OXFORD CAMBRIDGE AND RSA EXAMINATIONS

GCSE

J567/04

MATHEMATICS B

Paper 4

(Higher Tier)

MONDAY 4 MARCH 2013: Morning

DURATION: 1 hour 45 minutes plus your additional time allowance

MODIFIED ENLARGED 24pt

Candidate forename		Candidate surname	

Centre number						Candidate number				

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

Insert for Question 4

OTHER MATERIALS REQUIRED:

Geometrical instruments
Tracing paper (optional)
Scientific or graphical calculator

You are permitted to use a calculator for this paper.

READ INSTRUCTIONS OVERLEAF

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INSTRUCTIONS TO CANDIDATES

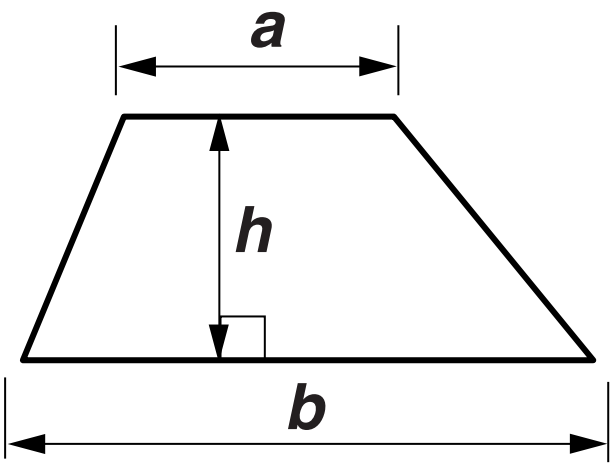
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Your answers should be supported with appropriate working. Marks may be given for a correct method even if the answer is incorrect.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

INFORMATION FOR CANDIDATES

- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.**
- **Your Quality of Written Communication is assessed in questions marked with an asterisk (*).**
- **The total number of marks for this paper is 100.**

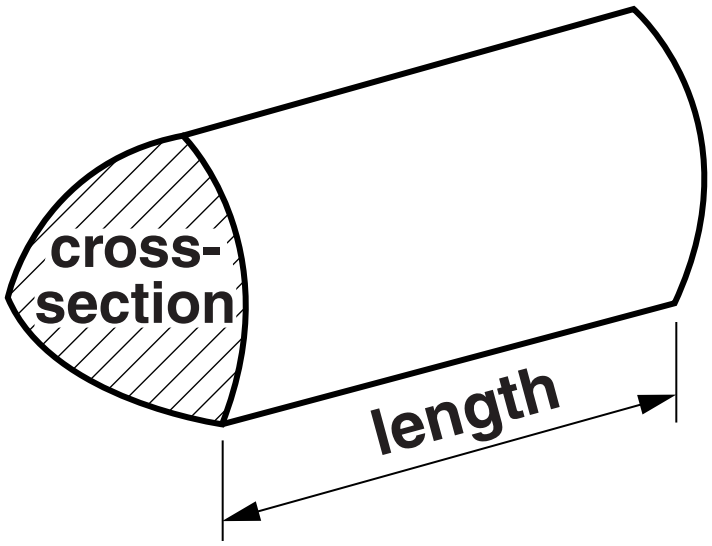
FORMULAE SHEET: HIGHER TIER

Trapezium



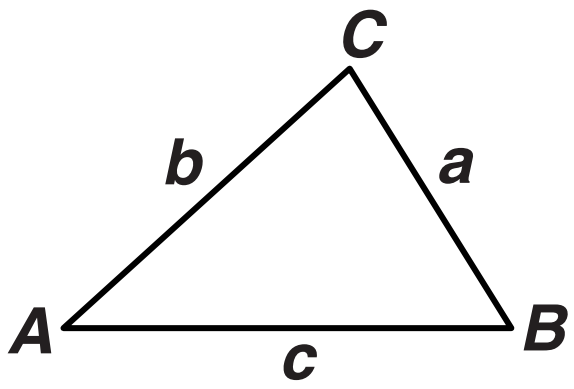
Area of trapezium $= \frac{1}{2}(a + b)h$

Prism



Volume of prism
= (area of cross-section) × length

In any triangle *ABC*

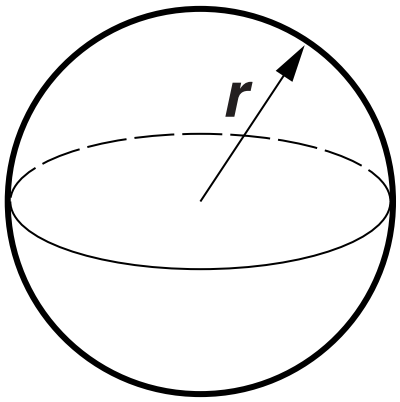


Sine rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

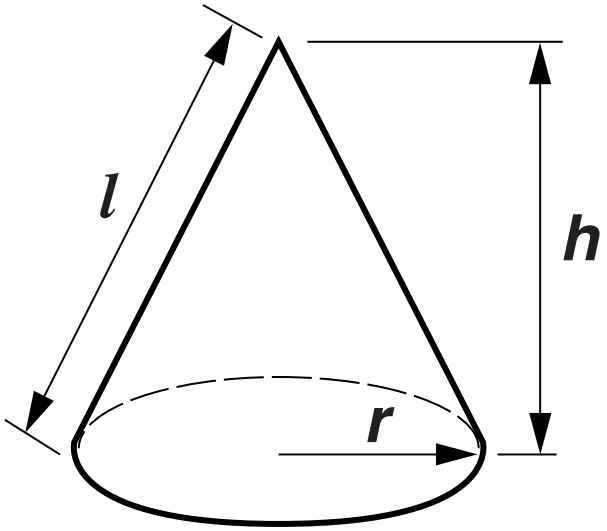
Sphere



Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

Cone



Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$, **where** $a \neq 0$, **are given by**

