OCR
Oxford Cambridge and RSA

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Tuesday 14 June 2016 – Morning

GCSE METHODS IN MATHEMATICS

B391/02 Methods in Mathematics 1 (Higher Tier)

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Geometrical instruments
- Tracing paper (optional)

Duration: 1 hour 15 minutes

* B 3 9 1 0 2 *

Candidate forename		Candidate surname	

Centre number						Candidate number				

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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).
- 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.
- Quality of written communication will be assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **12** pages. Any blank pages are indicated.

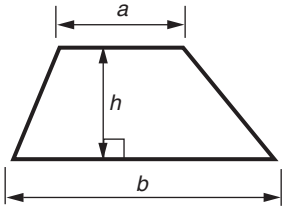
WARNING

No calculator can be used for this paper

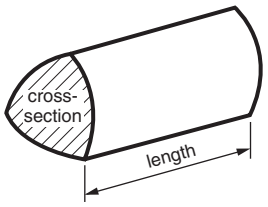
DC (RW/SG) 125148/1

Formulae Sheet: Higher Tier

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



Volume of prism = (area of cross-section) × length

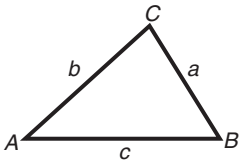


In any triangle *ABC*

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

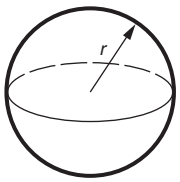
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



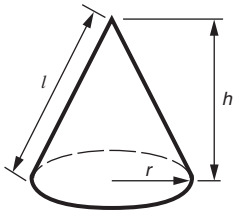
Volume of sphere $= \frac{4}{3}\pi r^3$

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



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

Curved surface area of cone $= \pi rl$



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

Answer **all** the questions.

1 **(a)** Find the smallest and largest fractions in this list.

$\frac{3}{5}$ $\frac{7}{4}$ $\frac{4}{7}$ $\frac{2}{3}$ $\frac{1}{2}$

(a) smallest .....

largest ..... **[2]**

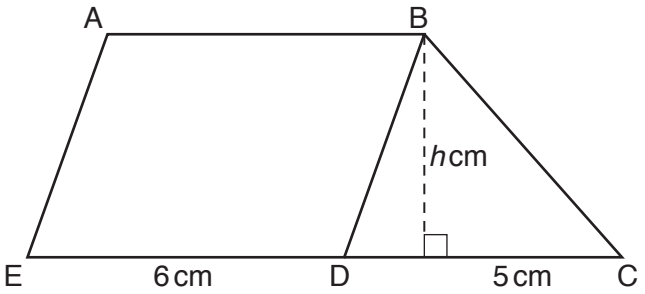
(b) Find the smallest and largest values in this list.

0.7 $\sqrt{0.7}$ 0.68 0.7^2 $\frac{1}{0.7}$

(b) smallest .....

