

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**  
**MATHEMATICS C (GRADUATED ASSESSMENT)**  
TERMINAL PAPER – SECTION B (Higher Tier)

**B282B**



Candidates answer on the Question Paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

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

**Friday 15 January 2010**

**Morning**

**Duration: 1 hour**



Candidate Forename					Candidate Surname				
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Centre Number						Candidate Number			
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**INSTRUCTIONS TO CANDIDATES**

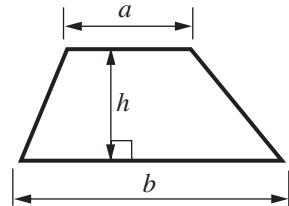
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show all your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

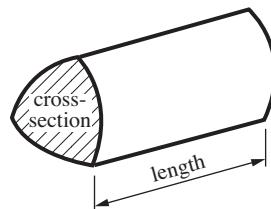
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 10.
- You are expected to use a calculator in Section B of this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

## Formulae Sheet

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



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

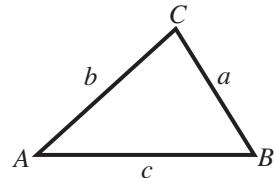


In any triangle  $ABC$

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

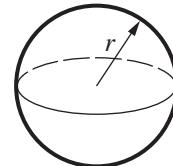
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



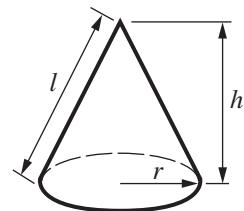
$$\text{Volume of sphere} = \frac{4}{3}\pi r^3$$

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



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

$$\text{Curved surface area of cone} = \pi r l$$



### 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**

- 10 (a)** Janna is writing a questionnaire about the fruit her friends eat.  
In each question she asks them to tick a box from a list of possible responses.

Write a question that Janna could use to find out her friends' favourite fruit.  
Include the response boxes.

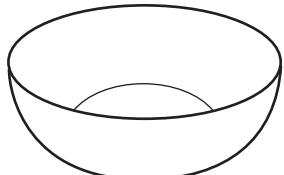
How many portions of fruit do you usually eat each day?

0	<input type="checkbox"/>	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>
more than 3 <input type="checkbox"/>							

[2]

- (b)** This picture shows a fruit bowl.

**Sketch** the plan and the elevation of this fruit bowl.

PlanElevation

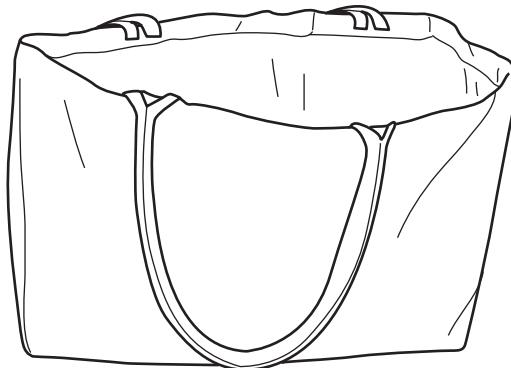
[3]

11 (a) In the UK in 2006, an average of 410 plastic carrier bags were used per second.

Show that this is equivalent to 35 million bags per day, to the nearest million.

[2]

(b) The capacity of this re-usable cloth bag is  $28000 \text{ cm}^3$ .



The capacity of a plastic carrier bag is about  $12000 \text{ cm}^3$ .

Write  $28000 : 12000$  as a ratio in its simplest terms.

