

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

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Forename(s)

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Candidate signature

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# GCSE Mathematics

# H



Higher

Paper 2

Calculator

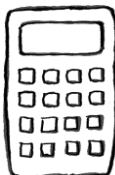
Summer 2019

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a calculator
- mathematical instruments.



### Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to the answer book.

### Advice

- In all calculations, show clearly how you work out your answer.

#### For Examiner's Use

Pages	Mark
3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
14 - 15	
16 - 17	
18 - 19	
20 - 21	
22 - 23	
24 - 25	
26 - 27	
<b>TOTAL</b>	

Teacher

Class

8300/MissB/2H

## Practice Paper Overview

Q	Topic	Mark	Total
1	Resultant Vectors	1	
2	Midpoint	1	
3	Equation of a Line	1	
4	Bearing	1	
5	Inequalities	2	
6	Error Interval	2	
7	Direct Proportion	3	
8	Mean from a Table	4	
9	Expanding Triple Brackets	3	
10	Algebraic Ratio	3	
11	Draw Box Plot (from list of data)	5	
12	Compound Interest & Successive Percentage Change	5	
13	Proportional Reasoning	3	
14	Product Rule of Counting	1	
15	Speed, Distance Time	4	
16	Trigonometry	5	
17	Form and Solve Equations	4	
18	Interpret Histogram	4	
19	Circle Theorem	1	
20	Equation of a Circle	1	
21	Functions	6	
22	Venn Diagram	1	
23	Quadratic Sequence	3	
24	Area Underneath a Curve	4	
25	Iteration	6	
26	Invariance	2	
27	Transformation Graphs	4	
<b>Total</b>			<b>80</b>

Answer **all** questions in the spaces provided.

Do not write  
outside the  
box

**1** Work out

**[1 mark]**

$$\begin{pmatrix} -5 \\ 4 \end{pmatrix} - \begin{pmatrix} -7 \\ 4 \end{pmatrix}$$

Circle your answer.

$$\begin{pmatrix} -13 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} -13 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} 2 \\ 4 \end{pmatrix}$$

$$\begin{pmatrix} 13 \\ 0 \end{pmatrix}$$

**2** P is (6, 7) and Q is (−4, 1)

Circle the midpoint of PQ.

**[1 mark]**

$$(5, 4)$$

$$(1, 4)$$

$$(-2, 6)$$

$$(2, 8)$$

**3** Circle the equation of a straight line which is parallel to

$$5y + 10x - 25 = 0$$

**[1 mark]**

$$y = 2x + 9$$

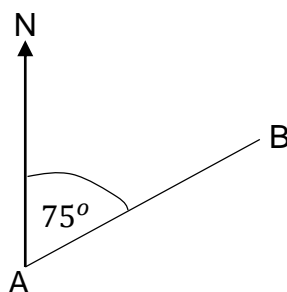
$$2x = 20 - y$$

$$2y = 12 - x$$

$$y = \frac{x}{2} - 10$$

- 4 The bearing of B from A is  $075^\circ$ .

[1 mark]



Not drawn  
accurately

Circle the bearing of A from B.

$285^\circ$

$105^\circ$

$075^\circ$

$255^\circ$

- 5 Solve the inequality

$$7 - \frac{x}{2} \leq 3$$

[2 marks]

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Answer \_\_\_\_\_

- 6 Sally won a race with a time of 89.2 seconds.

This time,  $t$ , is to the nearest tenth of a second.

Complete the error interval due to rounding.

[2 marks]

$$\underline{\hspace{10cm}} \leq t < \underline{\hspace{10cm}}$$

- 7  $y$  is directly proportional to the square of  $x$ .

$x$	6	$a$
$y$	9	16

Work out the value of  $a$ .

[3 marks]

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$$a = \underline{\hspace{5cm}}$$

- 8** Here is some information about 40 buses arriving back at the bus depot.

Number of minutes late, $t$	Number of buses	Midpoint	
$0 \leq t < 5$	8		
$5 \leq t < 15$	11		
$15 \leq t < 20$	15		
$20 \leq t < 30$	6		
$t \geq 30$	0		

- 8 (a)** Work out an estimate of the mean number of minutes late.

**[3 marks]**

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Answer \_\_\_\_\_

**8 (b)** The depot manager scrutinises the information in more detail.

Number of minutes late, $t$	Number of buses
$0 \leq t < 5$	8
$5 \leq t < 10$	0
$10 \leq t < 15$	11
$15 \leq t < 20$	15
$20 \leq t < 25$	1
$25 \leq t < 30$	5
$t \geq 30$	0

She works out an estimate of the mean using this information.

How does her estimate compare with the answer to part (a)?

Tick **one** box.

**[1 mark]**

☐

Lower than part (a)

☐

Same as part (a)

☐

Higher than part (a)

☐

Not possible to tell

9 Expand and simplify

$$(2x + 3)^2(x - 1)$$

**[3 marks]**

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Answer \_\_\_\_\_



**10** The ratio of  $x:y = 3:2$

**10 (a)** Circle the correct statement.

**[1 mark]**

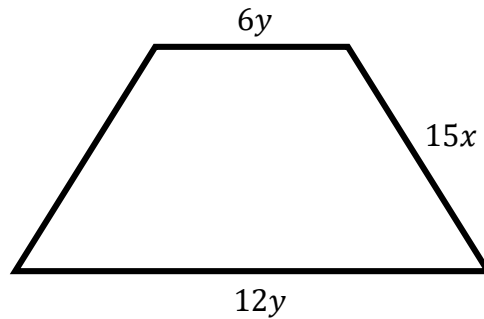
$y$  is  $\frac{3}{5}$  of  $x$

$y$  is  $\frac{2}{5}$  of  $x$

$y$  is  $\frac{3}{2}$  of  $x$

$y$  is  $\frac{2}{3}$  of  $x$

**10 (b)** Here is an isosceles trapezium.



Not drawn  
accurately

Using your answer to part (a).

Write an expression for the perimeter in terms of  $x$ .

**[2 marks]**

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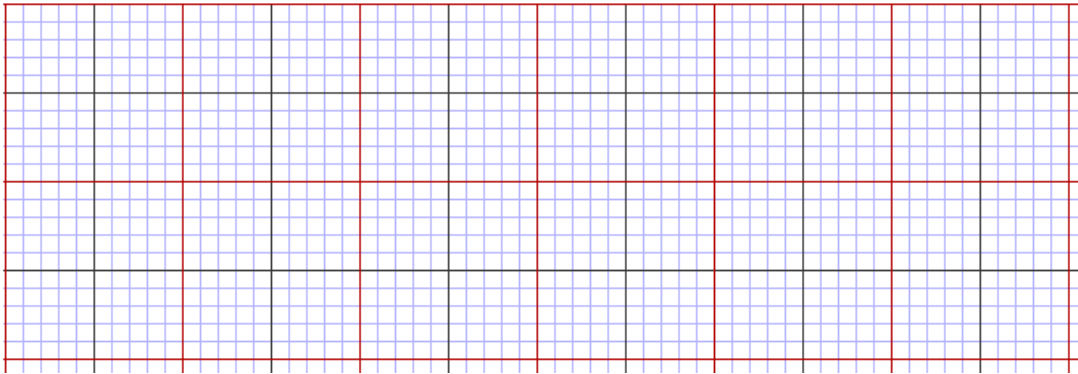
Answer \_\_\_\_\_

- 11** The Glasgow Warriors played 15 games of rugby.  
Here are the points they scored in each game.

8    9    10    20    21    22    23    24  
30    33    34    34    35    43    50

- 11 (a)** Draw a box plot for this information.

**[3 marks]**



Edinburgh Rugby plays against the same 15 teams in the league.

- The median number of points Edinburgh Rugby scored is 18.
- The interquartile range of these points is 14.
- The range of these points is 31.

- 11 (b)** Which team is more consistent at scoring points, the Glasgow Warriors or Edinburgh Rugby?  
You must give a reason for your answer.

**[2 mark]**

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**12** Here are the interest rates for two accounts.

<b>Account A</b>
Interest: 3% for the first year 1.5% for the second year 0.75% for the third year
Withdrawals allowed at any time.

<b>Account B</b>
Interest: 1.8% per year compound interest.
No withdrawals allowed until the end of three years.

Headar has £10 000 he wants to invest.

**12 (a)** Calculate which account would give him the most money if he invests his money for 3 years.

**[4 marks]**

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Answer \_\_\_\_\_

**12 (b)** Explain why he might not want to use Account B.

**[1 mark]**

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**13** It takes 5 men 12 hours to build a wall.

**13 (a)** How long would it take 8 men to build the wall?

**[2 marks]**

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Answer \_\_\_\_\_

**13 (b)** Comment on an assumption you made in part (a) and the impact this could have on the length of time taken to build the wall.

**[1 mark]**

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**14** A menu has a choice of 3 starters, 4 mains and 5 desserts.  
How many different choices of 3 course meals are there?  
Circle your answer.

**[1 mark]**

12

31

60

120

345

- 15** The distance by road from Middlesbrough to Buxton is 120 miles.  
A brass band travel by coach from Middlesbrough to Buxton.  
The coach leaves Middlesbrough at 9:45 am

- 15 (a)** The band assumes the coach will travel at an average speed of 50mph.

Use this assumption to work out the arrival time in Buxton.

**[3 marks]**

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Answer \_\_\_\_\_

- 15 (b)** In fact, the coach has a higher average speed.

How does this affect the arrival time?

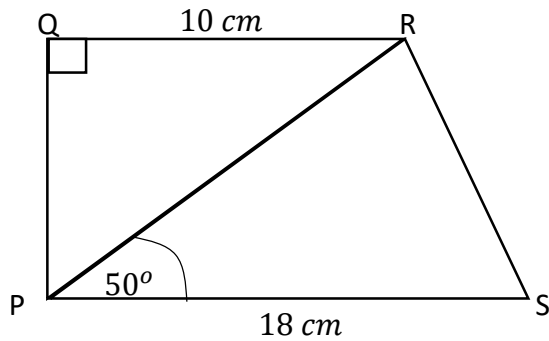
**[1 mark]**

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**16** Here are two triangles.



Not drawn  
accurately

Lines PQ and PS are perpendicular to each other.

Work out the length of RS.

**[5 marks]**

Correct to 3 significant figures.

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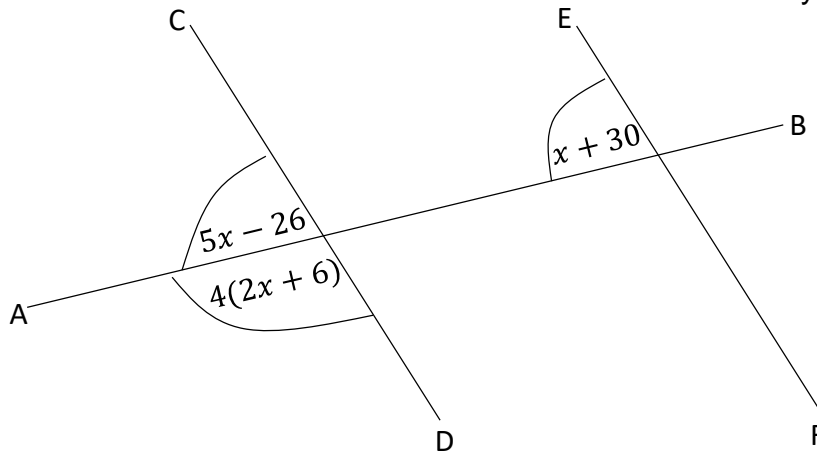
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Answer \_\_\_\_\_

17 AB, CD, EF are straight lines.

All angles are in degrees.

Not drawn  
accurately



Show that CD is parallel to EF.

[4 marks]

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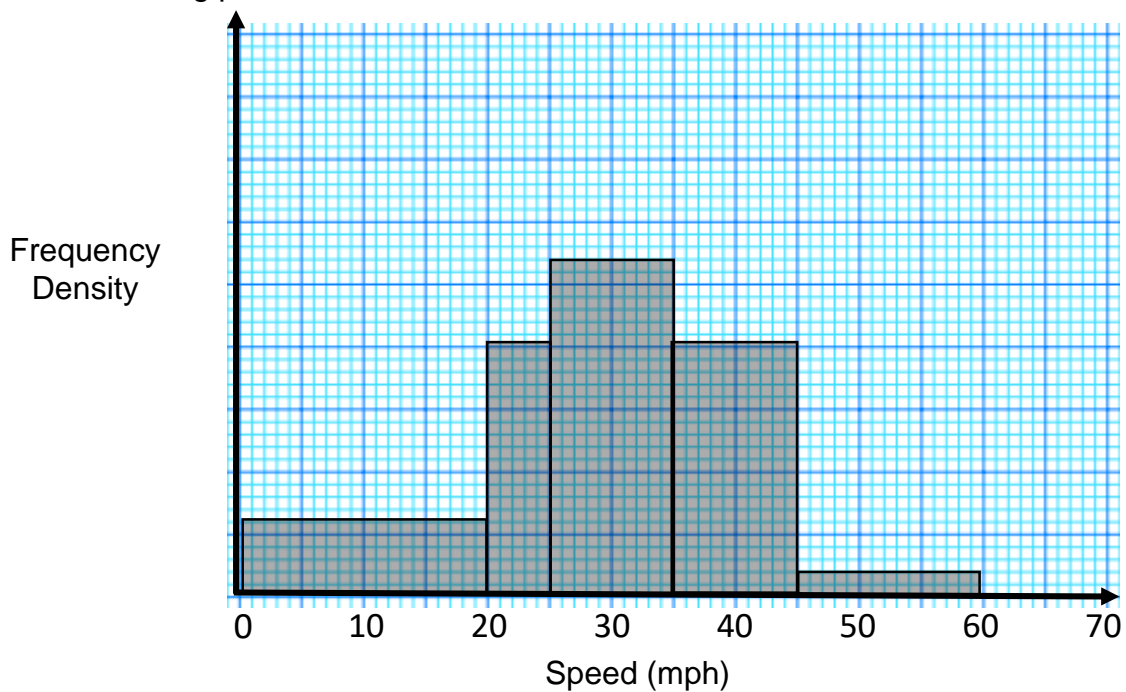
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- 18** The incomplete histogram gives some information about the speed of cars travelling past a school.



On a Monday morning a speed camera van measured the speed of the cars which passed the van.

There were 20 cars measured as travelling in the range  $20 \leq \text{speed} < 25$ .

The speed limit is 30 miles per hour.

Work out the proportion of cars that were caught speeding.

**[4 marks]**

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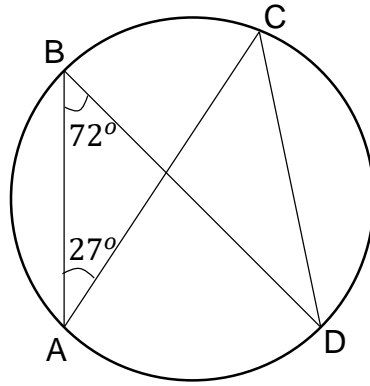
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Answer \_\_\_\_\_



19

Not drawn  
accurately

Circle the size of angle ACD.

[1 mark]

 $27^\circ$  $72^\circ$  $81^\circ$  $99^\circ$  $108^\circ$ 

20

A circle has equation  $x^2 + y^2 = 36$ 

Circle the length of its diameter.

[1 mark]

4

6

12

18

36

**21** For all values of  $x$ ,

$$f(x) = x^2 + 2$$

$$g(x) = 3 - x$$

**21 (a)** Find  $f^{-1}(x)$

**[2 marks]**

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Answer \_\_\_\_\_

**21 (b)** Solve the equation

$$fg(x) = 18$$

**[4 marks]**

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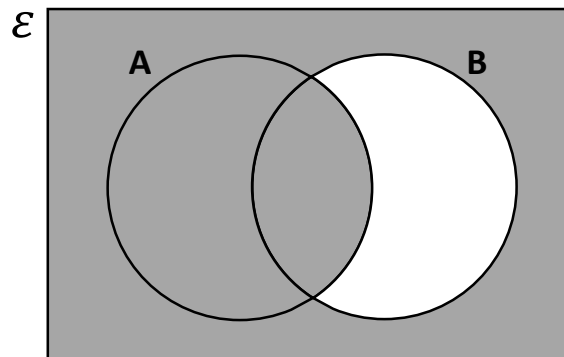
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Answer \_\_\_\_\_

- 22** Here is a Venn diagram representing the universal set, which includes set A and set B.



Circle the notation which represent the shaded region.

**[1 mark]**

$(A \cap B)' \cap A$

$(A \cap B) \cup A$

$A \cap B'$

$A \cup B'$

- 23** Here is a quadratic sequence.

7

20

39

64

The expression for the  $n$ th term of this sequence is  $pn^2 + qn$ .

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

**[3 marks]**

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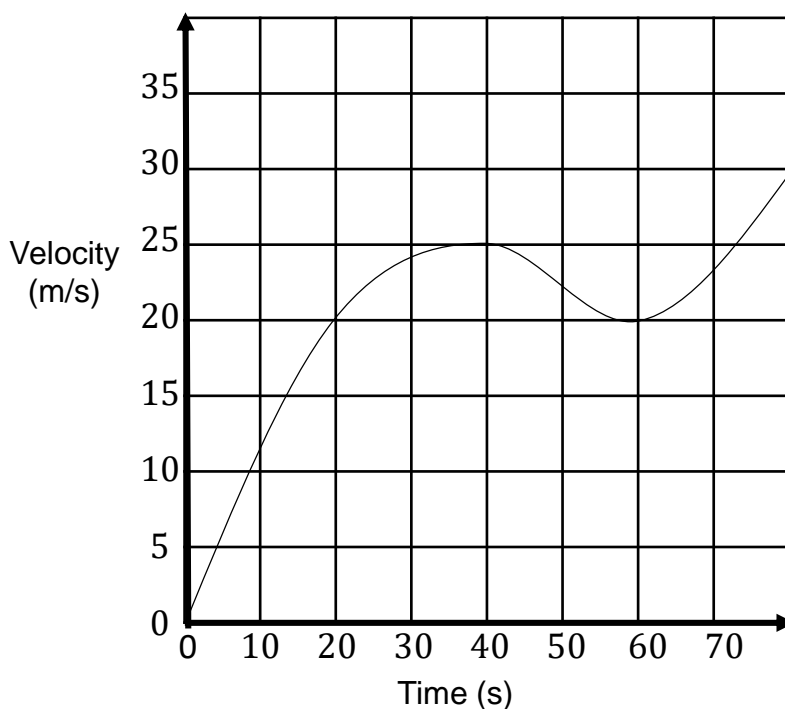
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$$p = \underline{\hspace{2cm}} \quad q = \underline{\hspace{2cm}}$$

**24** Here is a velocity-time graph for a bike journey.



**24 (a)** Work out an estimate for the total distance travelled in the first 60 seconds.

**[3 marks]**

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Answer \_\_\_\_\_

**24 (b)** Is your answer to (a) an underestimate or an overestimate of the actual distance?

Give a reason for your answer.

☐

Underestimate

☐

Overestimate

**[1 mark]**

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- 25 (a)** Show that the equation  $x^3 + 5x = 10$  has a solution  
between  $x = 1$  and  $x = 2$ .

**[2 marks]**


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- 25 (b)** Show that the equation  $x^3 + 5x = 10$  can be arranged to give

$$x = \frac{10}{x^2 + 5}$$

**[1 mark]**


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- 25 (c)** Starting with  $x_0 = 1$ , use the iteration formula  $x_n = \frac{10}{x_n^2 + 5}$ , to find an  
estimate for the solution of  $x^3 + 5x = 10$

**[3 marks]**


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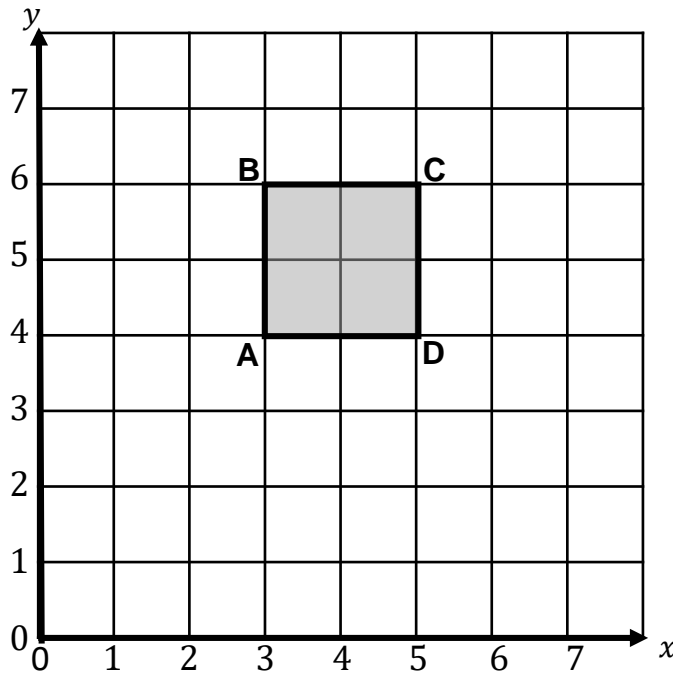


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Answer \_\_\_\_\_

**26**

A square ABCD is drawn on a centimetre grid.



- 26 (a)** ABCD is reflected in the line  $y = 4$  and  
Circle the number of invariant points.

**[1 mark]**

0                      1                      2                      3                      4

- 26 (b)** ABCD is reflected in the line  $x = 3$  and  
then rotated  $90^\circ$  anti-clockwise from the centre (3,4).  
Circle the number of invariant points.

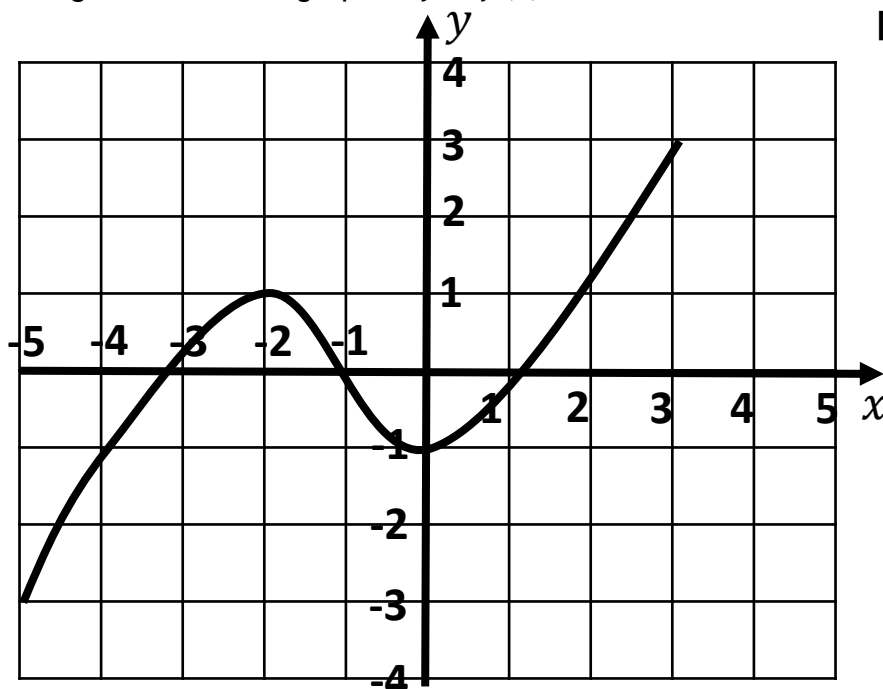
**[1 mark]**

0                      1                      2                      3                      4

**27 (a)** The graph of  $y = f(x)$  is shown on the grids.

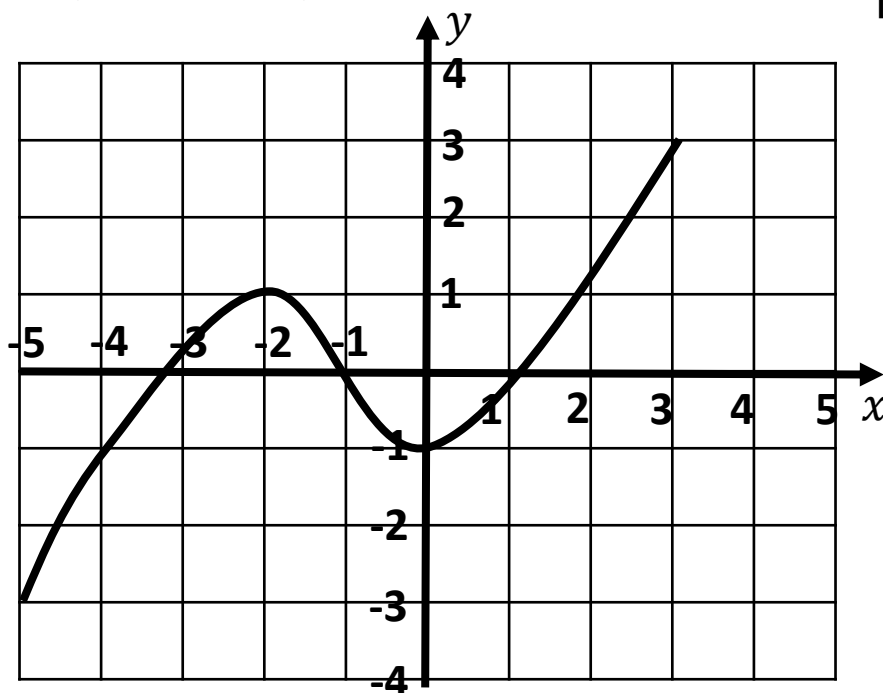
On this grid, sketch the graph of  $y = f(x) - 2$

[2 marks]



**27 (b)** On this grid, sketch the graph of  $y = f(-x)$

[2 marks]



**End of Questions**

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**ANSWER IN THE SPACES PROVIDED**

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