OCR
Oxford Cambridge and RSA

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Thursday 25 May 2017 – Morning

GCSE MATHEMATICS B

J567/03 Paper 3 (Higher Tier)

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour 45 minutes

J567703

4401106953

Candidate forename		Candidate surname	

Centre number						Candidate number				

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 barcodes.

INFORMATION FOR CANDIDATES

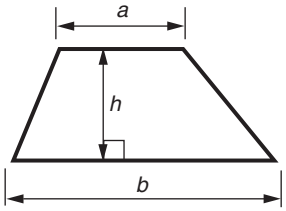
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your quality of written communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **100**.
- This document consists of **24** pages. Any blank pages are indicated.

WARNING

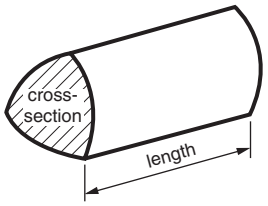
No calculator can be used for this paper

Formulae Sheet: Higher Tier

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



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

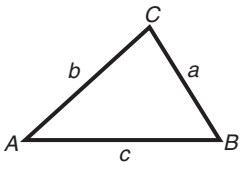


In any triangle *ABC*

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

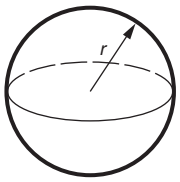
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



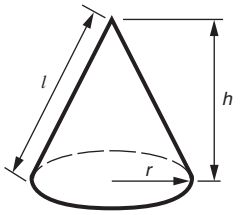
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



The Quadratic Equation

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

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

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

1 The table below summarises the age and gender of the population of a village.

Age (a years)	$0 \leqslant a < 20$	$20 \leqslant a < 40$	$40 \leqslant a < 60$	$60 \leqslant a$	Total
Number of males	100	140			
Number of females				210	650
Total	225	250	400	325	1200

(a) Complete the table. **[3]**

(b) Jared says that there are more females than males in the village.

Write down the information that supports this statement.

.....

.....

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

(c) Philippa says that less than a quarter of the village is aged 60 or over.

Use the table to show that this statement is not true.

.....

.....

..... **[2]**

(d) One of the females is selected at random.

Write down the probability that she is aged 60 or over.

(d) ..... **[2]**

2 **(a)** In 2000 the price of a rail ticket was £120.
By 2015 the price of this ticket had increased by 45%.

Work out the price of the ticket in 2015.

(a) £ ..... **[3]**

(b) The price of a different ticket is now 25% more than its price ten years ago.
Next month there is a special offer reducing the price of the ticket back to its price ten years ago.

Calculate the percentage by which the ticket price will be reduced next month.
You must show your working.

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

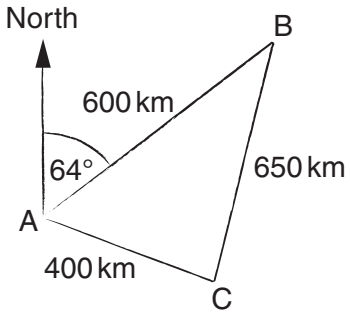
3 Each week there is a lottery.
This table summarises the lottery prizes paid out in one week.

Prize (£)	Number of winners
100	1
10	5
5	6
1	8
Total	20

Work out the mean prize that week.

£ ..... **[3]**

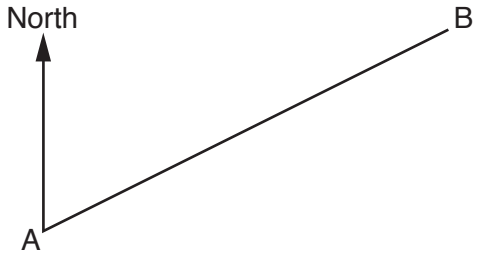
4 **(a)** A ship sails 600 km from A to B on a bearing of 064°.
It then sails 650 km to C and finally 400 km from C back to A.



