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EDEXCEL GCSE (9-1) MATHS: QUESTIONS BY TOPIC

Transformations & Vectors (G3)

GCSE (9-1) Mathematics (1MA1) · Foundation tier

33 questions · 75 marks · Mark schemes included

Past papers June 2017 - June 2025 · 2 sub-topics

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HOW TO USE THIS BOOKLET

Questions are grouped by sub-topic and run from the lowest to the highest mark tariff, then oldest paper first.

Click any row below to jump straight to that sub-topic or question.

On every question page, click ANSWER in the top-right corner to jump to its mark scheme; < QUESTION brings you back.

A gold bar in the left margin marks exactly where the question sits on the original page.

Diagrams, graphs, grids and tables are printed exactly as they appear in the original papers.

Each question is filed under its main topic; longer questions may also test skills from other topics.

QUESTION	SOURCE	MARKS	PAGE
G3a TRANSFORMATIONS		26 Qs · 57 marks	2
1. Q10	GCSE Paper 3F November 2018	1	3
2. Q3	GCSE Paper 1F June 2022	1	4
3. Q20	GCSE Paper 2F November 2017	2	5
4. Q14	GCSE Paper 3F November 2017	2	6
5. Q18	GCSE Paper 2F June 2018	2	7
6. Q19	GCSE Paper 1F November 2018	2	8
7. Q16	GCSE Paper 2F November 2018	2	9
8. Q13	GCSE Paper 2F November 2019	2	10
9. Q18	GCSE Paper 3F November 2019	2	11
10. Q11	GCSE Paper 1F November 2020	2	12
11. Q18	GCSE Paper 2F November 2020	2	13
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16. Q12	GCSE Paper 2F June 2023	2	18
17. Q16	GCSE Paper 3F June 2023	2	20
18. Q11	GCSE Paper 1F November 2023	2	21
19. Q21	GCSE Paper 2F November 2023	2	22
20. Q19	GCSE Paper 1F June 2024	2	23
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22. Q26	GCSE Paper 1F June 2019	3	25
23. Q18	GCSE Paper 3F June 2024	3	26
24. Q10	GCSE Paper 1F November 2024	3	28
25. Q13	GCSE Paper 2F June 2017	4	29
26. Q11	GCSE Paper 1F November 2022	4	31
G3b VECTORS		7 Qs · 18 marks	32
27. Q26	GCSE Paper 1F June 2018	2	33
28. Q29	GCSE Paper 2F June 2019	2	34
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30. Q26	GCSE Paper 1F June 2025	2	36
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QUESTIONS

33 questions · 75 marks · 2 sub-topics

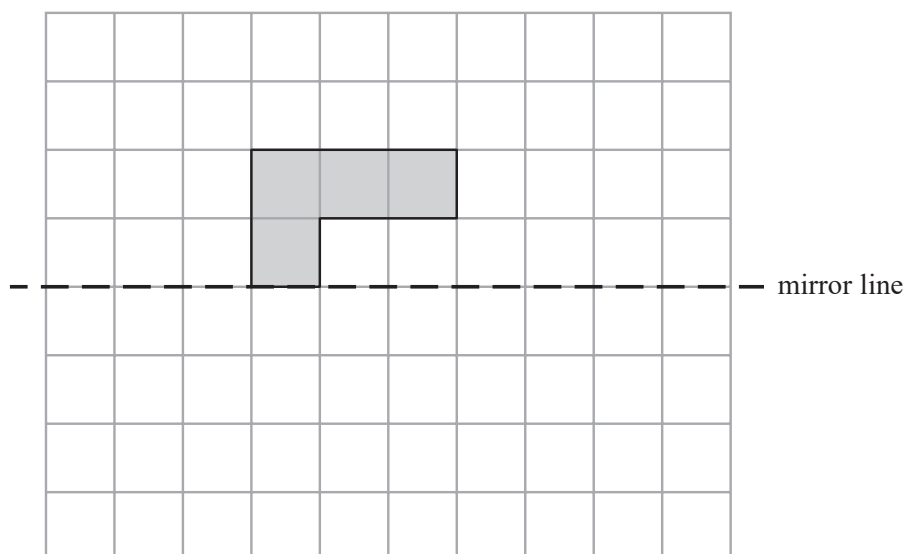
SUB-TOPIC G3a

TRANSFORMATIONS

Sub-topic G3a · 26 questions · 57 marks · lowest tariff first



10 On the grid, reflect the shaded shape in the mirror line.



(Total for Question 10 is 1 mark)

11 There are men and women at a meeting.

There are 28 women.

30% of the people at the meeting are men.

Work out the total number of people at the meeting.

(Total for Question 11 is 3 marks)

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

- 1 Change 40 centimetres into millimetres.

..... millimetres

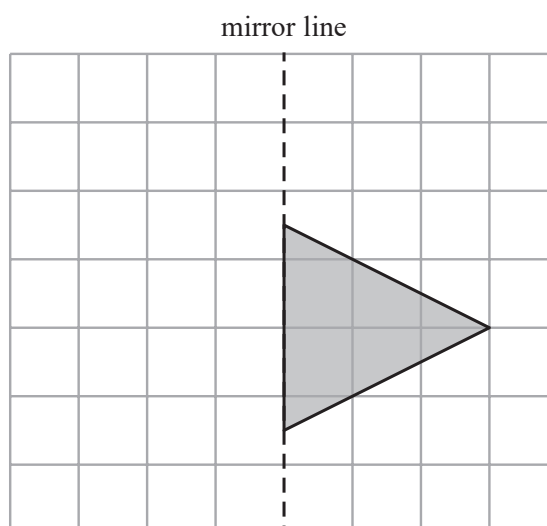
(Total for Question 1 is 1 mark)

- 2 Simplify $e + e + e + e$

.....

(Total for Question 2 is 1 mark)

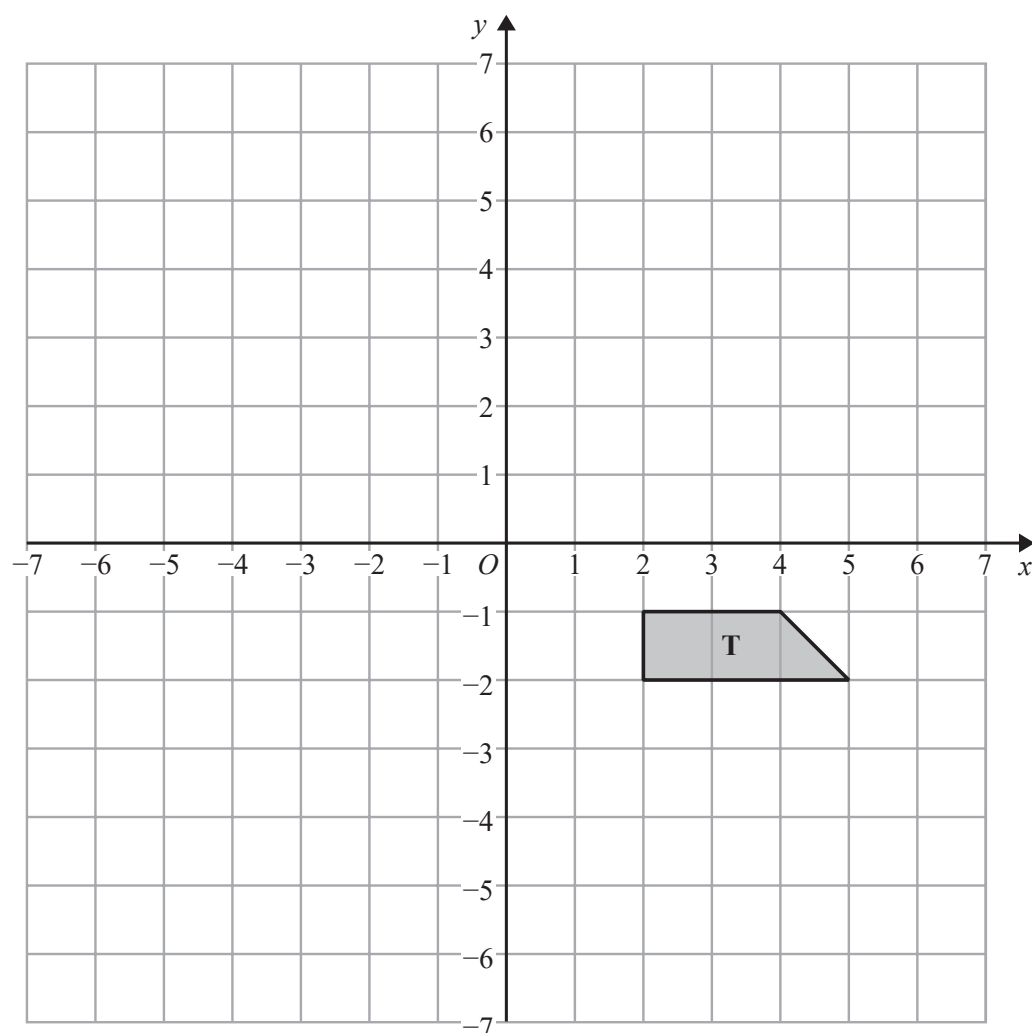
- 3 On the grid, reflect the shaded triangle in the mirror line.



(Total for Question 3 is 1 mark)



20



- (a) Rotate trapezium **T** 180° about the origin.
Label the new trapezium **A**.

(1)

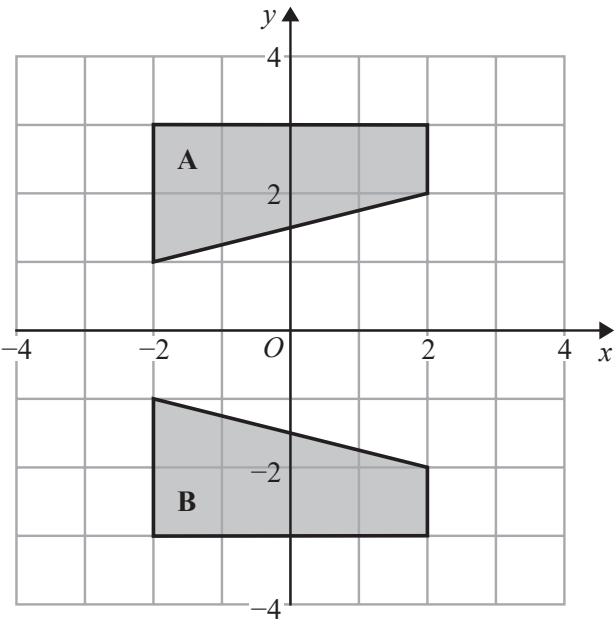
- (b) Translate trapezium **T** by the vector $\begin{pmatrix} -1 \\ -3 \end{pmatrix}$
Label the new trapezium **B**.

(1)

(Total for Question 20 is 2 marks)



14



Describe fully the single transformation that maps shape A onto shape B.

(Total for Question 14 is 2 marks)

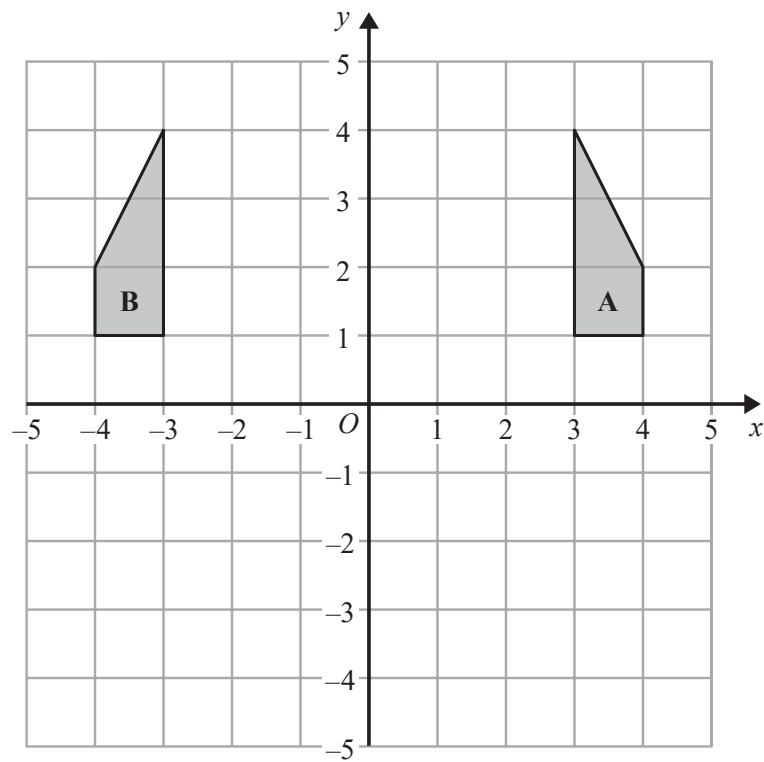
15 The ratio of the cost of one metre of cotton fabric to the cost of one metre of silk fabric is 2 : 5

Complete the table of costs.

	2 m	6 m	8 m	9 m
cotton fabric	£6			
silk fabric				

(Total for Question 15 is 3 marks)

18



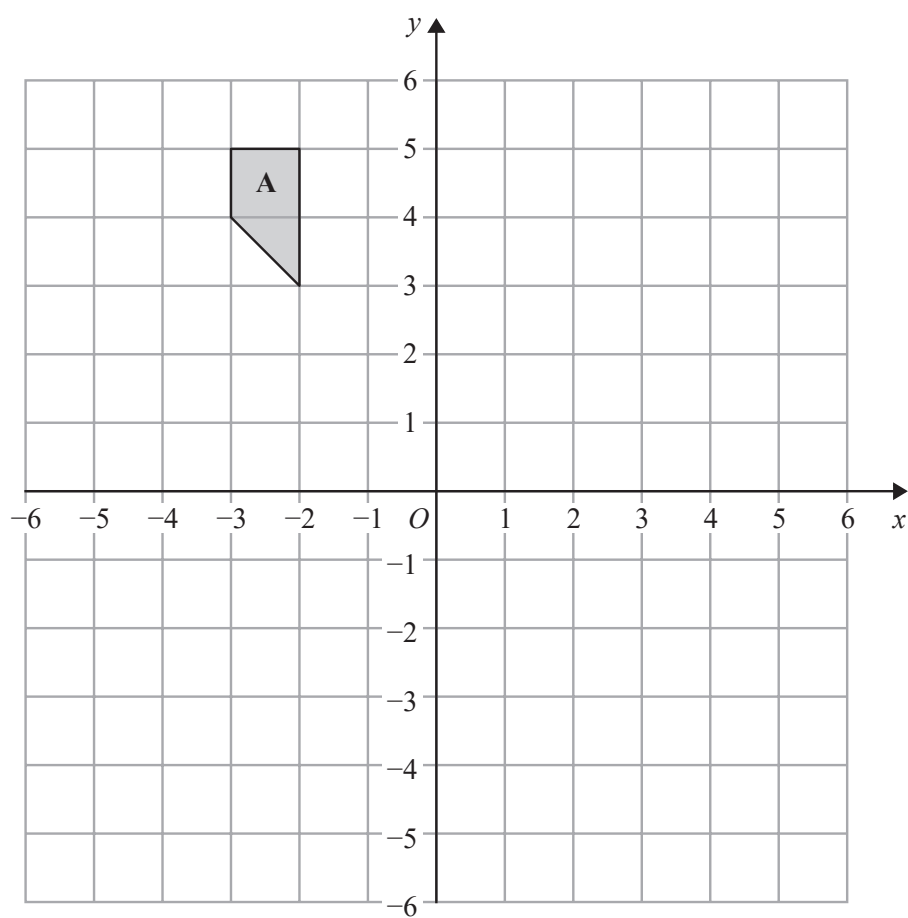
Describe fully the single transformation that maps shape A onto shape B.

.....

.....

(Total for Question 18 is 2 marks)

19



Rotate shape A 180° about (1, 0)

(Total for Question 19 is 2 marks)



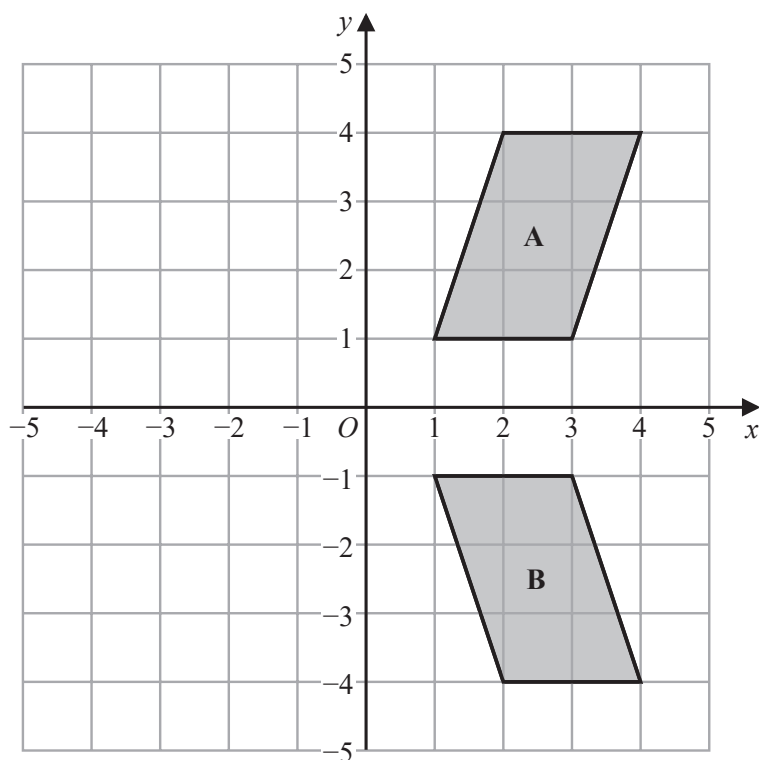
- 15 Remi invests £600 for 5 years in a savings account.
By the end of the 5 years he has received a total of £75 simple interest.

Work out the annual rate of simple interest.

.....%

(Total for Question 15 is 3 marks)

16

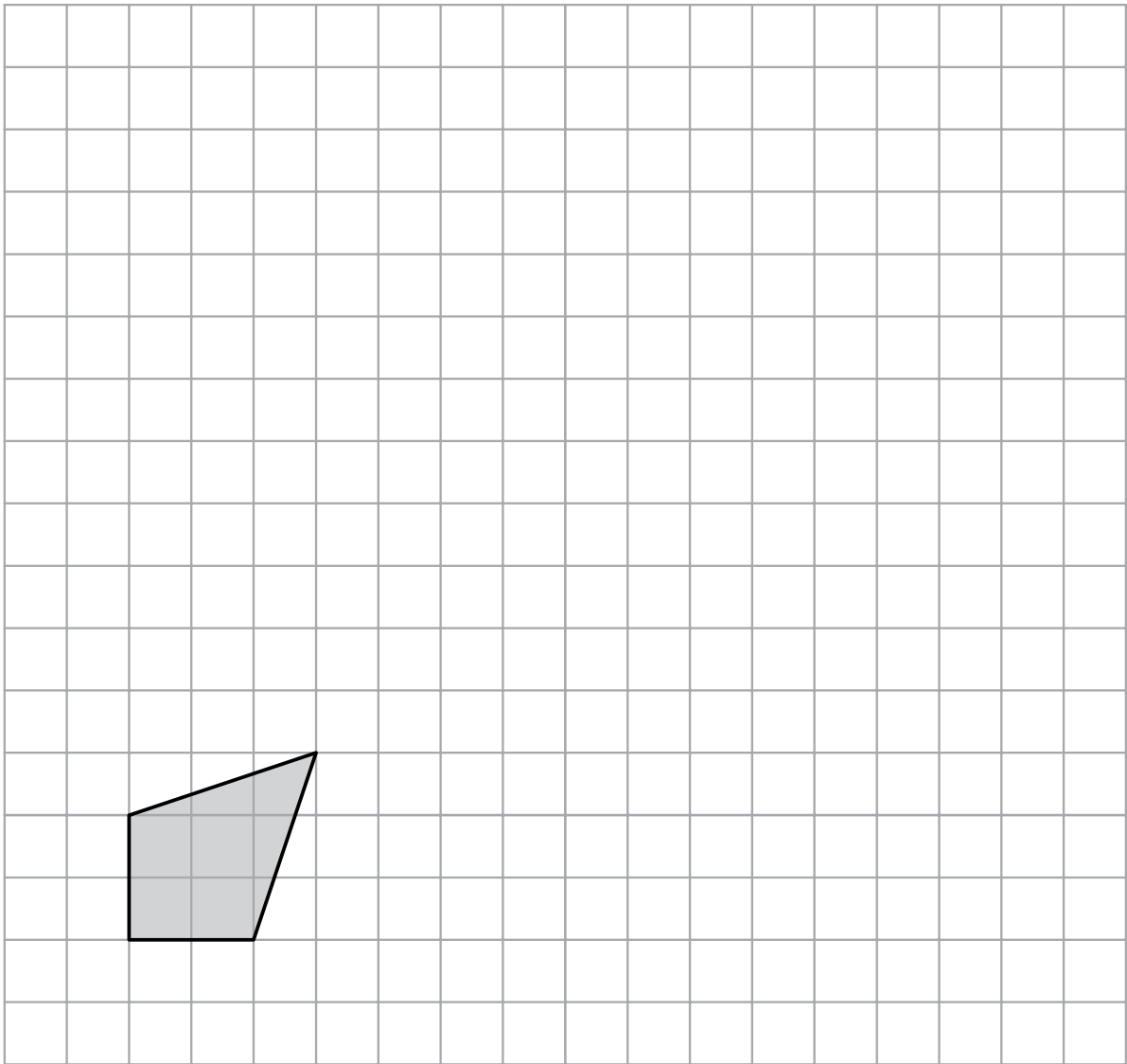


Describe fully the single transformation that maps shape A onto shape B.

(Total for Question 16 is 2 marks)



13

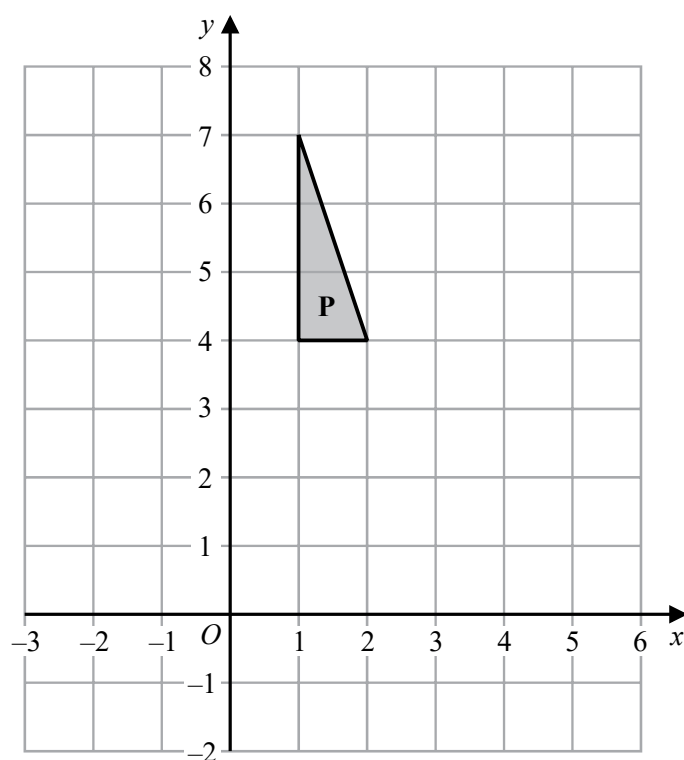


On the grid, draw an enlargement of the shaded shape with a scale factor of 3

(Total for Question 13 is 2 marks)



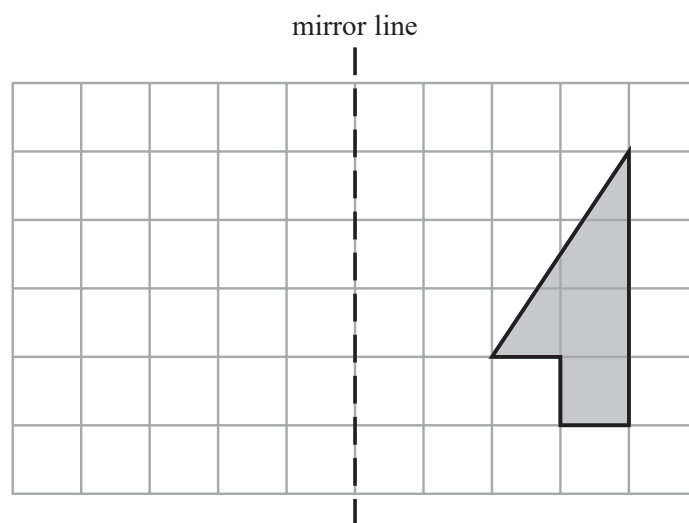
18



Reflect shape **P** in the line $y = 3$

(Total for Question 18 is 2 marks)

11



Reflect the shaded shape in the mirror line.

(Total for Question 11 is 2 marks)

12 The diagram shows a number machine.



(a) Find the output when the input is 7

.....
(1)

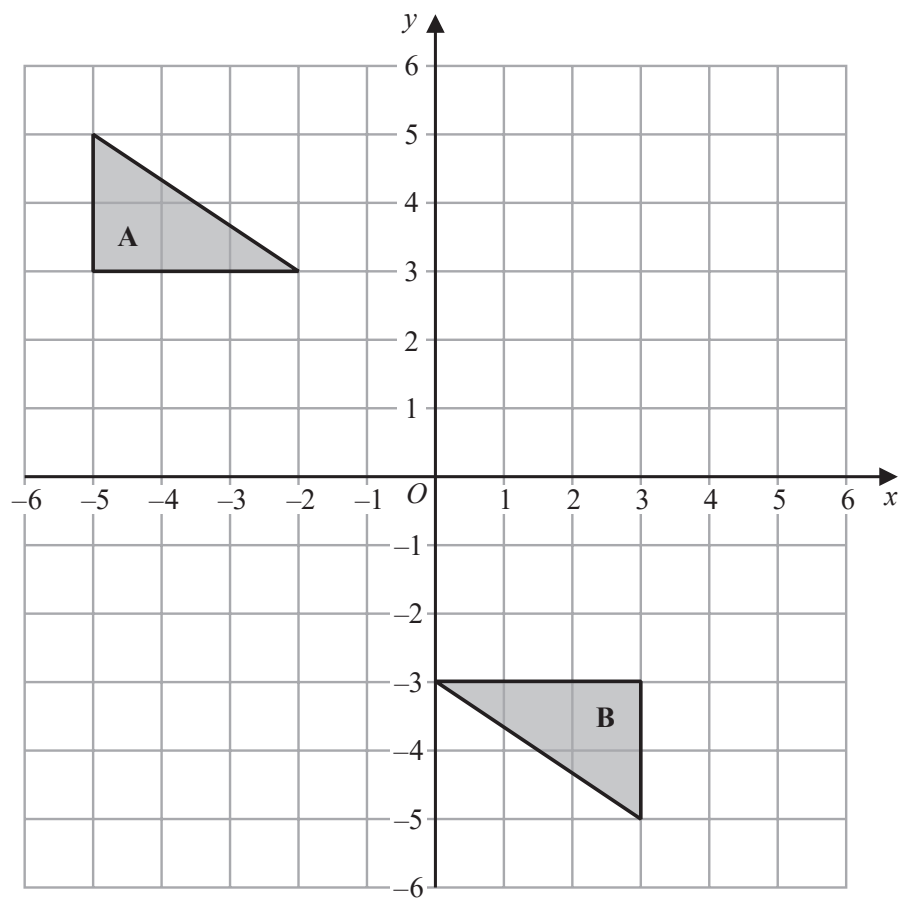
(b) Find the input when the output is 41

.....
(2)

(Total for Question 12 is 3 marks)



18



Describe fully the single transformation that maps triangle A onto triangle B.

.....

.....

.....

(Total for Question 18 is 2 marks)



- 9 Alec needs to work out the value of $2 + 3 \times 4$

He writes

$$2 + 3 = 5 \text{ and } 5 \times 4 = 20, \text{ so } 2 + 3 \times 4 = 20$$

Alec is wrong.
Explain why.

.....

.....

.....

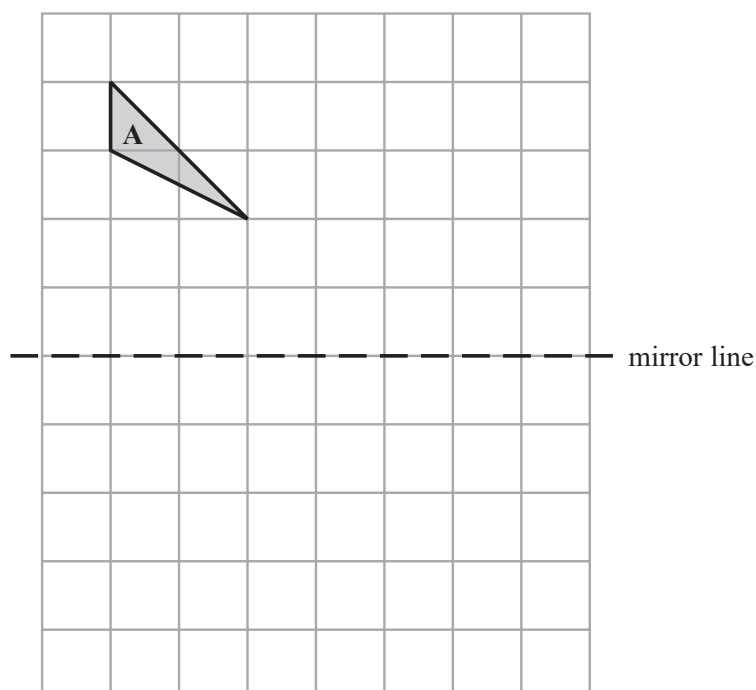
(Total for Question 9 is 1 mark)

- 10 Write 17 as a fraction of 30

.....

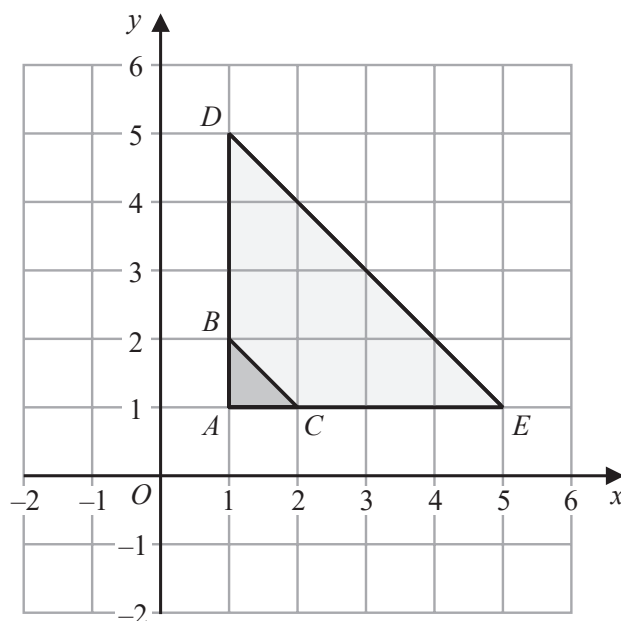
(Total for Question 10 is 1 mark)

- 11 Reflect shape A in the mirror line.



(Total for Question 11 is 2 marks)

16 Here is a diagram showing triangle ABC and triangle ADE .



Describe fully the single transformation that maps triangle ABC onto triangle ADE .

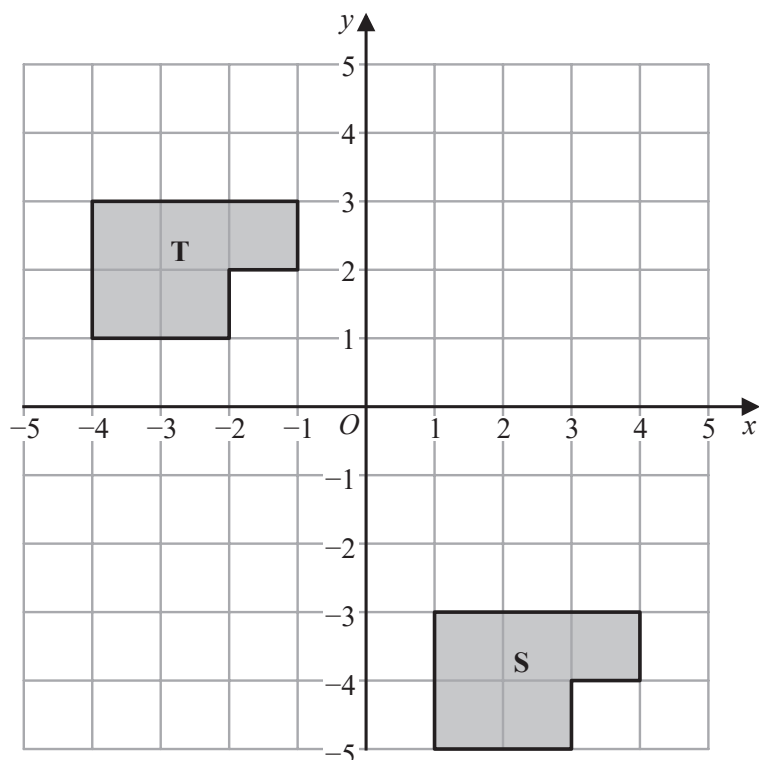
.....

.....

.....

(Total for Question 16 is 2 marks)

22



Describe fully the single transformation that maps shape S onto shape T.

.....

.....

.....

(Total for Question 22 is 2 marks)

23 The length of a football pitch is 90 metres, correct to the nearest metre.

Complete the error interval for the length of the football pitch.

..... m $\leq$ length < m

(Total for Question 23 is 2 marks)



17 (a) Write 87569 correct to 3 significant figures.

.....
(1)

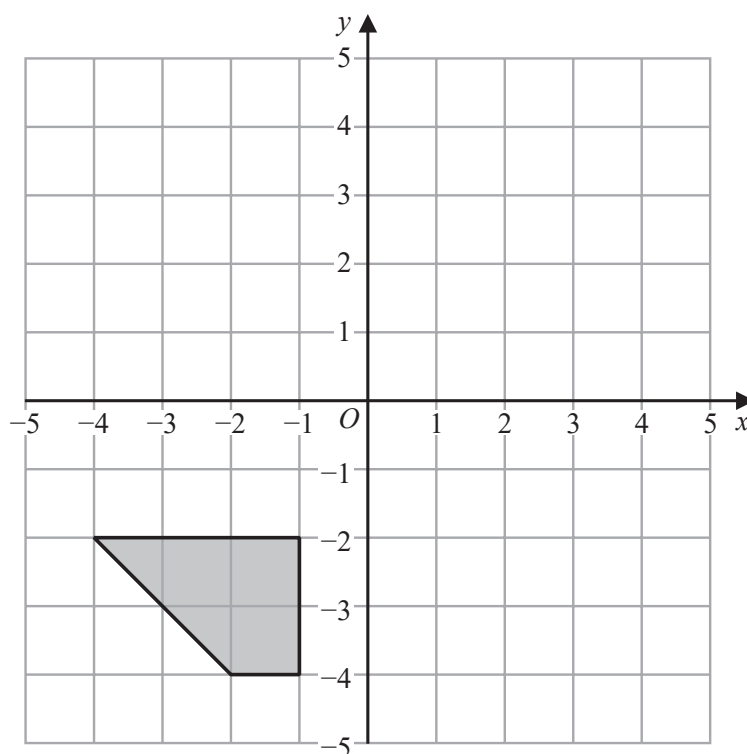
(b) Work out $\frac{(3.2 + 3.7) \times 4.9}{5.3 - 2.8}$

Give your answer as a decimal.

.....
(2)

(Total for Question 17 is 3 marks)

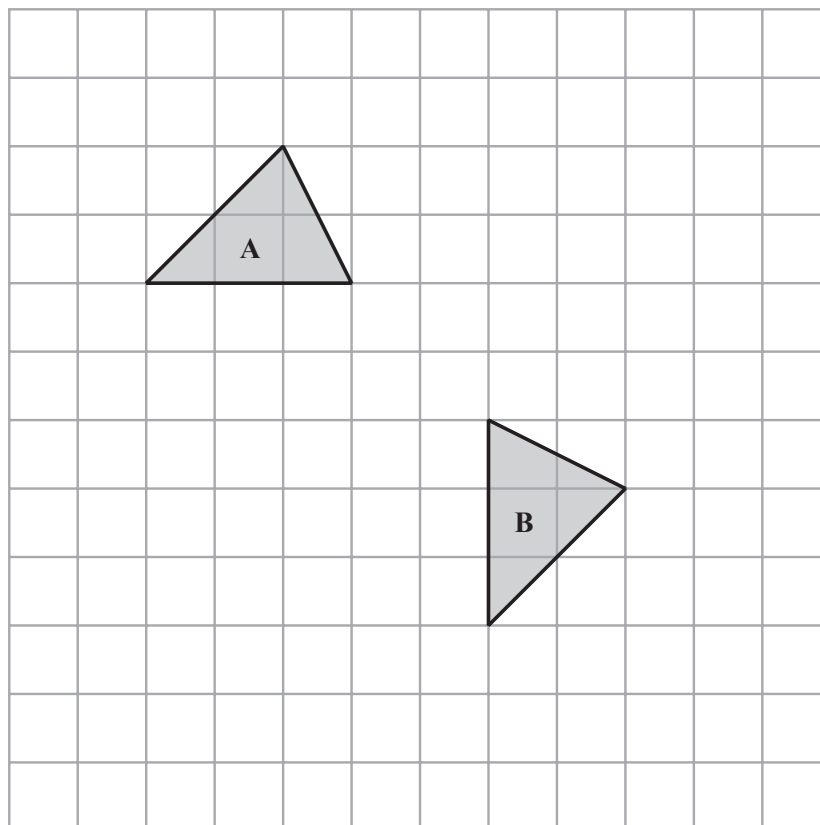
18



Rotate the shaded shape 90° anticlockwise about (0,0)

(Total for Question 18 is 2 marks)

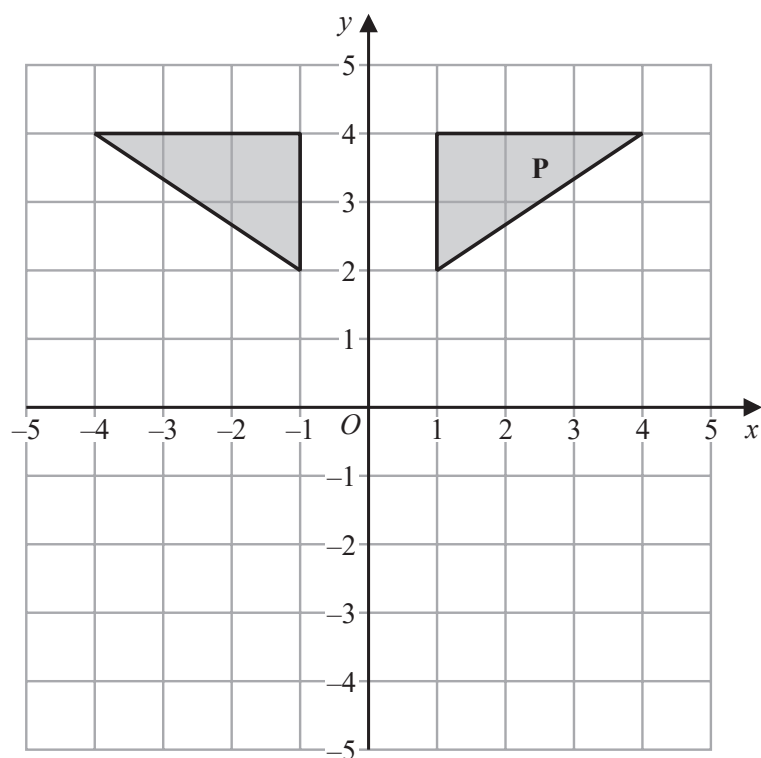
12 Shape A is reflected in a mirror line to give shape B.



(a) On the grid, draw the mirror line.

(1)

- (b) Alex is asked to reflect shape **P** in the x -axis.
Here is the diagram Alex draws.



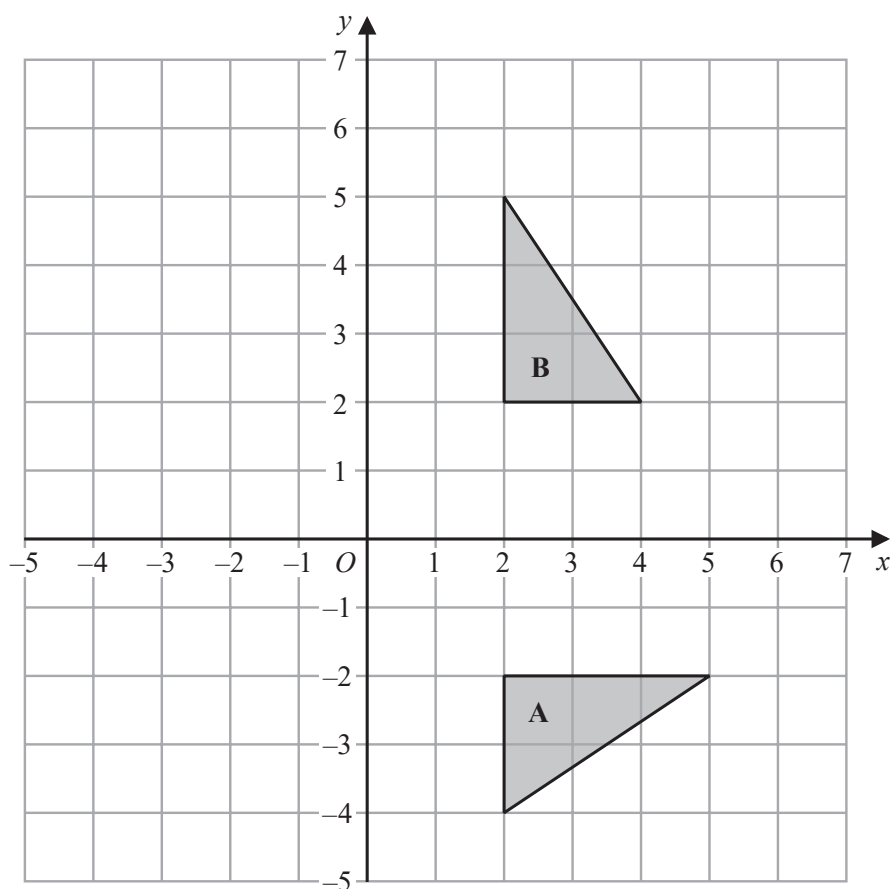
Explain the mistake Alex has made.

(1)

(Total for Question 12 is 2 marks)



16



Describe fully the single transformation that maps shape A onto shape B.

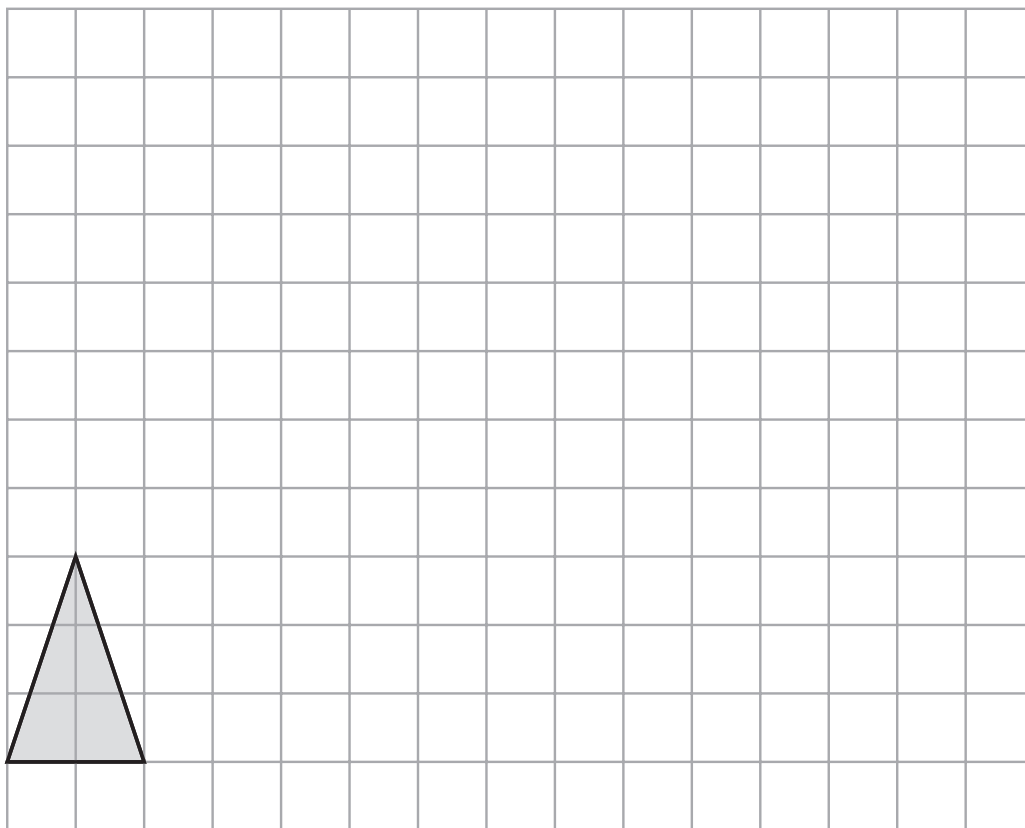
.....

.....

.....

(Total for Question 16 is 2 marks)

11

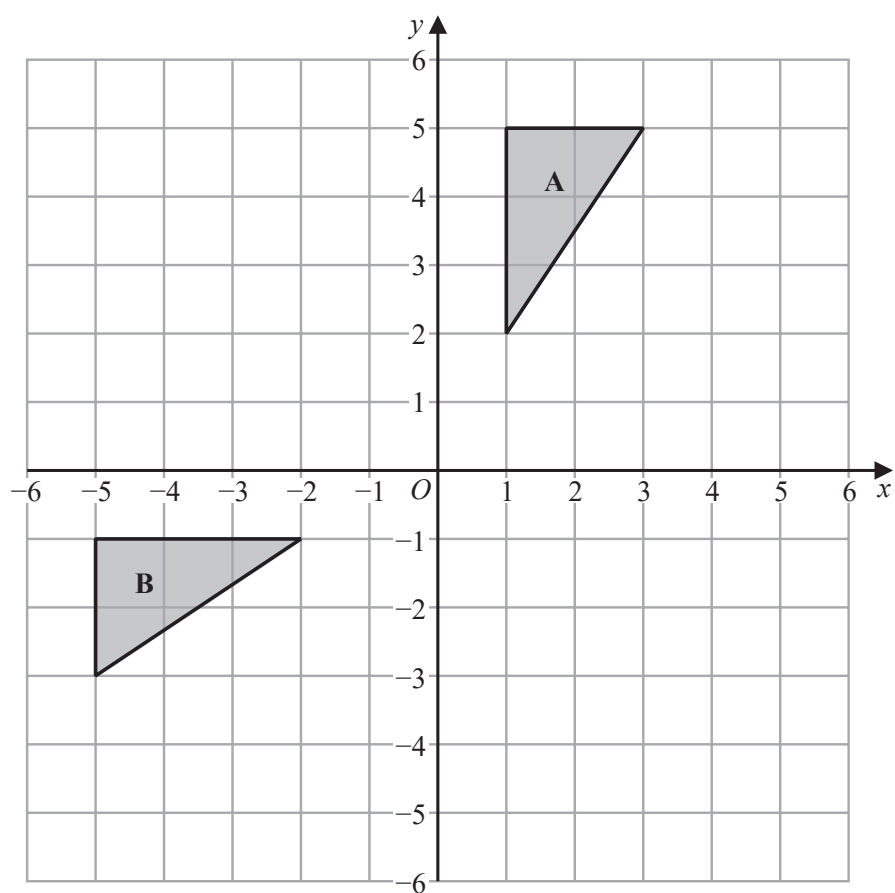


On the grid, draw an enlargement of the triangle with a scale factor of 3

(Total for Question 11 is 2 marks)



21



Describe fully the single transformation that maps triangle A onto triangle B.

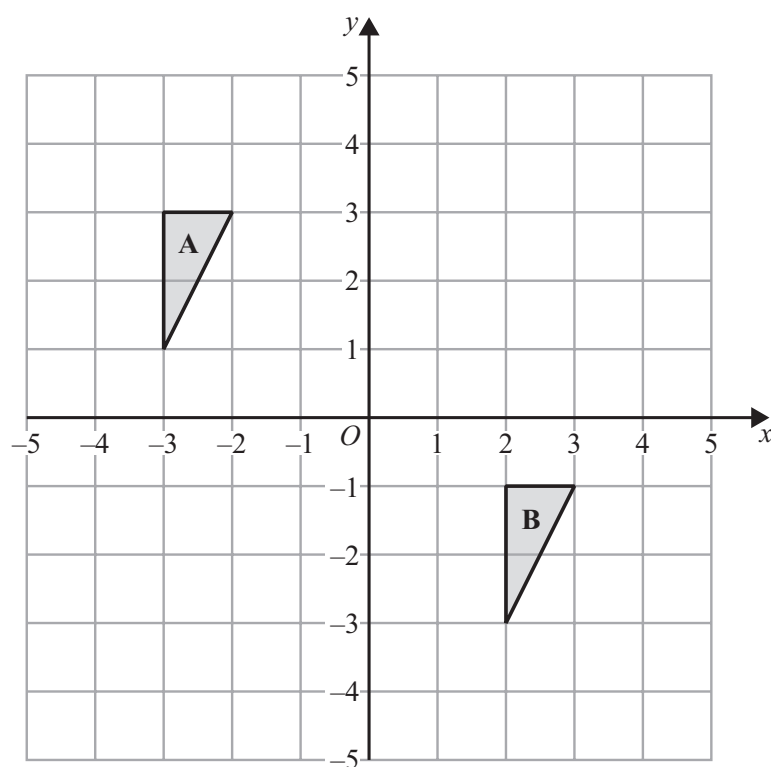
.....

.....

.....

(Total for Question 21 is 2 marks)

19



Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

.....

.....

(Total for Question 19 is 2 marks)

20 Here are the first four terms of an arithmetic sequence.

1 5 9 13

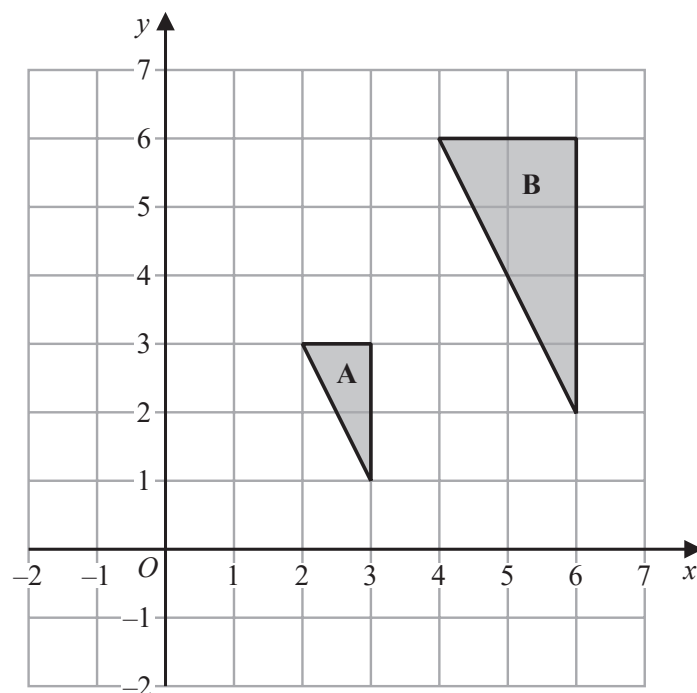
Find an expression, in terms of n , for the n th term of this sequence.

.....

(Total for Question 20 is 2 marks)



18



Describe fully the single transformation that maps triangle A onto triangle B.

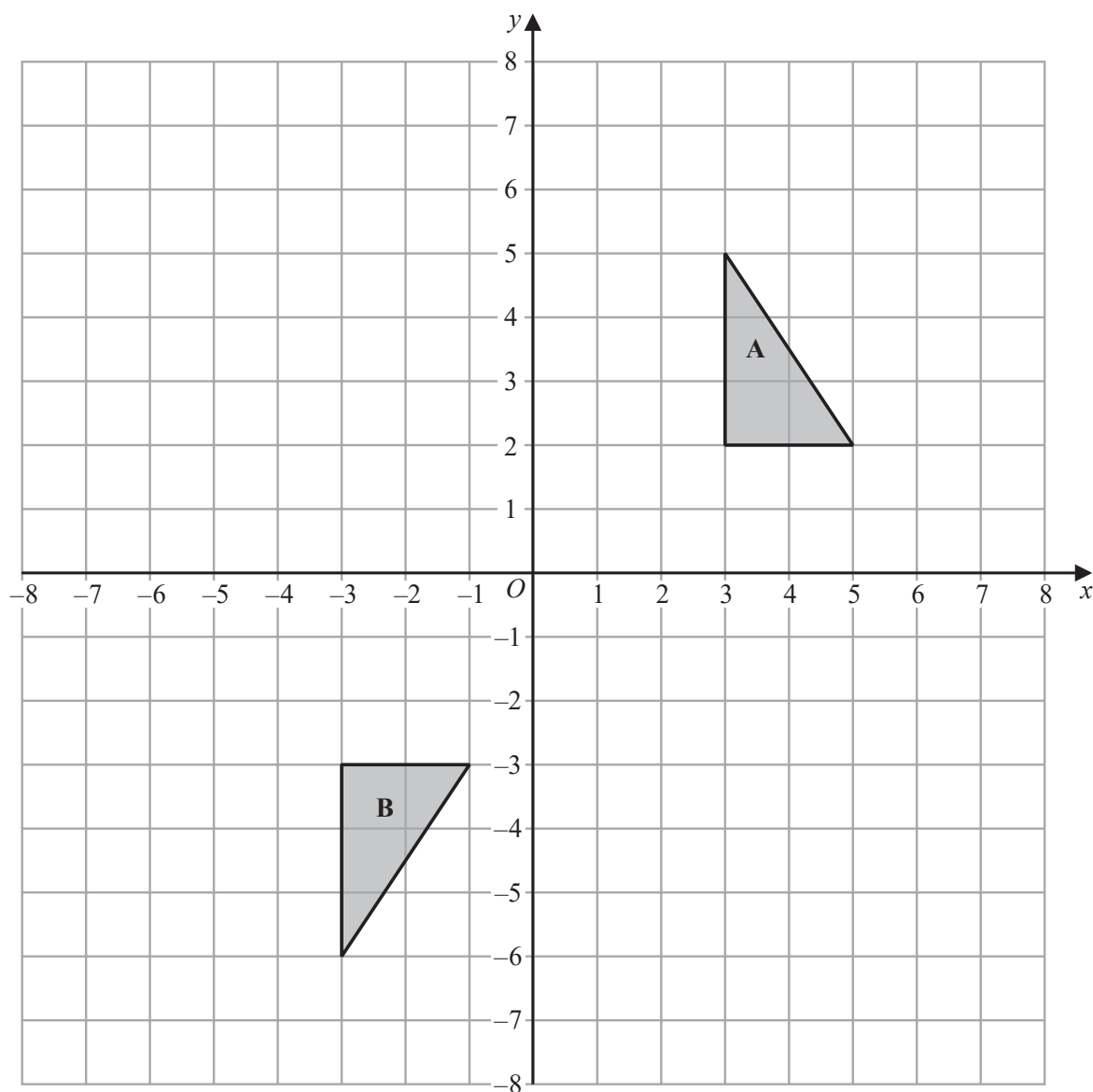
.....

.....

.....

(Total for Question 18 is 2 marks)

26



Shape **A** can be transformed to shape **B** by a reflection in the x -axis followed by a translation $\begin{pmatrix} c \\ d \end{pmatrix}$

Find the value of c and the value of d .

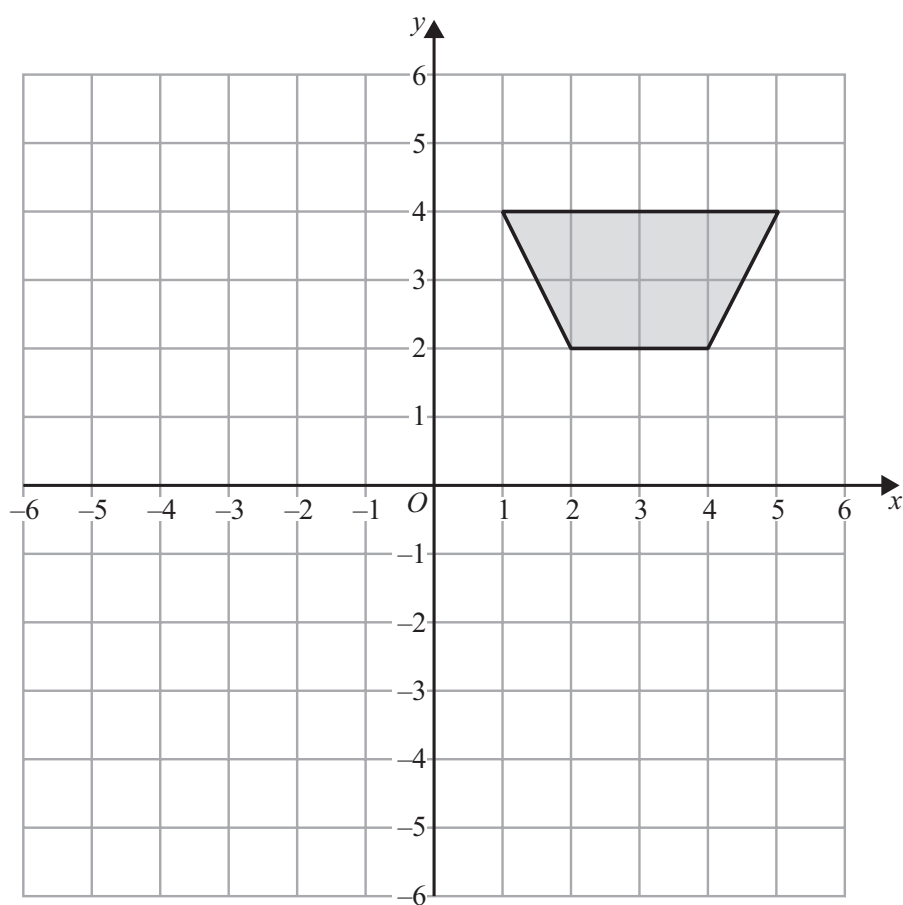
$c =$

$d =$

(Total for Question 26 is 3 marks)

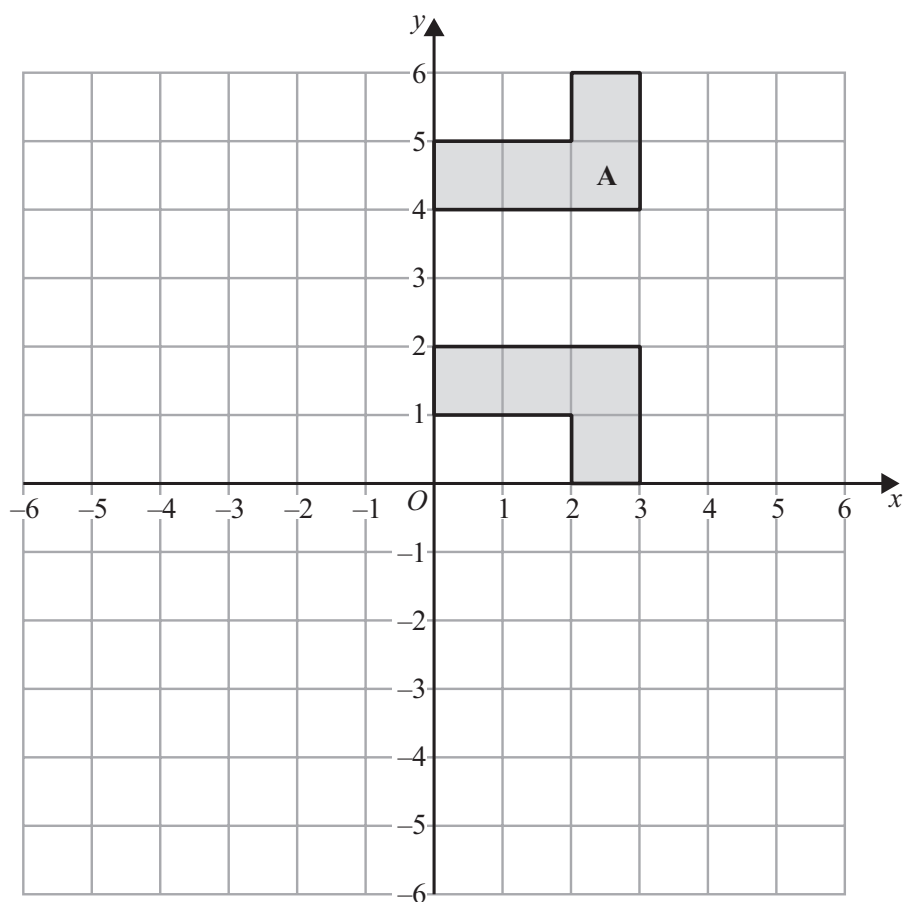


18



(a) On the grid above, rotate the shaded shape 180° about $(0, 0)$

(2)



Mike was asked to

‘Reflect shape A in the line with equation $x = 3$ ’

Mike’s answer is shown on the grid.

His answer is wrong.

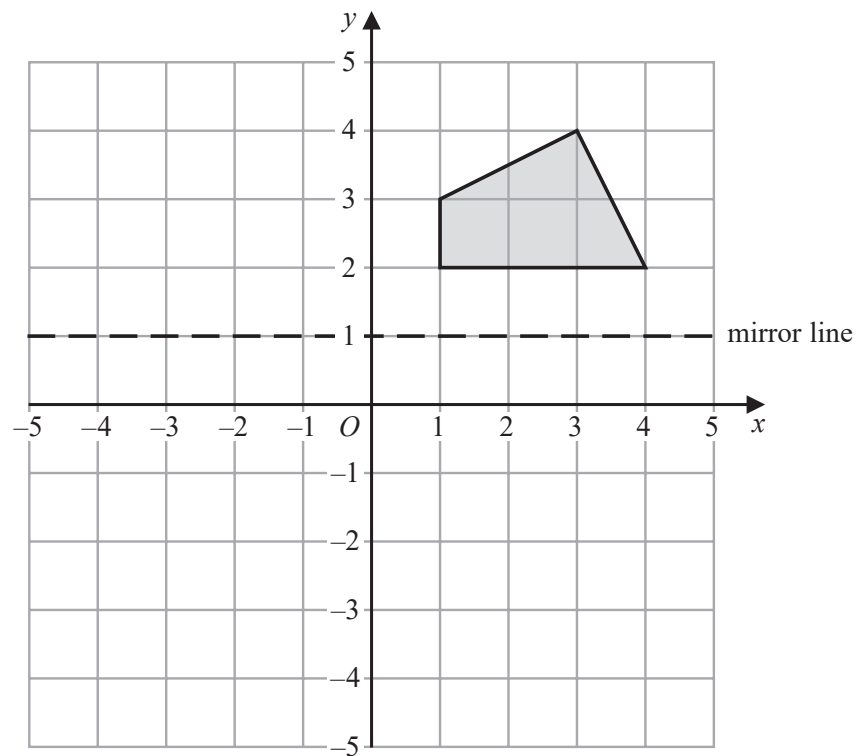
(b) Explain why.

(1)

(Total for Question 18 is 3 marks)



10



- (a) On the grid, reflect the shaded shape in the mirror line.

