OCR
RECOGNISING ACHIEVEMENT

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Monday 11 November 2013 – Morning

GCSE METHODS IN MATHEMATICS

B391/02 Methods in Mathematics 1 (Higher Tier)

B391031013

Candidates answer on the Question Paper.

OCR supplied materials:
None

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

Duration: 1 hour 15 minutes

B391 02

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.
- 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).
- Do **not** write in the bar codes.

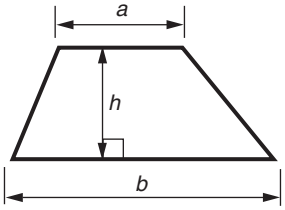
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- Your quality of written communication is assessed in questions marked with an asterisk (*).
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

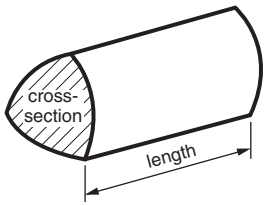
WARNING
No calculator can be used for this paper

Formulae Sheet: Higher Tier

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



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

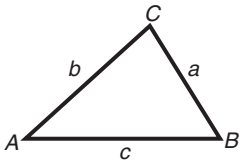


In any triangle *ABC*

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

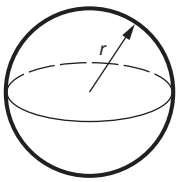
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



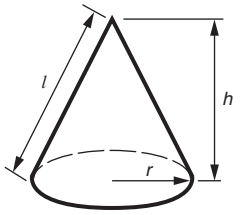
Volume of sphere $= \frac{4}{3}\pi r^3$

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

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

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Answer **all** the questions.

1 **(a)** Complete this table of equivalent fractions and decimals.
Where an answer is not exact, give it correct to three significant figures.

Fraction	Decimal
$\frac{3}{5}$	
$\frac{1}{8}$	
$\frac{5}{12}$	

[4]

(b) Estimate the value of

$$\frac{58.35 \times 7.24}{0.48}.$$

Show clearly the values you use.

(b) _____ **[3]**

2 Janie throws a dice 200 times.
She records her results in a table.

Number on dice	1	2	3	4	5	6
Frequency	15	48	6	55	12	

(a) How many times did Janie throw a 6?

(a) _____ **[2]**

(b) Find the relative frequency of getting a 4.
Give your answer as a fraction in its lowest terms.

(b) _____ **[2]**

(c) Is Janie's dice fair? State your reason.

_____ because _____

_____

_____ **[1]**

3 **(a)** Give the names of three special quadrilaterals that have two pairs of equal sides but not all four sides equal.

(a) _____

_____

_____ **[2]**

(b) Give the names of two special quadrilaterals that have exactly two lines of symmetry.

