

**Tuesday 13 June 2017 – Morning**

**GCSE METHODS IN MATHEMATICS**

**B391/02** Methods in Mathematics 1 (Higher Tier)

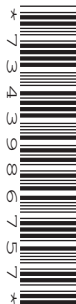
Candidates answer on the Question Paper.

**OCR supplied materials:**  
None

**Other materials required:**

- Geometrical instruments
- Tracing paper (optional)

**Duration:** 1 hour 15 minutes



Candidate forename						Candidate surname					
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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the barcodes.

### 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 **16** pages. Any blank pages are indicated.

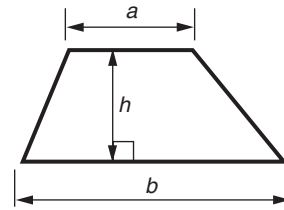
### WARNING



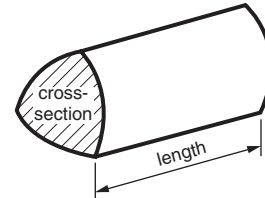
No calculator can be  
used for this paper

## Formulae Sheet: Higher Tier

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



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

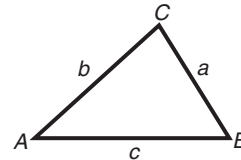


**In any triangle ABC**

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

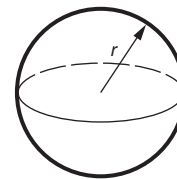
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



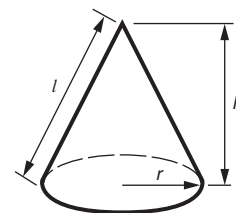
**Volume of sphere**  $= \frac{4}{3} \pi r^3$

**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**

3

Answer **all** the questions.

1 (a) Work out.

(i)  $-5 + -4 \times 3$

(a)(i) ..... [2]

(ii)  $\frac{-6 \times -4}{-3}$

(ii) ..... [2]

(b) (i) You are given that  $528 + 128 = 656$ .

Use this information to complete the following.

(b)(i)  $656 + \dots = 128$  [1]

(ii) You are given that  $16 \times 9 = 144$ .

Use this information to complete the following.

(ii)  $144 \times \dots = 16$  [1]

4

2 (a) Work out.

$$4^3 + \sqrt{196}$$

(a) ..... [2]

(b) Write these fractions as decimals.  
Give your answer correct to 3 decimal places.

(i)  $\frac{5}{8}$

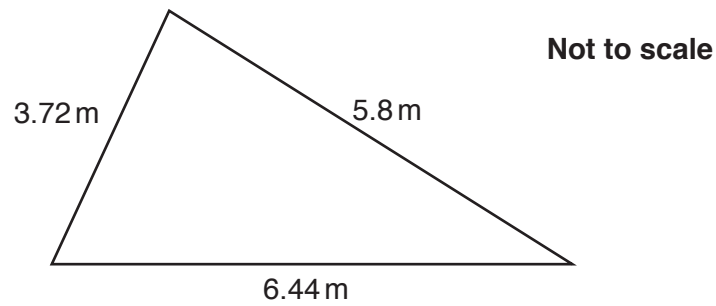
(b)(i) ..... [1]

(ii)  $\frac{3}{7}$

(ii) ..... [2]

5

- 3 (a) Find the perimeter of this triangle.



(a) ..... m [2]

- (b) A knife is 20.5 cm long.  
The blade is 11.8 cm long.

Find the length of the handle.

(b) .....cm [2]

- 4 (a) A row of blocks has a height of  $b$  cm.  
A wall with  $r$  rows of blocks has a height of  $h$  cm.

Write down a formula for  $h$ .

(a) ..... [1]

- (b) Apples cost £2 per kilogram and pears cost £3 per kilogram.  
The total cost of  $p$  kilograms of apples and  $q$  kilograms of pears is £ $C$ .

Write down, as simply as possible, a formula for  $C$ .

(b) ..... [2]

6

5 One week Tim earned £350.

He saved  $\frac{2}{5}$  of it.

(a) How much did he save?

(a) £ ..... [2]

(b) He then gave a donation to charity.

He spent  $\frac{1}{4}$  of the money he had left after he had made the donation.

