

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

GCSE MATHEMATICS

Past Paper
Website
Home



H

Higher Tier

Paper 3 Calculator

Tuesday 13 June 2017

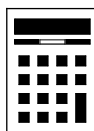
Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a calculator
- mathematical instruments.



Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice

- In all calculations, show clearly how you work out your answer.

For Examiner's Use

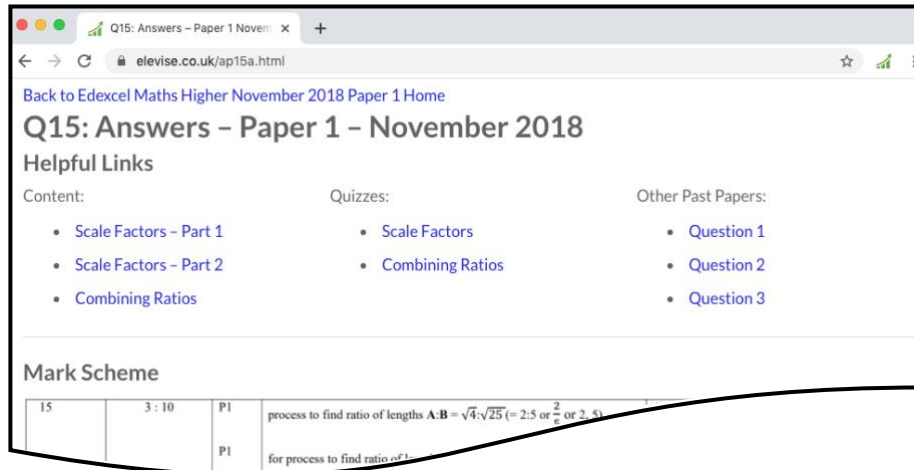
Pages	Mark
2–3	
4–5	
6–7	
8–9	
10–11	
12–13	
14–15	
16–17	
18–19	
20–21	
22–23	
24–25	
26	
TOTAL	



J U N 1 7 8 3 0 0 3 H 0 1

How the Past Papers work

Every past paper question has a corresponding webpage that has the mark scheme and worked solutions for that particular question. There are also helpful links to content for the concepts used to answer the question, quizzes that you can use to try some of the concepts and similar past paper questions. An example of a webpage for a question is given below:



How to get to the webpage


Every past paper question has a QR code next to it, such as:

15 Three solid shapes **A**, **B** and **C** are similar.

The surface area of shape **A** is 4 cm^2
The surface area of shape **B** is 25 cm^2

The ratio of the volume of shape **B** to the volume of shape **C** is $27 : 64$

Work out the ratio of the height of shape **A** to the height of shape **C**.
Give your answer in its simplest form.



AP15A

You can get to the corresponding webpage in 3 different ways:

- 1) Scanning the QR code with the camera on a smart phone or tablet.
- 2) Typing the code that is underneath the QR code at the end of www.elevise.co.uk/. For this question, the code is AP15A, so you would type www.elevise.co.uk/AP15A into the address bar to obtain the webpage. If you would like to see the question rather than the answers, you change the A at the end of the code to a Q; you would type www.elevise.co.uk/AP15Q
- 3) Clicking on the QR code if you are viewing the past paper as a PDF or on a web browser.

www.elevise.co.uk



Answer **all** questions in the spaces provided

1 $\mathbf{a} = \begin{pmatrix} -4 \\ -1 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$

Circle the vector $2\mathbf{a} + \mathbf{b}$

[1 mark]



$$\begin{pmatrix} -5 \\ -3 \end{pmatrix}$$

$$\begin{pmatrix} -11 \\ -3 \end{pmatrix}$$

$$\begin{pmatrix} -5 \\ -1 \end{pmatrix}$$

$$\begin{pmatrix} -11 \\ -1 \end{pmatrix}$$

2 Which of these values of n makes 2.7×10^n a cube number?

Circle your answer.

[1 mark]



0

1

2

3

3 Rearrange $2x = \frac{y}{w}$ to make w the subject.

Circle your answer.