largest ..... **[2]**

2 ABDE is a parallelogram. EDC is a straight line.
ED = 6 cm and DC = 5 cm.
The height of the shape ABCDE is *h* cm.



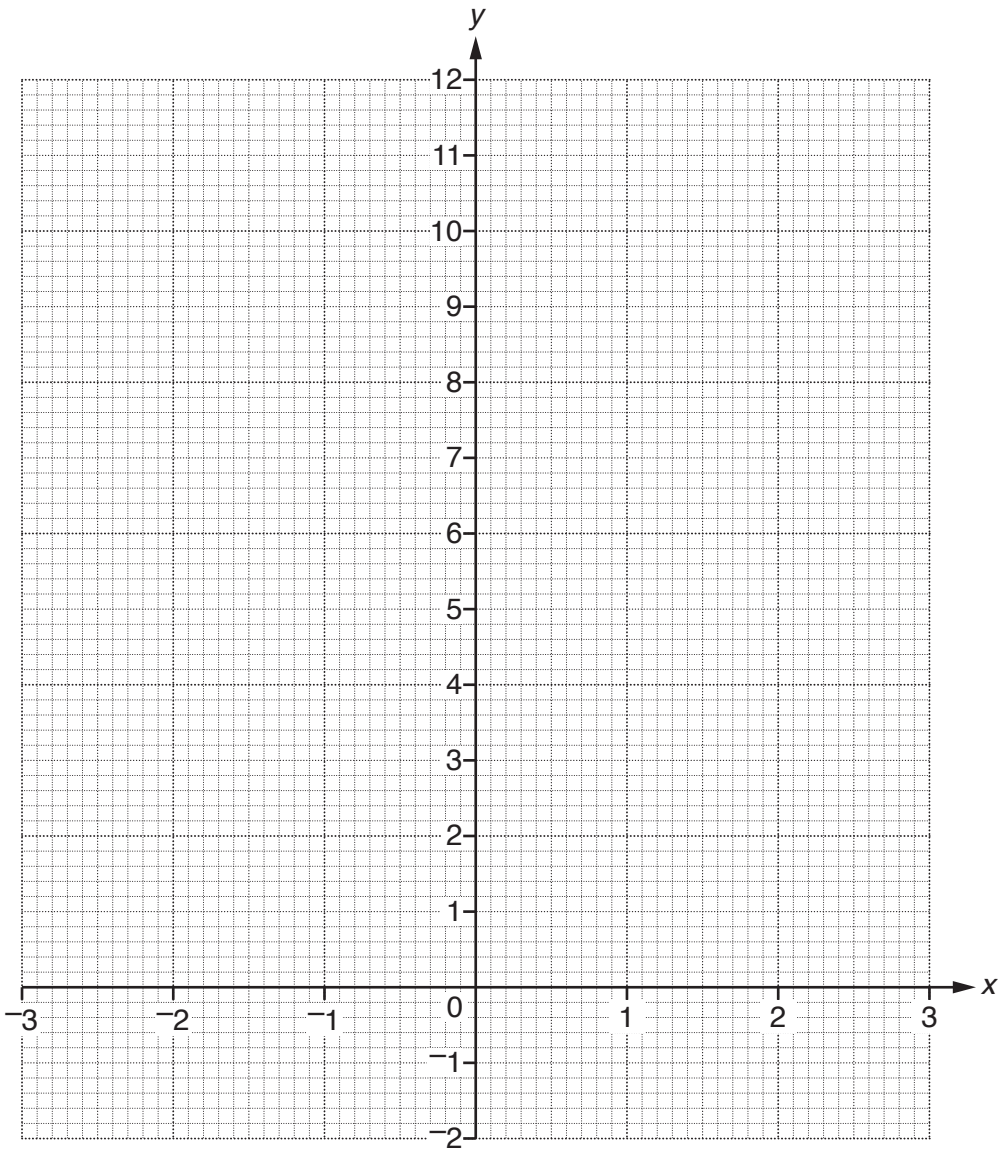
Not to scale

The total area of the shape ABCDE is 34 cm^2.

Find *h*.

h = ... **[3]**

3 **(a)** On the grid, plot the graph of $y = 5 + 2x$ for values of x between -3 and 3.



[3]

(b) The point $(a, 6)$ lies on the line $y = 5 + 2x$.

Find the value of a.

(b) $a =$ ..... **[1]**

4 **(a)** Work out.

(i) 0.3×0.2

(a)(i) ..... **[1]**

(ii) $\frac{4}{0.2}$

(ii) ..... **[1]**

(b) Work these out.
Give your answers as mixed numbers.