Not to scale

(i) Construct the triangle ABC using the scale 1 cm represents 100 km.
AB has been drawn for you.

Scale: 1 cm represents 100 km



[2]

(ii) Use your diagram to measure the bearing of A from C.

(a)(ii) ..... ° **[2]**

(b) (i) The length of the ship is 247 metres, correct to the nearest metre.

Write down the minimum length of the ship.

(b)(i) ..... m **[1]**

(ii) A newspaper report states that there are 2500 passengers on the ship, correct to two significant figures.

Write down the maximum number of passengers that could be on the ship.

(ii) ..... **[1]**

5 (a) There are 120 males and 180 females in Albany Tennis Club.

Write the number of males to the number of females as a ratio in its simplest form.

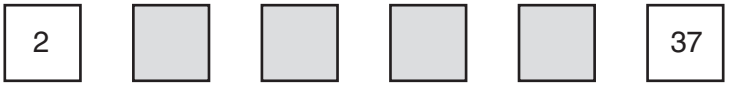
(a) ..... **[1]**

(b) The ratio of male to female players in Belfort Tennis Club is 3 : 5.
The club has a total of 240 players.
In the mixed doubles one male player partners one female player.

How many female players will **not** have a male partner?

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

6 Here are the first six terms of an **arithmetic** sequence.
Some of the numbers are missing.



Write an expression for the nth term of this sequence.

..... **[3]**

7 A teacher pays £680.40 for 21 identical train tickets.

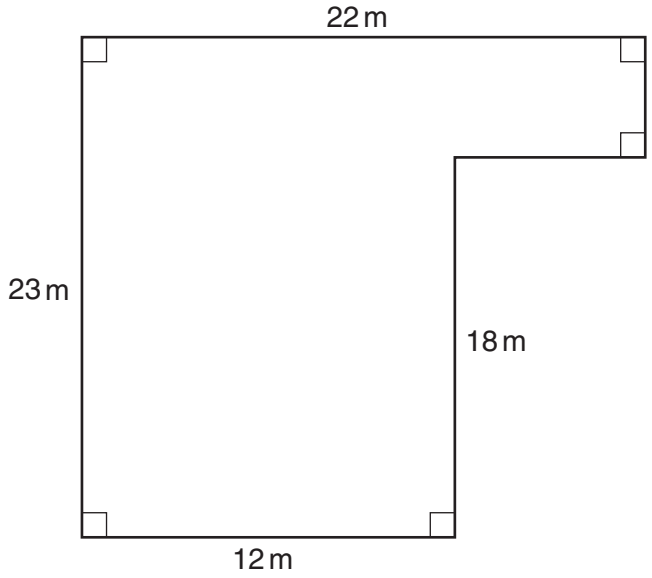
Complete the following.

An **estimate** for the cost of each ticket is

..... ÷ ..... = £ ..... **[2]**

8* The diagram shows Ali's lawn.
He buys packets of fertiliser for his lawn.
Each packet is sufficient for $20\,m^2$.

Work out how many packets he should buy.



Not to scale

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

9 **(a)** Write the recurring decimal 0.453453453… using the correct (dot) notation.

(a) ..... **[1]**

(b) Write $\frac{7}{11}$ as a recurring decimal.