[1 mark]



$$w = \frac{2y}{x}$$

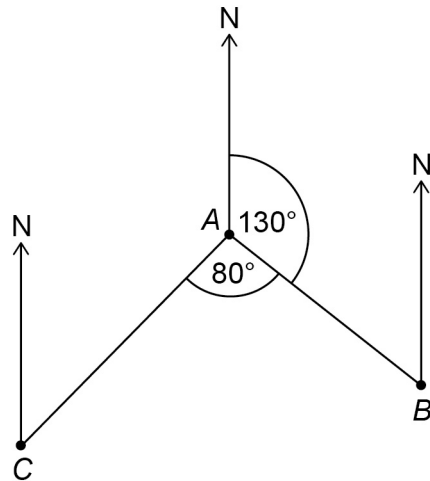
$$w = \frac{2x}{y}$$

$$w = \frac{y}{2x}$$

$$w = \frac{x}{2y}$$



4

Not drawn
accurately

Work out the bearing of C from A.
Circle your answer.



[1 mark]

030°

130°

150°

210°

Turn over for the next question

Turn over ►



5

A coin lands on Tails 200 times.

The relative frequency of Tails is 0.4

Work out the number of times the coin was thrown.

**[2 marks]**

Answer _____

6

How are the whole number solutions to A and B different?

A Solve $3 \leq 3x < 18$

B Solve $3 < 3x \leq 18$

**[2 marks]**



- 7 (a)** The length of a pipe is 6 metres to the nearest metre.

Complete the error interval for the length of the pipe.

[2 marks]



Answer _____ m \leq length < _____ m

- 7 (b)** The length of a different pipe is 4 metres to the nearest metre.

Olly says,

“The total length of the two pipes is 11 metres to the nearest metre.”

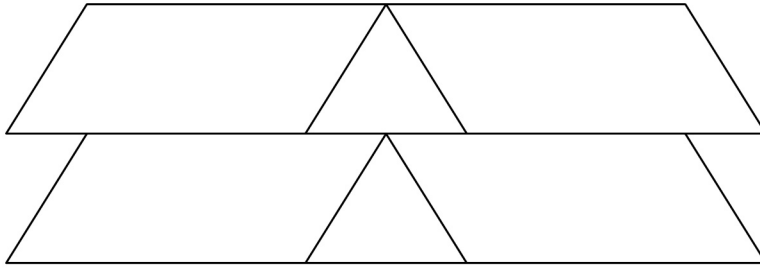
Give an example to show that he could be correct.

[2 marks]

Turn over for the next question



- 8** This shape is made from two triangles and four congruent parallelograms.



Not drawn
accurately

For each statement, tick the correct box.

- 8 (a)** The triangles are equilateral.



[1 mark]

☐

Must be true

☐

Could be true

☐

Must be false

- 8 (b)** The triangles are congruent.

[1 mark]

☐

Must be true

☐

Could be true

☐

Must be false



- 9** There are 720 boys and 700 girls in a school.

The probability that a boy chosen at random studies French is $\frac{2}{3}$

The probability that a girl chosen at random studies French is $\frac{3}{5}$

- 9 (a)** Work out the number of students in the school who study French.



[3 marks]

Answer _____

- 9 (b)** Work out the probability that a student chosen at random from the whole school does **not** study French.

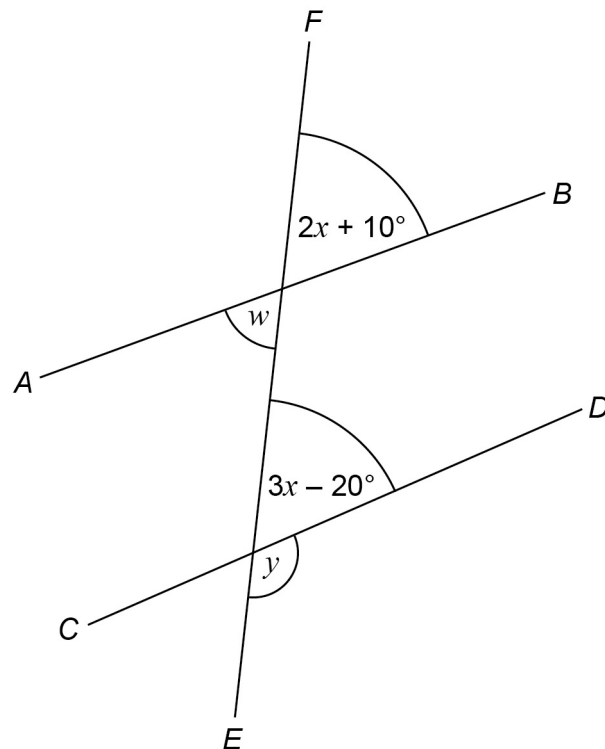
[2 marks]

