Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
January 2020

Mathematics

Unit M7 Paper 1
(Non-Calculator)
Higher Tier

MV18

[GMC71]

WEDNESDAY 15 JANUARY, 9.15am–10.30am

Time

1 hour 15 minutes, plus your additional time allowance.

Instructions to Candidates

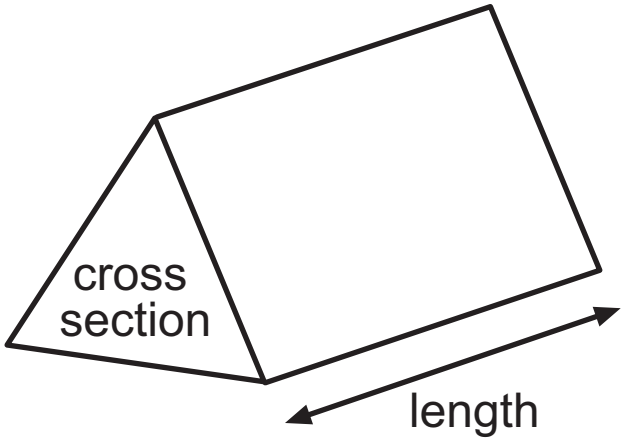
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write on blank pages or tracing paper.
Complete in black ink only.
Answer **all seventeen** questions.
All working should be clearly shown in the spaces provided.
Marks may be awarded for partially correct solutions.
You **must not** use a calculator for this paper.

Information for Candidates

The total mark for this paper is 50.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
You should have a ruler, compasses and a protractor.
The Formula Sheet is on pages 2 and 3.

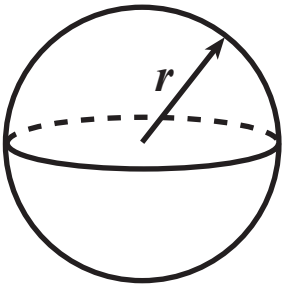
Formula Sheet

Volume of prism = area of cross section × length



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

Surface area of sphere $= 4\pi r^2$



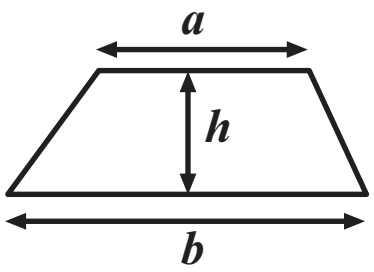
Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$, are given by

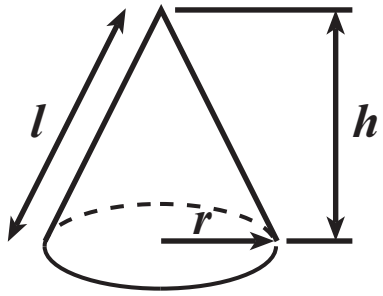
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

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

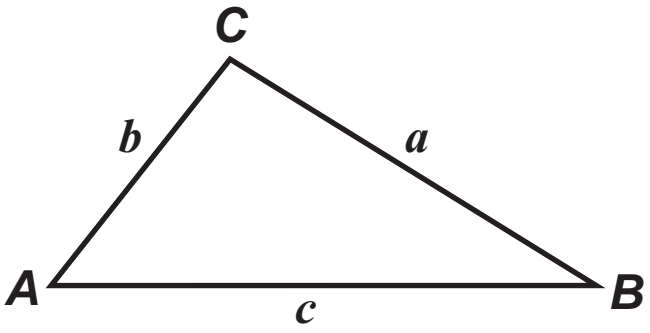


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



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 $= \frac{1}{2} ab \sin C$

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1 A sequence is formed using the rule:

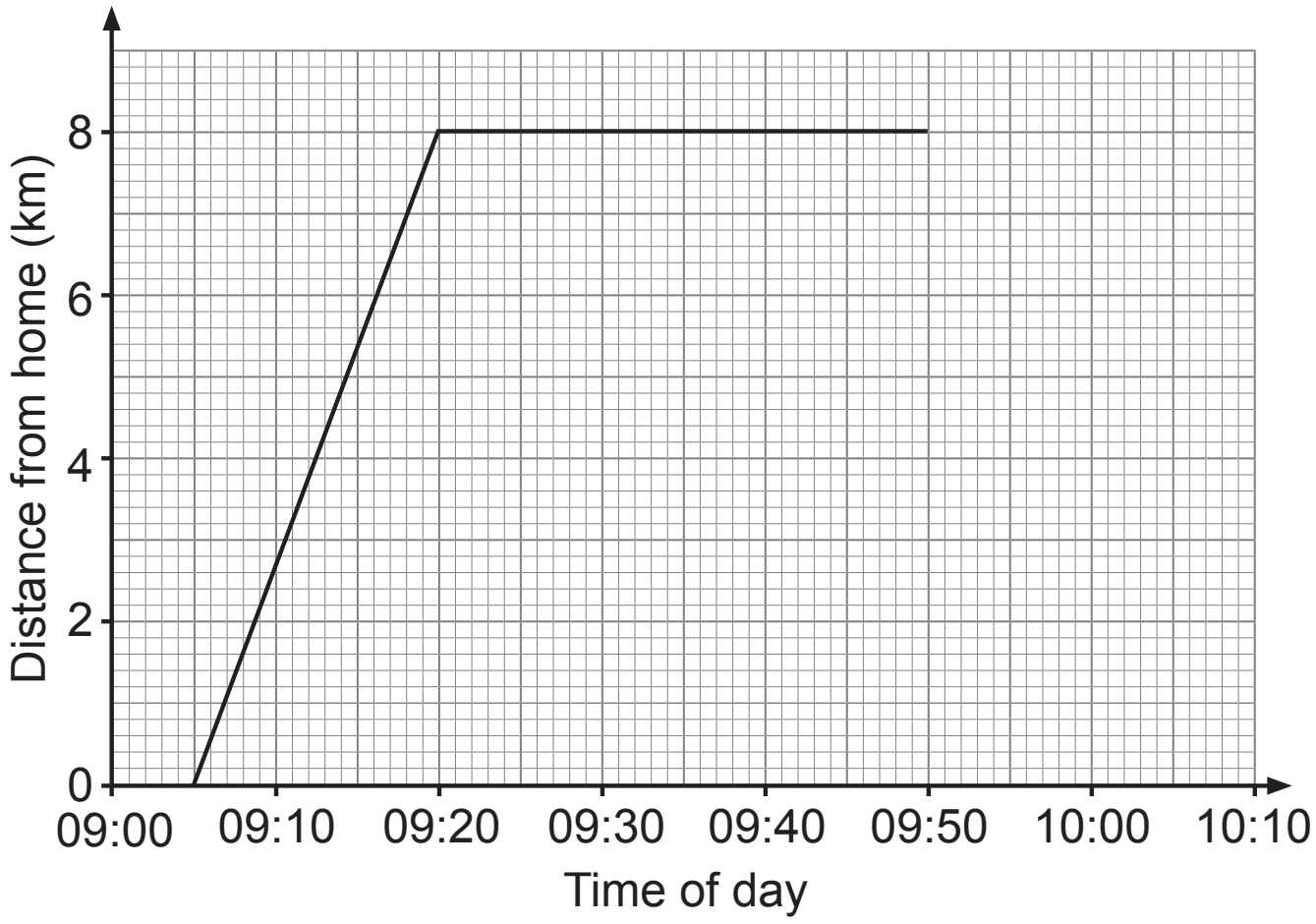
"Find the next term by adding the previous two terms"

Use this rule to complete the sequence below.
[1 mark]

x, 4, _____ , _____ , _____

2 Seb cycles from his home to his piano teacher's house on Saturday morning.

He stays there for 30 minutes and then returns directly home.



(a) At what time did Seb leave his home? [1 mark]

Answer _____

(b) How long did Seb take to get to his teacher's house? [1 mark]

Answer _____ minutes

Seb arrived home at 10:03

(c) Complete the distance–time graph. [1 mark]

(d) What distance did Seb travel in total? [1 mark]

Answer _____ km

(e) Did Seb travel home at a faster or slower speed? [1 mark]

Explain your answer clearly.