(b) ..... : ..... [2]

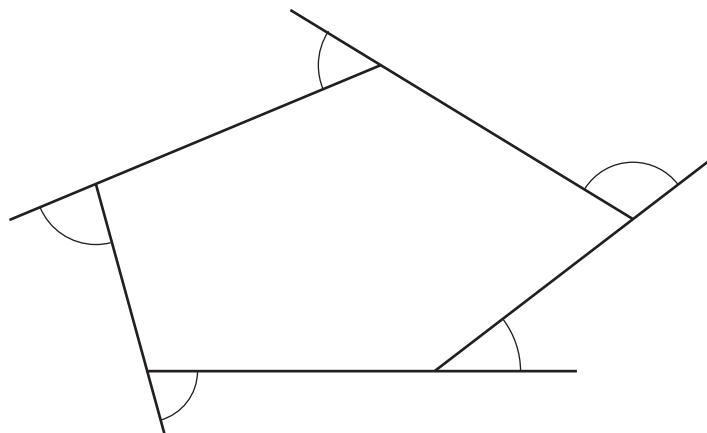
- (c) Colin asked the families in his road how many carrier bags they re-used each week.  
This table summarises the results.

Number of bags	Number of families (Frequency)
0 to 9	18
10 to 19	16
20 to 29	12
30 to 39	4

Calculate an estimate of the mean number of carrier bags re-used each week by each family.

(c) ..... [4]

12 (a)

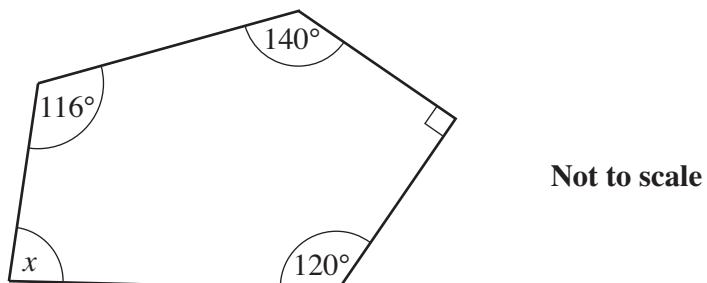


Explain how you can tell that the exterior angles of any pentagon add to  $360^\circ$ .

.....  
.....  
.....

[1]

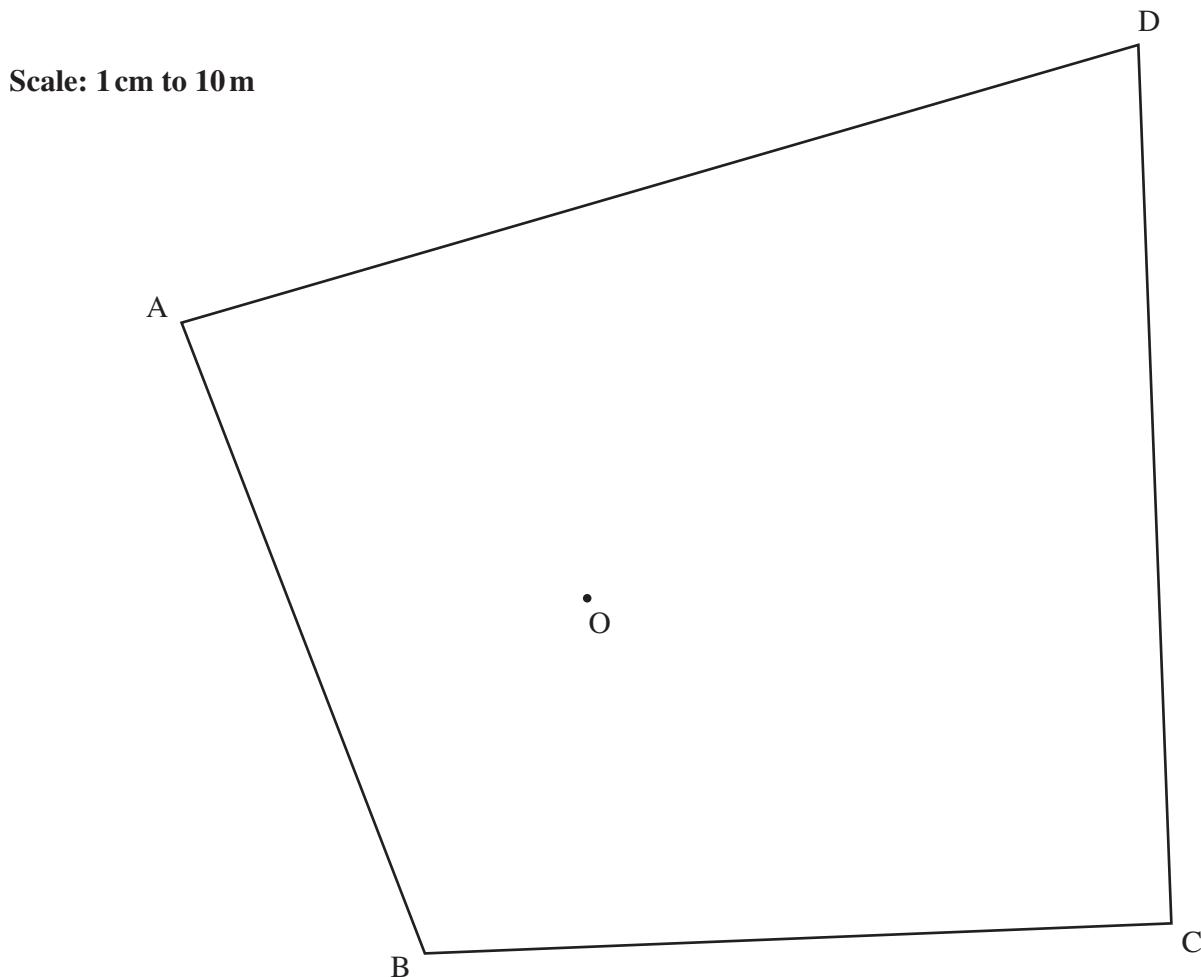
(b)



