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| Candidate forename | | Candidate surname | |
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| Centre number | | | | | | Candidate number | | | | |
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B280B

**MATHEMATICS C
(GRADUATED ASSESSMENT)**

MODULE M10 – SECTION B

THURSDAY 20 JANUARY 2011: Morning

DURATION: 30 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Geometrical instruments

Tracing paper (optional)

Scientific or graphical calculator

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

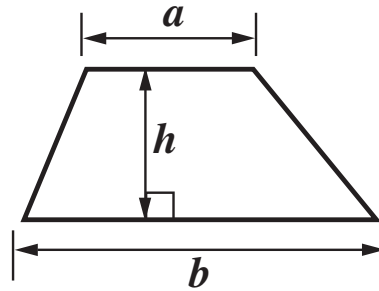
- Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Show your 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).
- Answer ALL the questions.

INFORMATION FOR CANDIDATES

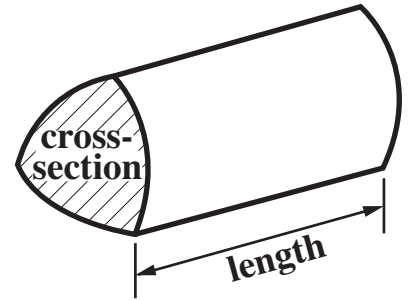
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 6.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is 25.

FORMULAE SHEET

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



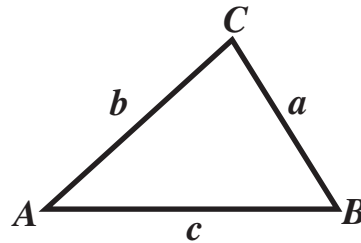
Volume of prism = (area of cross-section) \times length



In any triangle ABC

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

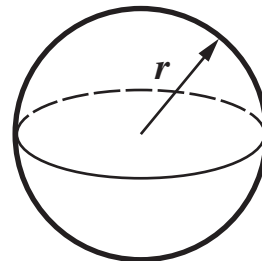
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$



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

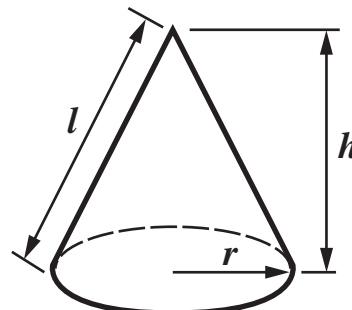
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



The Quadratic Equation

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

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

- 6 In a chemical reaction, the mass of a substance is decreasing. Its mass, M mg, t seconds after the reaction begins is given by this formula.**

$$M = 250 \times 10^{-0.3t}$$

- (a) What mass of this substance is present at the start of the reaction?**

(a) _____mg [1]

- (b) What mass of this substance is present two seconds after the start of the reaction?**

(b) _____mg [1]

**(c) How many seconds after the start of the reaction does the mass remaining become less than 1 mg?
Show how you decide.**

(c) _____ [2]

7 (a) Factorise.

$$5x^2 - 21x + 4$$

(a) _____ [2]

(b) Solve this equation.

$$5x^2 - 17x + 4 = 0$$

Give your answers correct to 2 decimal places.

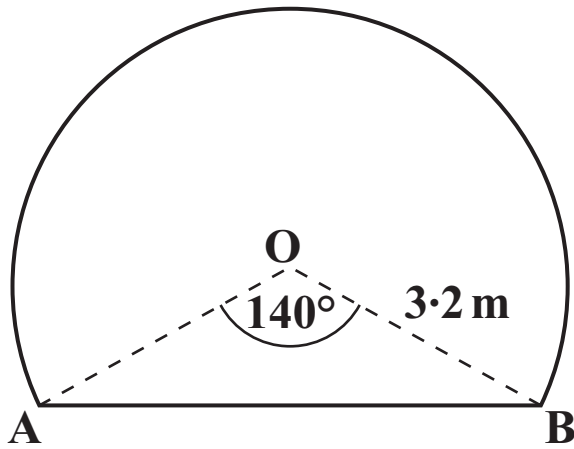
(b) _____ [3]

**8 Shenaz has a bag containing six pens.
Three pens are red, two are blue and one is green.
She takes pens out of the bag at random, WITHOUT
replacing them.**

**Calculate the probability that the first two pens she takes
out are the same colour.**

_____ [4]

- 9 The diagram shows the cross-section of a tunnel.
It is a segment of a circle, centre O and radius 3.2 m.
It is bounded by the chord AB .
Angle $AOB = 140^\circ$.

