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

A381/02

APPLICATIONS OF MATHEMATICS

Applications of Mathematics 1 (Higher Tier)

MONDAY 6 JUNE 2011: Afternoon

DURATION: 1 hour 15 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

Candidates answer on the question paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Scientific or graphical calculator

Geometrical instruments

Tracing paper (optional)

<p>You are permitted to use a calculator for this paper</p>
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READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

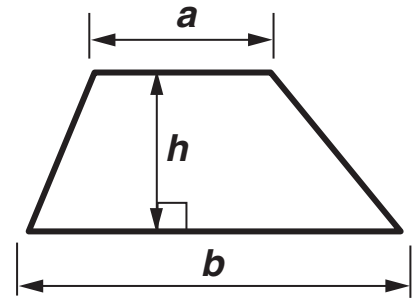
- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Your answers should be supported with appropriate 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

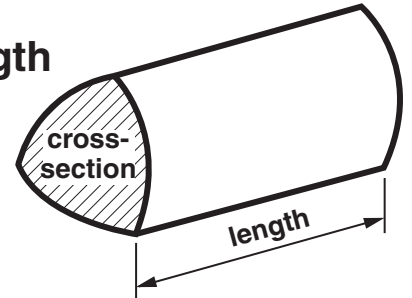
- **The number of marks is given in brackets [] at the end of each question or part question.**
- **Your Quality of Written Communication is assessed in questions marked with an asterisk (*).**
- **The total number of marks for this paper is 60.**

Formulae Sheet: Higher Tier

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



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

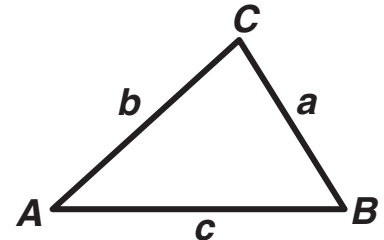


In any triangle ABC

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

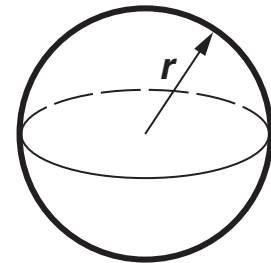
$$\text{Cosine rule} \quad a^2 = b^2 + c^2 - 2bc \cos A$$

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



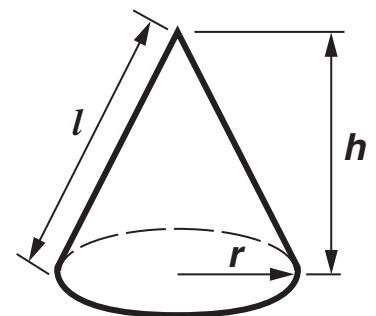
$$\text{Volume of sphere} = \frac{4}{3} \pi r^3$$

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



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

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



The Quadratic Equation

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

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

1 Work out.

$$\frac{17.2^2 - 8.3}{1.8 + \sqrt{91.6}}$$

Give your answer correct to one decimal place.