In this pentagon, find angle  $x$ .

(b) .....  $^\circ$  [3]

- 13 The scale drawing shows a park ABCD.  
There is an old oak tree at O.



The council wants to put a bandstand in the park.

It should be

- at least 20 m from the old oak tree at O,
- at least 50 m from the boundary CD,
- nearer to gate A than to gate B.

Construct and shade the region where the bandstand can go.  
Leave in all your construction lines.

[4]

14 (a) Solve.

$$5(x - 3) = 4$$

(a) ..... [3]

(b) Factorise and solve.

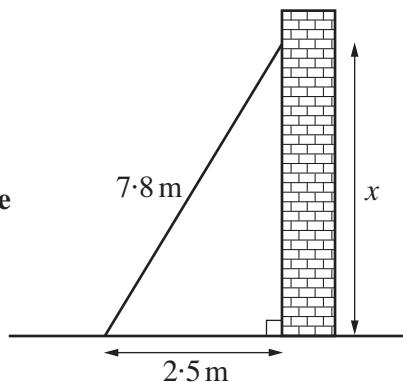
$$x^2 + 2x - 8 = 0$$

(b) ..... [3]

- 15 (a) A ladder 7·8 m long is leaning against a wall, as shown.  
The foot of the ladder is 2·5 m from the wall.

Calculate  $x$ , the distance the ladder reaches up the wall.  
Give your answer to a sensible degree of accuracy.

**Not to scale**



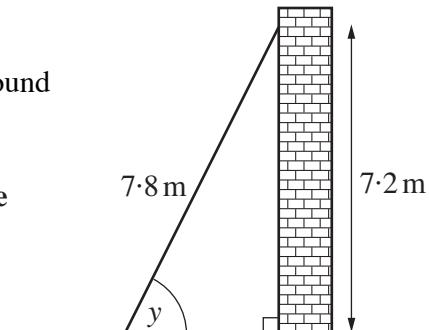
(a) ..... m [4]

- (b) The ladder is moved so that it now reaches 7·2 m up the wall.

For greatest safety, the angle,  $y$ , between the ladder and the ground should be about  $75^\circ$ .

State whether or not the ladder  
is near this position of greatest safety.  
Use calculations to support your answer.

