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Tuesday 19 June 2012 – Afternoon

GCSE METHODS IN MATHEMATICS

B391/02 Methods in Mathematics 1 (Higher Tier)

B317080612

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 **12** pages. Any blank pages are indicated.

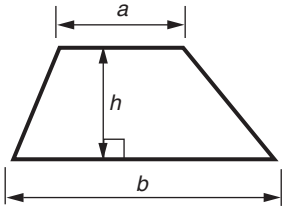
WARNING

No calculator can be used for this paper

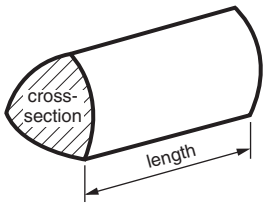
This paper has been pre modified for carrier language

Formulae Sheet: Higher Tier

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



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

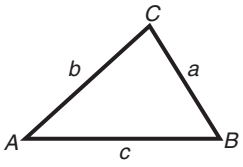


In any triangle *ABC*

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

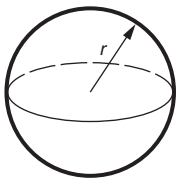
Cosine rule $a^2 = b^2 + c^2 - 2bc\cos A$

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



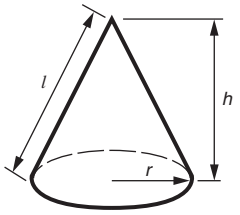
Volume of sphere $= \frac{4}{3}\pi r^3$

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

1 **(a)** Calculate.

(i) $0.1 + 0.3 \times 0.2$

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

(ii) $\frac{3}{7}$ of $38\frac{1}{2}$ metres

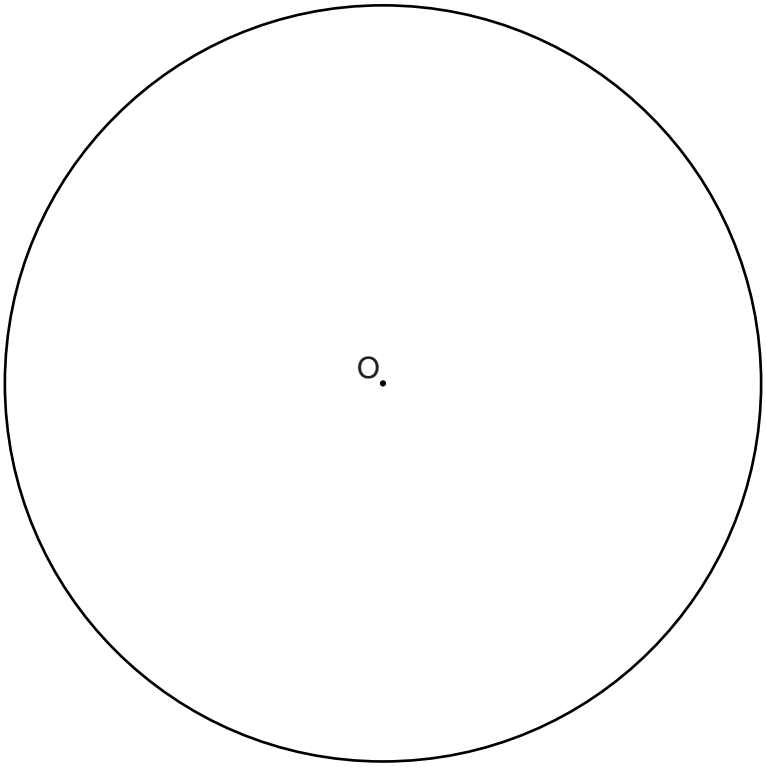
(ii) _____ m **[2]**

(b) Insert brackets in these calculations so that the answers are correct.

(i) 10 – 4 + 3 + 2 = 5 **[1]**

(ii) 16 + 4 × 5 ÷ 9 – 5 = 25 **[2]**

2 Construct a regular pentagon so that all its vertices lie on the circle, centre O.



[4]

3 **(a)** Factorise completely.