Answer _____

Turn over for the next question



- 10 AB , CD and EF are straight lines.



Not drawn
accurately

- 10 (a) Ava assumes that AB and CD are parallel.

What answer should she get for the size of angle y ?



AL10A

[4 marks]

Answer _____ degrees



10 (b)

In fact,

 AB and CD are **not** parallelangle w is 60° What effect does this have on the size of angle y ?

Tick a box.

☐ y is bigger☐ y is the same☐ y is smaller

Show working to support your answer.

[3 marks]

Turn over for the next question**Turn over ►**

- 11** Purple paint is made by mixing red paint and blue paint in the ratio 5 : 2
Yan has 30 litres of red paint and 9 litres of blue paint.

What is the **maximum** amount of purple paint he can make?

[3 marks]



Answer _____ litres

- 12** $(ar^b)^4 = 16r^{20}$ where a and b are positive integers.

Work out a and b

[2 marks]



$a =$ _____ $b =$ _____



13

In a class of 28 students

the mean height of the 12 boys is 1.58 metres

the mean height of all 28 students is 1.52 metres.

Work out the mean height of the girls.



AL13A

[4 marks]

Answer _____ metres

14

 $xy = c$ where c is a constant.

Circle the correct statement.

[1 mark]



AL14A

 y is directly proportional to x y is directly proportional to $\frac{1}{x}$ y is inversely proportional to $\frac{1}{x}$ x is directly proportional to y