**Not to scale**



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

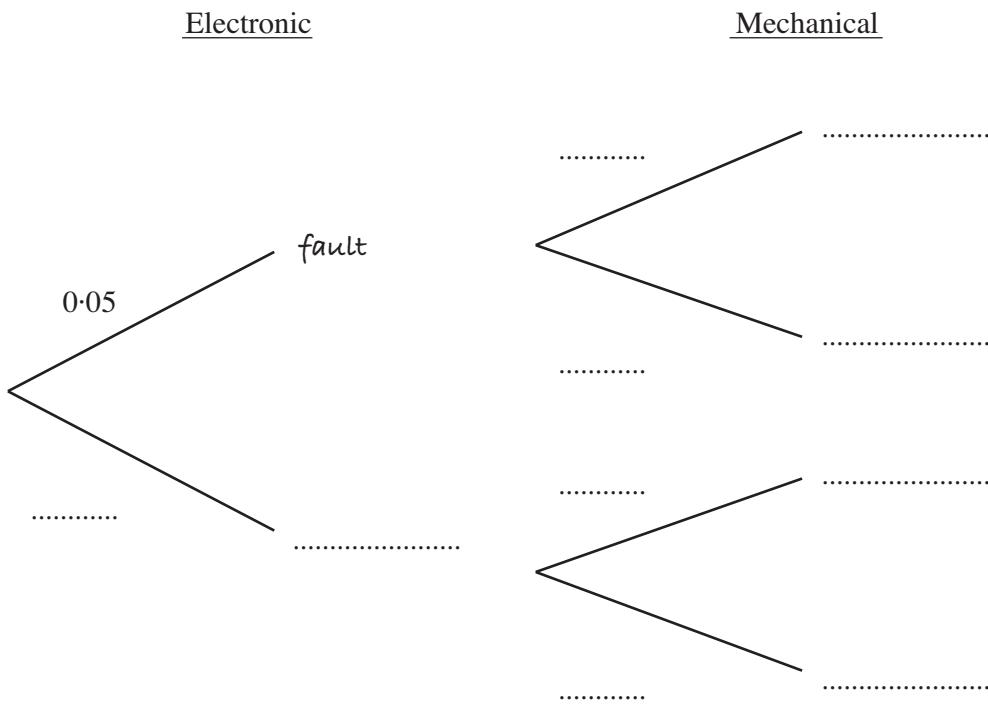
- 16** Cars are made on a factory production line.

The probability that one of these cars has an electronic fault is 0·05.

The probability that one of these cars has a mechanical fault is 0·02.

These events are independent.

- (a) Complete the tree diagram.



[2]

- (b) Calculate the probability that a car from this production line has neither of these faults.

(b) ..... [2]

17 Solve algebraically these simultaneous equations.

$$\begin{aligned}x + 2y &= 2 \\2x - y &= 5\end{aligned}$$

$$x = \dots$$

$$y = \dots [3]$$

18  $y$  is inversely proportional to  $x^2$ .

$y = 9$  when  $x = 2$ .

(a) Find an equation connecting  $y$  and  $x$ .

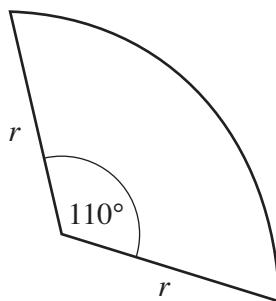
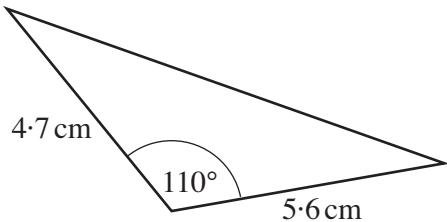
$$(a) \dots [3]$$

(b) Find the positive value of  $x$  when  $y = 4$ .

$$(b) \dots [1]$$

**TURN OVER FOR QUESTION 19**

- 19 This triangle and this sector of a circle have the same area.



**Not to scale**

Calculate the radius,  $r$ , of the sector.

.....cm [5]

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