Answer _____ because _____

_____

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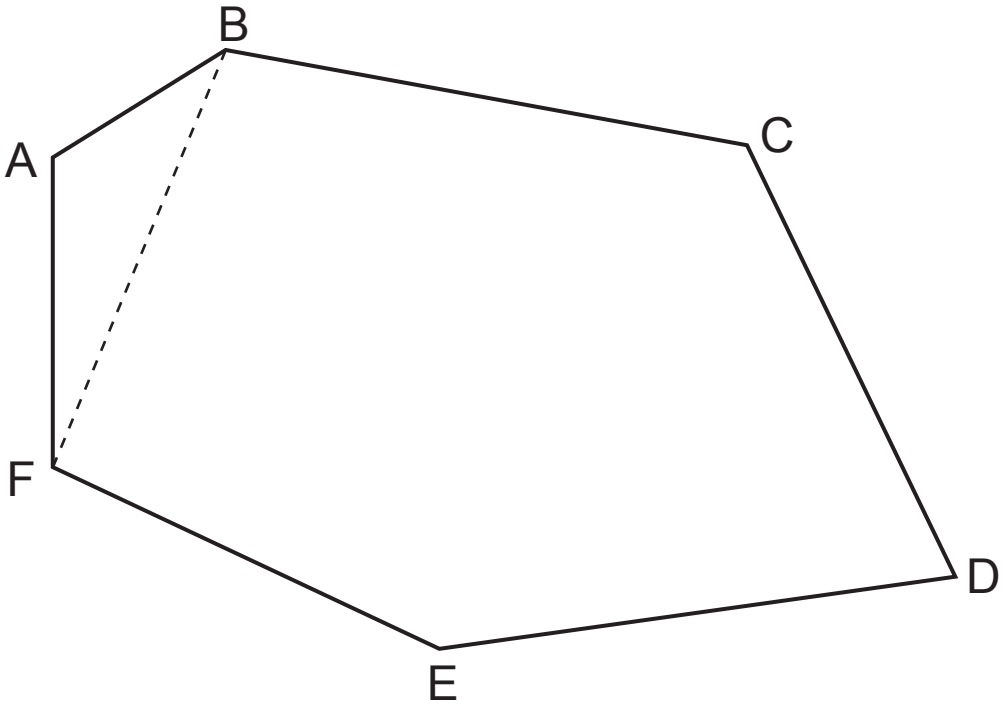
3 Polygon ABCDEF may be divided into triangles. One triangle is shown.

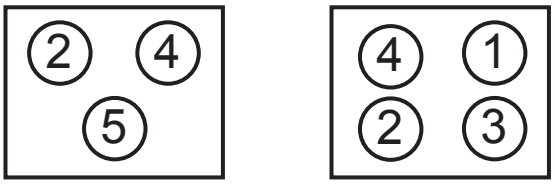


Use triangles to work out the sum of the interior angles of the polygon ABCDEF. [2 marks]

You **must show** your working.

Answer _____ °

4 Box 1 Box 2



There are two boxes of counters.

Each counter has a number on it as shown.

Mike takes one counter at random from Box 1 and then one counter at random from Box 2

(a) Complete the table to show all possible outcomes of counters taken. [2 marks]

		Box 2			
		1	2	3	4
Box 1	2	(2, 1)	(2, 2)		
	4	(4, 1)			
	5				

(b) What is the probability that Mike takes a counter with the same number on it from each box? [1 mark]

Answer _____

(c) The numbers on the counters taken are **multiplied**.

What is the probability of this multiplication giving an **even** number? [1 mark]

Answer _____

(d) On another day, Laura takes one counter from each box and **multiplies** the numbers together.

She replaces the counters and does the same thing again for a total of 30 times.

How many times would you expect her to get an **odd** number answer? [3 marks]

Answer _____

5 Estimate the value of $\frac{593}{4.1 \times 9.7}$ [2 marks]

Show all your working.