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

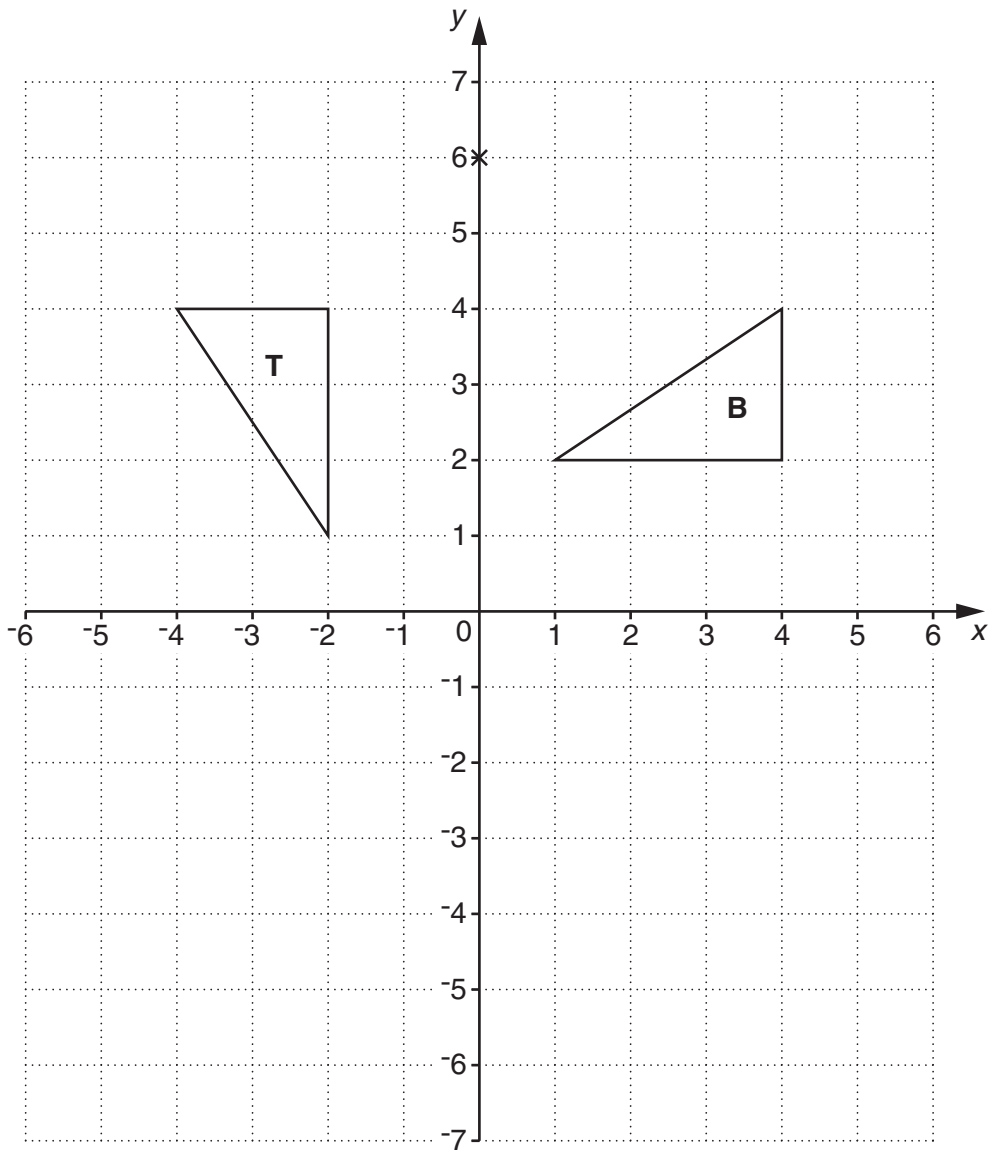
(c) Work out.

$2\frac{4}{5} \times 1\frac{2}{3}$

Write your answer as a mixed number in its simplest form.