(b) _____

_____ **[2]**

4 Find the value of S in each of these formulae when $a = 5$, $b = -4$ and $c = \frac{1}{2}$.

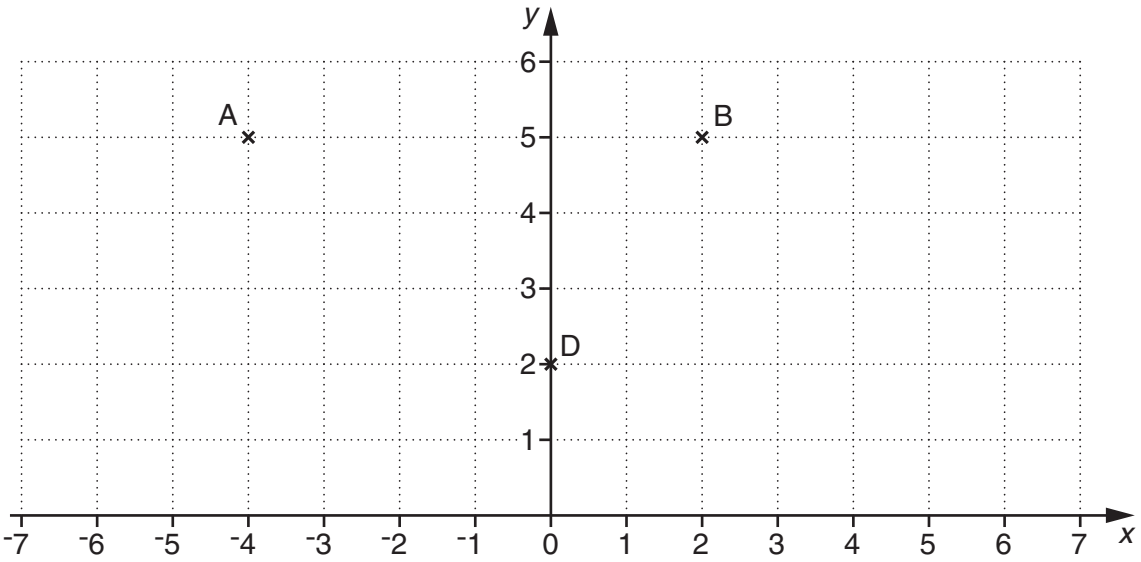
(a) $S = 5a^2$

(a) _____ **[1]**

(b) $S = \frac{a + 2b}{c}$

(b) _____ **[2]**

5 On this one-centimetre squared grid, A is the point $(-4, 5)$, B is the point $(2, 5)$ and D is the point $(0, 2)$.



(a) ABCD is a parallelogram.

(i) Find the coordinates of the point C.

(a)(i) (_____ , _____) **[2]**

(ii) Find the area of the parallelogram.

(ii) _____ cm^2 **[2]**

(b) Find the equation of the line BD.

(b) _____ **[2]**

6 **(a)** Fill in the gaps to make this statement correct.

$$5x + 4 - (\_\_\_\_\_ + \_\_\_\_\_) = 2x - 1$$ **[2]**

(b) Put + or − in each of the gaps to make this statement correct.

$$4a \_\_\_\_\_ 3b \_\_\_\_\_ (a \_\_\_\_\_ 2b) = 3a - b$$ **[2]**

7 **(a)** $7 \times 16 = 112$

Complete this statement, giving your answer as a fraction in its simplest form.

$112 \times \square = 7$

[1]

(b) $4^7 = 16\,384$

Complete this statement, giving your answer as a fraction.

$4 = 16\,384^{\square}$

[1]

8 First class stamps cost 15p more than second class stamps.

The cost of a second class stamp is x p.

(a) Write down, in terms of x, the cost of a first class stamp.

(a) _____ p **[1]**

(b) Katie buys 5 second class stamps and 6 first class stamps.
The total cost is £6.40.

Write down an equation in x and solve it to find the cost of a second class stamp.

(b) _____ p **[4]**

9 The number 75 has 6 factors.

This is a list of those factors.

1 3 5 15 25 75

John uses this method to find how many factors a number has.

- Write the number as the product of its prime factors in index form.
- Add one to each of the powers.
- Multiply the results.

For example,

$75 = 3^1 \times 5^2$

$(1+1)\times(2+1) = 2\times 3 = 6$

So 75 has 6 factors.

(a) $40 = 2^3 \times 5^1$

By listing all the factors of 40, show that John's method works for 40.

