

**Monday 8th June 2015 – 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.
- 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.

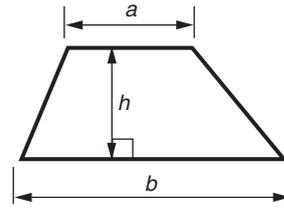
### INFORMATION FOR CANDIDATES

- 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.

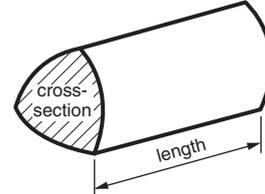


## Formulae Sheet: Higher Tier

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



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

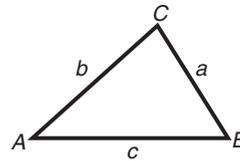


**In any triangle ABC**

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

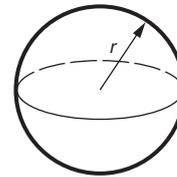
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



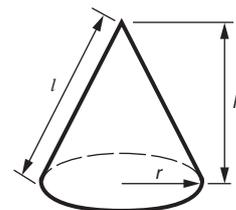
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

**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

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

**PLEASE DO NOT WRITE ON THIS PAGE**

Answer **all** the questions.

1 (a)  $43.2 \times 78.5 = 3391.2$

Use the calculation above to find

(i)  $4.32 \times 7850$ ,

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

(ii)  $33912 \div 0.432$ .

(ii) ..... [1]

(b) **Estimate** the value of

$$\frac{487 \times 0.032}{21.2 + 8.93}$$

You must show your working.

(b) ..... [3]

2 In each part give your answer as a fraction in its lowest terms.

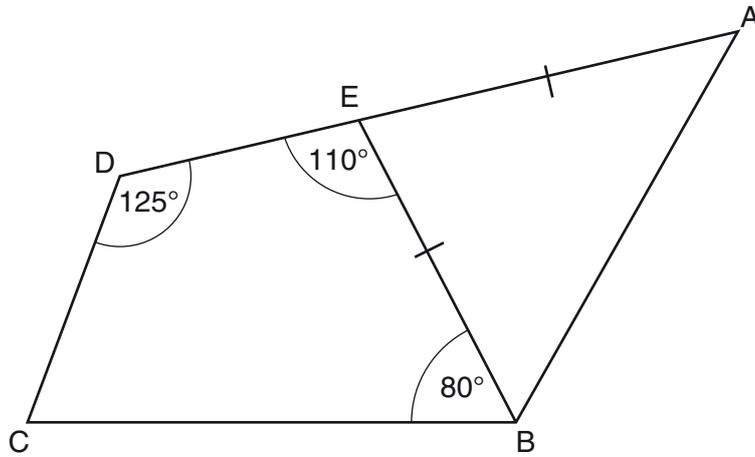
(a) Work out.  $\frac{7}{8} - \frac{1}{6}$

(a) ..... [2]

(b) Work out.  $\frac{28}{36} \times \frac{1}{49}$

(b) ..... [2]

- 3 BCDE is a quadrilateral.  
 Angle CDE =  $125^\circ$ , angle DEB =  $110^\circ$  and angle EBC =  $80^\circ$ .  
 DEA is a straight line and  $AE = BE$ .



Not to scale

Calculate

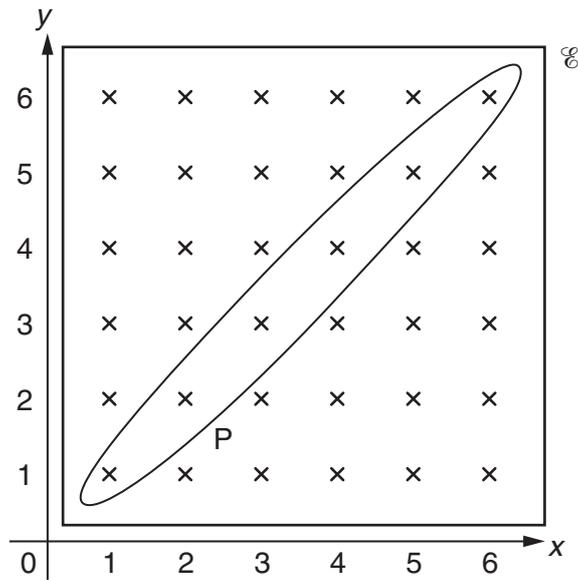
- (a) angle BCD,

(a) ..... $^\circ$  [2]

- (b) angle EAB.

(b) ..... $^\circ$  [2]

4 The Venn diagram below shows the sets  $\mathcal{E}$  and P.



$\mathcal{E} = \{\text{points where each of the coordinates is an integer from 1 to 6}\}$

(a) (i) Complete this statement.

P = {points where the x and y coordinates are .....} [1]

(ii) Q = {points where the x and y coordinates add up to 10}

Show the set Q on the Venn diagram above. [1]

(b) How many members has the set  $P \cap Q$ ?

(b) ..... [1]

(c) One of the points in  $\mathcal{E}$  is selected at random.