Turn over for the next question

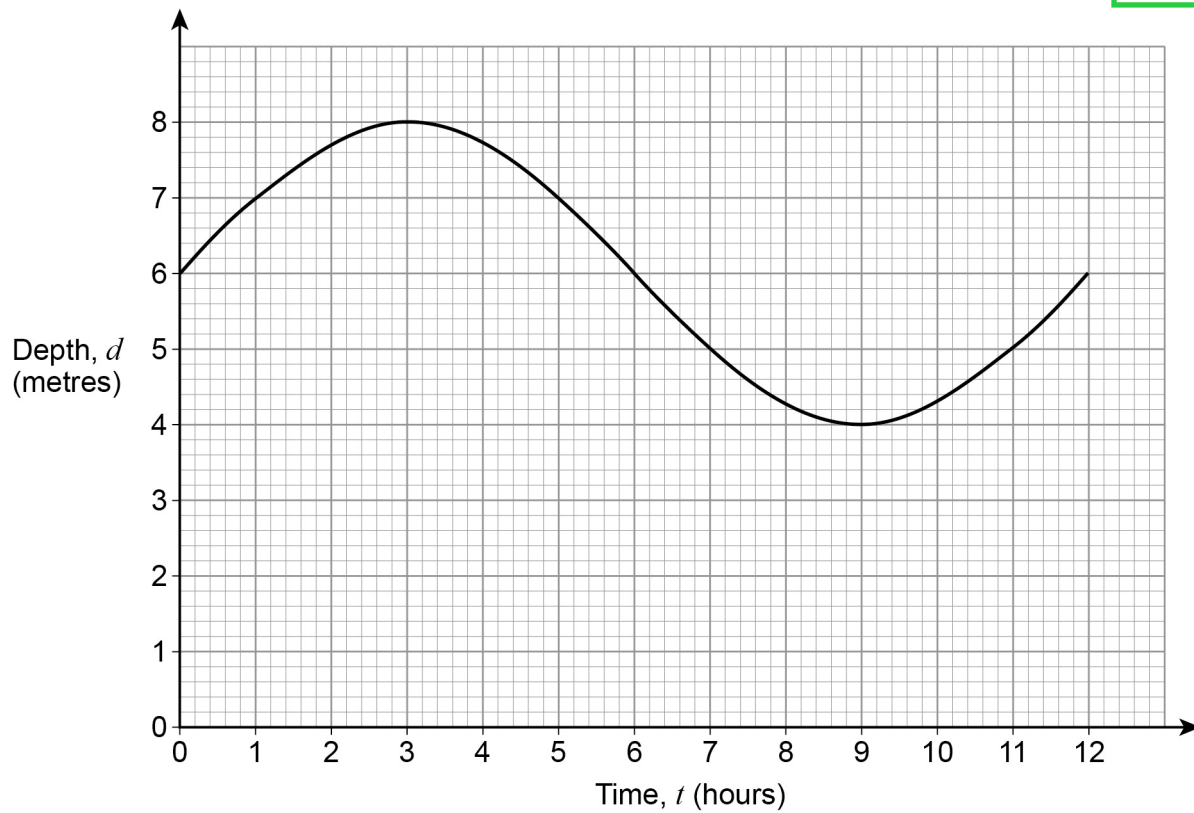




15 The graph shows the depth of water in a harbour for 12 hours.

d is the depth of water in a harbour in metres

t is the number of hours after 9 am



15 (a) For how many of the 12 hours is the depth more than 5 metres?

[1 mark]

Answer _____

15 (b) By how much does the depth change between 12 noon and 4 pm?

[1 mark]

Answer _____ metres



16

The value of a new car is £18 000

The value of the car decreases by

25% in the first year

12% in each of the next 4 years.

Work out the value of the car after 5 years.



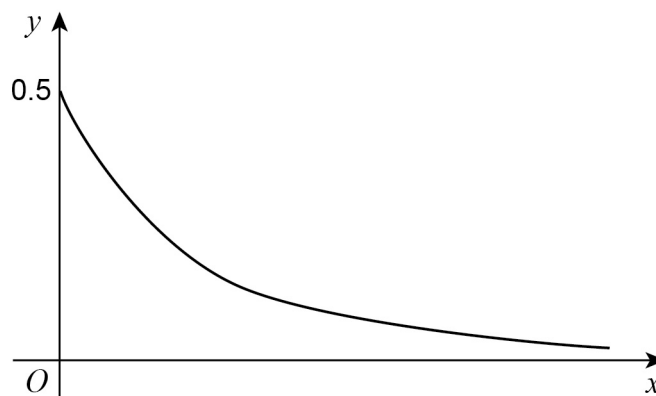
[3 marks]

Answer £ _____

Turn over for the next question



18

Nick sketches the graph of $y = 0.5^x$ for $x \geq 0$ Make **one** criticism of his sketch.

[1 mark]

Turn over for the next question

Turn over ►

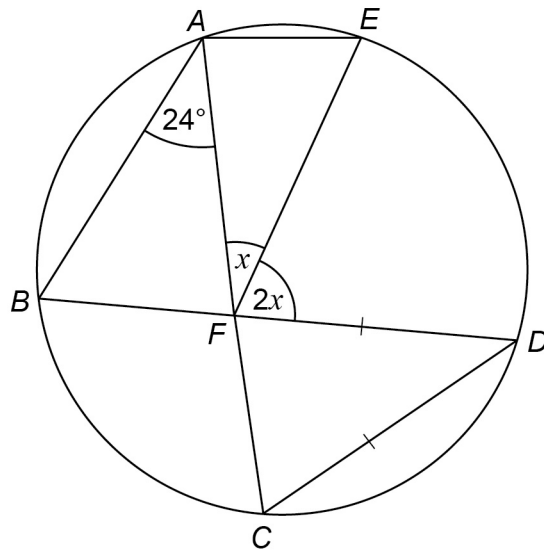


19

A, B, C, D and E are points on a circle.

BFD and AFC are straight lines.