_____

_____

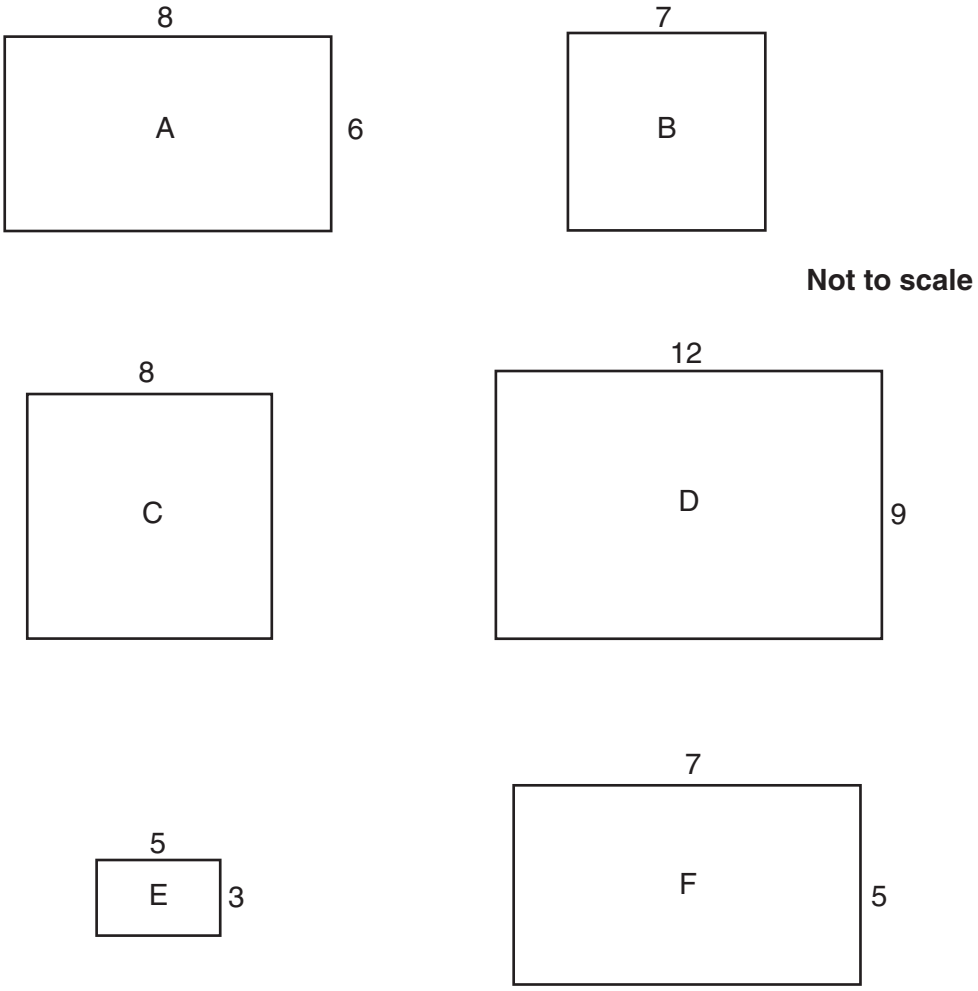
_____

_____ **[3]**

(b) Use John's method to find how many factors 540 has.

(b) _____ **[4]**

10 All the angles in these shapes are right angles. Shapes B and C are squares.



Which of the above shapes are similar to each other?
For each group, state your reasons.

_____

_____

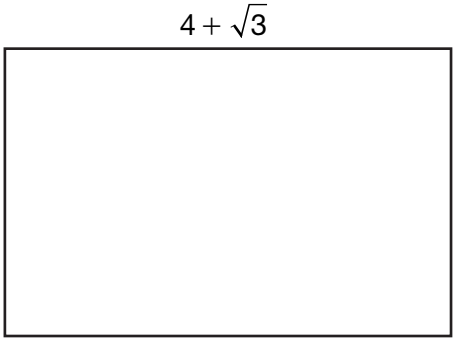
_____

_____

_____

_____ **[4]**

11 All the lengths in this question are in centimetres.

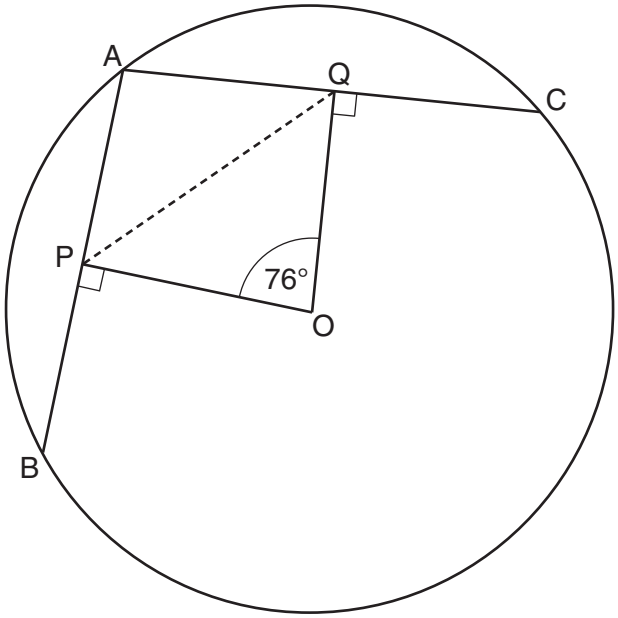


Not to scale

Find the **exact** value of the area of this rectangle, simplifying your answer.

_____ cm^2 **[4]**

12* AB and AC are chords of the circle centre O.



Not to scale

OP is perpendicular to AB and OQ is perpendicular to AC.
Angle POQ = 76° and AB = AC.

Find angle APQ, giving a reason for each step in your solution.

_____

_____

_____

_____

_____

_____ **[4]**

13 The probability that Albion wins any game is 0.4.
The probability that Albion draws any game is 0.15.

(a) Find the probability that Albion loses any game.

(a) _____ **[2]**

(b) Find the probability that Albion will win **exactly** one of the next two games.

(b) _____ **[3]**

END OF QUESTION PAPER

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