Answer _____

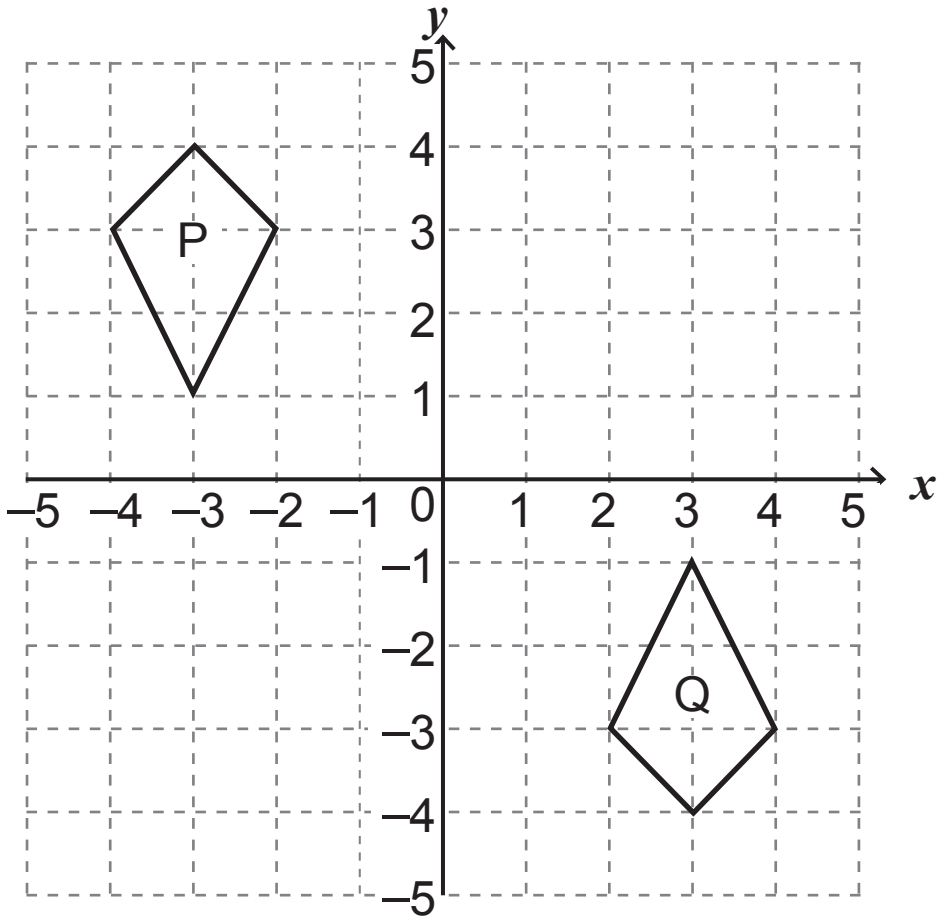
6 The prize money in a golf tournament is divided between the three golfers who finish first, second and third in the ratio 7 : 4 : 3

What **fraction** of the prize money does each of the first three golfers receive?

Write each fraction in its simplest form. [3 marks]

Answer 1st _____ 2nd _____ 3rd _____

7



(a) Describe fully the single transformation which would move shape P to shape Q. [3 marks]

Answer _____

(b) Translate shape P by 2 units to the right and 5 units down.

Label the image T. [1 mark]

(c) Describe fully the single transformation which would move shape T back to shape P. [2 marks]

Answer _____

8 Simplify the following.

(a) $4y^3 \times 3y^4$ [1 mark]

Answer _____

(b) $(m^4)^5$ [1 mark]

Answer _____

9 **(a)** Solve the inequality $6y + 5 \geq 2$ [2 marks]

Answer _____

(b) Write down the smallest **integer** value of y which satisfies the inequality

$6y + 5 \geq 2$ [1 mark]

Answer $y =$ _____

10 (a) Write 25 as a binary number. [1 mark]

Answer _____

(b) Write the binary number 1101001 in decimal form.
[1 mark]

Answer _____

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11 Make m the subject of the formula $H = mr + s$
[2 marks]

Answer $m =$ _____

12 Two fair dice are rolled.

Make a list of all the ways it is possible to get a total score of 7 on the two dice. [2 marks]