(c) ..... **[3]**

10 The diagram shows a one-centimetre square grid with triangles **B** and **T**.



(a) Reflect triangle **T** in the line $y = -1$.
Label the image **A**. **[2]**

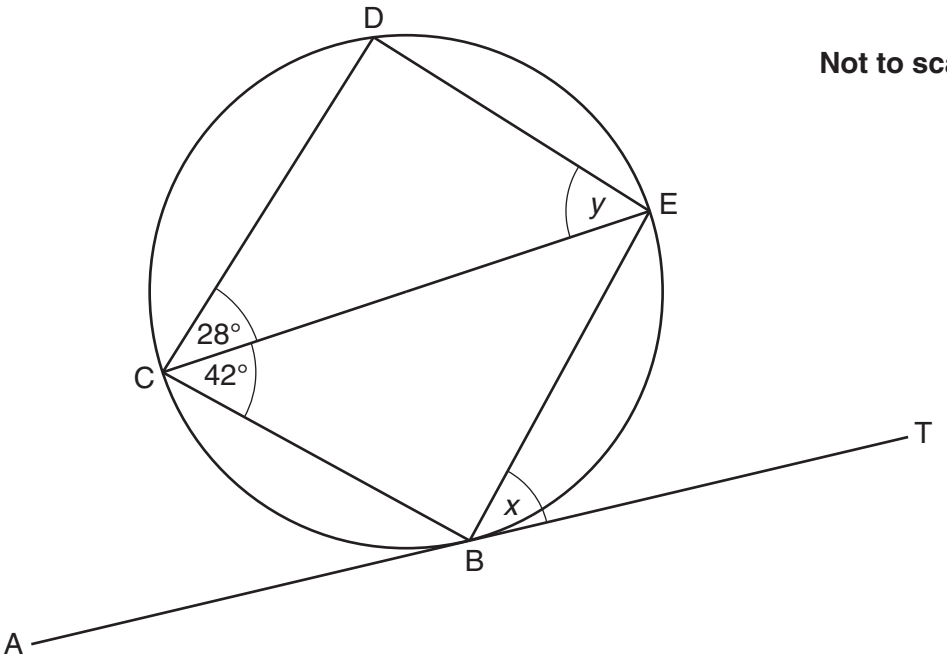
(b) Describe the **single** transformation that maps triangle **T** onto triangle **B**.

.....

..... **[3]**

(c) Enlarge triangle **B** using centre (0, 6) and scale factor $\frac{1}{2}$.
Label the image **C**. **[2]**

11 In the diagram, ABT is a tangent to the circle at B.
CE is a diameter of the circle.
D is a point on the circle.
Angle BCE = 42° and angle DCE = 28°.



Not to scale

Work out the following angles, giving reasons for your answers.

(a) Angle x = ...° because .....

.....

..... **[2]**

(b) Angle y = ...° because .....

.....

and .....

..... **[3]**

12 **(a)** Solve.

