

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**A501/02**

**MATHEMATICS A  
Unit A (Higher Tier)**

**WEDNESDAY 6 NOVEMBER 2013: Morning**

**DURATION: 1 hour  
plus your additional time allowance**

**MODIFIED ENLARGED**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Scientific or graphical calculator  
Geometrical instruments  
Tracing paper (optional)**

<p><b>You are permitted to use a calculator for this paper</b></p>
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**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

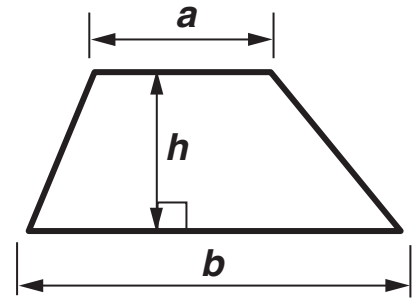
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you 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**

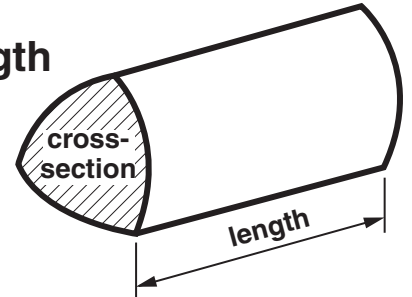
- **The number of marks is given in brackets [ ] at the end of each question or part question.**
- **The total number of marks for this paper is 60.**

# FORMULAE SHEET: HIGHER TIER

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



Volume of prism = (area of cross-section)  $\times$  length

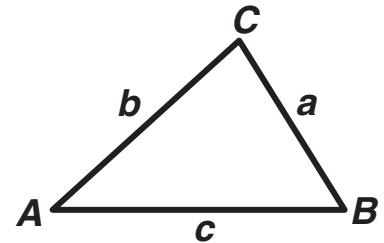


In any triangle *ABC*

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

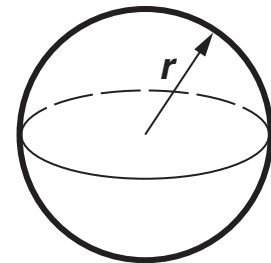
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



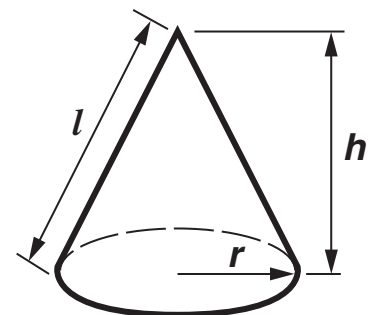
Volume of sphere =  $\frac{4}{3} \pi r^3$

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



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

Curved surface area of cone =  $\pi rl$



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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**Answer ALL the questions.**

**1 Debi makes Chocolate Courgette Cake.  
Her recipe uses 480 g of grated courgettes.  
The total weight of the other ingredients is 1.1 kg.**

**(a) Find the ratio of the weight of grated courgettes to  
the total weight of the other ingredients.  
Give your answer in its simplest form.**