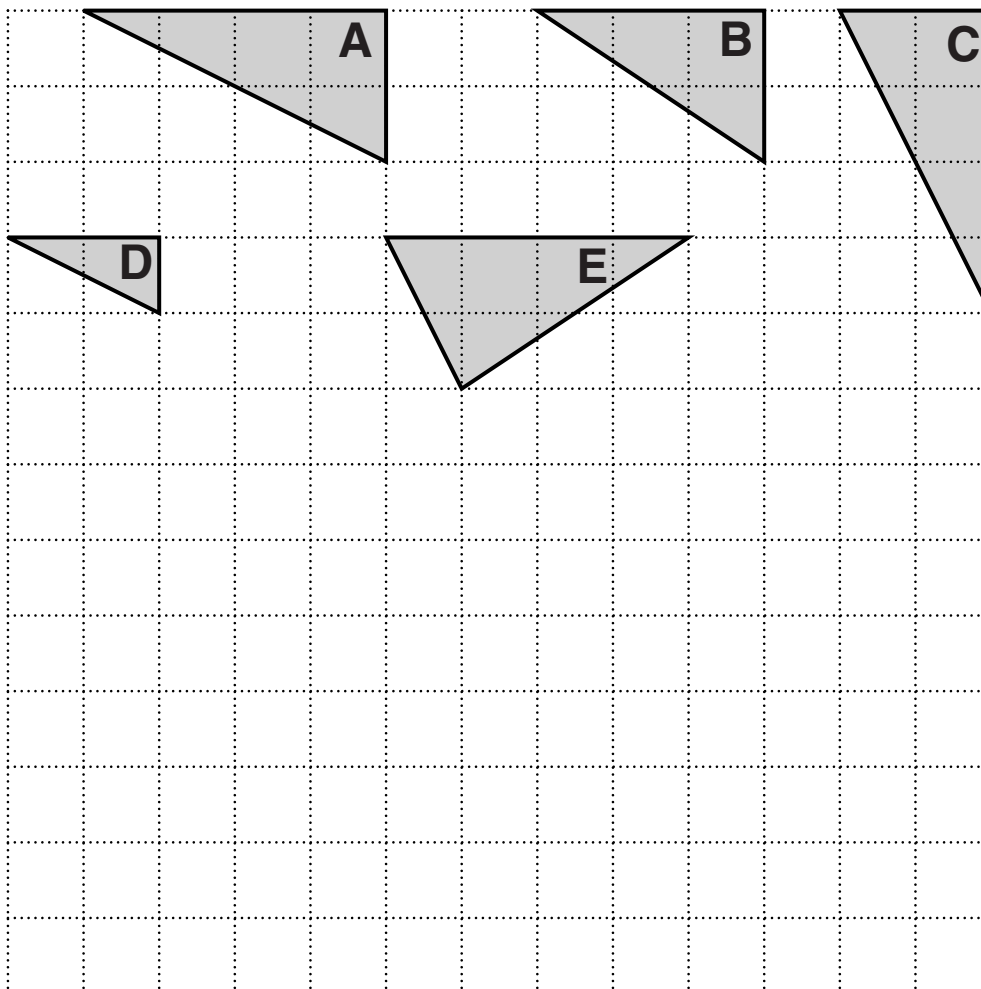
_____ [2]

2 Solve.

$$5(3x - 1) = 3(3x + 4) - 2$$

_____ **[3]**

- 3 These five triangles are drawn on a centimetre square grid. Together they make up the parts of a puzzle.



(a) Which of the triangles is congruent to triangle A?

(a) _____ [1]

(b) Which of the triangles is similar to triangle A but NOT congruent to it?

(b) _____ [1]

(c) To solve the puzzle the triangles have to be fitted together to make a square.

What is the length of the side of the square?

(c) _____ cm [3]

- 4 By rounding each number to one significant figure, estimate the answer to this calculation.

$$\frac{289.4 \times \sqrt[3]{60}}{5.86}$$

_____ [2]

- 5 (a) In February 2011 a motor company made 13 200 cars.
In March the number of cars made was 15% more than in February.**

How many cars were made in March?