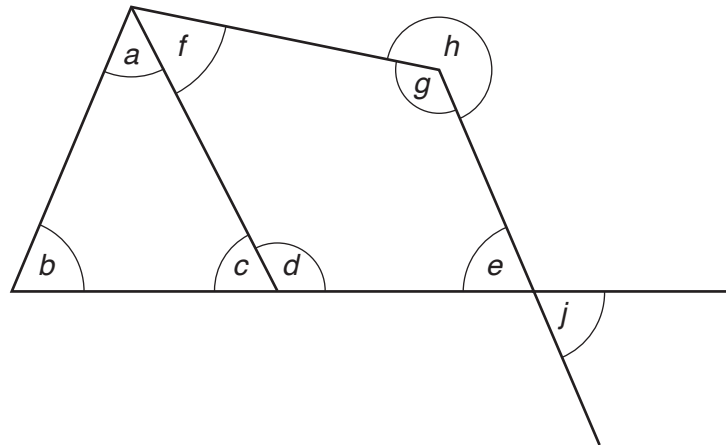
The amount he spent was £50.

How much money did he give to charity?

(b) £ ..... [3]

7

6



- (a) Write down two equal angles stating why they are equal.

..... = ..... Reason ..... [1]

- (b) Write down two angles that add up to  $180^\circ$  stating how you know they add up to  $180^\circ$ .

..... and ..... Reason ..... [1]

- (c) Use a single letter to complete the following.

(c)  $a + b =$  ..... [1]

8

7 A is the point  $(-4, 1)$ , B is the point  $(p, q)$ .

(a) M is the point  $(1, -3)$ .

$$\overrightarrow{AM} = \overrightarrow{MB}.$$

Find the value of  $p$  and the value of  $q$ .

(a)  $p = \dots\dots\dots$ ,  $q = \dots\dots\dots$  [2]

The line  $y = \frac{1}{2}x + 3$  crosses the  $y$ -axis at D.

(b) C is the point  $(r, s)$  and  $\overrightarrow{AC} = 3\overrightarrow{AD}$ .

Find the value of  $r$  and the value of  $s$ .

(b)  $r = \dots\dots\dots$ ,  $s = \dots\dots\dots$  [2]

(c) The line DE is perpendicular to AD.

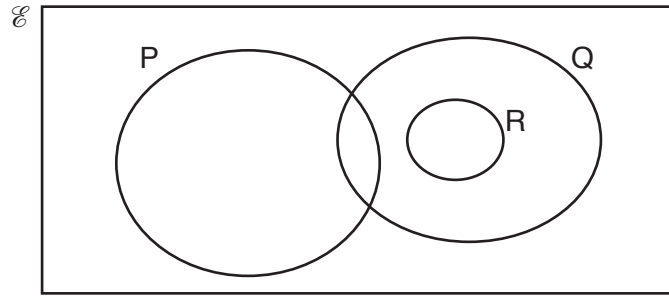
Find the equation of the line DE.

(c)  $\dots\dots\dots$  [2]



9

8



Complete these statements about sets P, Q and R.

- (a) R is a ..... of Q [1]
- (b)  $R \cup Q = \dots\dots\dots$  [1]
- (c)  $n(R \cap Q) = n(\dots\dots\dots)$  [1]
- (d)  $n(P \cup Q) = n(P) + n(Q) - n(\dots\dots\dots)$  [1]

- 9 (a) Factorise.

$$x^2 - x$$

(a) ..... [1]

- (b) Simplify.