**(a) \_\_\_\_\_ : \_\_\_\_\_ [3]**

**(b) Debi wants to make a larger Chocolate Courgette  
Cake.  
She wants to use 600 g of grated courgettes.**

**Calculate the total weight of the other ingredients  
that she will need to use.  
Give the units of your answer.**

**(b) \_\_\_\_\_ [3]**

**2 Maja and Charlie are playing a ‘think of a number’ game.**

**(a) Maja says:**

**I think of a number.**

**I add 4.**

**I multiply the result by 6.**

**The answer is 72.**

**Find the number that Maja thought of.**

**(a) \_\_\_\_\_ [2]**

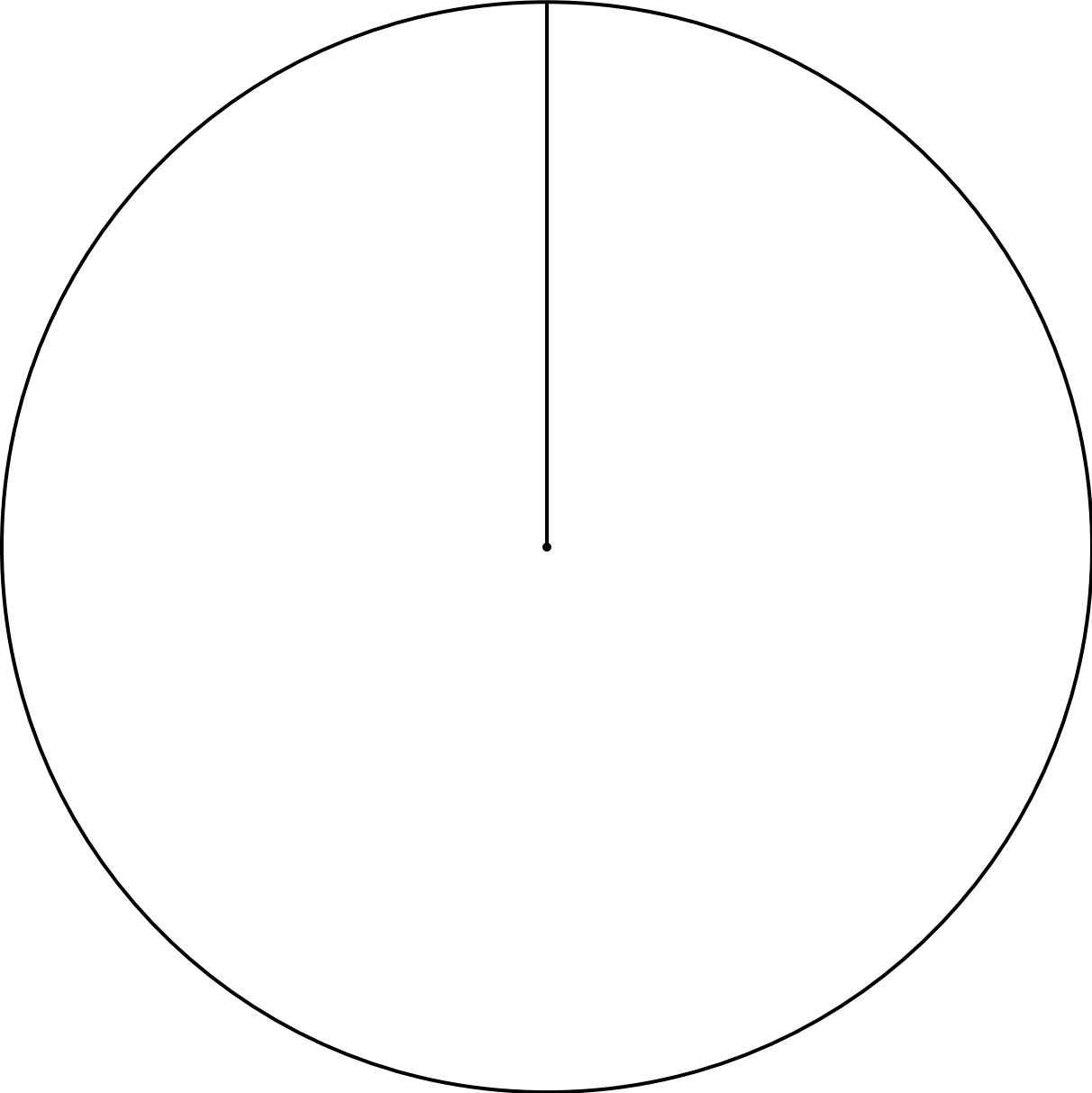


- 3 Four people stand in an election to represent their class.  
Here are the number of votes they each obtain.**