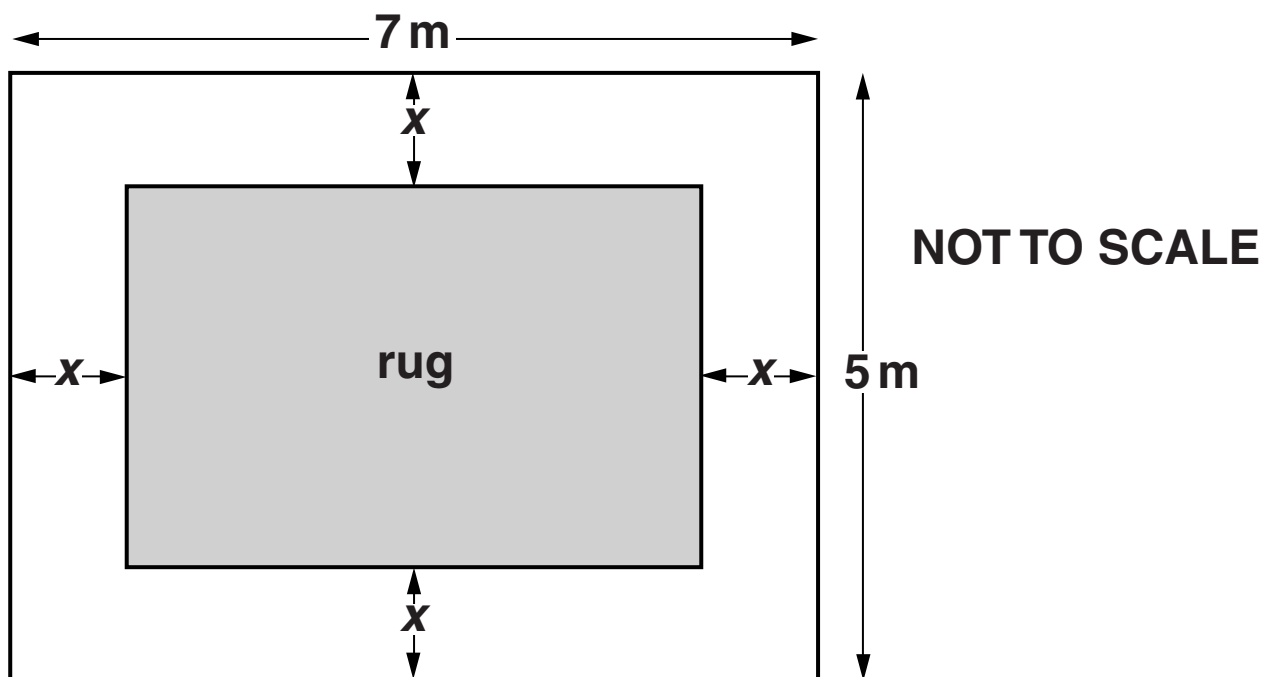
(a) _____ [2]

- (b) In April the company made 2875 vans.
This was 8% less than the previous month.**

How many vans were made in March?

(b) _____ [2]

- 6 The sketch shows the floor plan of a room partially covered by a rug.
The room measures 7 m by 5 m.
The border around the rug is x metres wide.



- (a) (i) Find, in terms of x , an expression for the length of the rug.

(a)(i) _____ [1]

- (ii) Find, and simplify, an expression for the perimeter of the rug.

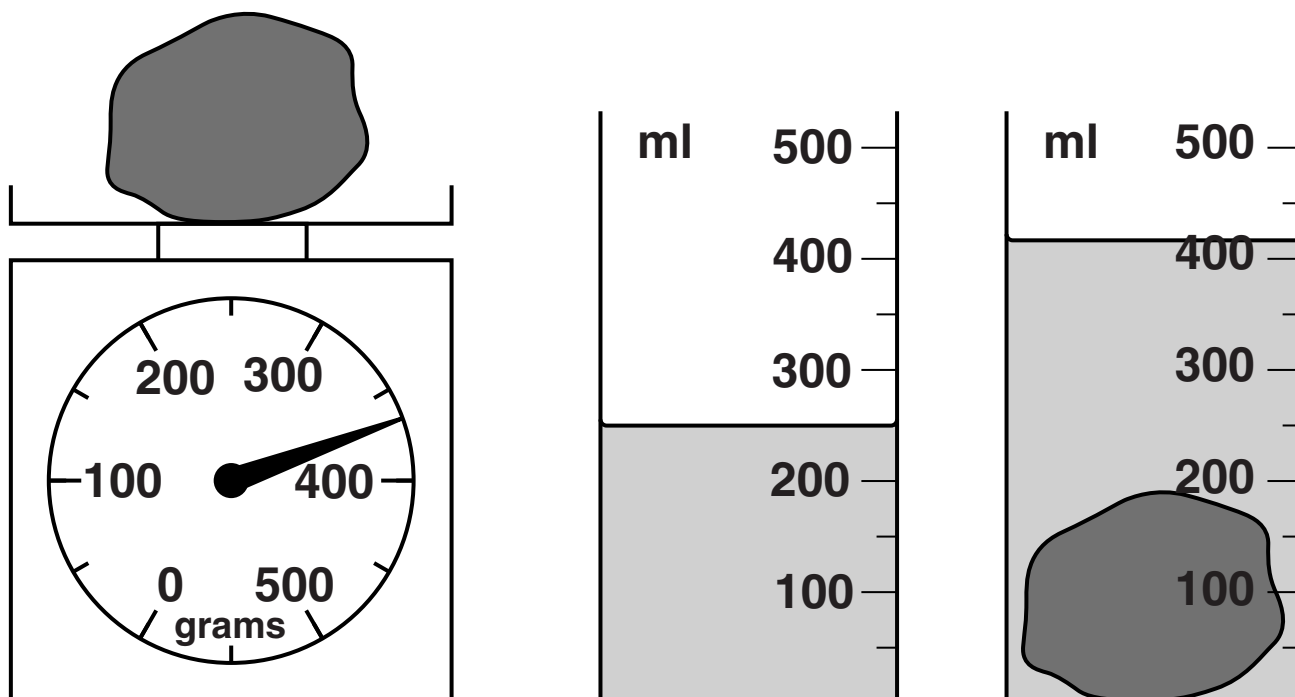
(ii) _____ [2]

