

Monday 11 November 2013 – 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



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. 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.

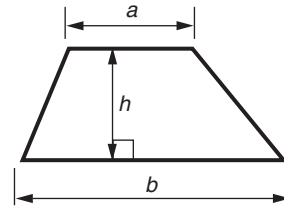
INFORMATION FOR CANDIDATES

- 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.

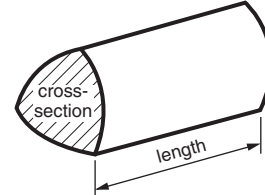


Formulae Sheet: Higher Tier

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



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

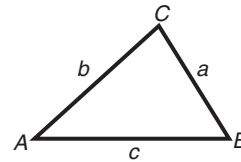


In any triangle ABC

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

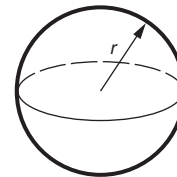
Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

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



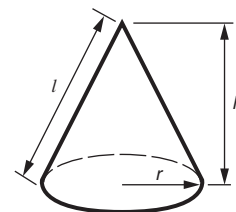
Volume of sphere = $\frac{4}{3}\pi r^3$

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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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 $c = \frac{1}{2}$.

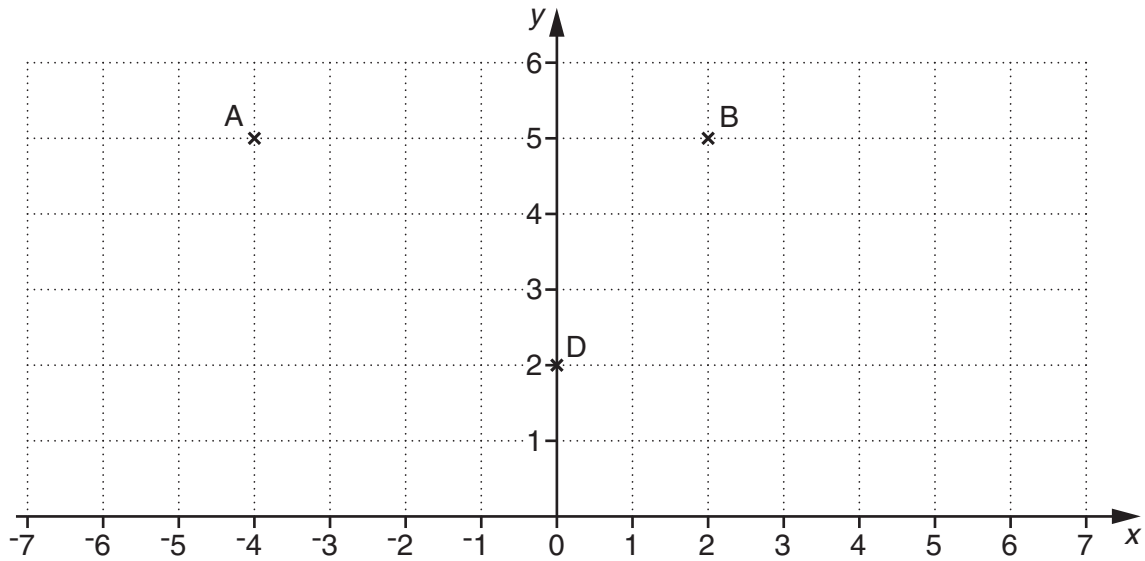
(a) $S = 5a^2$

(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.

$$5x + 4 - (\text{_____} + \text{_____}) = 2x - 1 \quad [2]$$

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

$$4a \text{ _____ } 3b \text{ _____ } (a \text{ _____ } 2b) = 3a - b \quad [2]$$

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

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

$$112 \times \boxed{} = 7$$

[1]

- (b) $4^7 = 16384$

Complete this statement, giving your answer as a fraction.

$$4 = 16384 \boxed{}$$

[1]

8

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

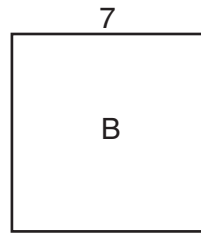
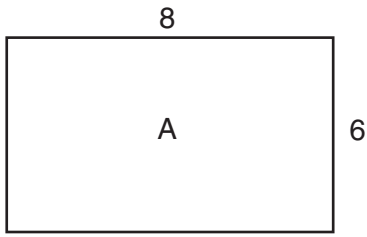
By listing all the factors of 40, show that John's method works for 40.

