

GCSE (9-1) Mathematics
J560/06 Paper 6 (Higher Tier)

Question Set 4

1

Amrit's income is 32% more than Bethan's income.
Amrit and Bethan's combined income is £54 868.

Calculate Amrit's income.

$$\text{Amrit} = 1.32 \times \text{Bethan}$$

$$A + B = 54\,868$$

$$1.32B + B = 54\,868$$

$$2.32B = 54\,868$$

$$B = 23650$$

$$A = 1.32 \times 23650$$

$$= \boxed{31218}$$

£ 31218 [5]

2

Jacob, Amelie and Reuben each roll a fair six-sided dice.
What is the probability that all three roll a number less than 3?

Give your answer as a fraction in its simplest form.

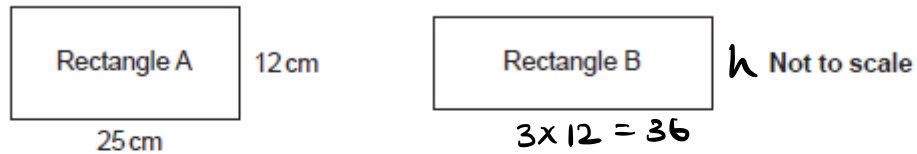
$$x < 3 = 1, 2 \quad p = \frac{2}{6}$$

$$\frac{2}{6} \times \frac{2}{6} \times \frac{2}{6} = \boxed{\frac{1}{27}}$$

..... $\frac{1}{27}$ [3]

3

The diagram shows two rectangles, A and B.



Rectangle A has a width of 25 cm and a height of 12 cm.
The width of rectangle B is three times the height of rectangle B.

The area of rectangle A is equal to the area of rectangle B.

Find the perimeter of rectangle B.

$$\text{Area: } A = B$$

$$\frac{1}{3} \times 25 = \frac{36 \times h}{36}$$

$$h = \frac{25}{3}$$

perimeter of B:

$$\left(36 + \frac{25}{3}\right) \times 2$$

$$= 88.6 \text{ or } 88\frac{2}{3}$$

88.67

..... cm [5]

4 (a)

(a) Complete the table for $y = x^2 - 4x + 1$.

x	-1	0	1	2	3	4	5
y	6	1	-2	-3	-2	1	6

[2]

