

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

B280A

Candidates answer on the Question Paper

OCR Supplied Materials:
None

Other Materials Required:

- Geometrical instruments
- Tracing paper (optional)

Thursday 21 January 2010
Afternoon

Duration: 30 minutes



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|--------------------|--|-------------------|--|
| 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 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.
- The total number of marks for this Section is **25**.
- This document consists of **12** pages. Any blank pages are indicated.

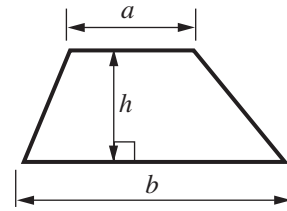
WARNING



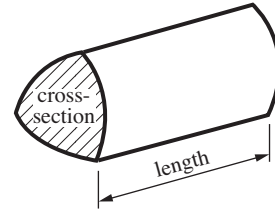
No calculator can be used for Section A of this paper

Formulae Sheet

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



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

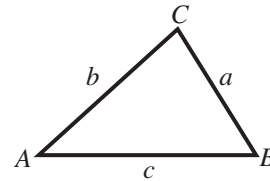


In any triangle ABC

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

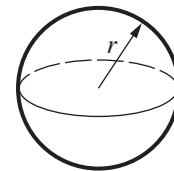
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



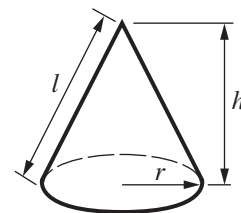
Volume of sphere = $\frac{4}{3}\pi r^3$

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



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

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



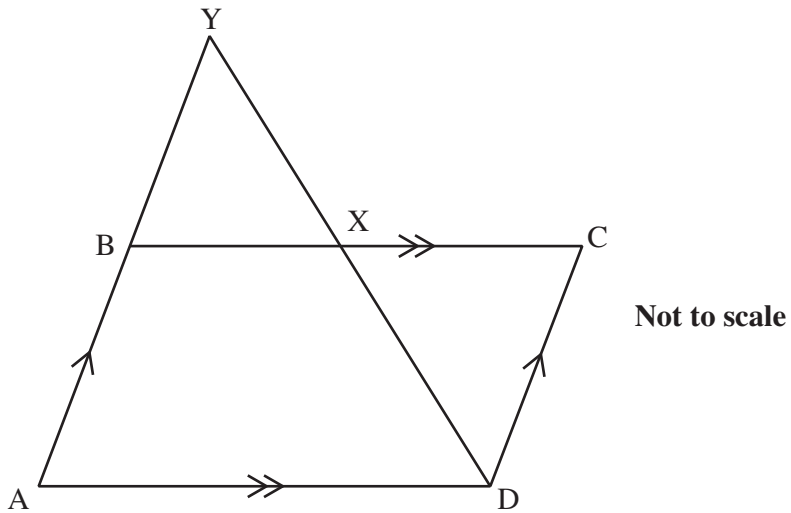
The Quadratic Equation

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

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

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1



ABCD is a parallelogram.
 X is the midpoint of BC.
 The lines through AB and DX meet at Y.

Complete this proof to show that triangle BXY is congruent to triangle CXD.

Statement

Reason

BX = XC

X is the midpoint of BC

.....

.....

.....