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

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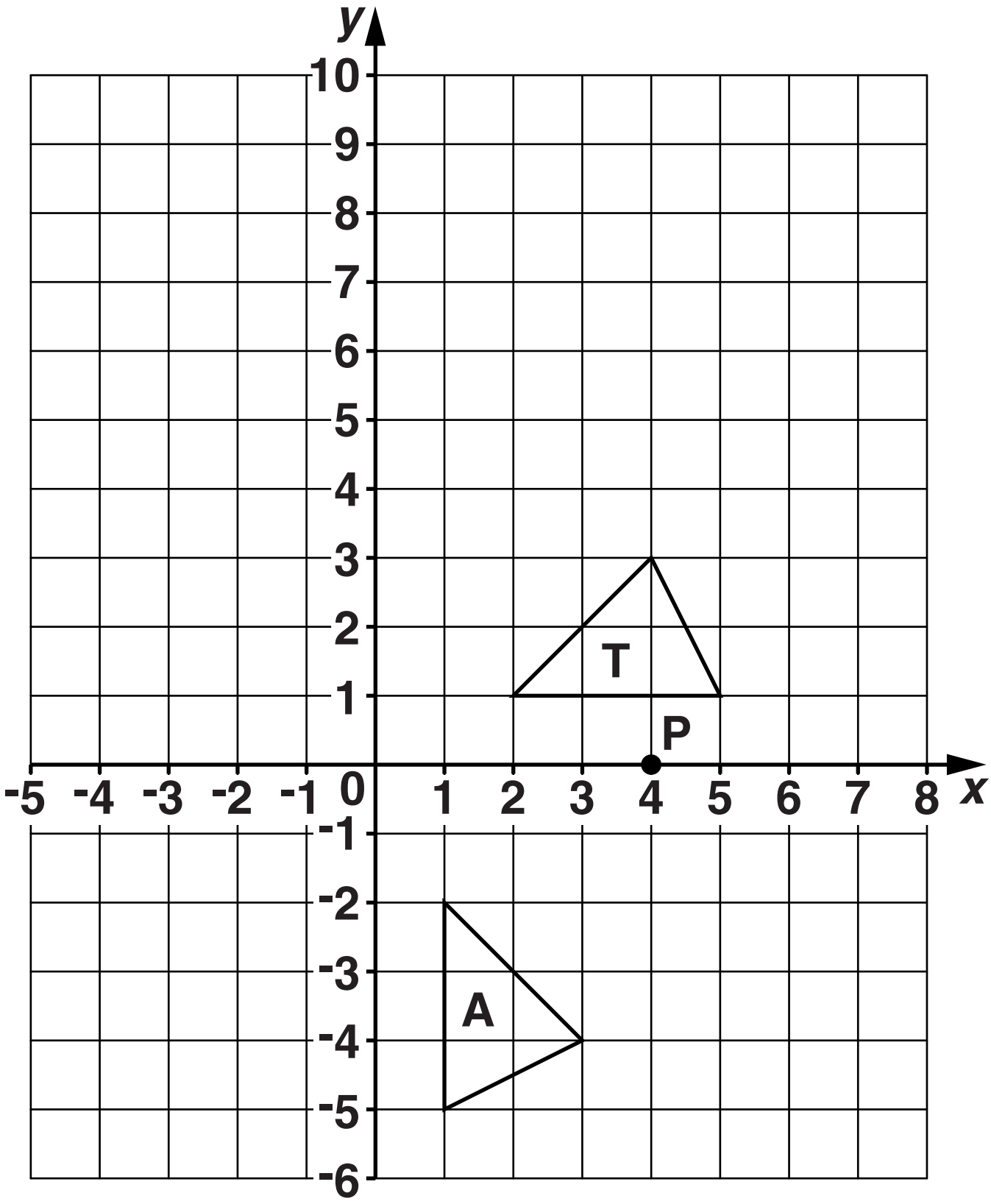
1 Here is a grid with two triangles, T and A.



(a) **Describe fully the SINGLE transformation that maps triangle T onto triangle A.**

_____

_____ **[3]**

(b) **Enlarge triangle T with scale factor 3 and centre P (4, 0).** **[2]**

2 The graph opposite is for converting Pounds (£) to Danish Kroner (DKK).

(a) Use the graph to convert £6 to Danish Kroner (DKK).

(a) _____ **DKK [1]**

(b) Work out the gradient of the line.

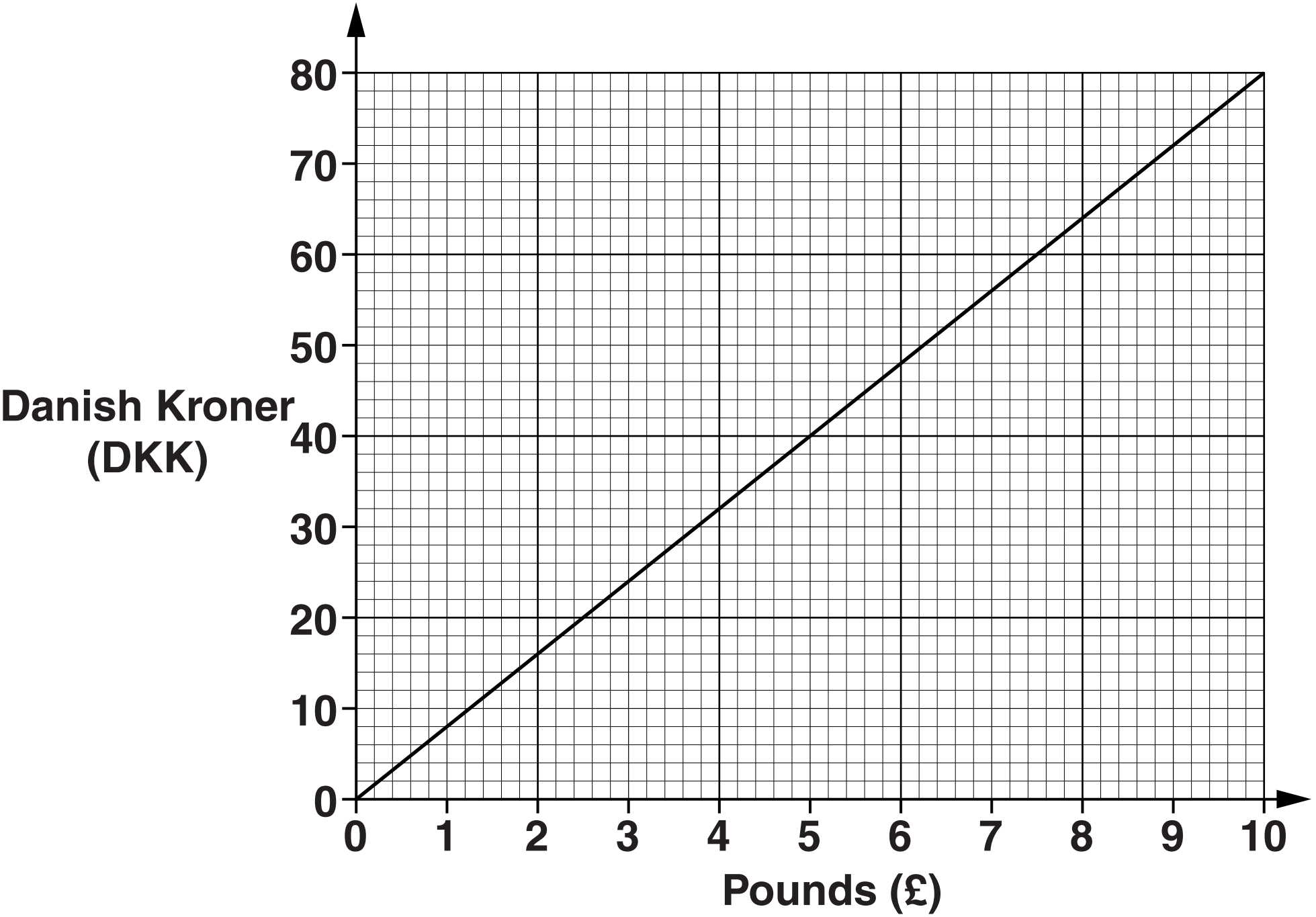
(b) _____ **[2]**

(c) Explain what this gradient represents.