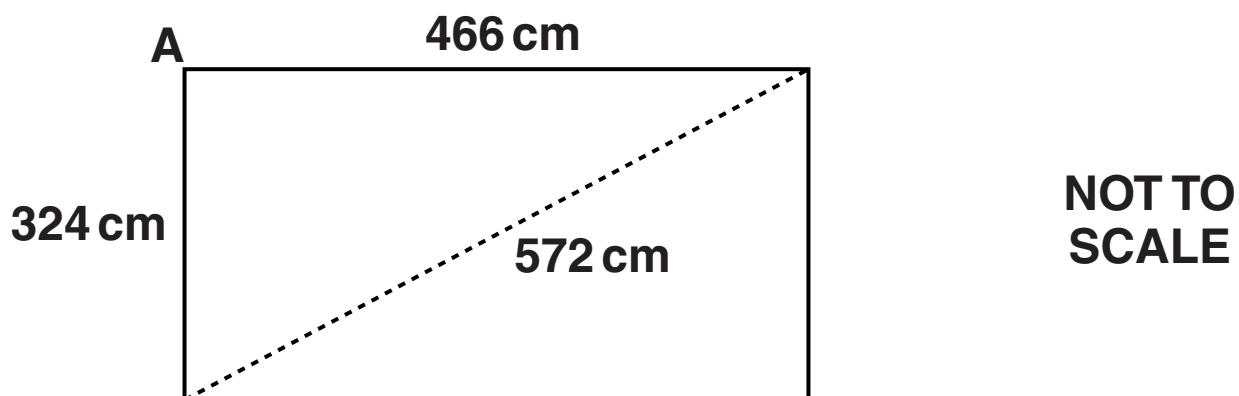
<b>Name</b>	<b>Number of votes</b>
<b>Jessie</b>	<b>5</b>
<b>Anton</b>	<b>10</b>
<b>Vivek</b>	<b>8</b>
<b>Silpa</b>	<b>7</b>
<b>Total</b>	<b>30</b>



**Use the circle below to construct and label an accurate pie chart to represent these results. [3]**



- 4 Catherine is designing a new kitchen. She wants to find out whether the walls meet at an angle of  $90^\circ$ . She measures two walls and a diagonal across the kitchen floor. The following diagram of the floor shows her measurements.



- (a) Use the wall measurements to calculate what the length of the diagonal should be if angle  $A = 90^\circ$ .

(a) \_\_\_\_\_ cm [3]

- (b) Use your result for the length of the diagonal to decide whether angle A is equal to  $90^\circ$ , less than  $90^\circ$  or more than  $90^\circ$ . Show how you decide.

Angle A is \_\_\_\_\_  $90^\circ$  because

\_\_\_\_\_

\_\_\_\_\_ [1]

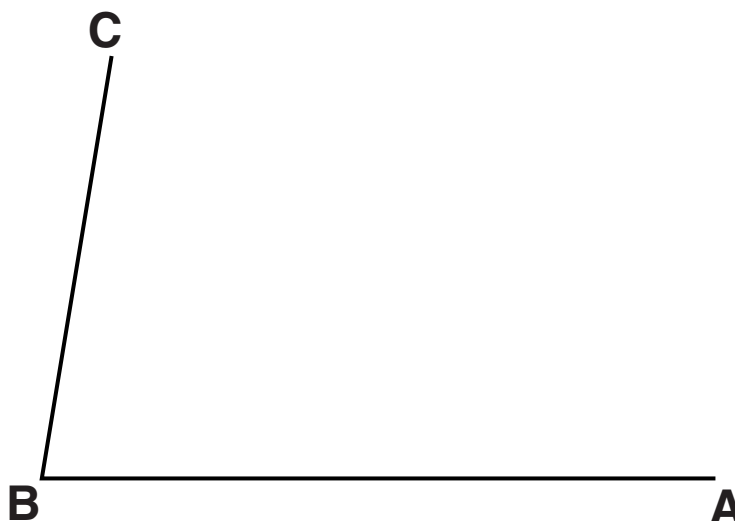
- 5 Use a pair of compasses and a ruler to answer this question.  
Do not rub out your construction lines.

A park is a quadrilateral ABCD.

$AD = 375$  m and  $CD = 250$  m.

The positions of A, B and C are shown on the following scale drawing.

SCALE: 1 cm REPRESENTS 50 m



- (a) Complete the scale drawing of the park. [2]

**(b) There is a gate at B.**

**A straight path from B is the same distance from BC as from BA.**

**It continues across the park to a gate at E on side AD.**

**(i) Construct the path on the scale diagram and mark the position of E. [2]**

**(ii) How long is the path BE in the actual park?**

**(b)(ii) \_\_\_\_\_ m [2]**

6 (a) The  $n$ th term of a sequence is  $n(n + 1)$ .