$5x^2 - 10x$

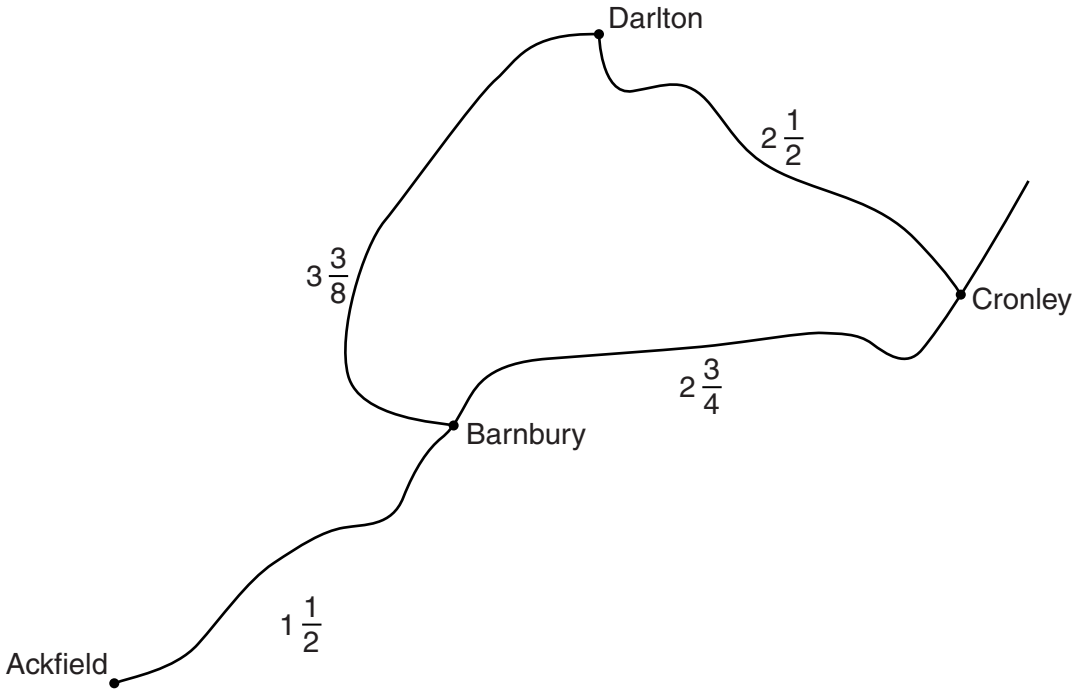
(a) _____ **[2]**

(b)* Solve.

$4x + 2 = 3(5 - 2x)$

(b) _____ **[3]**

4 This diagram shows some roads between some villages near Sam's home at Ackfield.
The distances shown are in miles.



(a) Each day, from Monday to Thursday, Sam drives from home in Ackfield to work in Cronley and back again.
Sam uses the shortest route for these journeys.

Calculate the total distance Sam drives from Monday to Thursday.

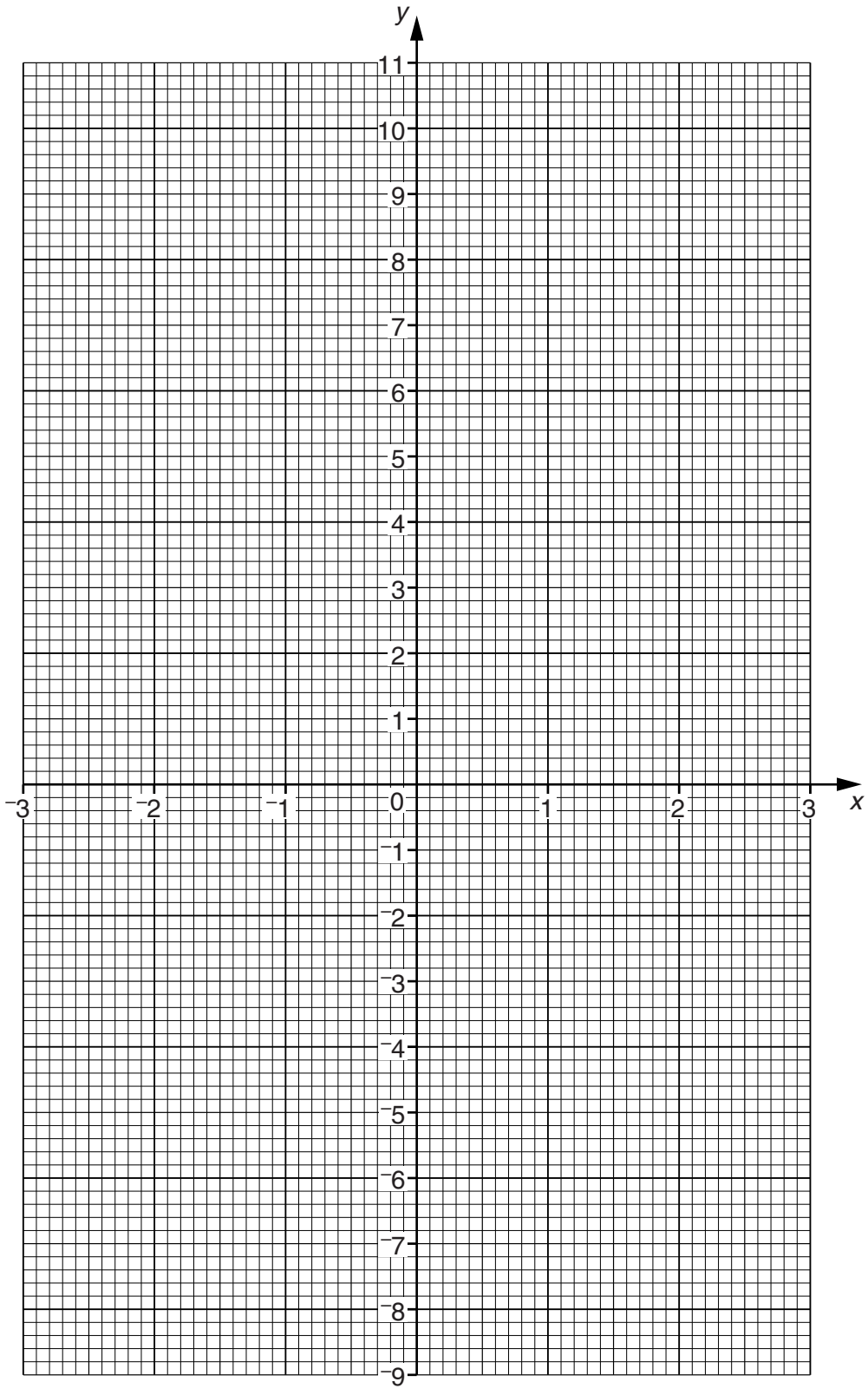
(a) _____ miles **[3]**

(b) On Friday Sam goes shopping in Darlton on the way home.

Calculate how much further Sam drives on Friday than he drives on Thursday.

(b) _____ miles **[3]**

5 **(a)** On the grid, draw the graph of $y = 3x + 2$ for $^{-}3 \leqslant x \leqslant 3$.



[3]

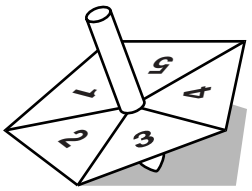
(b) Use the graph to solve $3x + 2 = 6$.

(b) _____ **[1]**

(c) Find the equation of the line parallel to the line in part **(a)**, which passes through the point (1, 7).

(c) _____ **[3]**

6 Janine spins this fair spinner twice.
Her score is the total of the numbers from the two spins.



(a) Complete the grid showing Janine's possible scores.

		2nd spin				
		1	**2**	**3**	**4**	**5**
1st spin	**1**	2			5	
	2					
	3					
	4	5			8	
	5					

[1]