$DC = DF$



Not drawn
accurately



Work out the size of angle x .

You **must** show your working which may be on the diagram.

[4 marks]

Answer _____ degrees



20

This sign shows when a lift is safe to use.

Total mass of people must be 450 kg or less



Ben and some other people are in the lift.

Their total mass is 525 kg to the nearest 5 kg

Ben gets out.

He has a mass of 78 kg to the nearest kg

Is the lift now safe to use?

You **must** show your working.

[4 marks]

Answer _____

Turn over for the next question



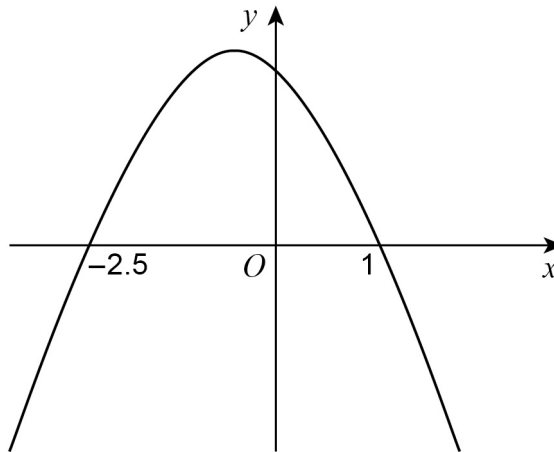
21

Here is a sketch of $y = f(x)$ where $f(x)$ is a quadratic function.

The graph intersects the x -axis where $x = -2.5$ and $x = 1$



Not drawn
accurately



Circle the solution of $f(x) > 0$

[1 mark]

$$x < -2.5 \text{ or } x > 1$$

$$x > -2.5 \text{ or } x > 1$$

$$-2.5 < x < 1$$

$$x > -2.5 \text{ or } x < 1$$





AL22A

[3 marks]

[illegible]

Answer _____

Turn over for the next question



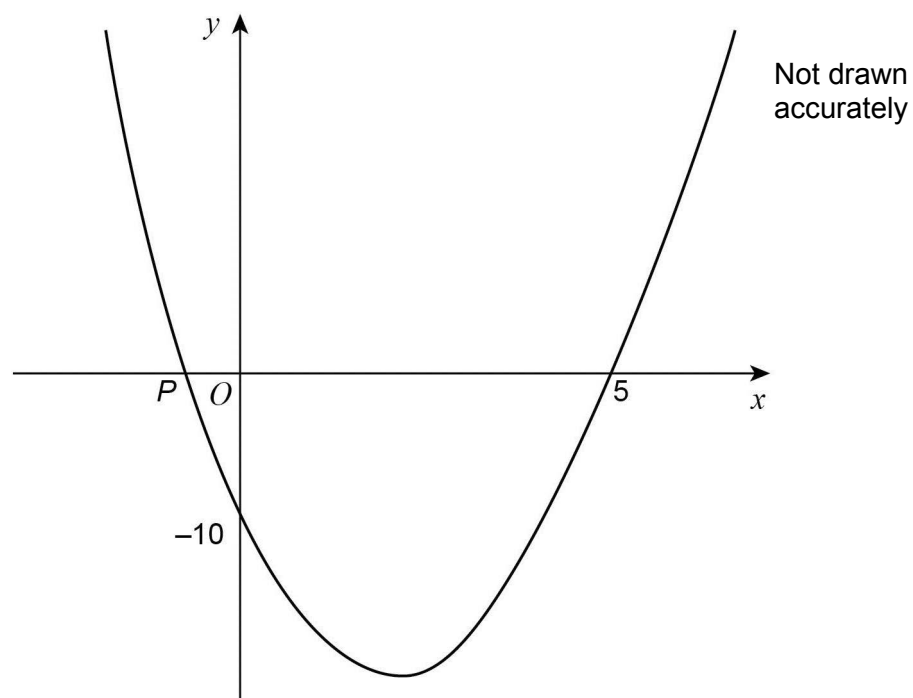
23

Here is a sketch of $y = x^2 + bx + c$

The curve intersects

the x -axis at $(5, 0)$ and point P

the y -axis at $(0, -10)$



Work out the x -coordinate of the turning point of the graph.