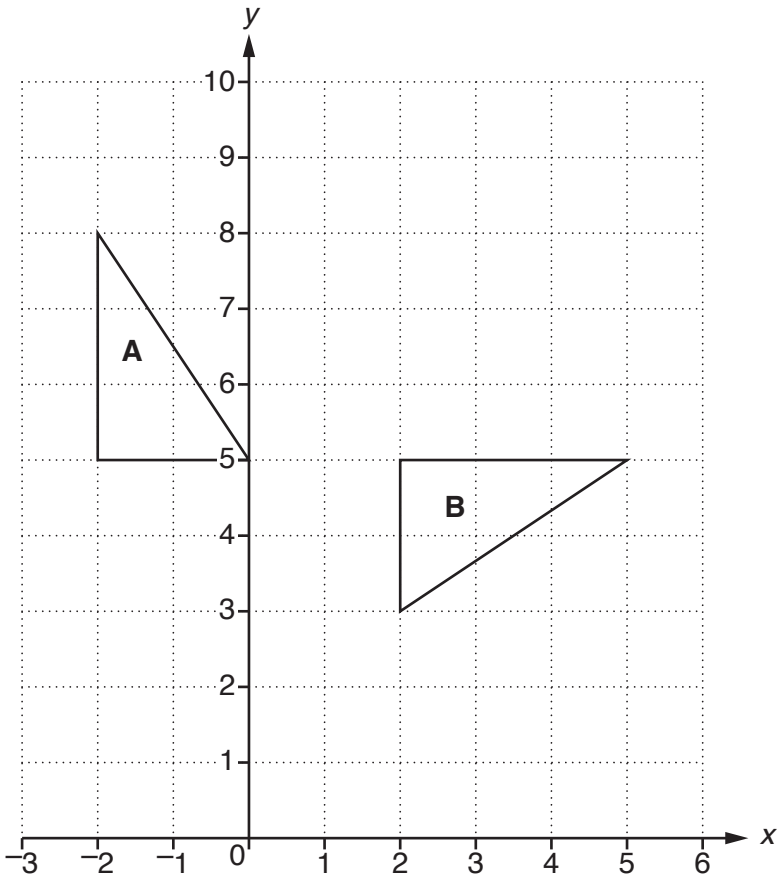
(i) $\frac{2}{3} + \frac{4}{5}$

(b)(i) ..... **[2]**

(ii) $1\frac{1}{2} \times \frac{3}{4}$

(ii) ..... **[2]**

5



Describe fully the **single** transformation that maps triangle **A** onto triangle **B**.

.....

..... **[3]**

6* Ian went by car to visit relatives.
Here is some information about his journey there and back.

- Total distance: 261.5 miles
- Diesel consumption: 51.2 miles per gallon
- Time for outward journey: 1 hour 55 minutes
- Time for homeward journey: 2 hours 25 minutes
- Cost of diesel: £1.22 per litre
- 1 gallon: approximately 4.6 litres

Estimate the total cost of diesel for the whole journey.

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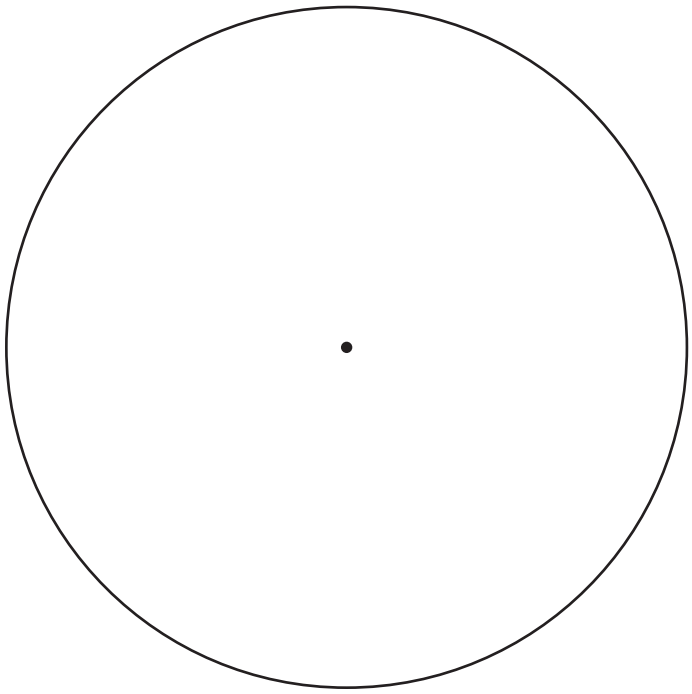
£ ..... **[4]**

7 Draw accurately a regular pentagon so that all its vertices are on this circle.



[3]

8 **(a)** Complete these statements.

(i) $16 = 2^{\square}$ **[1]**

(ii) $\dfrac{3^2 \times 3^6}{3^3} = 3^{\square}$ **[2]**

(b) Find the value of

(i) 5^0,

(b)(i) ..... **[1]**

(ii) 10^{-2}.

(ii) ..... **[1]**

9 **(a)** Put one pair of brackets in this statement to make it correct.

$$5a - 3a - 2 + 5 = 2a - 7$$

[1]

(b) Put a sign (+ or –) in each space to make this statement correct.

$$5b \text{ ..... } (4 \text{ ..... } 3b) \text{ ..... } 7 = 2b - 11$$

[2]

(c) Put a positive integer in each space to make this statement correct.

$$4c + \text{ ..... } (3c + \text{ ..... }) - 2(c + \text{ ..... }) = 11c - 16$$

[2]

10 Hanif and Sarah are playing 'Think of a number'.

(a) Hanif makes these statements about his number.

- It has two digits.
- It is both a square number and a cube number.

What is Hanif's number?