$$y = (-1)^2 - 4 \times (-1) + 1$$

$$= 1 + 4 + 1$$

$$= 6$$

$$y = 1 - 4 + 1$$

$$= -3 + 1$$

$$= -2$$

$$y = 2^2 - 4 \times 2 + 1$$

$$= 4 - 8 + 1$$

$$= -4 + 1$$

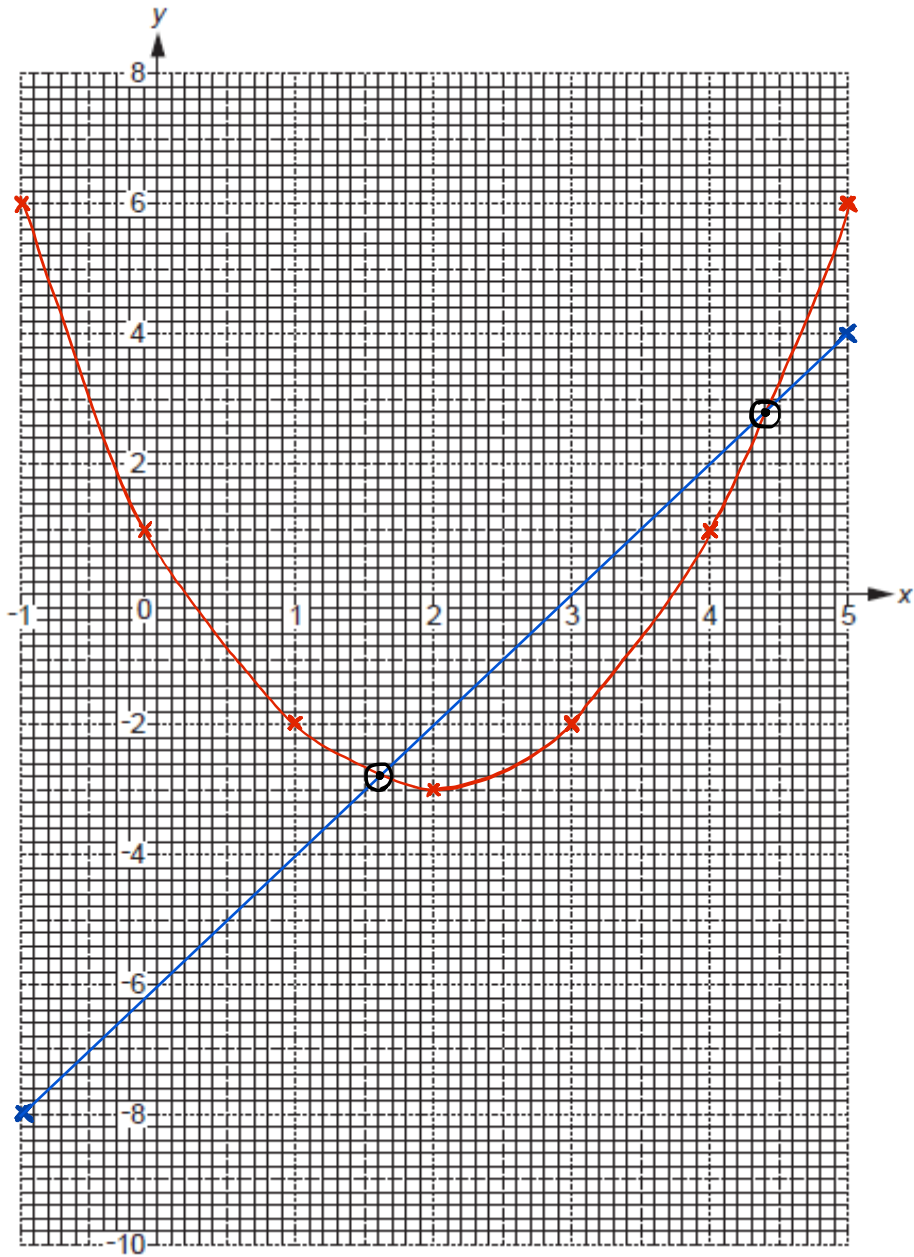
$$= -3$$

$$y = 4^2 - 4 \times 4 + 1$$

$$= 16 - 16 + 1$$

$$= 1$$

- 4 (b) Draw the graph of $y = x^2 - 4x + 1$ for $-1 \leq x \leq 5$.



[3]

- 4 (c) (c) On the same grid, draw the graph of $y = 2x - 6$ for $-1 \leq x \leq 5$.

[3]

$$x = -1 \quad y = 2x - 6 = -2 - 6 = -8$$

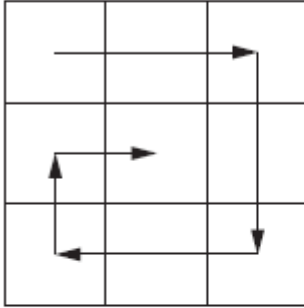
$$x = 5 \quad y = 2x - 6 = 10 - 6 = 4$$

- 4 (d) (d) Use your graphs to solve the equation $x^2 - 4x + 1 = 2x - 6$.
Give your answers to 1 decimal place.

(d) $x = 1.6$ or $x = 4.4$ [2]

5 (a)

Nine consecutive numbers are written on a 3-by-3 grid. They are arranged, in ascending order, in a spiral as shown.



(a) Karen writes the numbers 3 to 11 on her grid.

3	4	5
10	11	6
9	8	7

The total of the first column is $3 + 10 + 9 = 22$.

Karen says

The total of the first column is one less than the total of the second column.

Show that this is correct for Karen's grid.

[1]

$$4 + 11 + 8 = 23$$

$22 < 23$ by +1 so Karen is correct

5 (b)

(b) Victor says

If any nine consecutive numbers are arranged in ascending order in this spiral on a 3-by-3 grid, the total of the first column will always be one less than the total of the second column.

Prove that Victor is correct.

[5]

x	$x+1$
$x+7$	$x+8$
$x+6$	$x+5$

↓ ↓

$$x + x + 7 + x + 6 = 3x + 13 \quad \leftarrow \text{first column}$$

$$x + 1 + x + 8 + x + 5 = 3x + 14 \quad \leftarrow \text{2nd column}$$

$$3x + 13 < 3x + 14 \quad \text{by } +1$$

∴ no matter what number we start with (x)
we would always have a difference of 1
between the sum of 2 columns

- 6 (a) (a) Arron ran a distance of 5 km at an average speed of 2.2 m/s.

How long did Arron run for?

Give your answer in minutes and seconds, to the nearest second.

$$s = \frac{d}{t} \quad 2.2 = \frac{5000}{t}$$

$$5 \text{ km} = 5000 \text{ m}$$

$$t = \frac{5000}{2.2} = 2272.727\dots \text{ s}$$

$$\downarrow \div 60$$

$$37.8787\dots \text{ mins}$$

$$0.8787 \times 60 = 52.7 \text{ s}$$

(a) 37..... minutes 53..... seconds [4]

- 6 (b) (b) Claudine cycled a distance of 53 km in 2.7 hours.
The distance is measured correct to the nearest km.
The time is given correct to 1 decimal place.

Calculate the lower and upper bounds of her average speed.

Give your answers correct to 2 decimal places.

$$s = \frac{d}{t} \quad \text{lower bound: } d \downarrow t \uparrow \quad \frac{52.5}{2.74} = 19.16$$

$$\text{upper bound: } d \uparrow t \downarrow \quad \frac{53.4}{2.65} = 20.15$$

(b) lower bound = 19.16..... km/h

upper bound = 20.15..... km/h [6]

7

Dani has a pack of 45 cards.
Each card is either red or black.