$$3a^2 - 5a + 2a + 5a^2$$

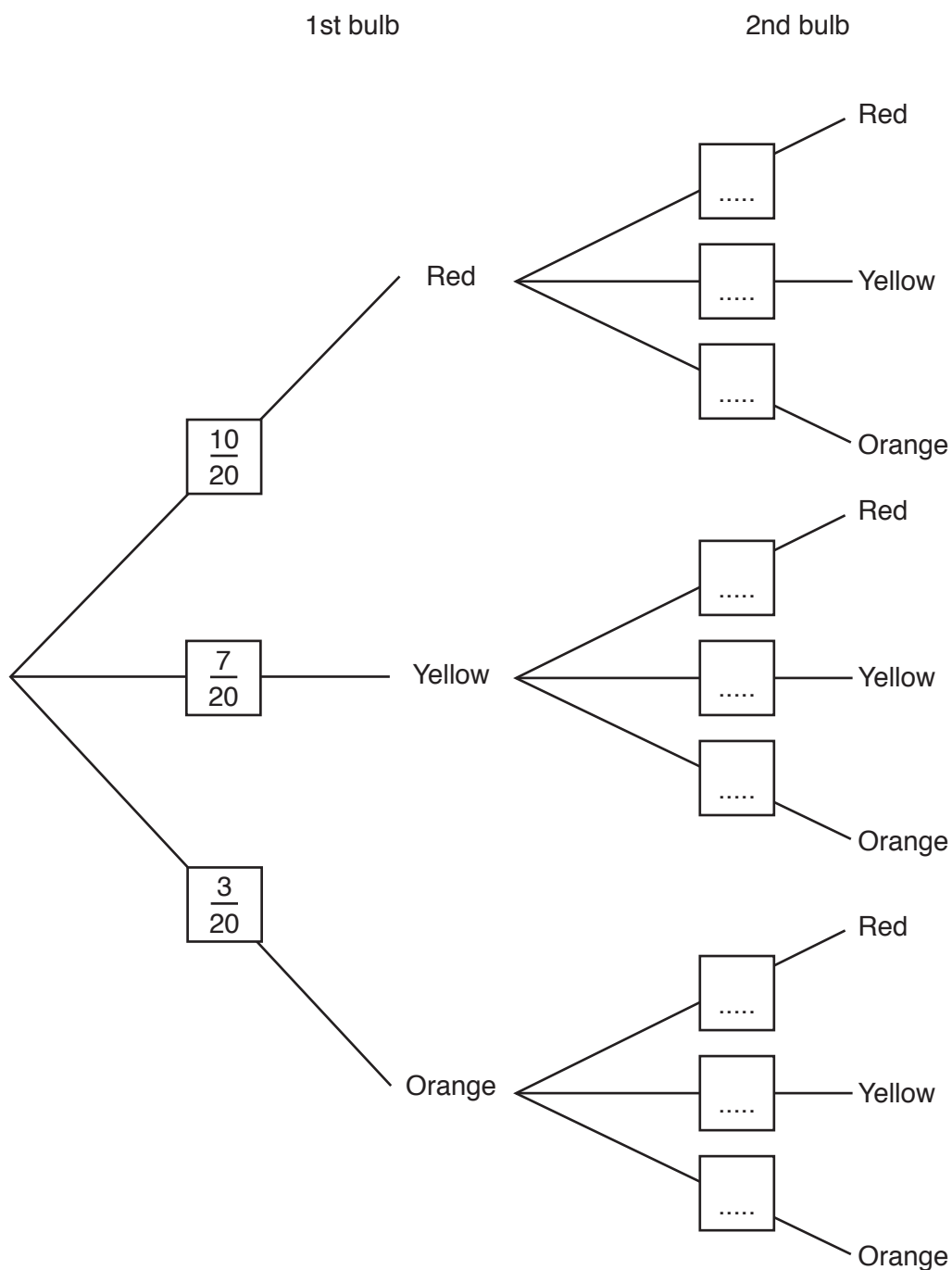
(b) ..... [2]

- (c) Solve.

$$2(x - 1) = 6(x + 5)$$

(c) ..... [3]

- (a)** Complete this tree diagram to show the possible outcomes.