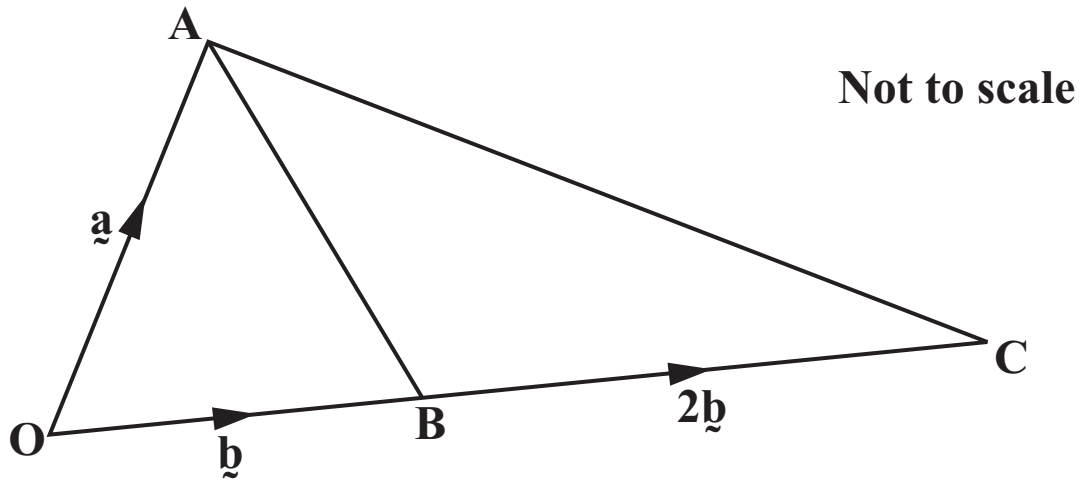


Not to scale

Calculate the area of the cross-section of the tunnel.

_____ m^2 [5]

10 The diagram shows triangle OAC.



$$\vec{OA} = \mathbf{a} \text{ and } \vec{OB} = \mathbf{b}.$$

$$\vec{BC} = 2\mathbf{b}.$$

(a) Find

(i) \vec{AB} ,

(a)(i) _____ [1]

(ii) \vec{AC} .

(ii) _____ [1]

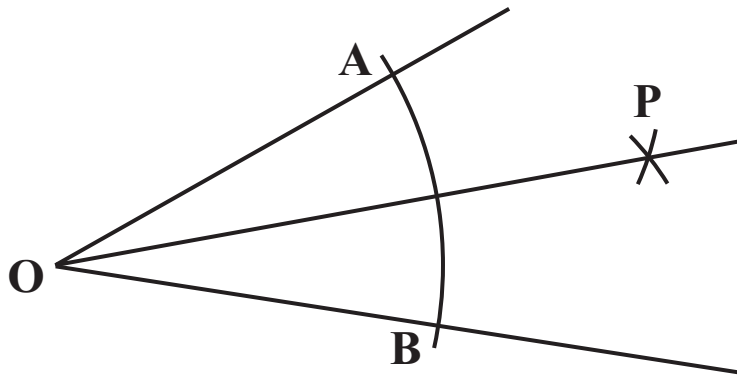
(b) **D** is the point on **AB** produced such that $\overrightarrow{BD} = 2\overrightarrow{AB}$.

Use vectors to prove that **OD** and **AC** are **NOT** parallel.

[2]

TURN OVER FOR QUESTION 11

- 11 The diagram shows a construction for bisecting an angle using a ruler and compasses.



Complete this proof to show why this construction works.

| Statement | Reason |
|--|-----------------------------|
| $OA = OB$ | arcs drawn with same radius |
| $AP = BP$ | _____ |
| _____ | _____ |
| So triangles OAP and OBP are congruent | _____ |
| So angle AOP = angle BOP as required | |

[3]

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