



# 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

**Tuesday 21 June 2011  
Afternoon**

**Duration: 30 minutes**



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

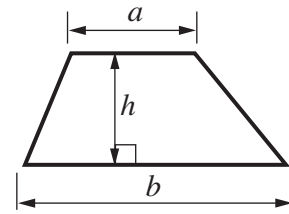
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Show your working.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

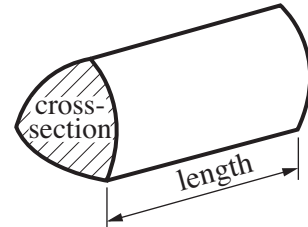
- The number of marks is given in brackets [ ] at the end of each question or part question.
- Section B starts with question 8.
- You are expected to use a calculator in Section B of this paper.
- Use the  $\pi$  button on your calculator or take  $\pi$  to be 3.142 unless the question says otherwise.
- The total number of marks for this Section is **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

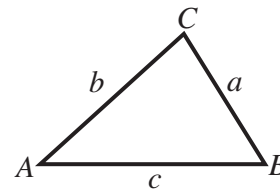


In any triangle  $ABC$

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

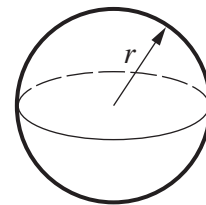
Cosine rule  $a^2 = b^2 + c^2 - 2bc \cos A$

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



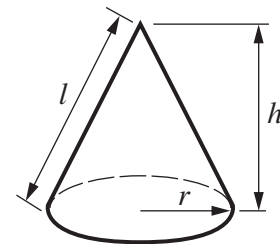
Volume of sphere =  $\frac{4}{3}\pi r^3$

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



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

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

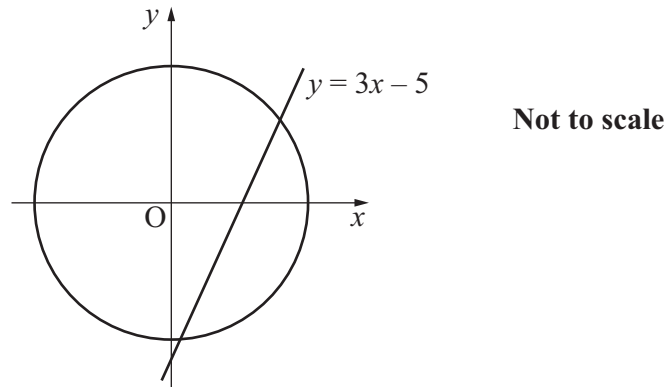


### The Quadratic Equation

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**



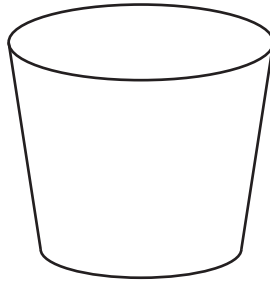
The sketch shows a circle with equation  $x^2 + y^2 = 16$  and a straight line with equation  $y = 3x - 5$ .

- (a) Show that the  $x$ -coordinates of the points of intersection of the circle and the line satisfy the equation  $10x^2 - 30x + 9 = 0$ . [3]

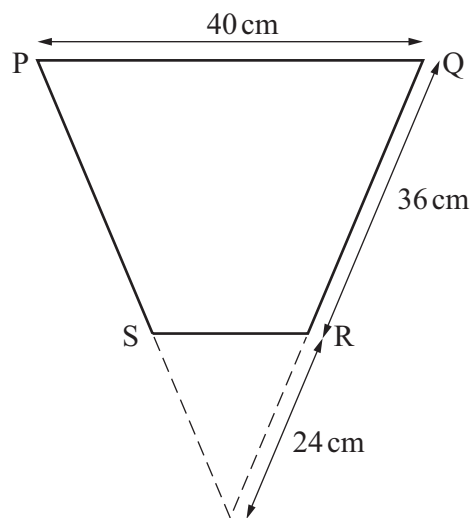
- (b) By solving the equation  $10x^2 - 30x + 9 = 0$ , find the  $x$ -coordinates of these points of intersection.  
Give your solutions correct to 2 decimal places.

(b) ..... [3]

- 9 This lampshade is a frustum of a cone.



The diagram shows the vertical cross-section PQRS through the centre of the lampshade.



**Not to scale**

- (a) Show that  $SR = 16$  cm.

[2]

(b) Calculate the area of the curved surface of the lampshade.

(b) .....cm<sup>2</sup> [3]

10 Mr Blake is playing a number game with his class.  
He has ten cards in a bag, numbered 0 to 9.  
He uses these cards to make a 2-digit target number, for example 17 or 05.  
He picks one card out of the bag and fixes it on the board. This is the 'tens' digit.  
Then he picks another card out of the bag. This is the 'units' digit.

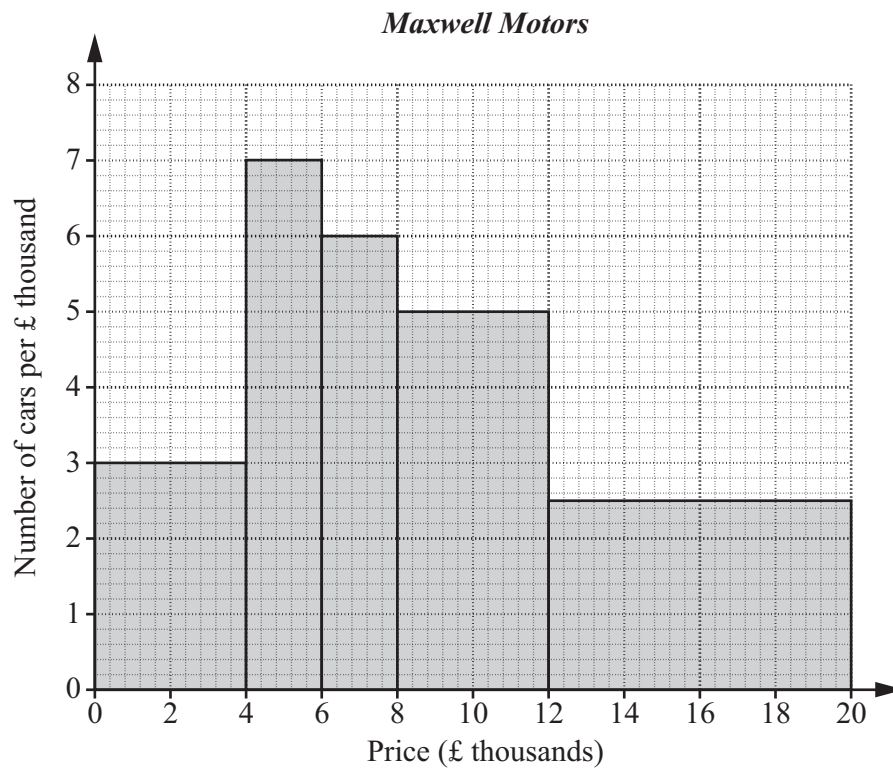
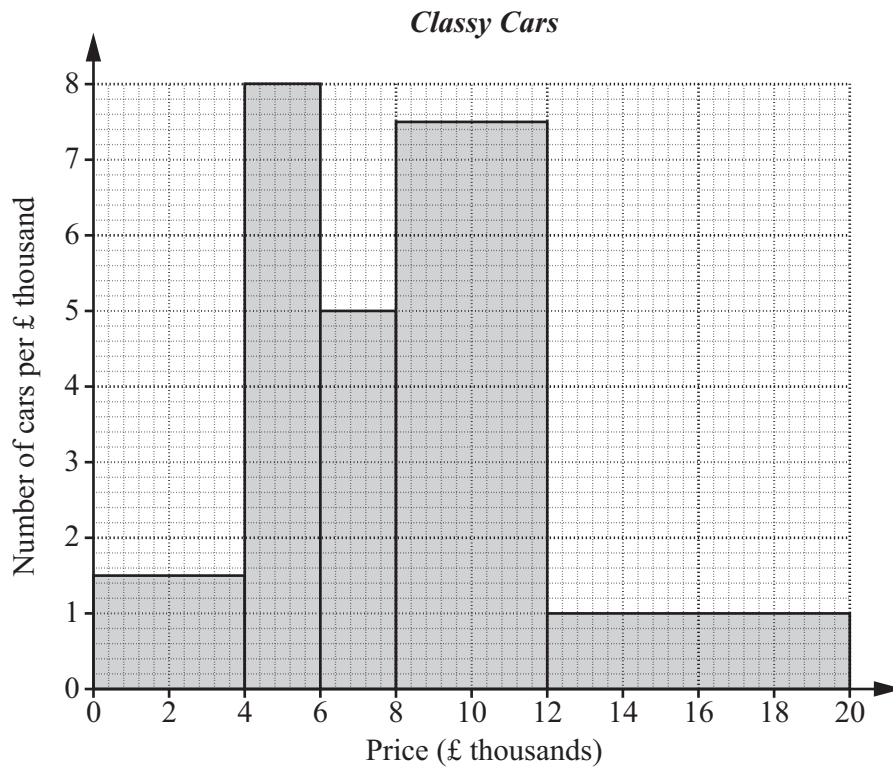
(a) What is the probability that the target number is 99?  
Explain your answer.

The probability is ..... because.....  
..... [1]

(b) Work out the probability that the target number is a multiple of 9.

(b) ..... [2]

- 11 *Classy Cars* and *Maxwell Motors* are two companies selling second-hand cars. These histograms show the distributions of the prices of the cars at the two companies.



Which company has the greater percentage of cars priced at £8000 or more?  
Justify your answer fully.

..... [4]

12 (a) Find the value of  $n$  for which  $30 \times 7^n = 72\,030$ .

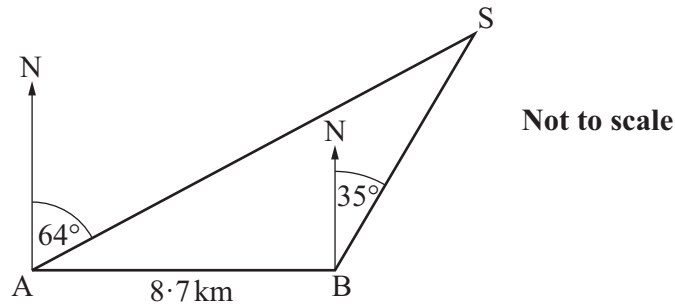
(a) ..... [1]

(b) Find the value of  $n$  for which  $5 \times 25^n = 1$ .

(b) ..... [2]

**TURN OVER FOR QUESTION 13**

- 13 The diagram shows the position of a ship, S, and two points on land, A and B. B is due East of A and the distance AB is 8.7 km. The bearing of S from A is  $064^\circ$  and the bearing of S from B is  $035^\circ$ .



Calculate the distance of the ship from A.

..... km [4]

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