[3]

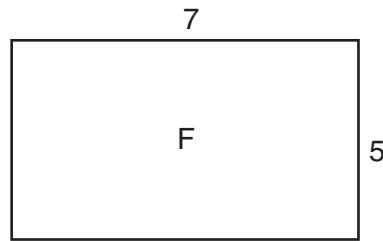
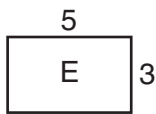
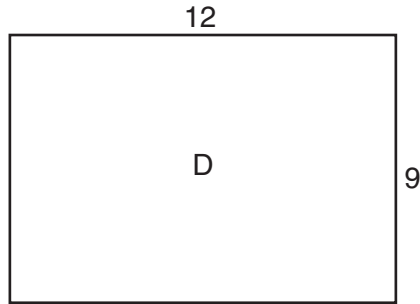
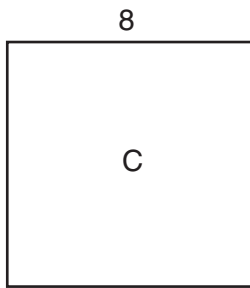
(b) Use John's method to find how many factors 540 has.

(b) _____ [4]

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



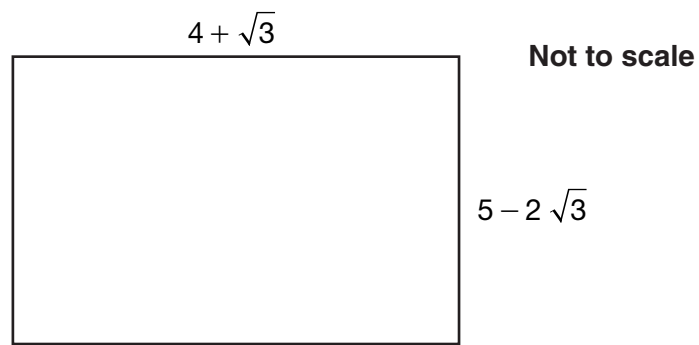
Not to scale



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

[4]

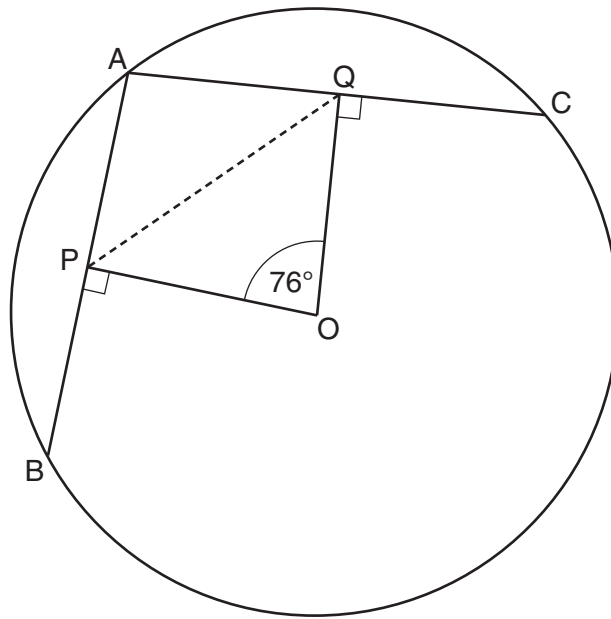
11 All the lengths in this question are in centimetres.



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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