(b) Find the probability that Janine's score is

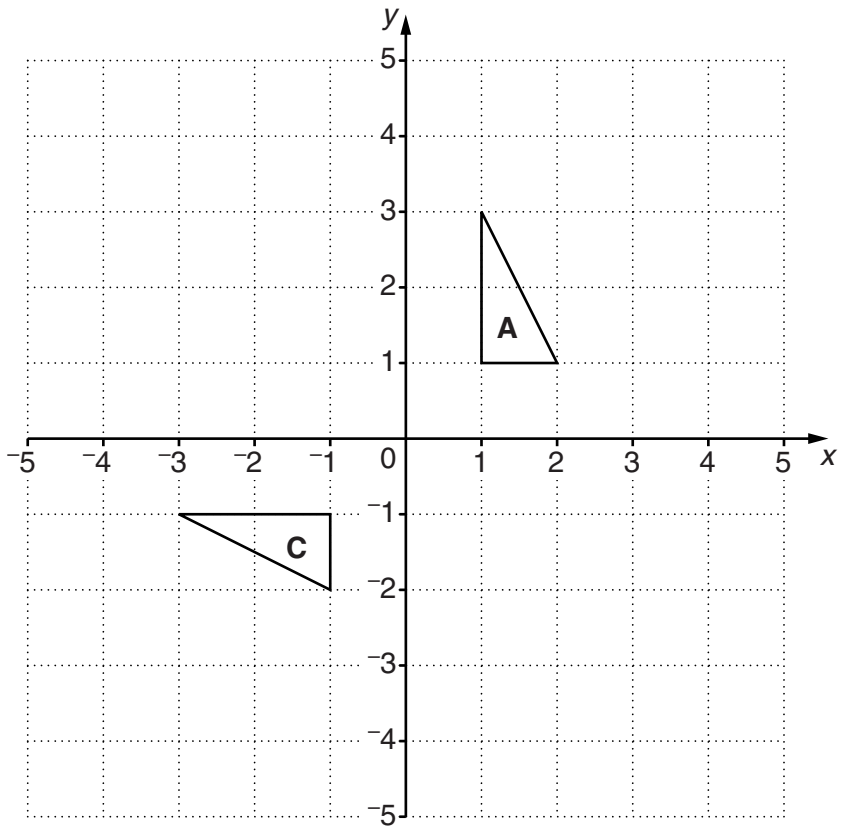
(i) 4,

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

(ii) an odd number.

(ii) _____ **[1]**

7



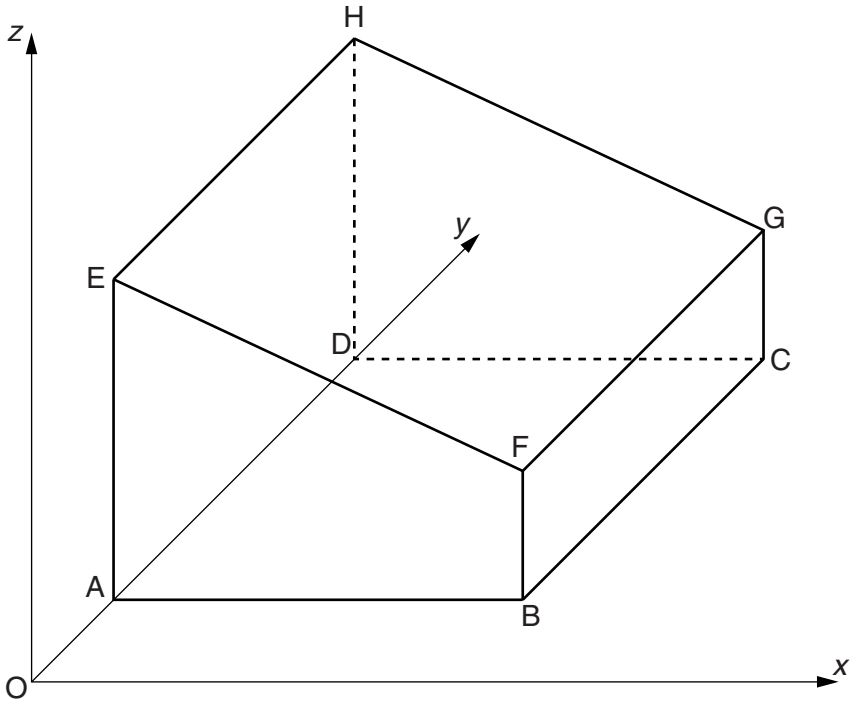
(a) Translate triangle **A** using the vector $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$. Label the image B. **[2]**

(b) Describe fully the single transformation that maps triangle **A** onto triangle **C**.

_____ **[2]**

(c) Enlarge triangle **A** with centre (0, 2) and scale factor $^{-}2$. Label the image D. **[2]**

8 The diagram shows a prism ABCDEFGH with a horizontal rectangular base ABCD.
ABFE is a trapezium.
AE, BF, CG and DH are vertical.



AE = 7, BC = 8, BF = 3 and AB = 7.

(a) Calculate the area of the trapezium ABFE.

(a) _____ units^2 **[3]**

(b) O*x* and O*y* are horizontal axes.
D is a point on the *y*-axis.
A is the point (0, 1, 0).

Find the coordinates of the following points.