One-third of the cards in the pack are **red**.

She picks two cards from the pack, without replacement.

Calculate the probability that Dani picks two **black** cards.

$$\frac{2}{3} = \text{p of black}$$

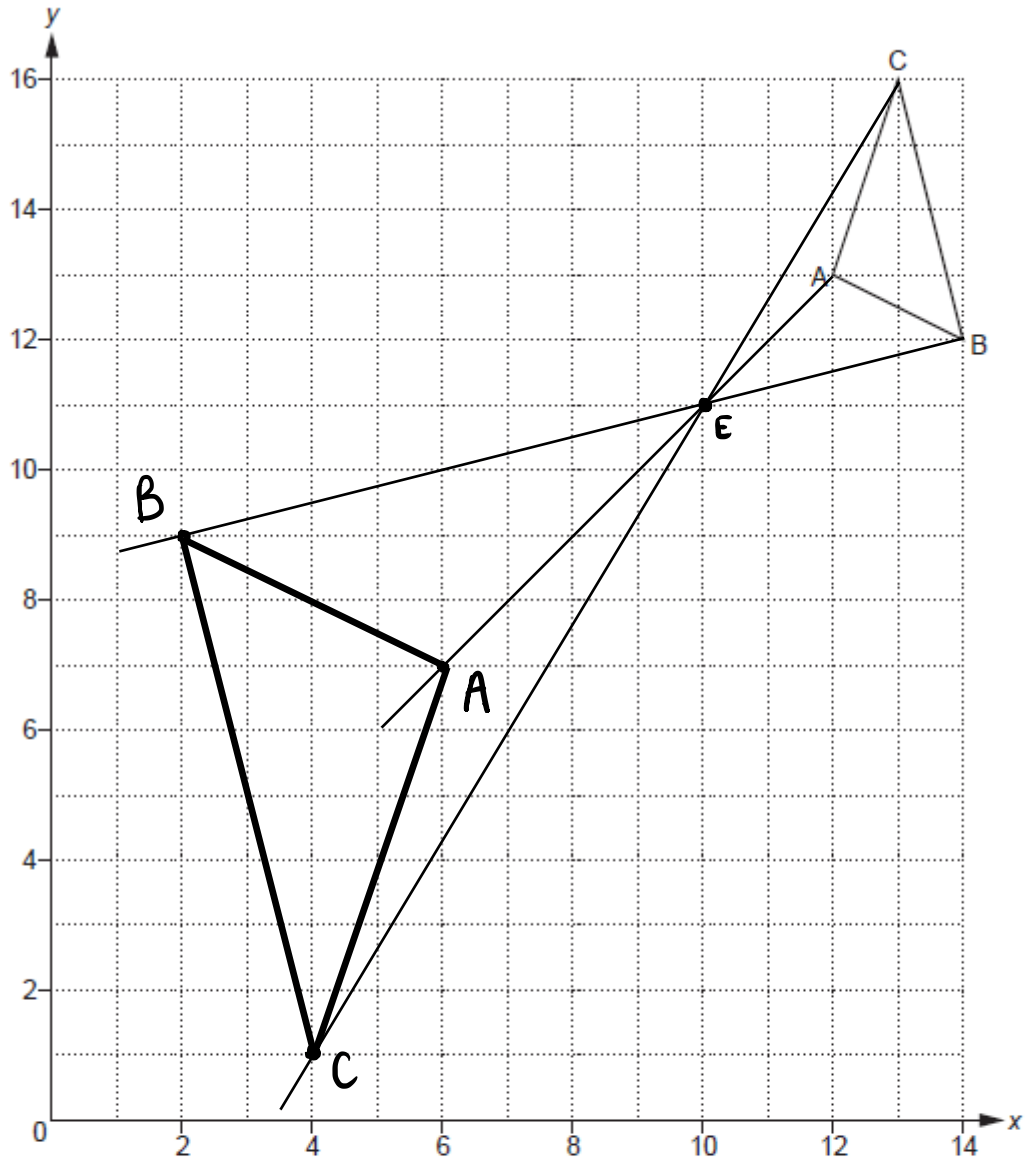
$$\frac{2}{3} \times \frac{29}{44} = \frac{29}{66}$$

$$\frac{29}{66}$$

..... [5]

8 (a)

A triangle has vertices A, B and C.



The triangle is enlarged with scale factor f and centre of enlargement E.

Vertex A maps to (6, 7).

Vertex B maps to (2, 9).

(a) Find the coordinates of the centre of enlargement, E.

(a) (10 , 11) [2]

8 (b) (b) Find the scale factor, f .

(b) 2 [2]

8 (c) (c) Vertex C maps to the point R.
Find the coordinates of R.

(c) (..... 4 , 1) [2]

Total Marks for Question Set 4: 50

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge