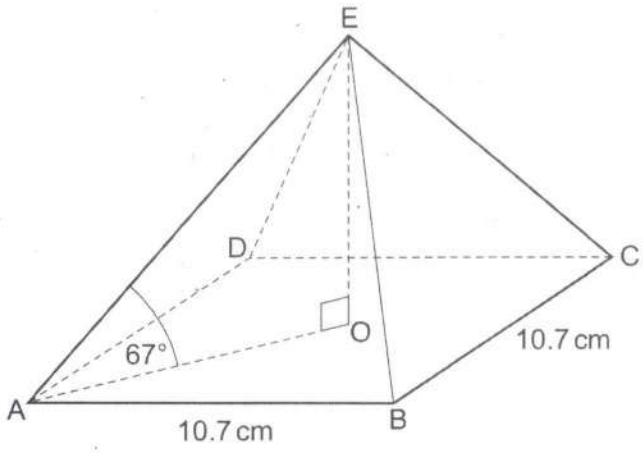
$x = \sqrt{7} \quad | \quad -\sqrt{7}$

$y = -3 \times \sqrt{7} \quad | \quad y = -3x - \sqrt{7}$ m ✓

($\sqrt{7}$, $-3\sqrt{7}$) and ($-\sqrt{7}$, $3\sqrt{7}$) ✓ **[5]**

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22 The diagram shows a square-based pyramid ABCDE.
O is the centre of the base.

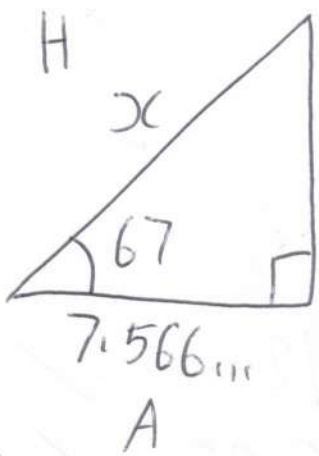


The length of the base is 10.7 cm.
Angle EAO is 67°.

Calculate the length of AE.
You must show your working.

$AC = \sqrt{10.7^2 + 10.7^2} = 15.13...$ ✓✓

$AO = \frac{15.13...}{2} = 7.566...$ ✓



C A (H)

$x = \frac{7.566...}{\cos 67}$ ✓✓

AE = 19.36 ✓ cm **[6]**

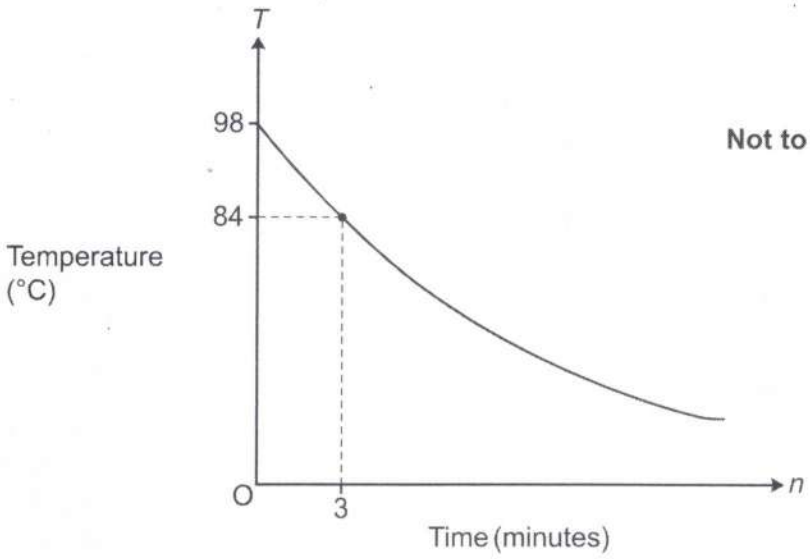
[19.34 → 19.37]

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23 A pot of tea is made using boiling water and left to cool.
The temperature, T°C, of the pot of tea after n minutes is given by the formula

$T = ab^n$.

The graph shows some information about the temperature of the pot of tea.



Find the value of a and the value of b.

$T = 98 \times b^n$

$84 = 98 \times b^3$ ✓

$\frac{6}{7} = b^3$

$b = \sqrt[3]{\frac{6}{7}}$

$a =$ 98 ✓

$b =$ 0.95 ✓ (0.9499...) [3]

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24 **(a)** Show that the equation $x^4 + 3x^2 - 2x - 5 = 0$ has a solution between $x = 1$ and $x = 2$. **[3]**

$f(1) = -3$ ✓

$f(2) = 19$ ✓

sign change hence $1 < \text{solution} < 2$

(b) Find this solution correct to **1** decimal place.
You must show calculations to support your answer.

$f(1.5) = 3.8125$ ✓

$f(1.3) = 0.3261$ ✓

$f(1.2) = -1.0064$

$f(1.25) = -0.371\ldots$ ✓

$1.25 \leqslant x \leqslant 1.3$

✓

(b) $x =$ 1.3 **[4]**

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25 A bag contains only round tiles and square tiles.
Each tile is either black or white.

$3:1 = \frac{3}{4} : \frac{1}{4}$

The ratio of round tiles to square tiles is 3 : 1.
45% of all the tiles are round black tiles.
9% of all the tiles are square white tiles.

Show that the proportion of round tiles that are black is less than the proportion of square tiles that are black. **[6]**

	B	W	Total
R	0.45	0.3	0.75
S	0.16	0.09	0.25
	0.61	0.39	1

✓✓ ✓✓

Round that are black $= \frac{0.45}{0.75} = 0.6$ ✓

Square that are black $= \frac{0.16}{0.25} = 0.64$ ✓

$0.6 < 0.64$

END OF QUESTION PAPER

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