(a) ..... **[2]**

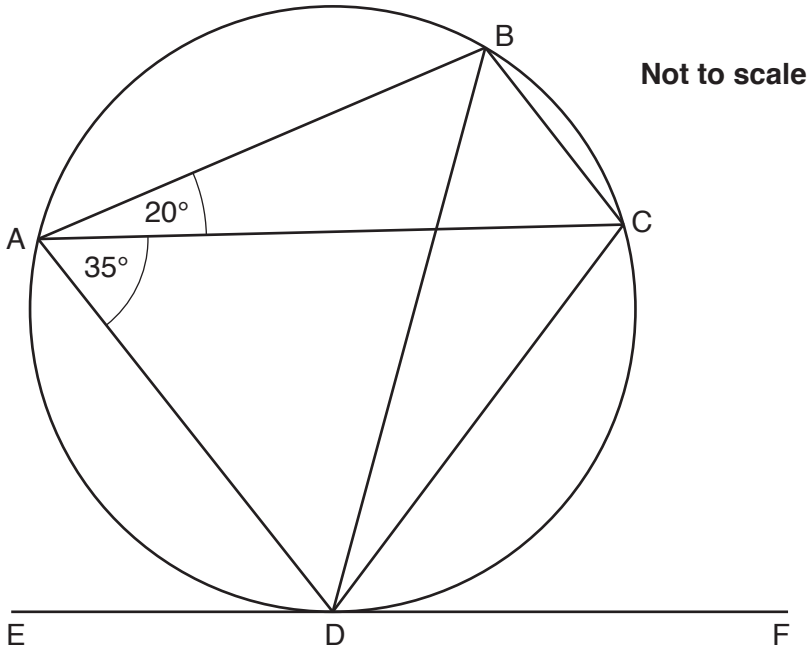
(b) Sarah makes these statements about her number.

- It is less than 100.
- It has only two prime factors, 2 and 5.
- It is 1 more than a prime number.
- It is 1 less than a square number.

What is Sarah's number?

(b) ..... **[3]**

11 A, B, C and D are points on the circle.
EDF is a tangent to the circle at D.
Angle CAD = 35° and angle BAC = 20°



Find the size of each of these angles, giving your reasons.

(a) Angle BCD

..... because .....

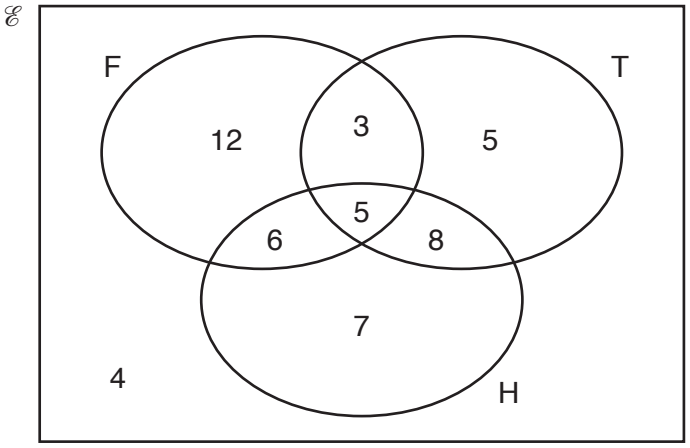
..... **[2]**

(b) Angle CDF

..... because .....

..... **[2]**

12 The Venn diagram shows the number of people playing football (F), hockey (H) and tennis (T) in a group of 50 people.



(a) What is the probability that a person chosen at random from the group of 50 people

(i) plays none of the three sports,

(a)(i) ..... **[1]**

(ii) is a member of the set $(F \cup T) \cap H'$?

(ii) ..... **[2]**

(b) (i) Two people are chosen at random from the group of 50.

What is the probability that both of them play all three sports?

(b)(i) ..... **[2]**

(ii) Two people are chosen at random from those who play tennis.

What is the probability that one of them also plays football but not hockey and the other also plays hockey but not football?

(ii) ..... **[3]**

13 **(a)** Write down the gradient of the straight line with equation $y = 3x - 2$.

(a) ..... **[1]**

(b) Find the equation of the straight line that is **perpendicular** to the line in part **(a)** and that passes through the point (6, 2).

(b) ..... **[3]**

14 Multiply out and simplify.

$a\sqrt{3}(5\sqrt{3}a^2b - 3ab^2)$

..... **[2]**

END OF QUESTION PAPER