

Wednesday 6 November 2013 – Morning

## GCSE MATHEMATICS A

**A501/02** Unit A (Higher Tier)

Candidates answer on the Question Paper.

**OCR supplied materials:**

None

**Other materials required:**

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

**Duration:** 1 hour



Candidate forename		Candidate surname	
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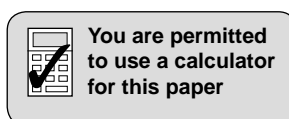
Centre number						Candidate number				
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### INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

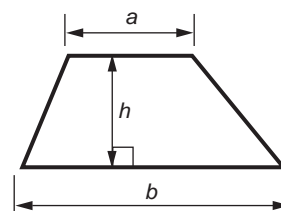
### INFORMATION FOR CANDIDATES

- 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**.
- This document consists of **16** pages. Any blank pages are indicated.

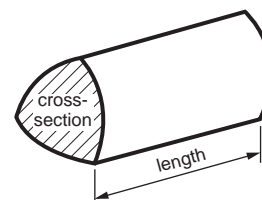


## Formulae Sheet: Higher Tier

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



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

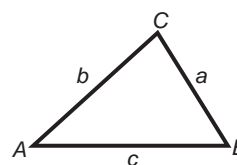


In any triangle *ABC*

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

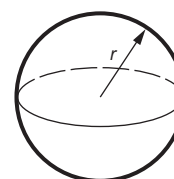
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



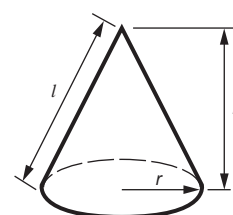
Volume of sphere =  $\frac{4}{3}\pi r^3$

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



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

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



**The Quadratic Equation**

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

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

**PLEASE DO NOT WRITE ON THIS PAGE**

## 3

Answer **all** the questions.

- 1 Debi makes Chocolate Courgette Cake.  
Her recipe uses 480g 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 600g 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]

4

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]

(b) Charlie says:

I think of a number.  
I multiply it by 6.  
I add 4 to the result.  
The answer is 39 more than the number I first thought of.

(i) Let  $n$  be the number that Charlie first thought of.

Complete this equation for Charlie's number game.

\_\_\_\_\_ =  $n + 39$  [1]

(ii) Solve the equation to find the number that Charlie first thought of.

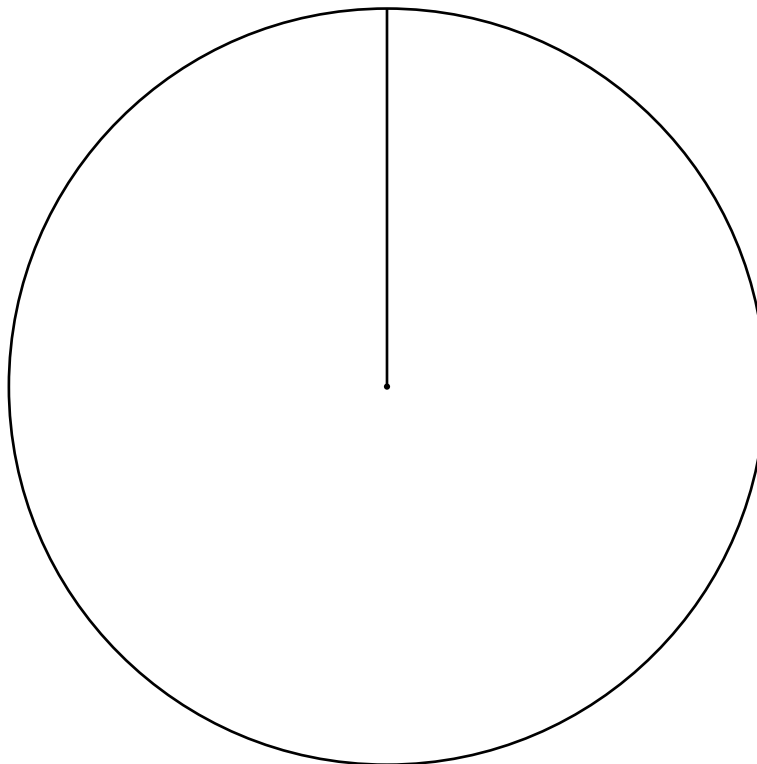
(b)(ii) \_\_\_\_\_ [3]

5

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

Name	Number of votes
Jessie	5
Anton	10
Vivek	8
Silpa	7
Total	30

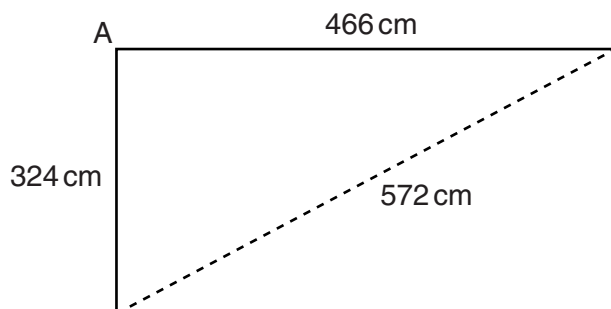
Use the circle below to construct and label an accurate pie chart to represent these results.



[3]

6

- 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. This diagram of the floor shows her measurements.



**Not to scale**

- (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]

7

- 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.

**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]

8

- 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]



9

7 (a) Calculate.

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

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

(b) Insert brackets to make this calculation correct.

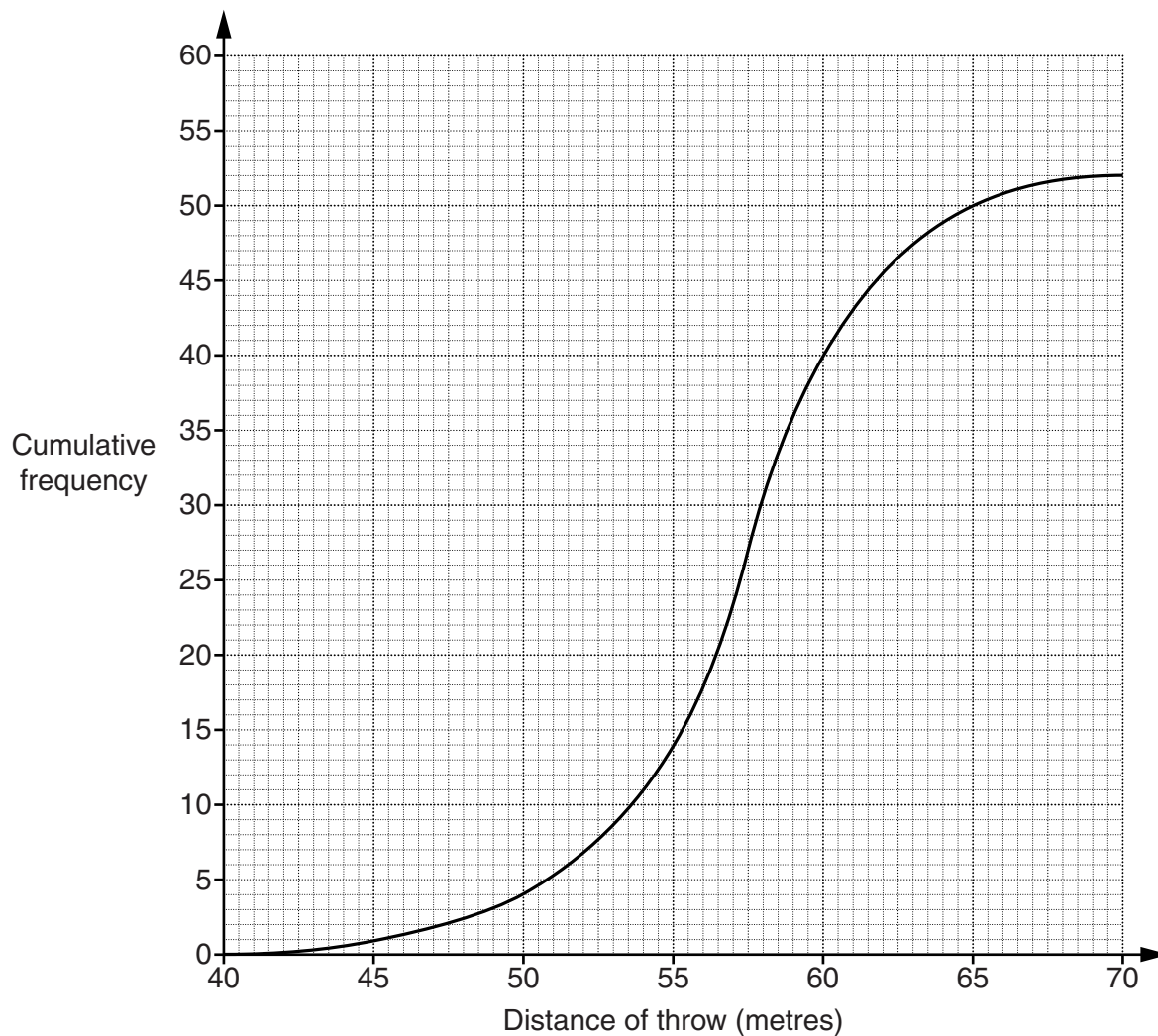
$$9 + 3 \times 7 - 5 = 24 \quad [1]$$

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

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

10

- 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. This cumulative frequency graph represents the results.



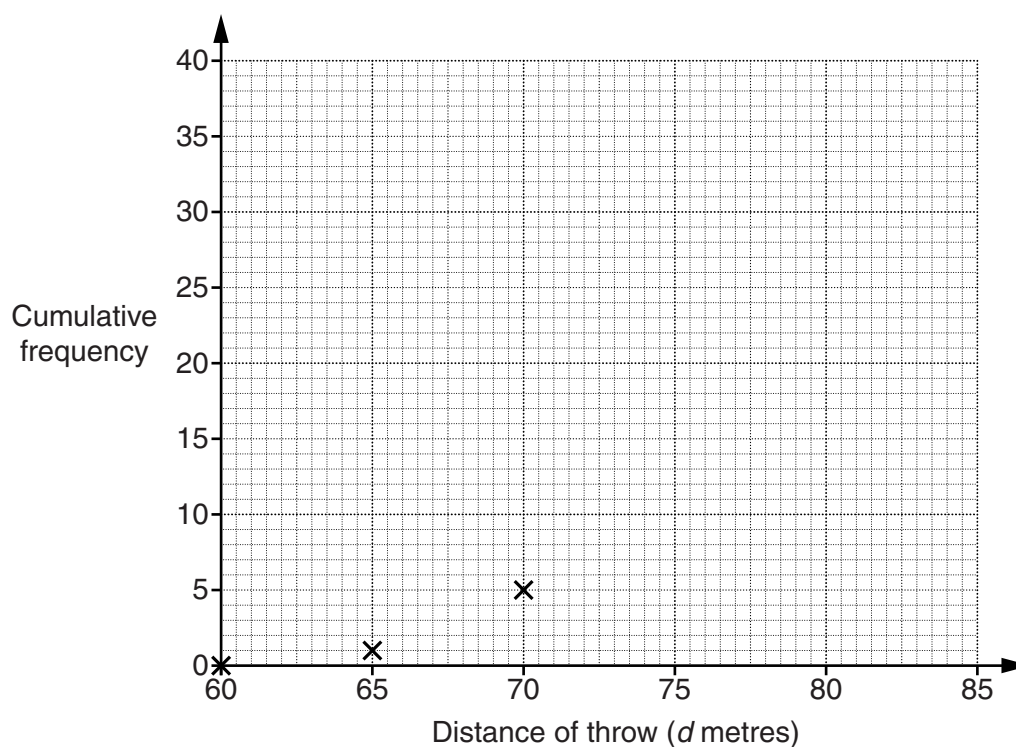
Use the graph to find an estimate of the median distance thrown by the 52 women.

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

(b) This 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.

The men's interquartile range is \_\_\_\_\_ m so Janine's statement is

True

False

Can't tell

[3]

- 9 (a) You are given this 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 this 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]

13

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

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

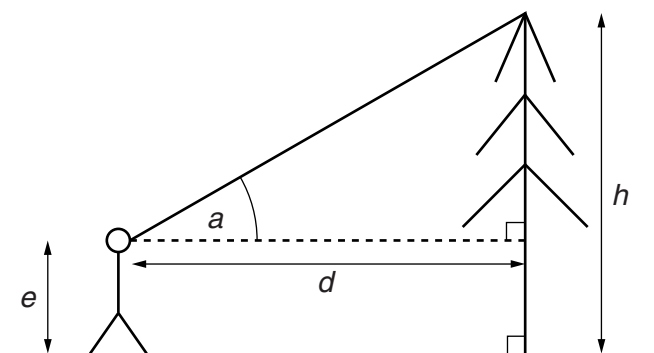
(a) \_\_\_\_\_ [2]

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

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

14

- 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.



Not to scale

- (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]

15

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

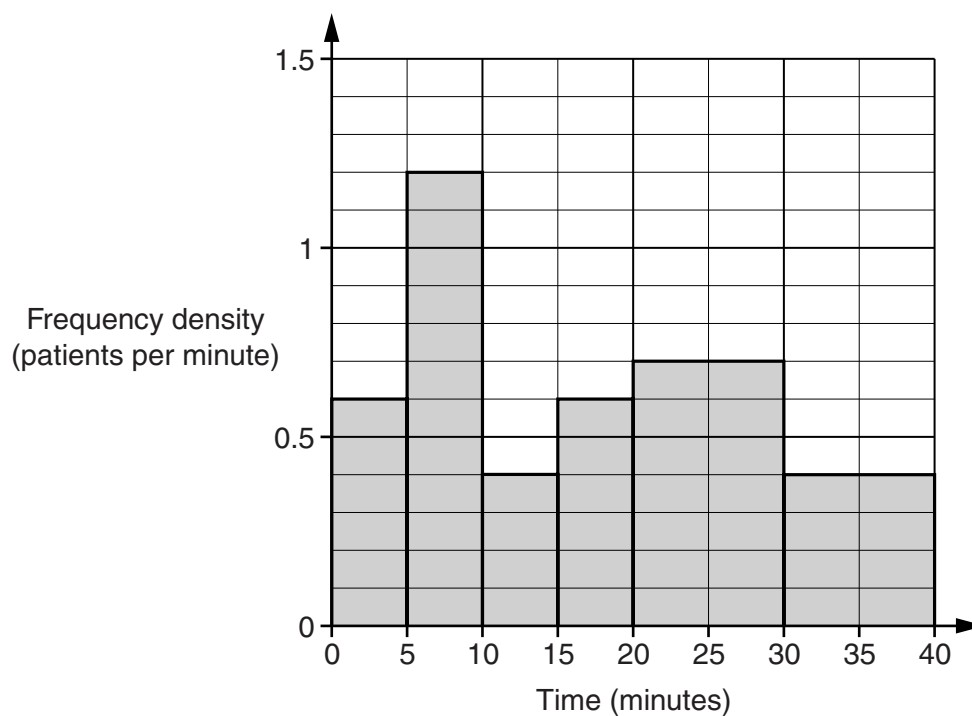
$$h = e + d \tan a$$

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

**TURN OVER FOR QUESTION 12**

16

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



- (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**