Find the probability that the point is a member of  $P \cup Q$ .

(c) ..... [2]

- 5 Lian, Hattie and Wilson collect picture cards.  
 Hattie has 30 more cards than Wilson.  
 Lian has twice as many cards as Wilson.  
 Altogether they have 310 cards.

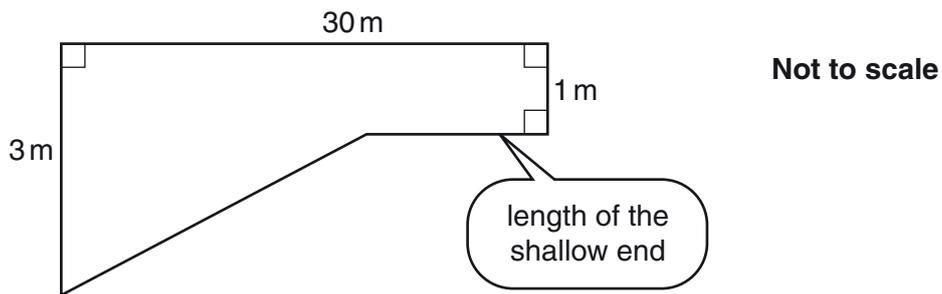
(a) Wilson has  $x$  cards. Use the information above to write down an equation in terms of  $x$ .

(a) ..... [2]

(b) Solve the equation in part (a) to find how many cards Wilson has.

(b) ..... [2]

- 6 The diagram shows the **cross-section** of a swimming pool.

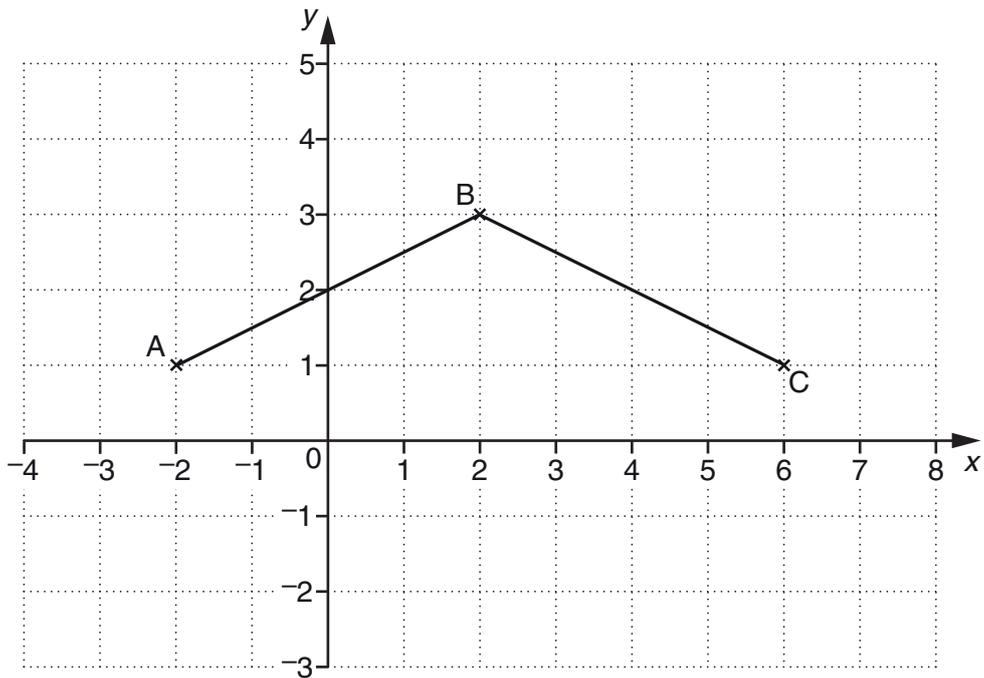


The depth of the shallow end is 1 m and the maximum depth at the deep end is 3 m.  
 The length of the pool is 30 m.  
 The area of the cross-section of the pool is  $48\text{ m}^2$ .

Find the length of the shallow end.

..... m [4]

7 The points **A**, **B** and **C** are plotted on the grid.



(a) ABCD is a rhombus.

Write down the coordinates of the point D.

(a) ( ..... , ..... ) [2]

(b) Find the equation of the line AB.

(b)  $y = \dots\dots\dots$  [2]

- 8 (a) Simplify.

$$3(2x - 5y) - 2(x + 3y)$$

(a) ..... [3]

- (b) Factorise completely.

$$2a^2 + 6a$$

(b) ..... [2]

- 9 (a) Work out  $(8.4 \times 10^3) \times (1.5 \times 10^{-8})$ .  
Give your answer in standard form.

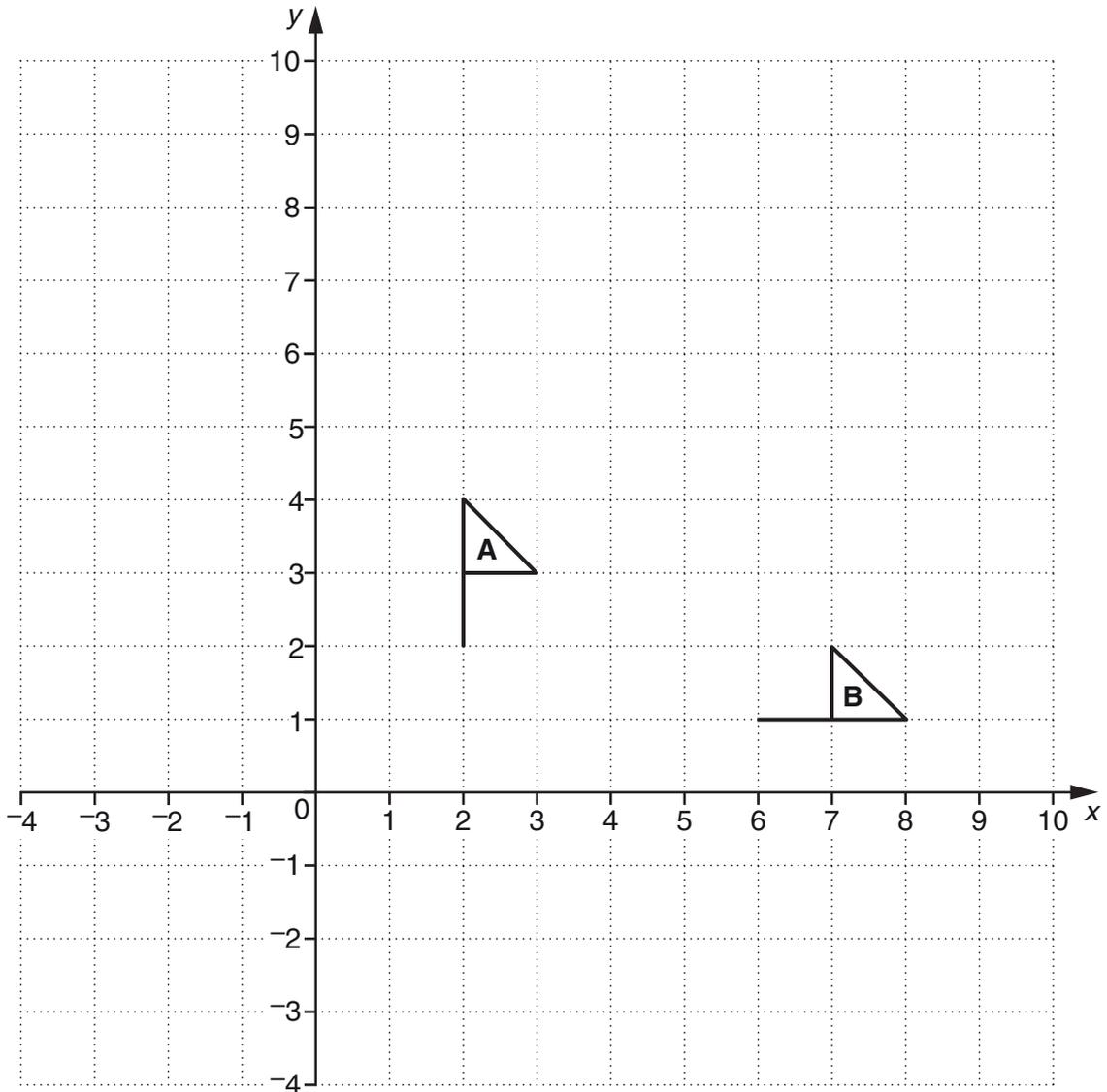
(a) ..... [2]

- (b) The distance from the Sun to the Earth is 149 600 000 km.  
Each second, light travels 299 192 km.

By approximating the numbers and writing them in standard form,  
**estimate** the time, in seconds, it takes for light from the Sun to reach the Earth.

(b) ..... seconds [4]

10 Two flags, **A** and **B**, are shown on the coordinate grid.



Flag **A** can be transformed to flag **B** by a rotation followed by a reflection.

Complete the following to **fully** describe the two transformations.

Rotation .....

Reflection ..... [3]

$$11 \quad P = 5 + 2\sqrt{3} \qquad Q = 6 - \sqrt{3}$$

Writing your answers in the form  $a + b\sqrt{3}$ , find

(a)  $3P + 2Q$ ,

(a) ..... [2]

(b)  $P^2 - Q^2$ .

(b) ..... [4]



- 13** Amy and Bishan are playing a dice game with a normal fair dice.  
 If it lands on 1, Amy wins and the dice is not thrown again.  
 If it lands on 6, Bishan wins and the dice is not thrown again.  
 If it lands on any other number, it is thrown again.

(a) What is the probability that the game is won in either one or two throws?

(a) ..... [3]

(b) Write down an expression, in terms of  $n$ , for the probability that Amy wins on the  $n$ th throw.

(b) ..... [2]

**END OF QUESTION PAPER**

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