(b) The perimeter of the rug is 20 m.

Find the length and width of the rug.

(b) _____ m by _____ m [3]

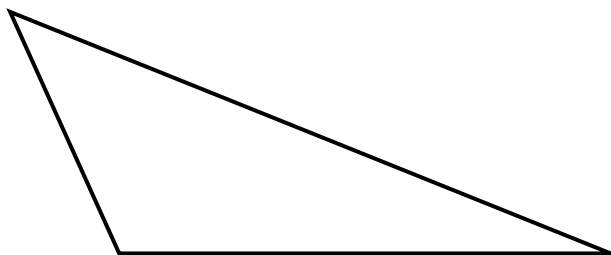
- 7 David conducted an experiment to find an estimate for the density of sandstone. He used weighing scales and a measuring cylinder. He weighed the sandstone and then placed it in a measuring cylinder containing water. The diagrams show the stages.



Use the information shown to estimate the density of sandstone.
Give the units of your answer.

_____ [5]

8 Trevor drew this triangle.



Work out the area of Trevor's triangle.

_____ cm^2 [3]

9 Ms Smith ran a competition for parents and pupils. When she counted up the entries she noticed that the total number of entries was a square number greater than 100.

$\frac{5}{8}$ of the entries were from parents.

$\frac{1}{4}$ of the entries were from girls.

The rest of the entries were from boys.

Calculate the minimum possible number of entries from boys.

_____ [4]

**10 Teresa's car has a trip computer.
It records the petrol consumption in litres per 100 km
and also in miles per gallon.
The number of litres per 100 km, L , is inversely
proportional to the number of miles per gallon, M .
For a journey the computer records L as 11.3 and M
as 40.**

(a) Find a formula for L in terms of M .

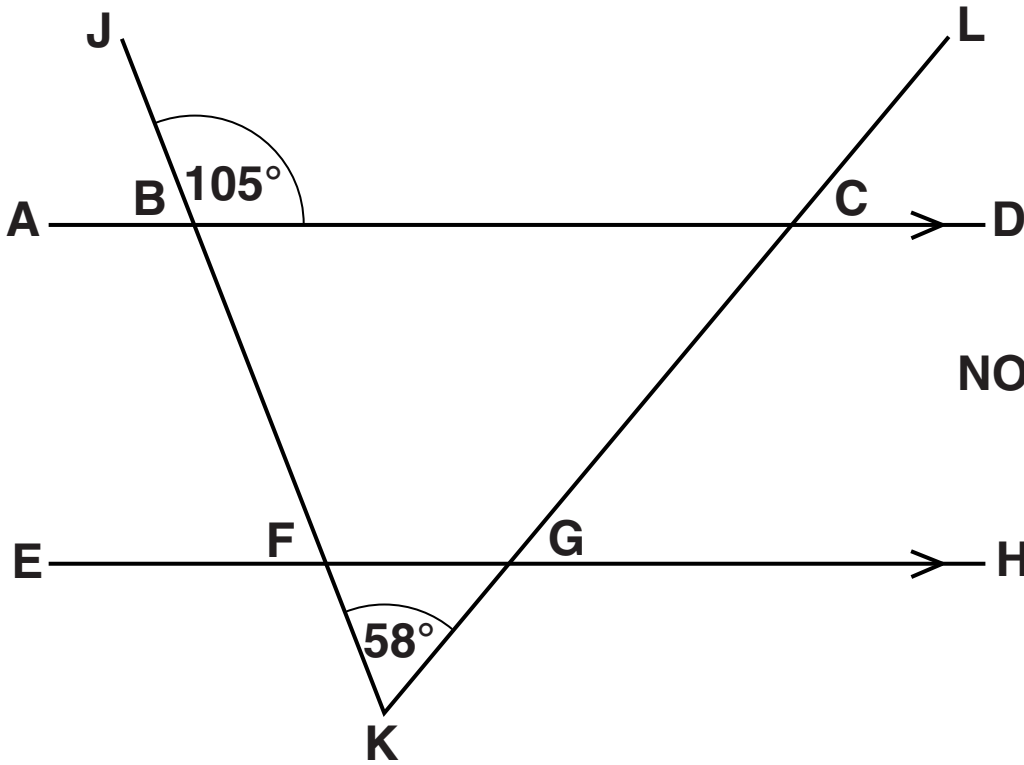
(a) _____ [2]