$$8x + 14 = 2x - 4$$

(a) $x =$ ..... **[3]**

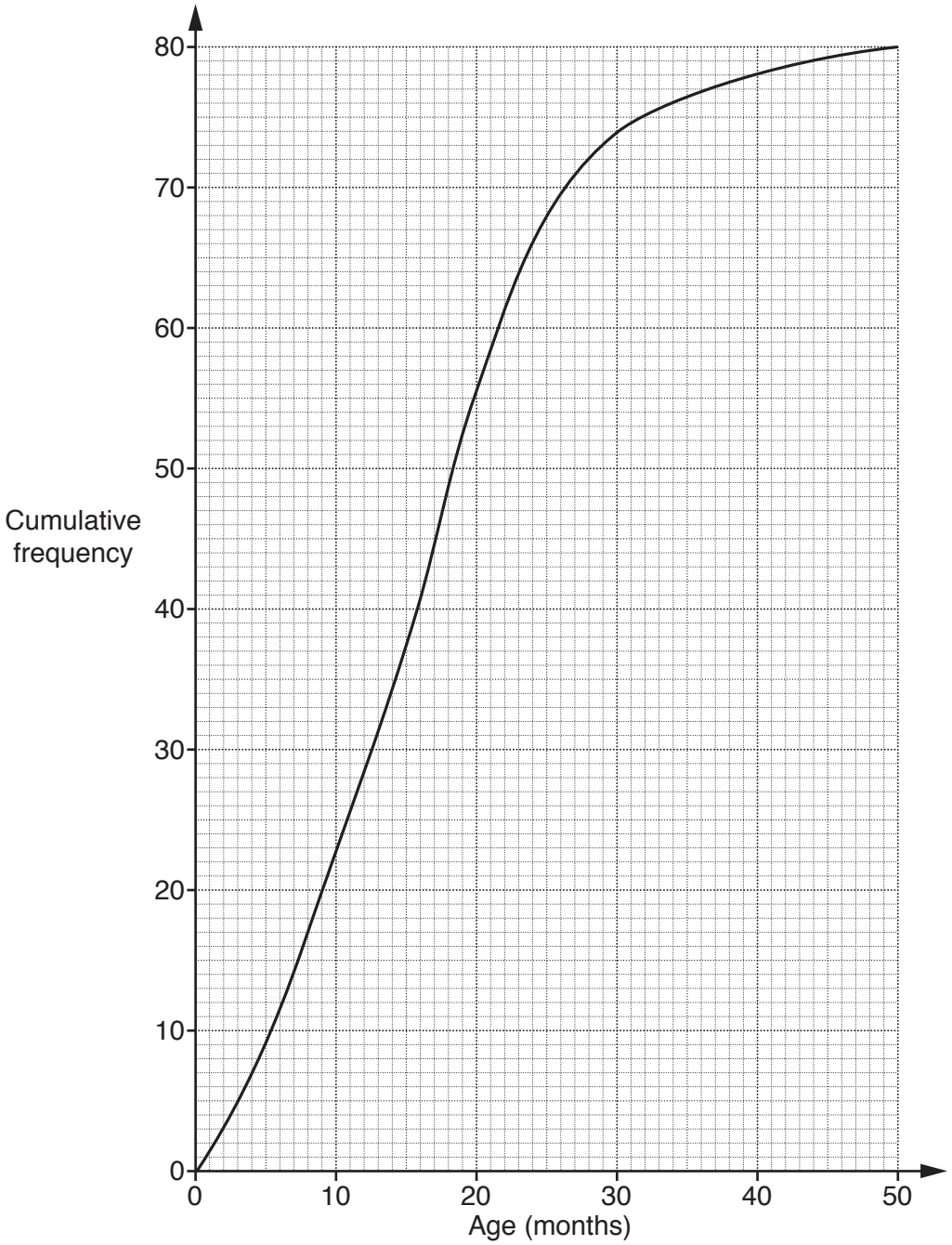
(b) Solve algebraically these simultaneous equations.

$$5x + 3y = 27$$
$$2x + 4y = 8$$

(b) $x =$ .....

$y =$ ..... **[4]**

13 A company records the age, in months, of each of its 80 computers.
The cumulative frequency graph summarises this information.



(a) Find the median age of the computers.

(a) ..... months **[1]**

(b) Find the interquartile range of the age of the computers.

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

(c) The company decides to replace all computers over 2 years old.
The cost of replacing each computer is £500.

Work out the cost of replacing all the computers over 2 years old.

(c) £ ..... **[3]**

14 A line, L, has the equation $y = 5x - 1$.

(a) Complete the coordinates of the point of intersection of this line with the line $x = 8$.

(a) (**8** , ...) **[1]**

(b) Write down the gradient of line L.

(b) ..... **[1]**

(c) Write down the equation of the line that is parallel to line L and that passes through the point (0, 6).

(c) ..... **[2]**

15 In the table below, y is directly proportional to the square of x.

Work out the value of a in the table.

x	2	6
y	12	a

..... **[2]**

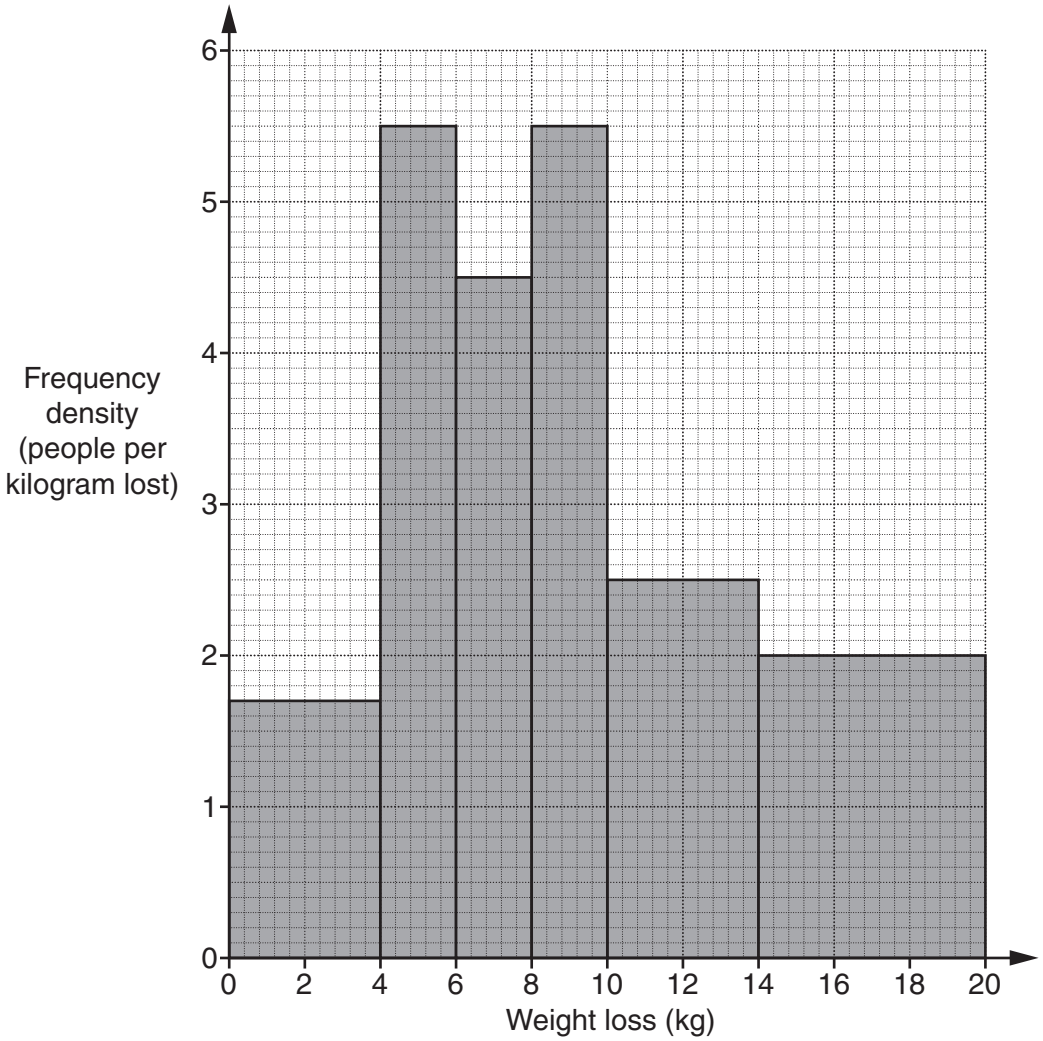
16 **(a)** Write the expression $x^2 - 4x - 3$ in the form $(x - a)^2 - b$.

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

(b) Hence, or otherwise, write down the coordinates at which $y = x^2 - 4x - 3$ has its minimum value.

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

17 *Weight-reducers* record the weight lost by each of their 60 customers.
The results are summarised in this histogram.



(a) Show that 11 customers lost between 8 kg and 10 kg in weight. **[1]**

(b) *Weight-reducers* claim that more than half of their customers lose 8 kg or more.

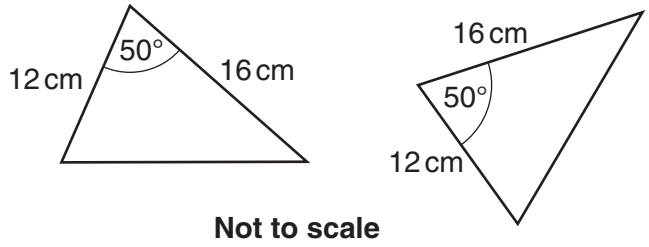
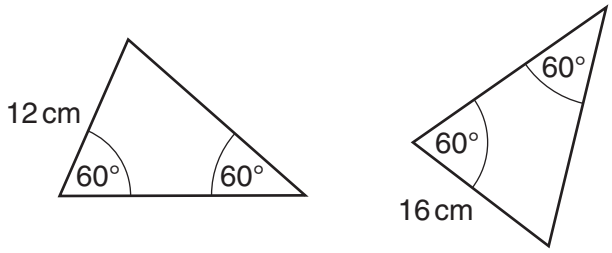
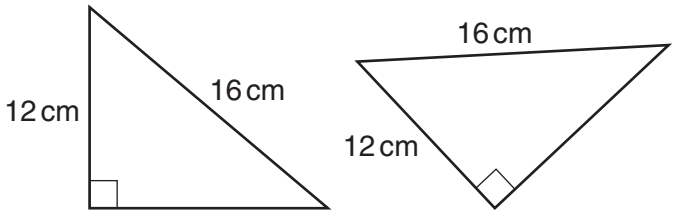
Do these results support their claim?
Use the histogram to justify your answer.

.....

..... **[3]**

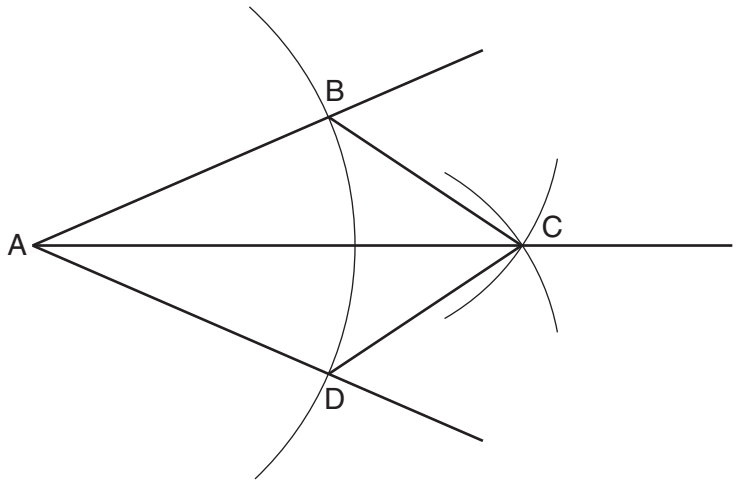
18 (a) In each row of the table there are two triangles.

State whether the two triangles are congruent or not.
If they are congruent state a reason from SSS, SAS, ASA or RHS.

Triangles	Congruent (Y/N)	Reason
 **Not to scale**		
 **Not to scale**		
 **Not to scale**		

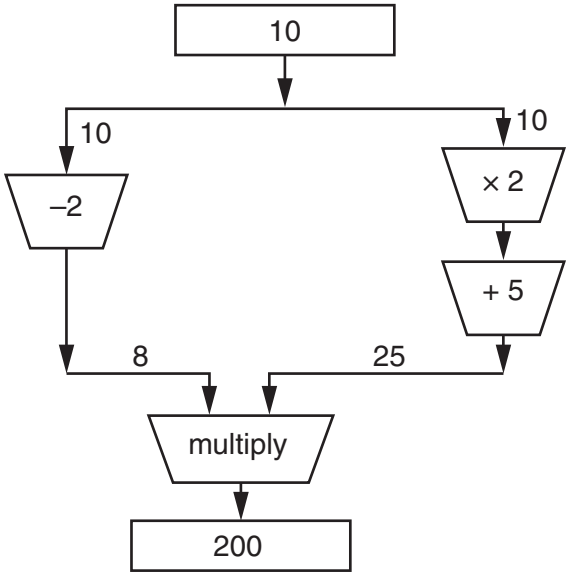
[2]

(b) The diagram shows the construction of the bisector, AC, of angle DAB.