[4 marks]

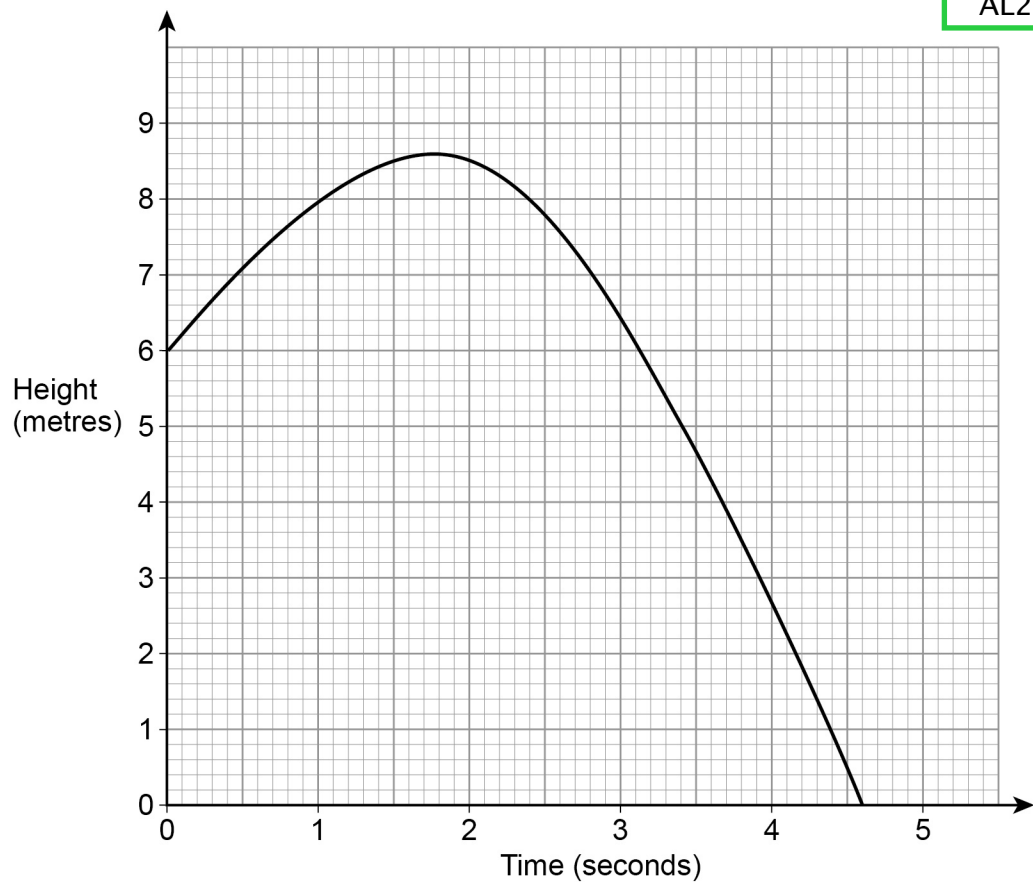
Answer _____



24

A ball is thrown from a point 6 metres above the ground.

The graph shows the height of the ball above the ground, in metres.



Estimate the speed of the ball, in m/s, after 1 second.

You **must** show your working.

[2 marks]

Answer _____ m/s



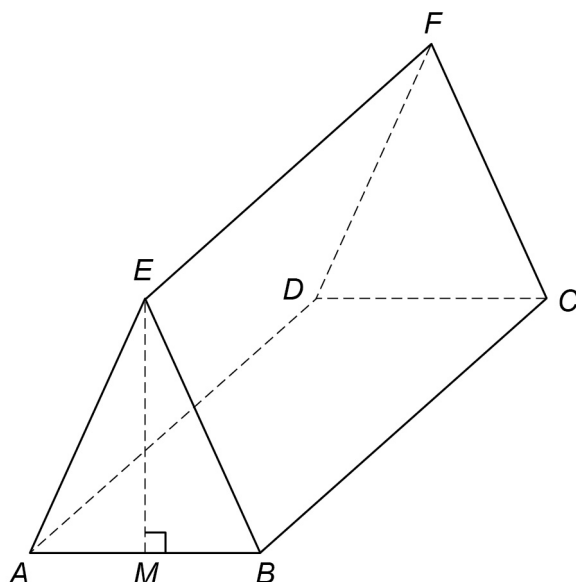
25

Rectangle $ABCD$ is the horizontal base of a triangular prism $ABCDEF$.