**(b) For a different journey the computer records
50 miles per gallon.**

How many litres per 100 km is this?

(b) _____ [1]

11* In the diagram below, AD and EH are parallel straight lines.
Angle JBC = 105° and angle FKG = 58° .
JBFK and LCGK are straight lines.



12 Pino is going on holiday to St Anton in Austria.

- (a) He changes £500 into euros (€).
The exchange rate is £1 = €1.16.**

What is £500 in euros?

(a) € _____ [1]

- (b) Pino will drive from Calais to St Anton.
This table gives some information about his route.**

Total distance = 896 km (548 km of which is on motorways)

Average speed on motorways = 120 km/h

Average speed on other roads = 80 km/h

Petrol consumption on motorways = 11.3 litres per 100 km

Petrol consumption on other roads = 10.0 litres per 100 km

Average cost of petrol = €1.30 per litre

- (i) Calculate the total driving time for this route.
Give your answer in hours and minutes.**

(b)(i) _____ hours _____ minutes [4]

(ii) Calculate the total cost of the petrol for this route.

(ii) € _____ [4]

13 (a) Write these as a power of 5.

(i) 1

(a)(i) _____ [1]

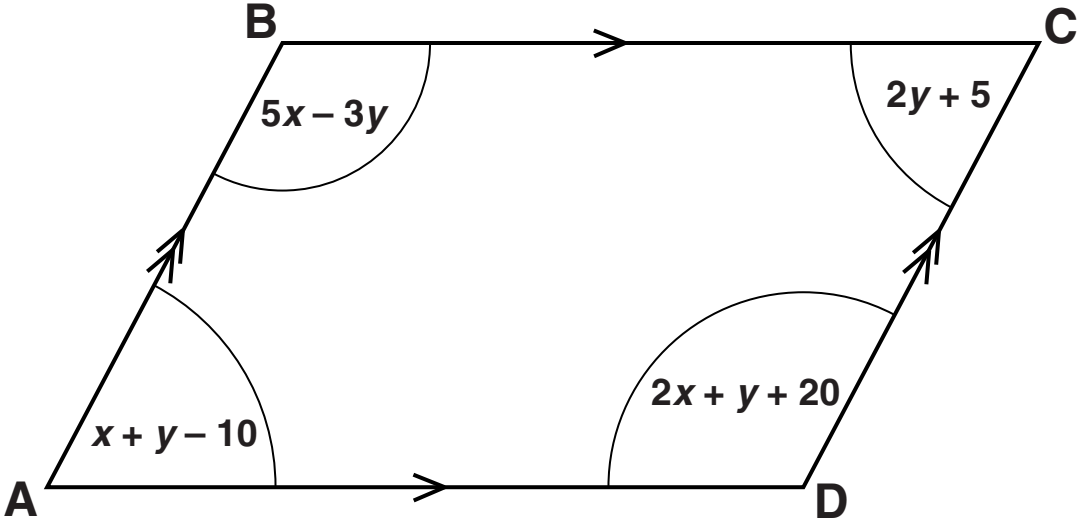
(ii) $\frac{1}{25}$

(ii) _____ [1]

(b) Find the value of $16^{\frac{3}{2}}$.

(b) _____ [2]

14 Work out the size of each angle in the parallelogram below.



[6]

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