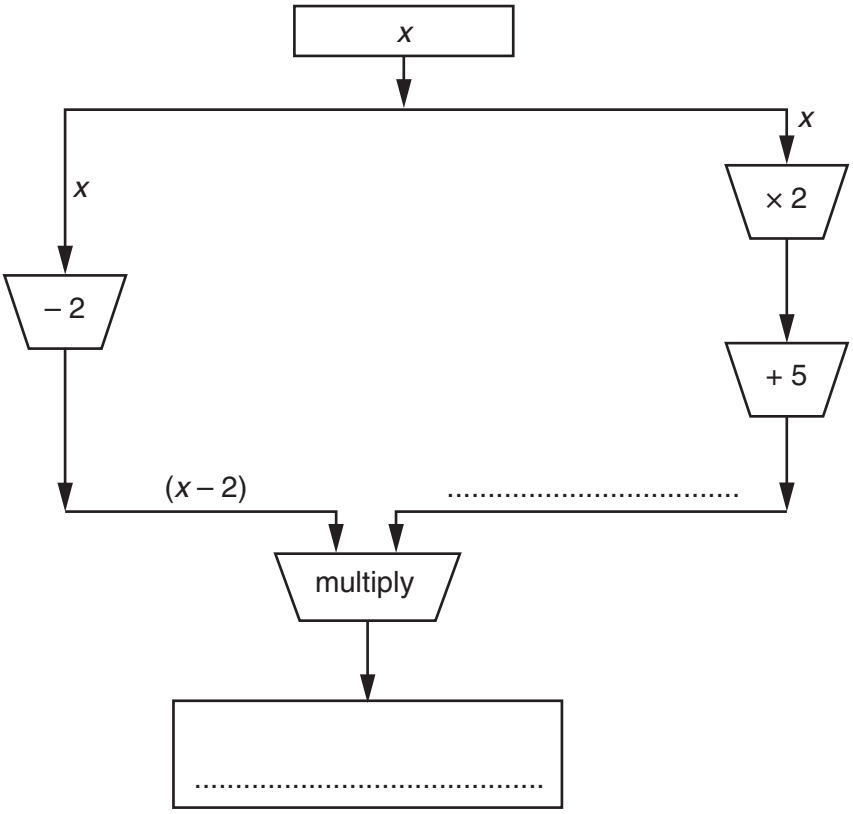


Prove that the triangles ABC and ADC are congruent.
Give a reason for each statement you make. **[3]**

19 The diagram shows a function machine.
The example shows that when 10 is input the output is 200.



(a) Complete the diagram below for an input of x.



[2]

(b) The challenge is to find an input number to make the output 35.

(i) Use the output in **part (a)** to form an equation and show that it can be simplified to $2x^2 + x - 45 = 0$.

[2]

(ii) Solve $2x^2 + x - 45 = 0$ to find the two values of x that each give an output of 35.

(b)(ii) $x =$..... or $x =$ ..... **[3]**

TURN OVER FOR QUESTION 20

20 **(a)** The expression $\left(\frac{x^{6}}{x^{-4}}\right)^{\frac{1}{2}}$ can be simplified to x^{a}.

Find the value of a.

(a) $a =$ ..... **[2]**

(b) Express as a single fraction in its simplest form.

$$\frac{6}{x+1} + \frac{5}{x-3}$$

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

END OF QUESTION PAPER