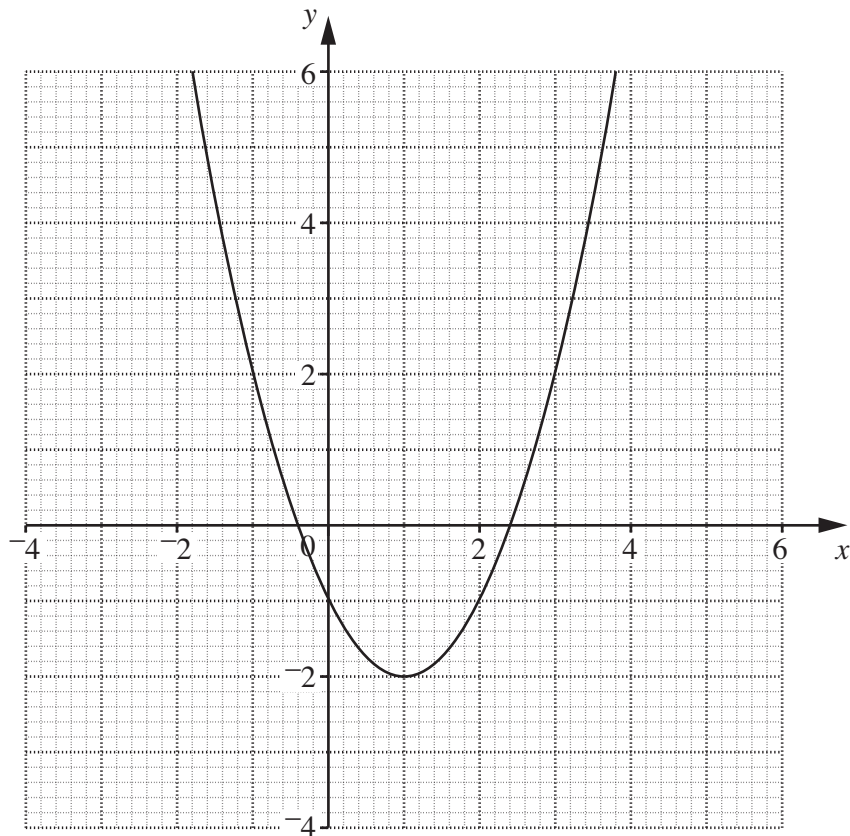
.....

so triangles BXY and CXD are congruent

.....

[3]

2 This is the graph of $y = x^2 - 2x - 1$.



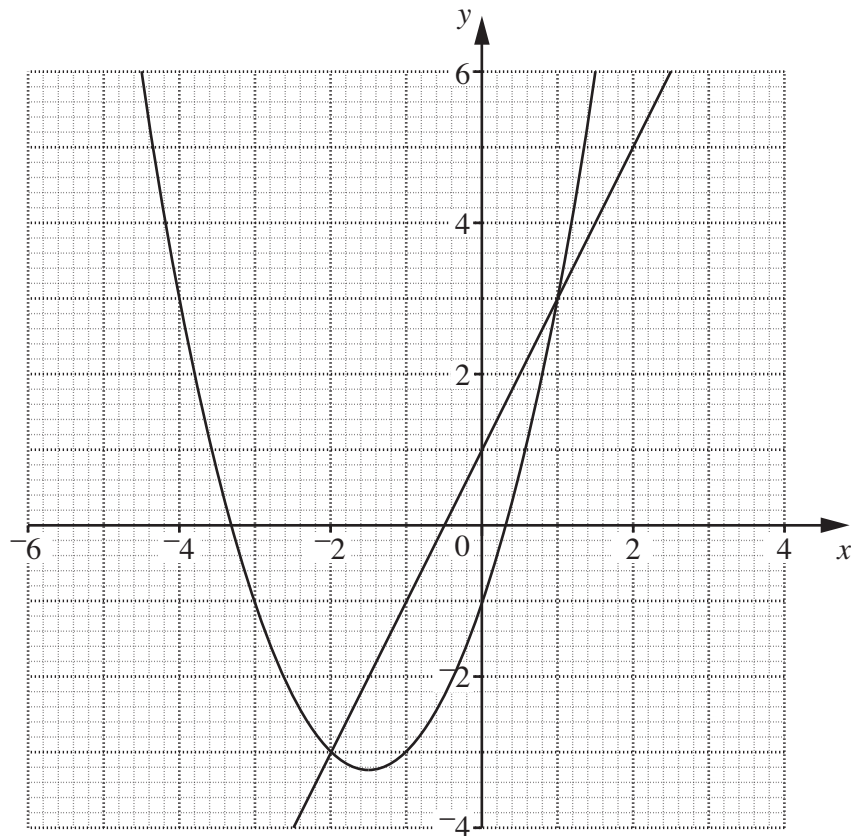
(a) Draw a suitable straight line on the graph to solve this equation.

$$x^2 - 2x - 1 = 2 - x$$

Write down your solutions.

(a) and [3]

(b) This grid shows the graphs of $y = x^2 + 3x - 1$ and $y = 2x + 1$.



The points of intersection of the two graphs give the solutions of one of the equations below.