(i) E

(b)(i) (_____, _____, _____) **[1]**

(ii) H

(ii) (_____, _____, _____) **[1]**

(iii) G

(iii) (_____, _____, _____) **[1]**

9 Asif, Becky and Cara are describing quadrilaterals.

(a) Asif says,

"In my quadrilateral, the diagonals bisect each other and it has rotational symmetry but no line symmetry."

Give the name of Asif's shape.

(a) _____ **[1]**

(b) Becky says,

"In my quadrilateral, the diagonals intersect at right angles and it has line symmetry but no rotational symmetry."

Give the name of Becky's shape.

(b) _____ **[1]**

(c) Cara says,

"In my quadrilateral, the diagonals bisect each other at right angles and it has rotational symmetry of order 2."

Give the name of Cara's shape.

(c) _____ **[1]**

10 **(a)** Evaluate.

$$64^{\frac{-2}{3}}$$

(a) _____ **[3]**

(b) $x = a \times 10^5$ where $5 < a < 10$.
$y = b \times 10^7$ where $5 < b < 10$.

When xy is expressed in standard form, $xy = c \times 10^d$ where $1 \leqslant c < 10$.

(i) Find the value of d.

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

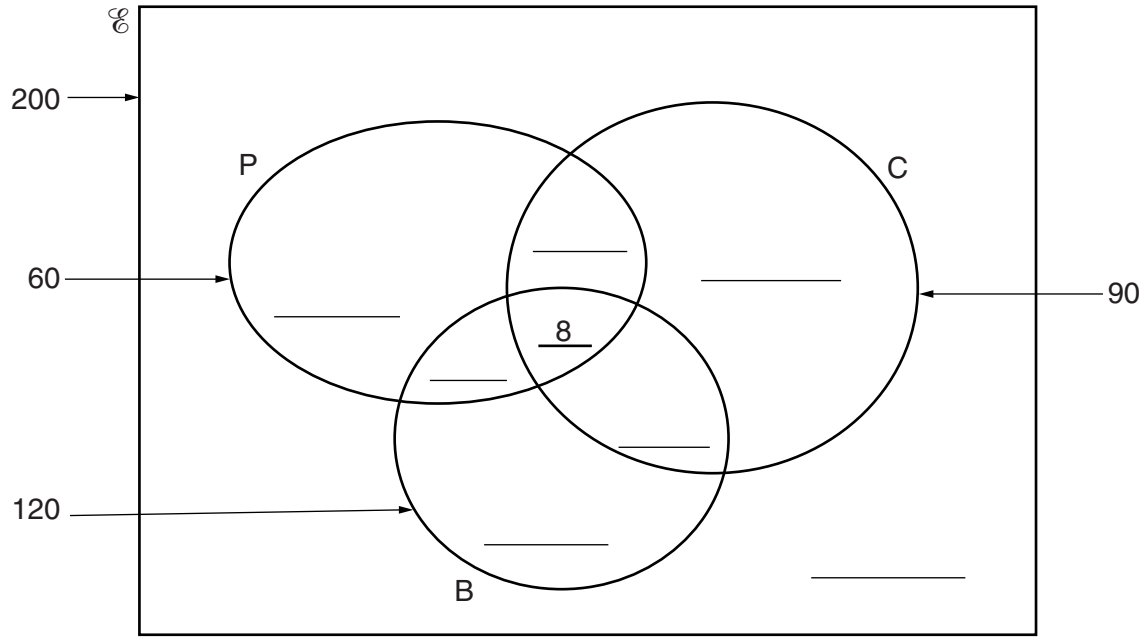
(ii) Express c in terms of a and b.

(ii) _____ **[2]**

11 At a Science sixth form 200 students study Science.
Physics (P), Chemistry (C) and Biology (B) are three of the Science subjects.

60 study Physics, 90 study Chemistry and 120 study Biology.
36 study Physics and Chemistry.
45 study Biology and Chemistry.
19 study Physics and Biology.
8 study all three subjects.

(a) Complete this Venn Diagram.



[3]

(b) Find the probability that a student chosen at random from these 200 students

(i) studies none of the three subjects,

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

(ii) studies Biology and Chemistry but not Physics,

(ii) _____ **[1]**

(iii) is a member of the set $P \cap (B \cup C)$.

(iii) _____ **[1]**