Work out the first three terms of this sequence.

(a) \_\_\_\_\_ [2]

(b) Here are the first four terms of another sequence.

7      4      1      -2

Find an expression for the  $n$ th term of this sequence.

(b) \_\_\_\_\_ [2]

**7 (a) Calculate.**

$$\frac{936}{5.2 - 1.95}$$

**(a) \_\_\_\_\_ [1]**

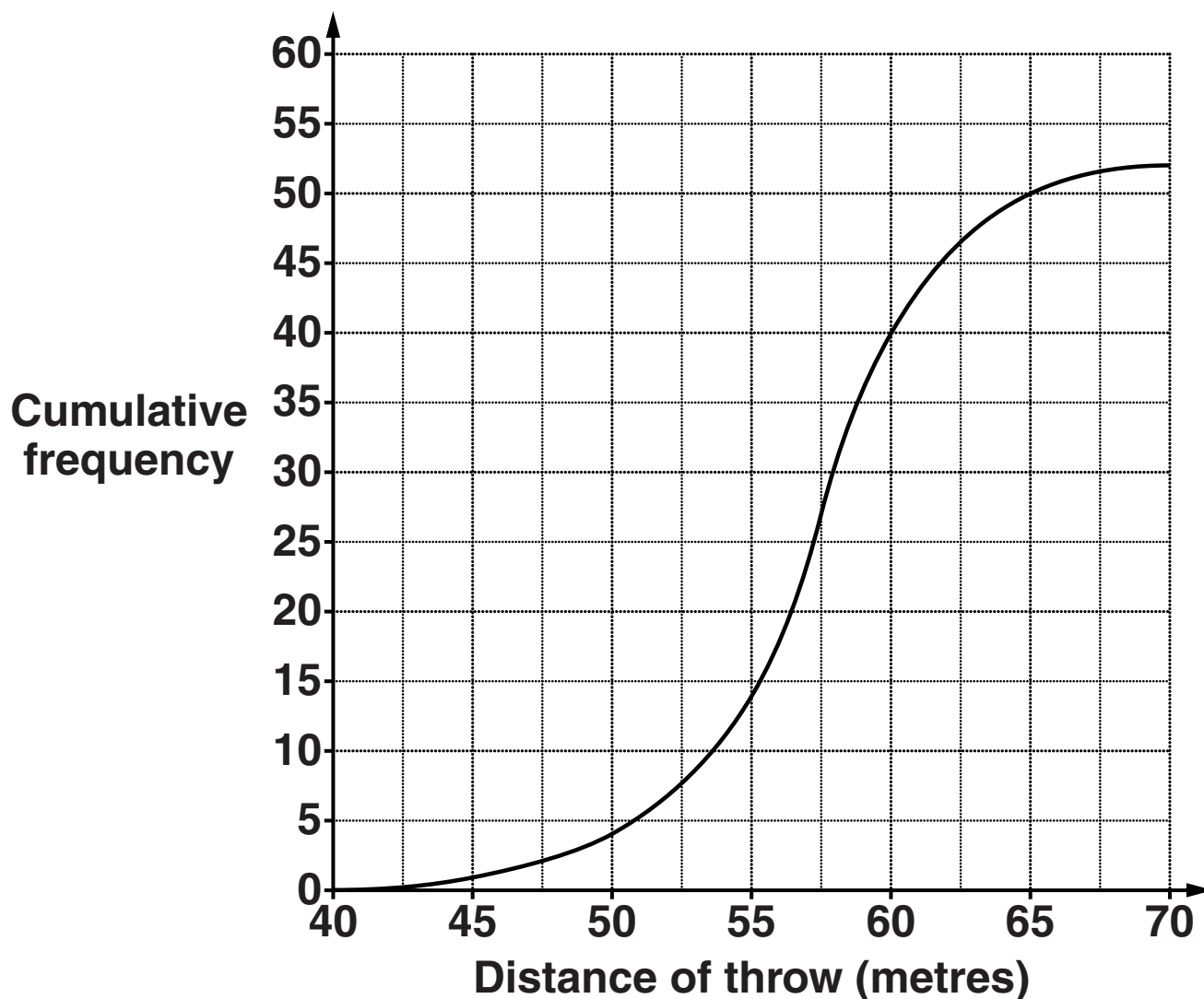
**(b) Insert brackets to make the following calculation correct.**

$$9 + 3 \times 7 - 5 = 24 \quad [1]$$

**(c) Find the highest common factor (HCF) of 216 and 360.**

**(c) \_\_\_\_\_ [3]**

- 8 (a) In the Women's Javelin event at the Beijing Olympics, there was a preliminary round. The distance, in metres, of each competitor's best throw was recorded. The following cumulative frequency graph represents the results.



Use the graph to find an estimate of the median distance thrown by the 52 women.

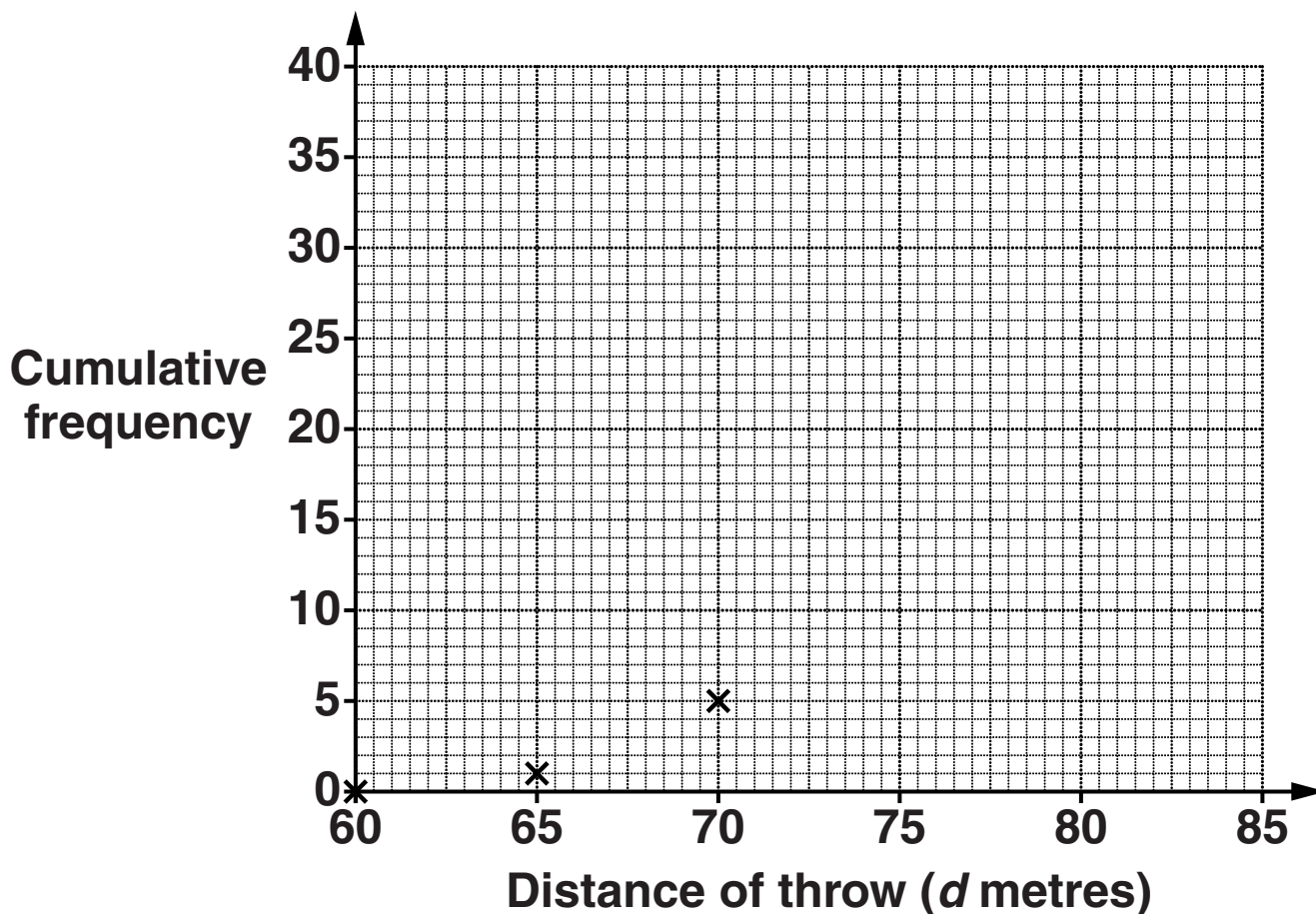
(a) \_\_\_\_\_ m [2]



(b) The following table summarises the results for the Men's Javelin preliminary round.

Distance of throw ( $d$ metres)	Frequency
$60 \leq d < 65$	1
$65 \leq d < 70$	4
$70 \leq d < 75$	11
$75 \leq d < 80$	13
$80 \leq d < 85$	8

Complete the CUMULATIVE FREQUENCY graph to represent the Men's Javelin results. [3]



**(c) The interquartile range for the distances thrown by the women was 5.0 m.**

**Janine says:**

**The distances thrown by the women were less varied than those thrown by the men.**

**Use your graph to find an estimate of the interquartile range for the distances thrown by the men and circle the correct response to Janine's statement shown below.**

**The men's interquartile range is \_\_\_\_\_ m**

**so Janine's statement is True False Can't tell [3]**

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9 (a) You are given the following identity

$$5x + 3(2x - 7) \equiv ax + b$$

where  $a$  and  $b$  are integers.

Find the values of  $a$  and  $b$ .

(a)  $a =$  \_\_\_\_\_

$b =$  \_\_\_\_\_ [2]

**(b) You are given the following equation**

$$5x + 3(2x - 7) = cx + d$$

where  $c$  and  $d$  are integers.

You are given also that this equation has solution  $x = 4$  and is NOT AN IDENTITY.

Find a possible pair of values of  $c$  and  $d$ .

**(b)  $c =$  \_\_\_\_\_**

**$d =$  \_\_\_\_\_ [2]**

**10 You are given that  $f(x) = 5x - 2$ .**

**(a) Find the value of  $x$  when  $f(x) = 1$ .**

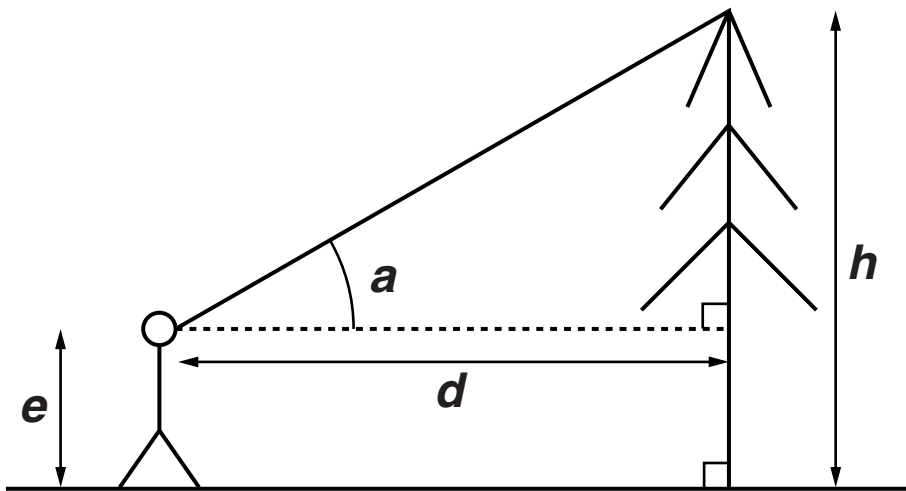
**(a) \_\_\_\_\_ [2]**

**(b) Find and simplify an expression for  $f(1 + 2x)$ .**

**(b) \_\_\_\_\_ [2]**

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- 11 Pali wants to find the height,  $h$  m, of a tree. He stands a distance,  $d$  m, from the tree. Then he measures the angle,  $a$ , of the top of the tree from the horizontal. His friend then measures the height,  $e$  m, of Pali's eye from the ground. This is shown on the following diagram.