Answer _____

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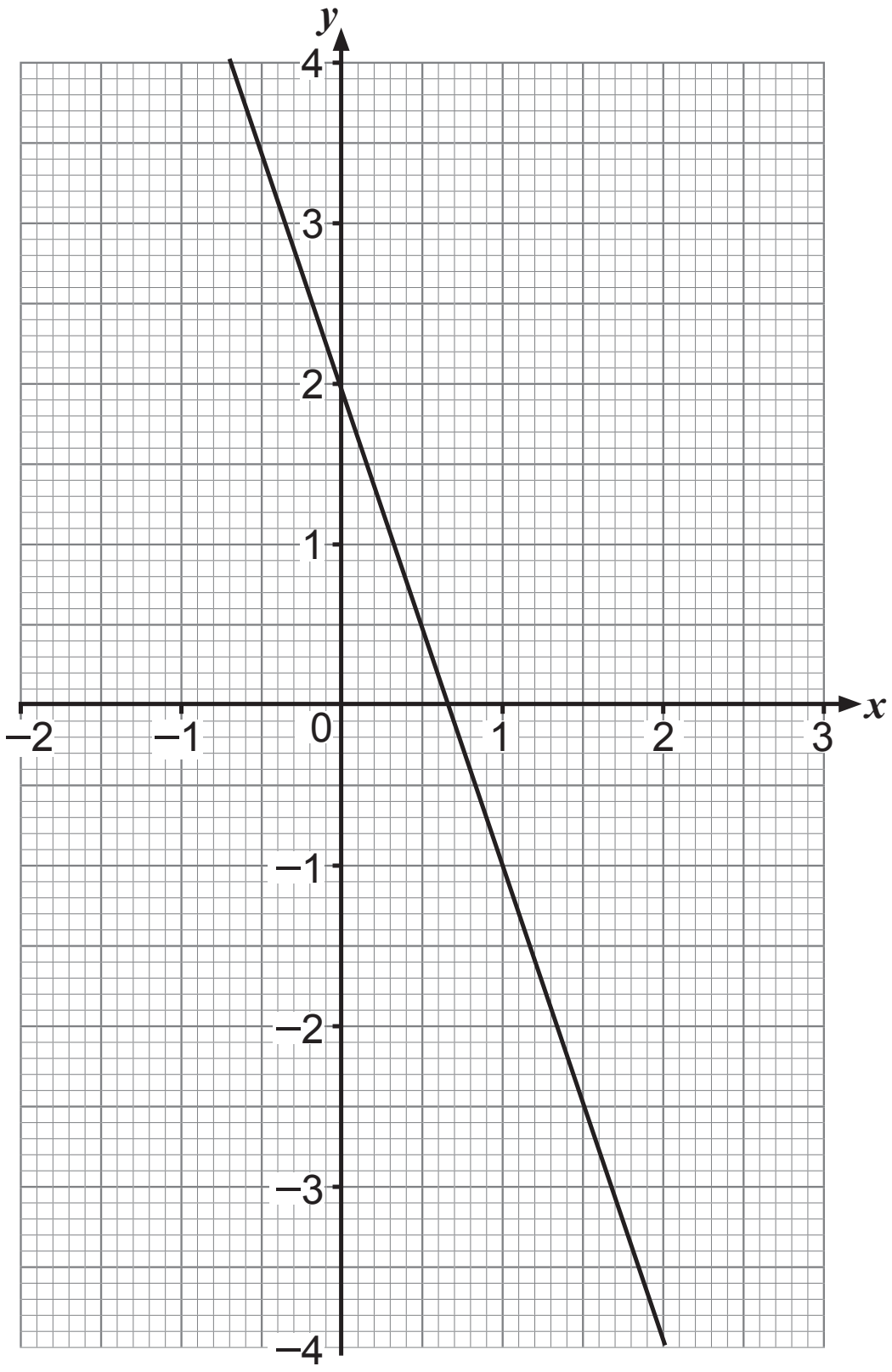
(Questions continue overleaf)

13



By drawing a suitable line on the grid opposite solve the simultaneous equations [4 marks]

$y = 2x - 2$

$y = -3x + 2$

Answer $x =$ _____ $y =$ _____

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14 Find the value of $(-2)^{-2}$ [2 marks]