_____

_____ **[1]**

11


Danish Kroner
(DKK)
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
Pounds (£)

(d) Convert 152 DKK to Pounds.

(d) £_____ [2]

BLANK PAGE

3 (a) Here is a list of numbers.

39 43 57 79 91 111

Write down all the numbers in this list which are prime numbers.

(a) _____ [1]

(b) Write 42 as a product of its prime factors.

(b) _____ [2]

(c) Find the lowest common multiple of 24 and 42.

(c) _____ **[2]**

(d) A travel firm has to take 95 pupils on a visit.
It has taxis which take 7 passengers and minibuses which take 15 passengers.
They do not want to have any empty seats.

Work out how many taxis and minibuses they need to use.

(d) taxis = _____

minibuses = _____ **[2]**

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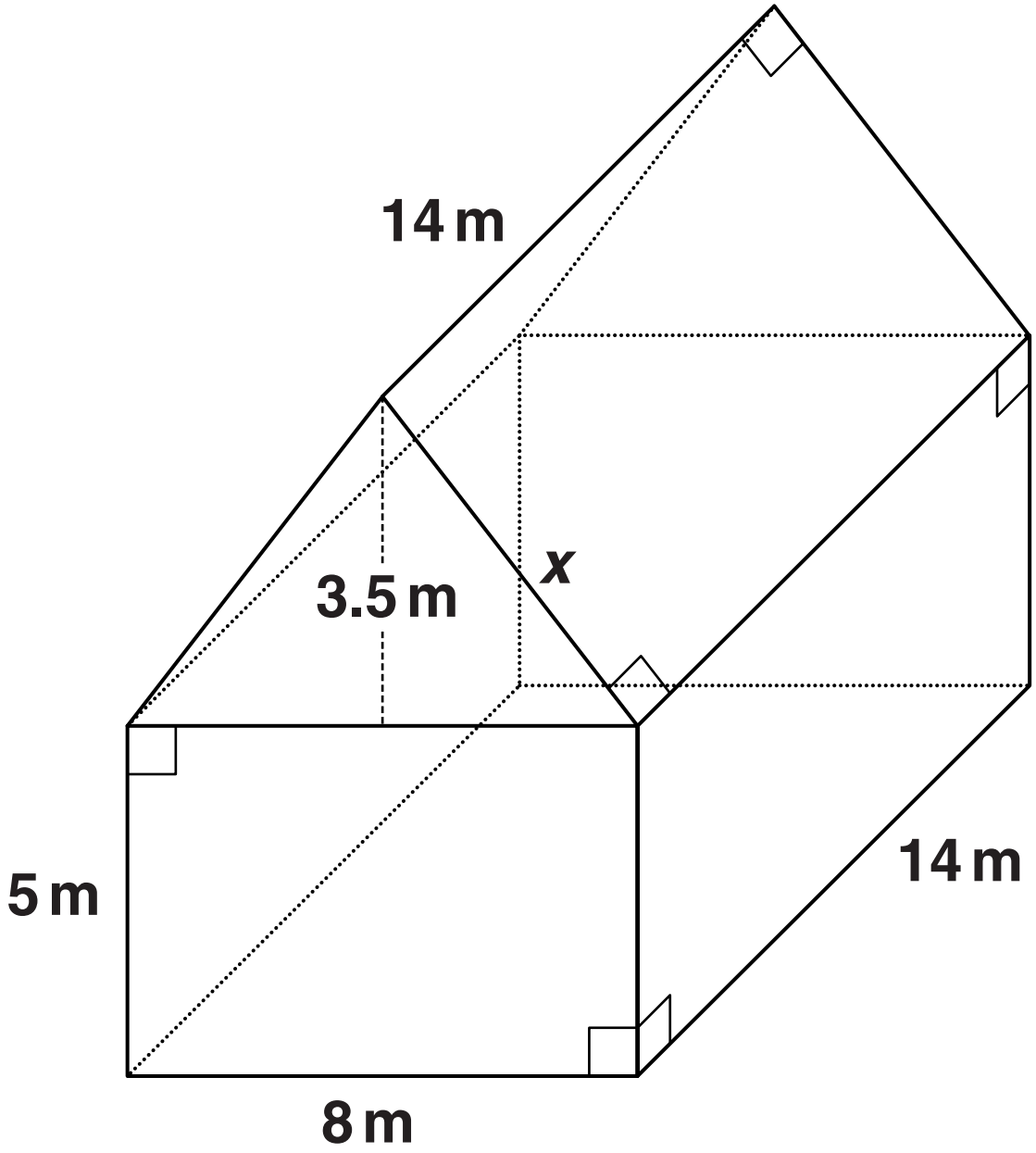
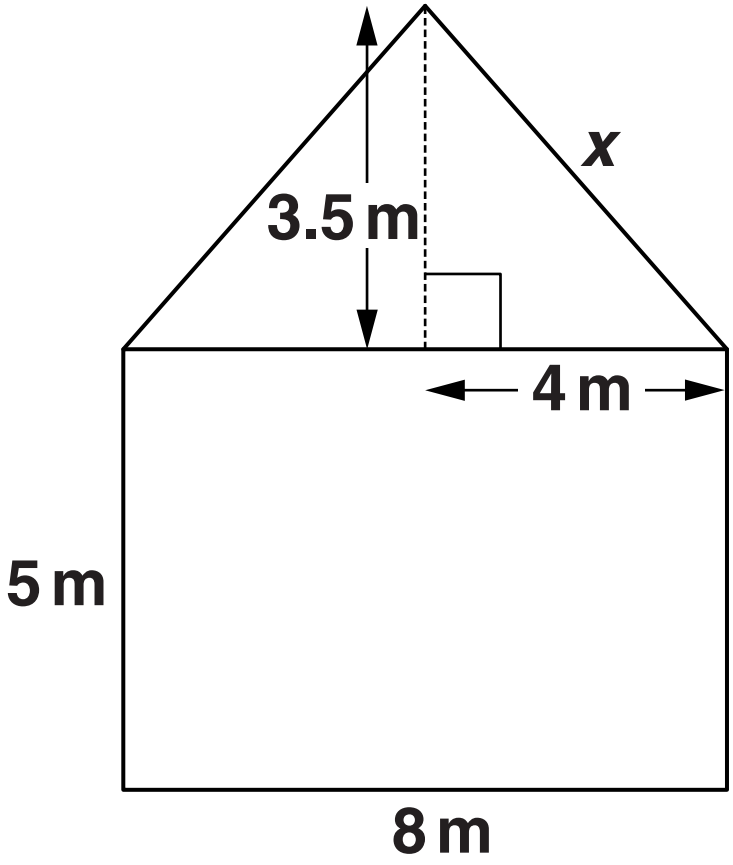
4 Here is a diagram of a barn.



(a) The front elevation of the barn is sketched below.

Calculate the length *x*.