- (a) Show that the height of the tree is given by this formula.

$$h = e + d \tan a$$

[2]



**(b) When Pali stands 25 m from the tree, angle  $a = 32^\circ$ . The height of his eye above the ground is 1.7 m.**

**Use the formula  $h = e + d \tan a$  to find the height of the tree.**

**(b) \_\_\_\_\_ m [2]**

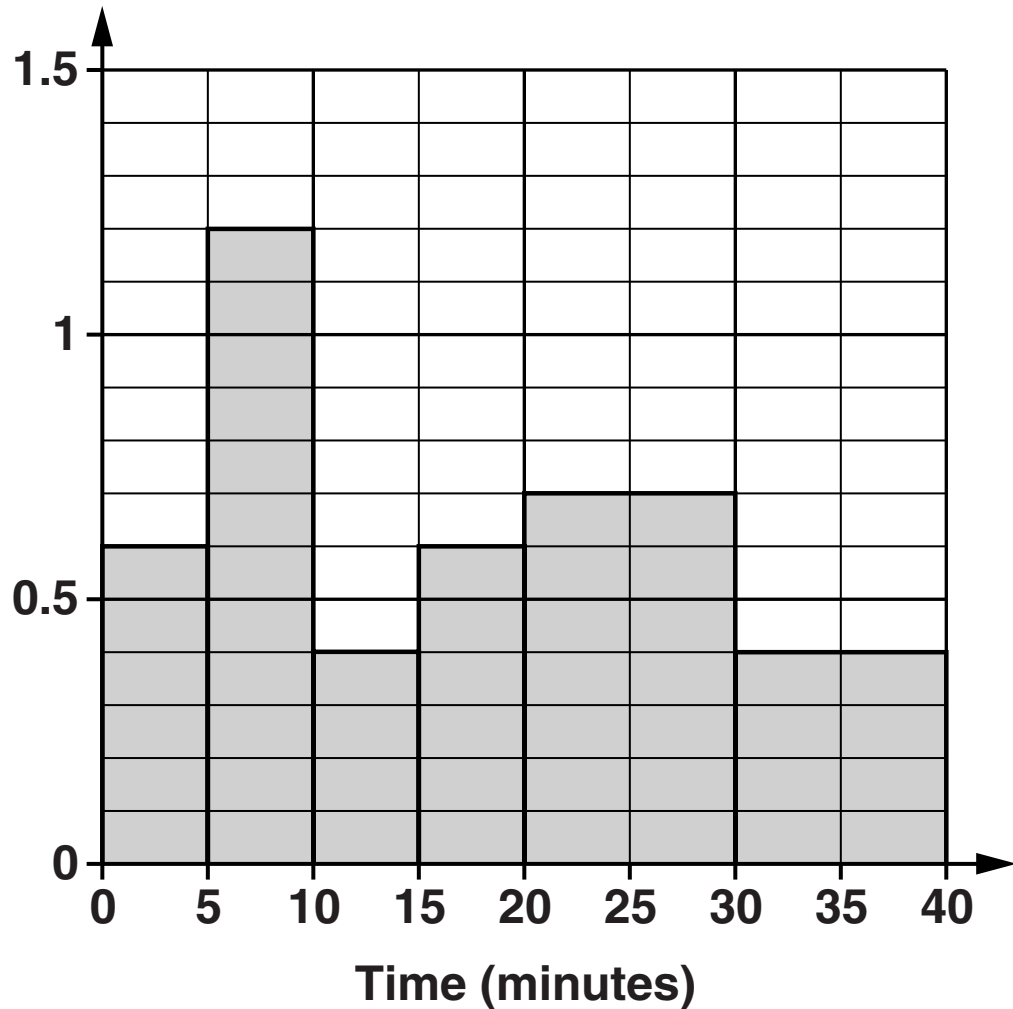
**(c) Rearrange this formula to make  $a$  the subject.**

$$h = e + d \tan a$$

**(c) \_\_\_\_\_ [3]**

- 12 The following histogram summarises the times that 25 patients waited before their appointment at a dental surgery one day.

Frequency density  
(patients per minute)



- (a) How many patients waited between 20 and 30 minutes?

(a) \_\_\_\_\_ [1]

**(b) Calculate an estimate of the MEDIAN waiting time.  
Show your method.**

**(b) \_\_\_\_\_ minutes [2]**

**END OF QUESTION PAPER**

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