Answer _____

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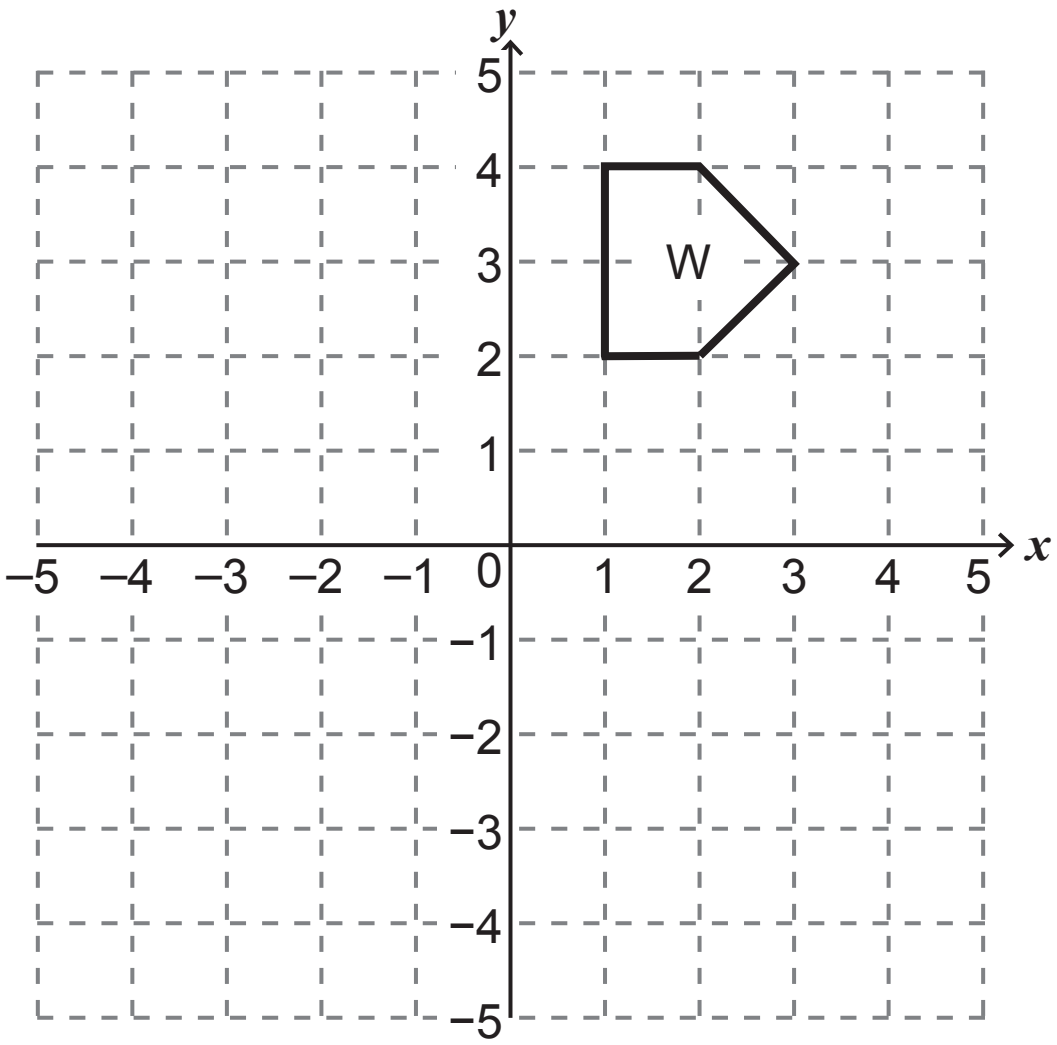
15 Make x the subject of the formula $y = \frac{b}{\sqrt{x}}$ [2 marks]

Answer $x =$ _____

16



On the grid, draw the reflection of the shape W in the line $y = -x$ [2 marks]

17 There are three main routes from Belleek to Enniskillen by car.

There are five main routes from Enniskillen to Fintona by car.

(a) How many different ways can James travel from Belleek to Enniskillen to Fintona by car using only main routes?
[1 mark]

Answer _____

(b) On a particular day, two of the main routes from Enniskillen to Fintona were closed.

By what percentage has the number of different ways for James to travel from Belleek to Enniskillen to Fintona by car using only main routes been reduced?
[2 marks]

Answer _____ **%**

This is the end of the question paper

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
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Total Marks	

Examiner Number