



M10

GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS C (GRADUATED ASSESSMENT)
 MODULE M10 – SECTION B

B280B



Candidates answer on the question paper.

OCR supplied materials:
None

Other materials required:

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

Thursday 20 January 2011
Morning
 Duration: 30 minutes



Candidate forename		Candidate surname	
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Centre number						Candidate number			
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MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

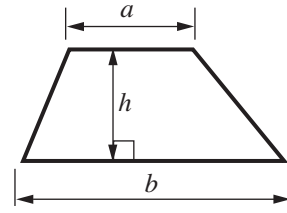
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Show your working. 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.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

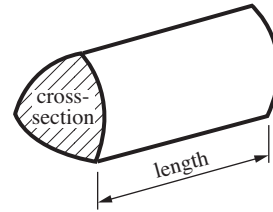
- The number of marks is given in brackets [] at the end of each question or part question.
- Section B starts with question 6.
- You are expected to use a calculator in Section B of this paper.
- Use the π button on your calculator or take π to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **25**.
- This document consists of **8** pages. Any blank pages are indicated.

Formulae Sheet

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



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

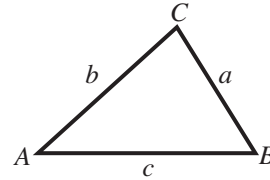


In any triangle ABC

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

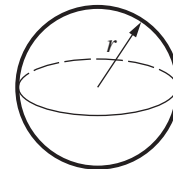
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



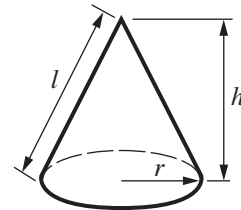
Volume of sphere = $\frac{4}{3}\pi r^3$

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

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

PLEASE DO NOT WRITE ON THIS PAGE

- 6 The mass of a substance decreases during a chemical reaction.
 t seconds after the reaction begins its mass, M mg, 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.

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

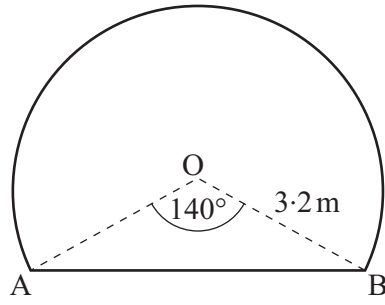
Give your answers correct to 2 decimal places.

(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]



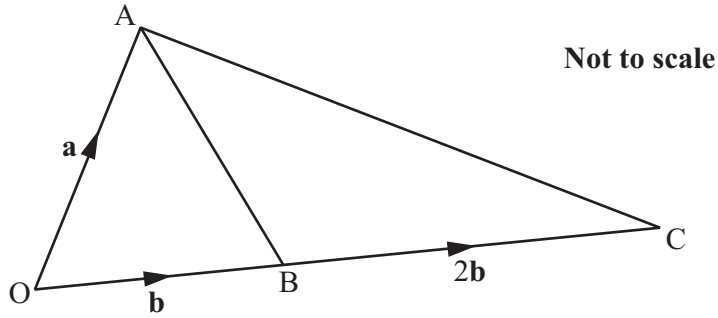
Not to scale

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°.

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

.....m² [5]

10



$\vec{OA} = \mathbf{a}$ 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 $\vec{BD} = 2\vec{AB}$.

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

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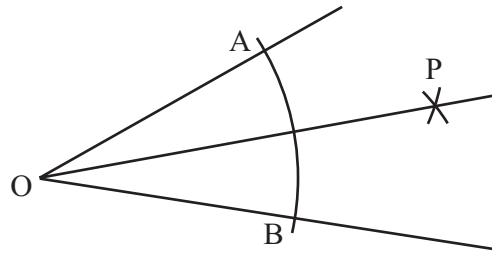
.....

.....

..... [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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