$$AE = BE$$

E is vertically above M , the midpoint of AB .

$$AB = 16 \text{ cm} \quad AE = 17 \text{ cm} \quad BC = 30 \text{ cm}$$



25 (a) Show that $EM = 15 \text{ cm}$

[2 marks]



[4 marks]

[illegible]

Answer degrees

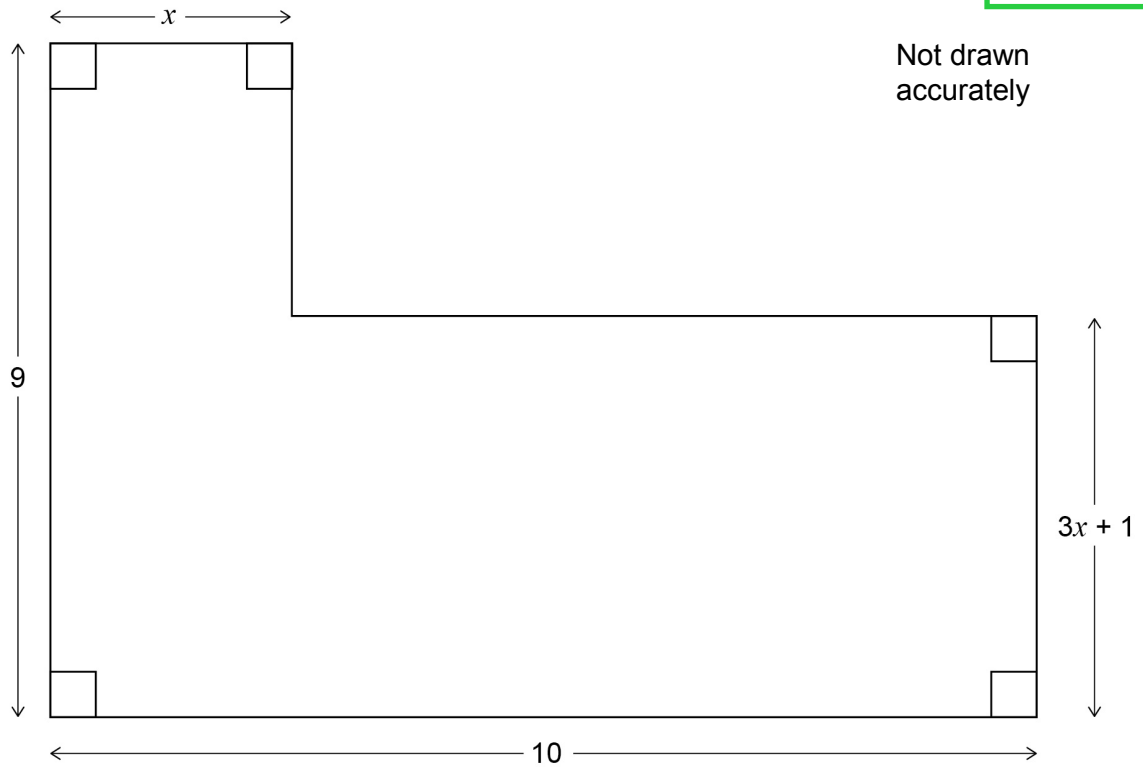
Turn over for the next question



26

Here is an L-shape.

All dimensions are in centimetres.

Not drawn
accurately

Work out the value of x .

[6 marks]

[illegible]

Answer

Turn over for the next question

6

Turn over ►



27 Prove that $x^2 + x + 1$ is always positive.

[3 marks]



END OF QUESTIONS