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11

(b) Find the probability that the bulbs are

(i) both red,

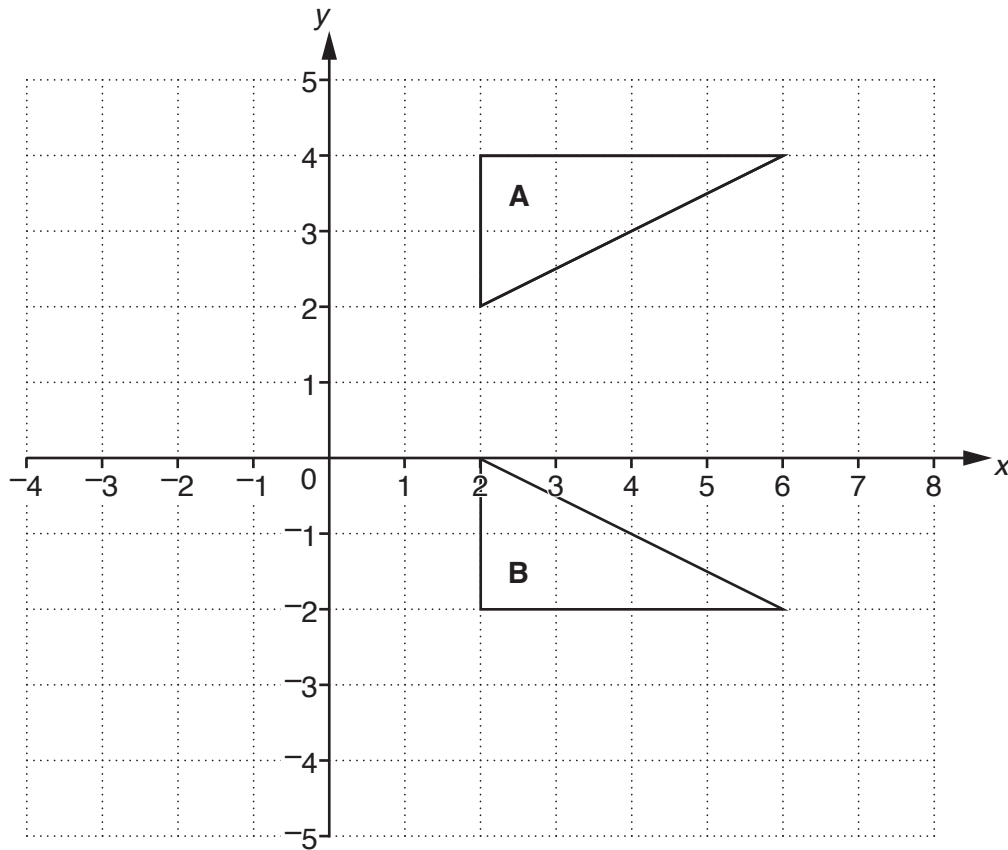
(b)(i) ..... [2]

(ii) both the same colour,

(ii) ..... [3]

(iii) different colours.

(iii) ..... [1]



- (a) Describe fully the single transformation that maps triangle **A** onto triangle **B**.

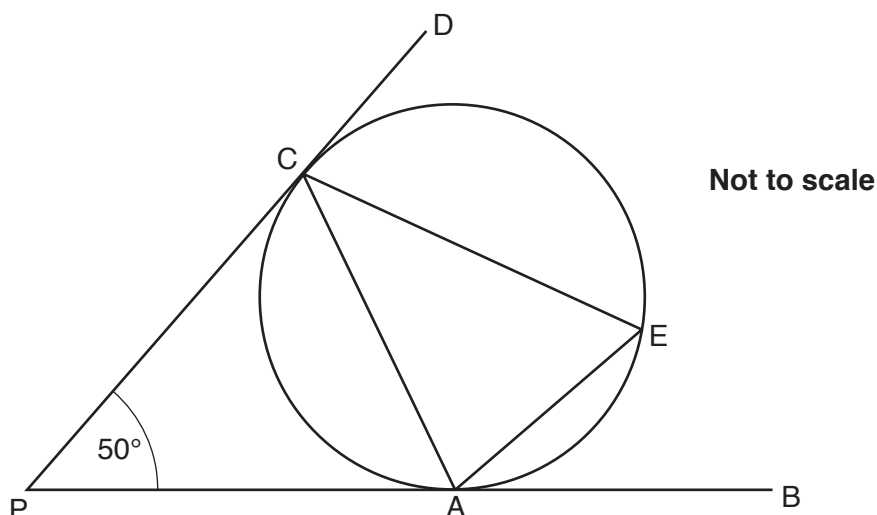
.....  
..... [2]

- (b) Enlarge triangle **A** with scale factor  $-\frac{1}{2}$  and centre (0, 0).

[2]

12\*

13



PAB and PCD are tangents to the circle at A and C.  
Angle APC =  $50^\circ$ .

Find angle AEC.  
You must show a reason for each step of your working.

.....

.....

.....

.....

.....

.....

Angle AEC = ..... [5]

**END OF QUESTION PAPER**



This image shows a full page of primary-ruled paper. It features a vertical solid line on the left side, creating a narrow margin. The rest of the page is filled with horizontal dashed lines, providing a guide for handwriting practice. There are no markings or text on the page.

This image shows a blank sheet of white paper designed for writing. It features a series of evenly spaced horizontal blue lines across its entire width. A single vertical blue line runs down the left side, creating a narrow margin. The paper is otherwise completely empty, with no text or markings.

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