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

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

$$x^2 + 5x = 0$$

$$x^2 + x = -2$$

Put a ring round the correct equation.

[1]

- 3 (a) Expand and simplify.

$$(2 - \sqrt{3})^2$$

Write your answer in the form $a - b\sqrt{3}$ where a and b are integers.

(a)..... [2]

- (b) Work out.

$$9^{-\frac{3}{2}}$$

(b) [3]

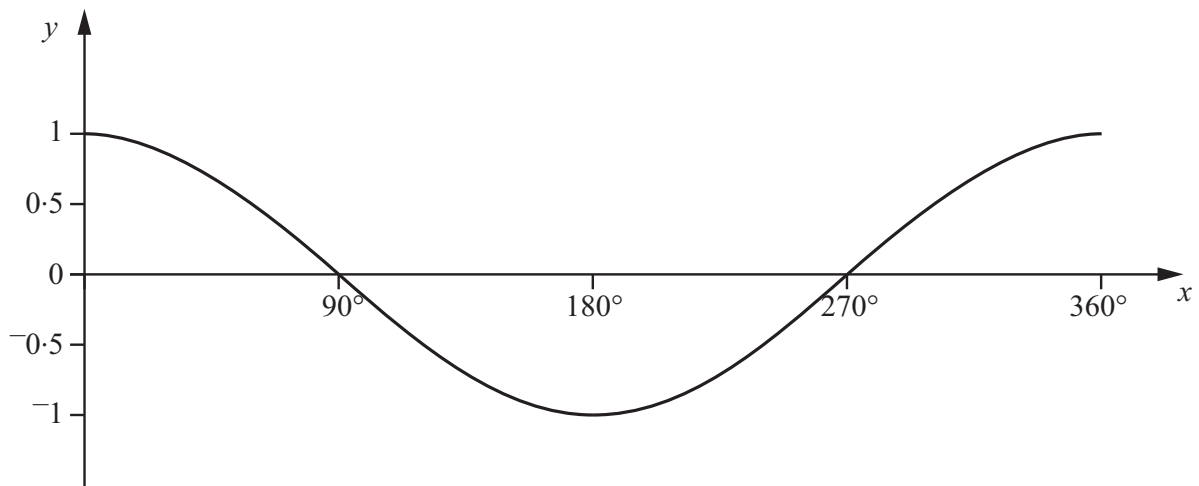
- 4 Find as a single fraction.

$$\frac{3}{2x-1} + \frac{1}{x-2}$$

Give your answer as simply as possible.

..... [3]

- 5 This is the graph of $y = \cos x$ for $0^\circ \leq x \leq 360^\circ$.



One of the solutions of the equation $\cos x = -0.3$ is 107° , correct to the nearest degree.

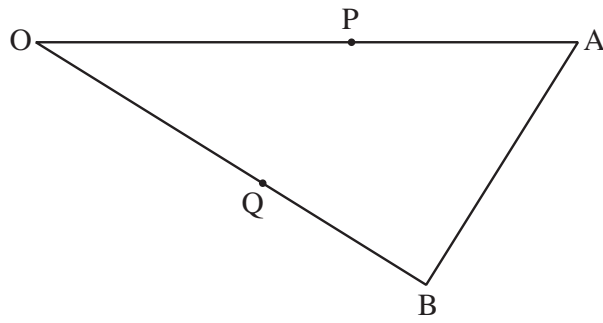
Find the second solution for $0^\circ \leq x \leq 360^\circ$.

.....^o [1]

- 6 A bag contains 7 red and 3 yellow counters.
Robert picks a counter at random from the bag and **does not** replace it.
He then picks a second counter at random from the bag.

What is the probability that he picks one counter of each colour?

..... [4]



Not to scale

OAB is a triangle.

P is the midpoint of OA.

Q is the midpoint of OB.

$\vec{OA} = 4\mathbf{a}$ and $\vec{OB} = 4\mathbf{b}$.

(a) Find \vec{AB} in terms of \mathbf{a} and \mathbf{b} .

(a) [1]

(b) Show that $\vec{PQ} = 2(\mathbf{b} - \mathbf{a})$.

.....

.....

..... [2]

(c) What do your answers to parts (a) and (b) tell you about PQ and AB?

.....

..... [2]

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