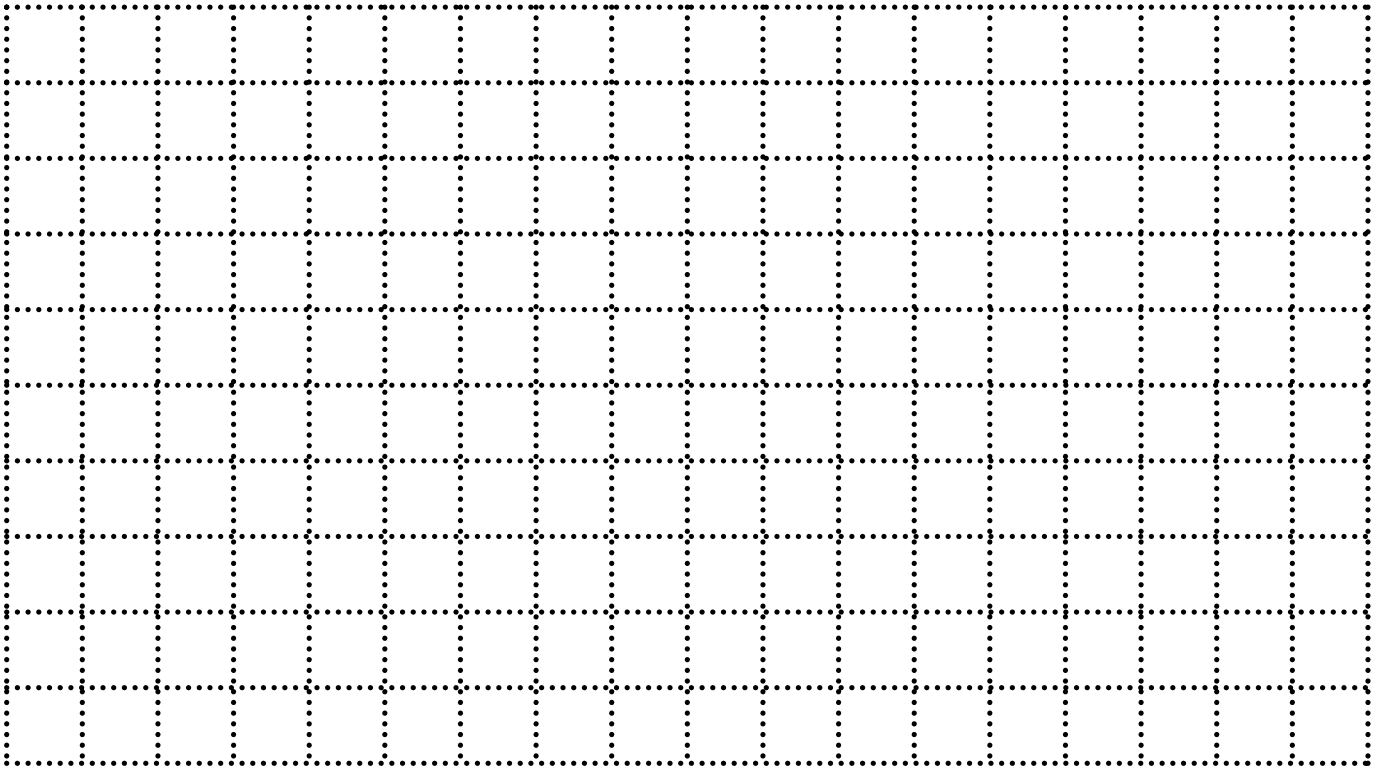


Not to scale

(a) _____ **m [3]**

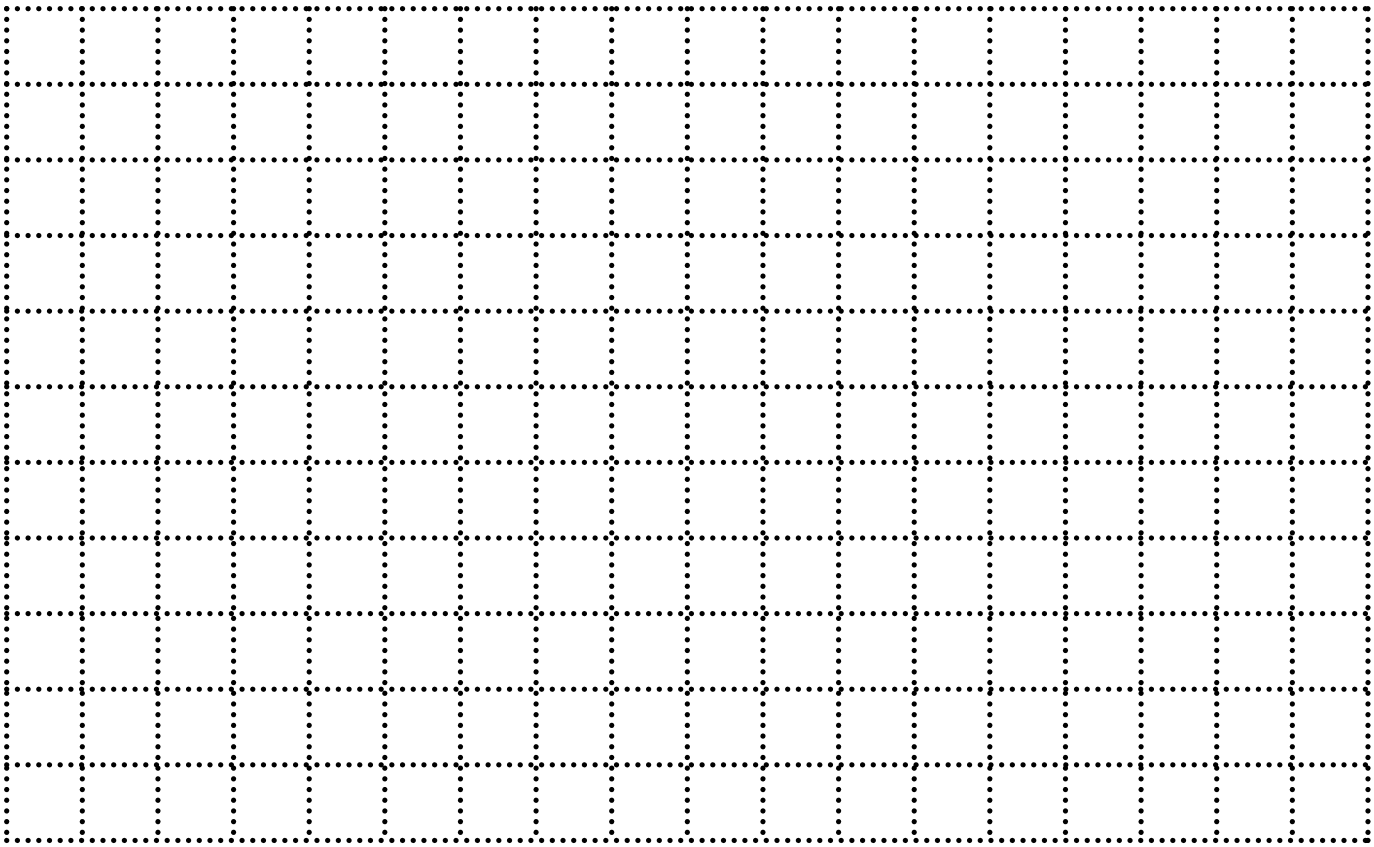
(b) You may wish to use the extra copy of the diagram included on the insert provided.

(i) Draw the PLAN VIEW of the barn on the grid below using a scale of 1 cm to 1 m.



[1]

(ii) Draw the SIDE ELEVATION of the barn on the grid below using a scale of 1 cm to 1 m.



[1]

5 Here are the first four terms of a sequence.

17 23 29 35

Write an expression for the nth term.

_____ **[2]**

6 (a) Multiply out the brackets and simplify.

$5(x - 3) + 2(x + 5)$

(a) _____ **[2]**

(b) Solve.

$$12x - 11 = 4x + 9$$

(b) $x =$ _____ **[3]**

BLANK PAGE

7 Golf scores are recorded on cards. The table below summarises the scores for one day.

Score	Frequency
60 – 66	10
67 – 73	15
74 – 80	14
81 – 87	4

(a) Calculate an estimate of the mean score.

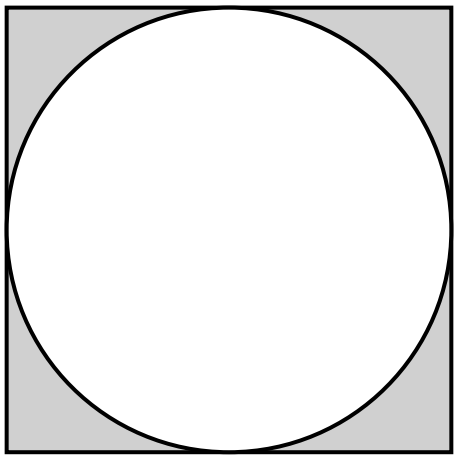
(a) _____ [4]

(b) A card is picked at random.

Work out the probability that the score on the card is 73 or below.

(b) _____ **[2]**

8 The diagram below shows a circular pond with paving stones around the edge making up a square.
The length of each side of the square is 12 m.



12 m

Not to scale

Calculate the shaded area.

_____ m^2 [4]

9 (a) Calculate.

$$\sqrt{18.5^2 - 11.1^2}$$

(a) _____ **[1]**

(b) Here are three cards.

A

$$\frac{1}{2.5^2 - 1.5^2}$$

B

$$\left(\frac{35}{54}\right)^2$$

C

$$\sqrt[3]{0.06}$$

Work out the values written on each card.
Put the values in order, smallest first.

(b) _____
smallest

_____

_____ **[2]**

10 (a) The equation $x^3 - x^2 - 40 = 0$ has a solution between $x = 3$ and $x = 4$.

Find this value of x correct to 1 decimal place.
Show clearly your trials and the values of their outcomes.

x			

(a) x = _____ [3]

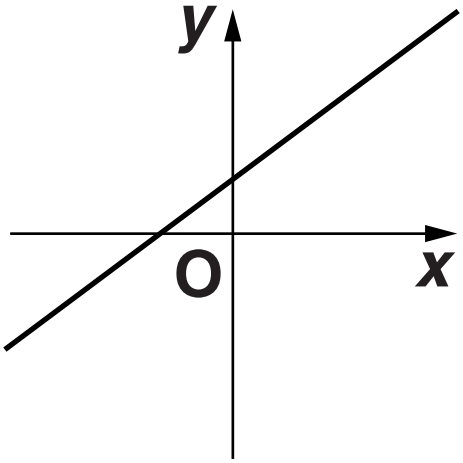
(b) Solve.

$$\frac{(x-5)}{3} + \frac{(3x+4)}{2} = 15$$

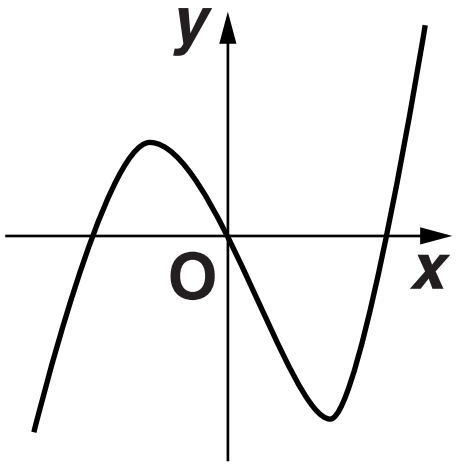
(b) $x =$ _____ [4]

11 Here are three sketch graphs.

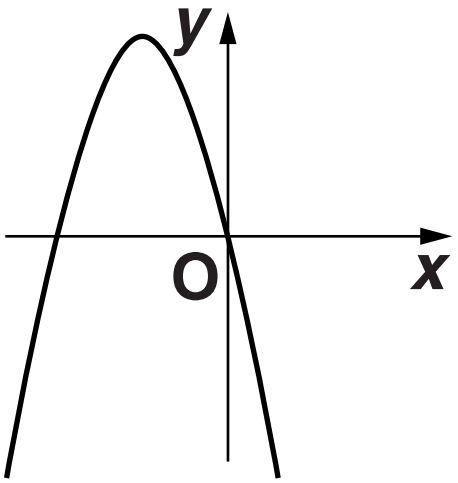
Graph A



Graph B



Graph C



Write the equation of each graph shown on the opposite page in the spaces on the answer line below.
Choose your answers from this list.

$y = -4x - 4x^2$	$y = 4x$
$y = -4x + 4$	$y = x^3 - 4x$
$y = x^3 - 4x + 4$	$y = 4x^2 - 4x$
$y = 4x - 4x^2$	$y = x + 4$

Graph A is $y =$ _____

Graph B is $y =$ _____

Graph C is $y =$ _____ **[3]**

12 (a) Write 16 000 in standard form.

(a) _____ **[1]**

(b) Some facts about four planets are shown in the table opposite.

(i) Complete this sentence, giving your answer correct to 3 significant figures.

The volume of Venus is

_____

times the volume of Mercury. [2]

	Mass (kg)	Volume (m^3)
Mercury	3.30×10^{23}	6.08×10^{19}
Venus	4.87×10^{24}	9.28×10^{20}
Earth	5.97×10^{24}	1.08×10^{21}
Mars	6.42×10^{23}	1.63×10^{20}

(ii) Show that the Earth has the greatest density.

Make all your working clear. [3]

13 Make c the subject of this formula.

$$E = mc^2$$

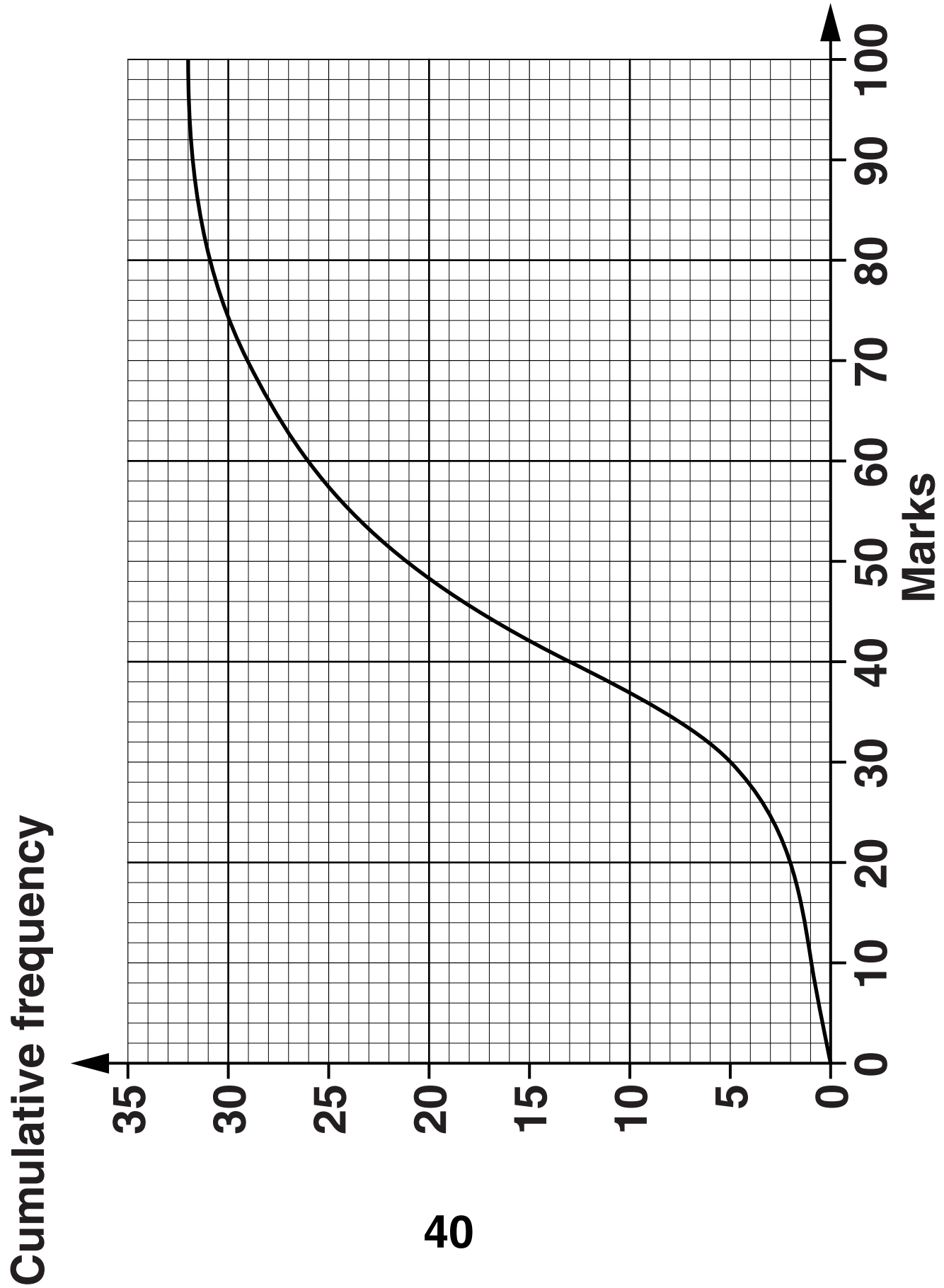
$c =$ _____ **[2]**

14 y **is directly proportional to** x^2 **and** $y = 80$ **when** $x = 4$**.**

Write a formula for y **in terms of** x**.**

_____ **[3]**

15 Mr Chalmers gave a GCSE paper to all the 32 pupils in his class. The results are summarised in the cumulative frequency graph below.



(a) Use the graph to find

(i) the number of pupils who scored 30 marks or fewer,

(a)(i) _____ [1]

(ii) the median,

(ii) _____ [1]

(iii) the interquartile range.

(iii) _____ [2]

(b)*The marks for each grade for the GCSE paper are given in the table below.

Mark	Grade
0 to 9	U
10 to 24	E
25 to 40	D
41 to 54	C
55 to 69	B
70 to 84	A
85 to 100	A*

The percentage of students nationally achieving a grade C, or better, for the paper was 55%.
Mr Chalmers says that his pupils' results are better than this.

Is he correct?
Show your working clearly.

_____

_____

_____

_____ **[5]**

(c) Explain why this may not be a sensible comparison.

_____

_____ **[1]**

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16 A golfer records the distances he hits golf balls.

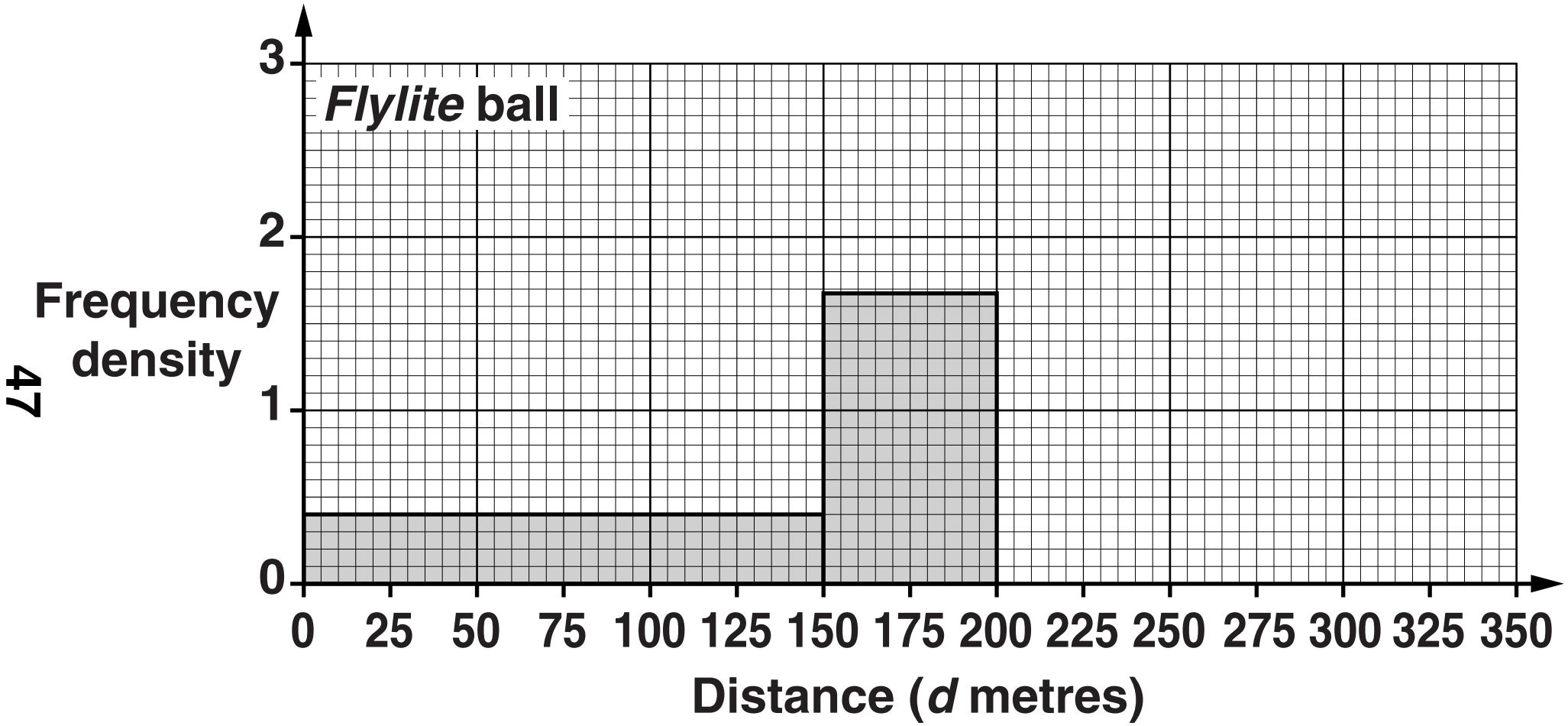
(a) The table below shows the distances with *Flylite* balls.

Distance (d metres)	Frequency
$0 \leqslant d < 150$	60
$150 \leqslant d < 200$	84
$200 \leqslant d < 225$	58
$225 \leqslant d < 250$	20
$250 \leqslant d < 300$	15

Complete the histogram opposite for this information.

The first two rows of information are already shown on the grid.

[2]


Flylite ball
Frequency density
47
3
2
1
0
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350
Distance (*d* metres)

(b) The histogram opposite summarises the distances with the *Arrowe* balls.

Make two different comments comparing the distances he hits these two types of ball. Calculations are not necessary.

Comment 1

_____

_____

_____

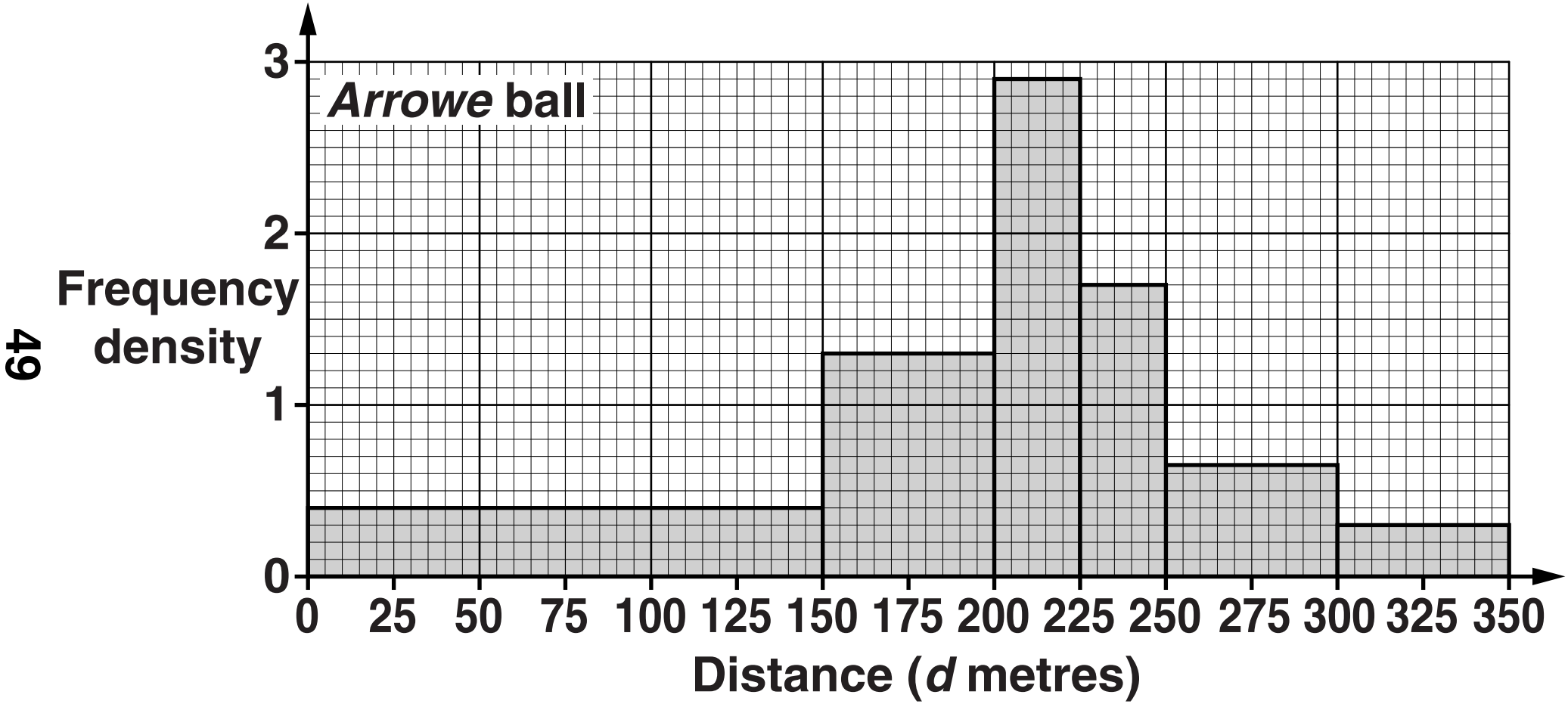
Comment 2

_____

_____

_____

[2]


Arrowe ball
Frequency density
3
2
1
0
0 25 50 75 100 125 150 175 200 225 250 275 300 325 350
Distance (d metres)

49

17 Here are the equations of two graphs.

$y^2 = x^2 - 2x + 10$
$y = 3x + 2$

(a) Show that the point of intersection of these graphs satisfies the equation $4x^2 + 7x - 3 = 0$.

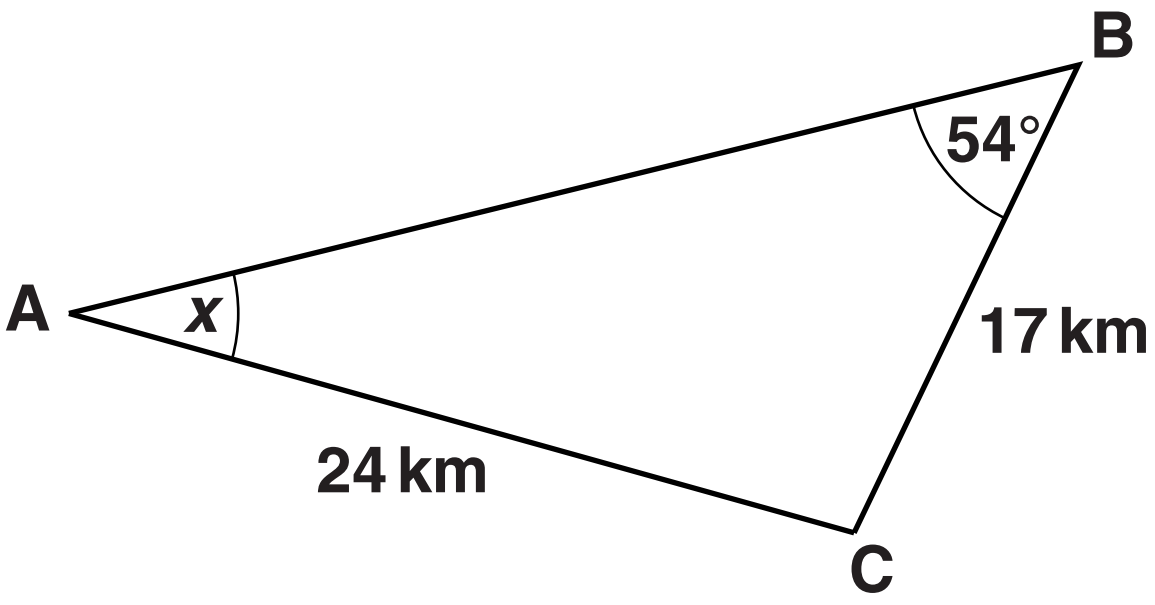
[3]

(b) Solve the equation $4x^2 + 7x - 3 = 0$, giving your answers correct to 2 decimal places.

(b) x = _____ and x = _____ [3]

18 The diagram below shows information about triangle ABC.

Not to scale



Calculate angle *x*.

_____° [3]

19 A building project is expected to cost £4 500 000.
The agreed completion date is 1 January 2014.
After this date, for every month it is delayed, the cost increases by 2% of the cost for the previous month.

(a) Calculate the cost on 1 April 2014.

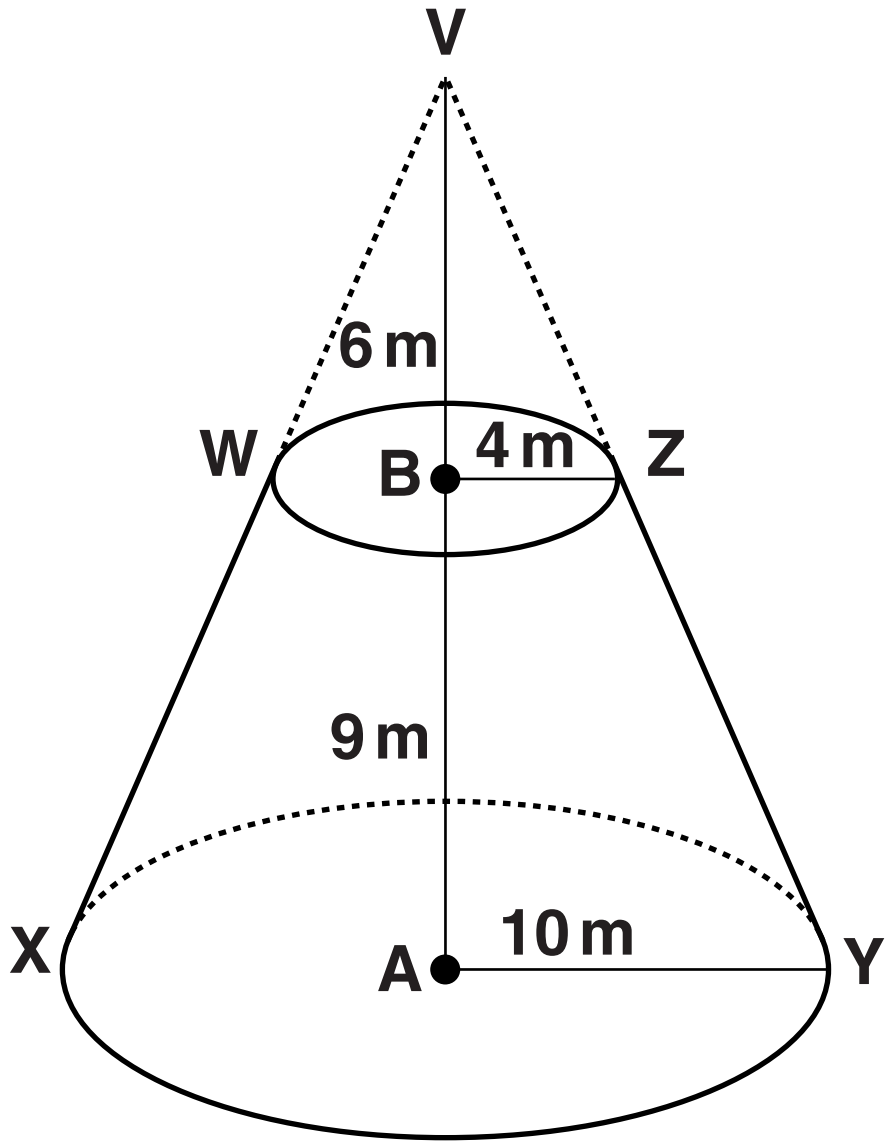
(a) £_____ [1]

(b) When the cost first exceeds £5 500 000, for how many months has the project been delayed?

(b) _____ **[3]**

20 WXYZ is a frustum of a cone.

The centre of the circular base is point A and the centre of the circular top is point B.



The base radius, AY, of the frustum is 10 m and the top radius, BZ, is 4 m.

VB = 6 m and BA = 9 m.

Calculate the volume of the frustum.

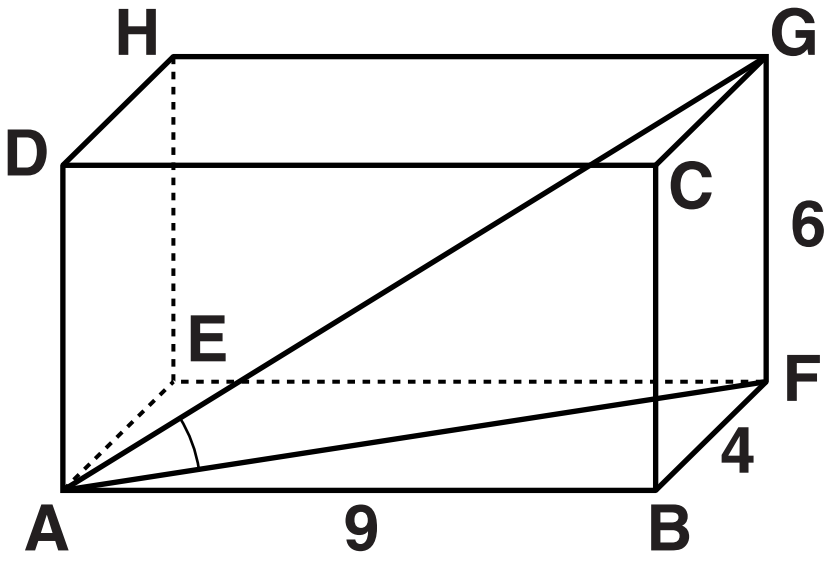
_____ m^3 [4]

21 ABCDEFGH is a cuboid.

AB = 9

BF = 4

FG = 6



Calculate the angle GAF.

_____° [5]

END OF QUESTION PAPER

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