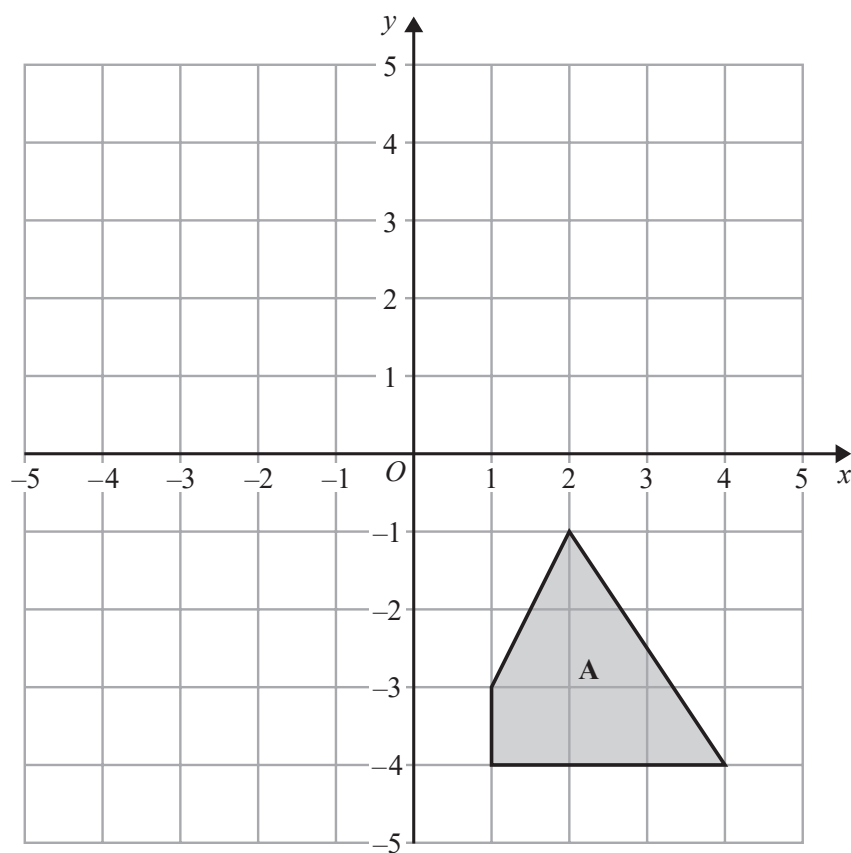
(2)

- (b) Write down the equation of the mirror line.

(1)

(Total for Question 10 is 3 marks)

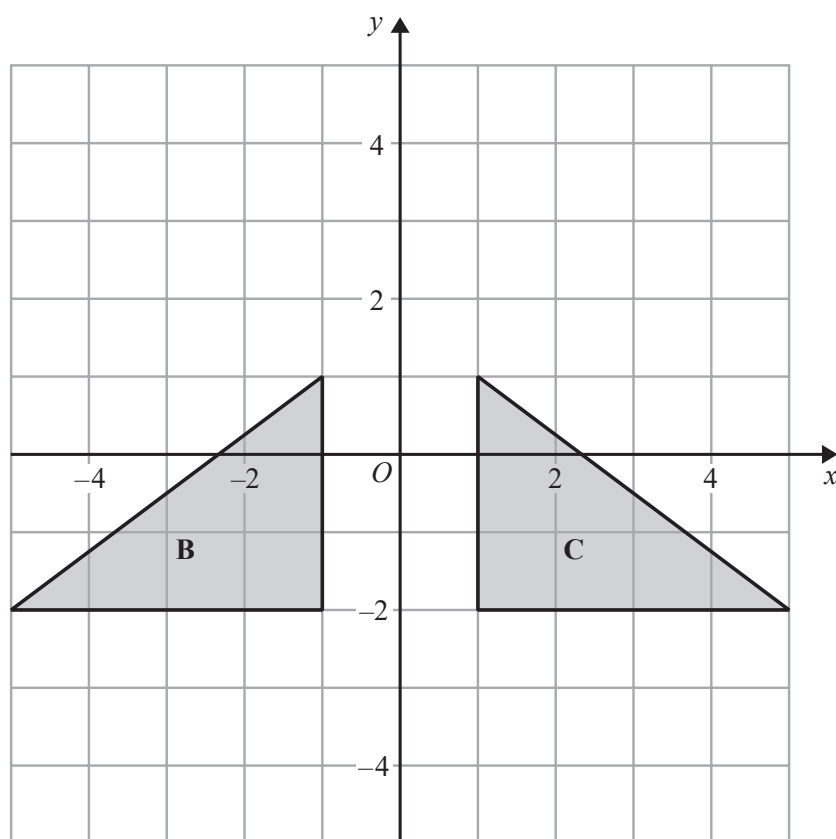
13



(a) Rotate shape A 90° clockwise about centre O.

(2)





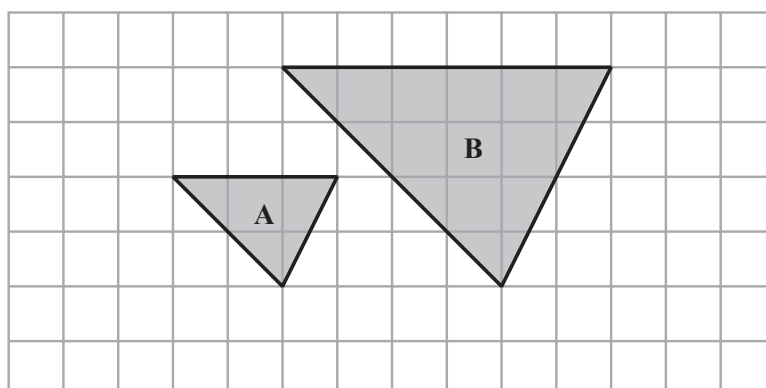
(b) Describe fully the single transformation that maps triangle **B** onto triangle **C**.

(2)

(Total for Question 13 is 4 marks)



11 Here are two triangles on a grid.



Triangle **B** is an enlargement of triangle **A**.

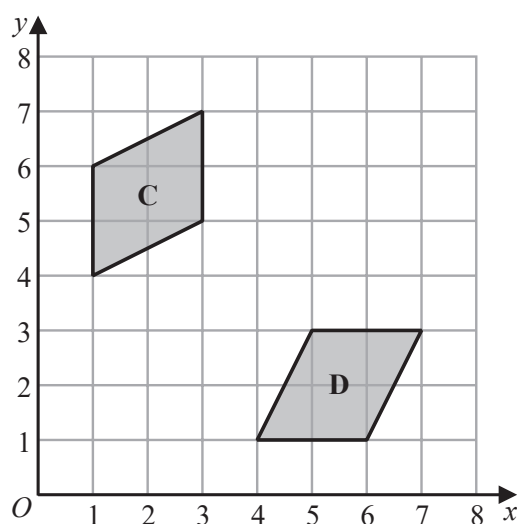
(a) (i) Write down the scale factor of the enlargement.

.....
(1)

(ii) On the grid, mark with a cross (×) the centre of enlargement.

(1)

Here are two parallelograms on a coordinate grid.



Parallelogram **D** is a reflection of parallelogram **C**.

(b) (i) On the grid, draw the mirror line.

(1)

(ii) Write down an equation of this mirror line.

.....
(1)

(Total for Question 11 is 4 marks)

SUB-TOPIC G3b

VECTORS

Sub-topic G3b · 7 questions · 18 marks · lowest tariff first



26 $\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 7 \end{pmatrix}$

Work out $2\mathbf{a} + \mathbf{b}$ as a column vector.

$$\begin{pmatrix} \\ \\ \end{pmatrix}$$

(Total for Question 26 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS



28 Here are the first five terms of a Fibonacci sequence.

3 3 6 9 15

(a) Write down the next two terms of the sequence.

..... , ...
(1)

The first three terms of a different Fibonacci sequence are

a a $2a$

(b) Find the 6th term of this sequence.

.....
(2)

(Total for Question 28 is 3 marks)

29 $\mathbf{a} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$

Work out $\mathbf{a} - 2\mathbf{b}$ as a column vector.

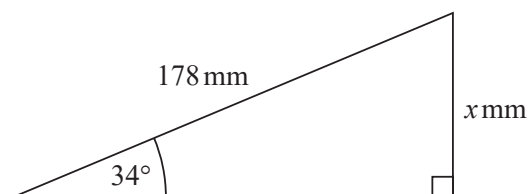
$\begin{pmatrix} \\ \text{---} \\ \end{pmatrix}$

(Total for Question 29 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS



25



Work out the value of x .
Give your answer correct to 1 decimal place.

(Total for Question 25 is 2 marks)

26 $\mathbf{a} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} 5 \\ -2 \end{pmatrix}$

Find $2\mathbf{a} - 3\mathbf{b}$ as a column vector.

$$\begin{pmatrix} \\ \\ \end{pmatrix}$$

(Total for Question 26 is 2 marks)



26 $\mathbf{c} = \begin{pmatrix} 7 \\ 4 \end{pmatrix}$ $\mathbf{d} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$

Work out $2\mathbf{c} + 3\mathbf{d}$

Give your answer as a column vector.

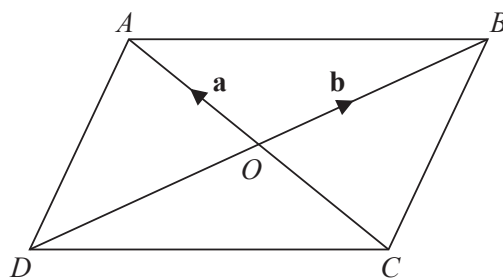
$$\begin{pmatrix} \\ \\ \end{pmatrix}$$

(Total for Question 26 is 2 marks)

TOTAL FOR PAPER IS 80 MARKS



27



$ABCD$ is a parallelogram.

The diagonals of the parallelogram intersect at O .

$$\vec{OA} = \mathbf{a} \text{ and } \vec{OB} = \mathbf{b}$$

(a) Find, in terms of $\mathbf{b}$, the vector $\vec{DB}$.

.....
(1)

(b) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, the vector $\vec{AB}$.

.....
(1)

(c) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, the vector $\vec{AD}$.

.....
(1)

(Total for Question 27 is 3 marks)

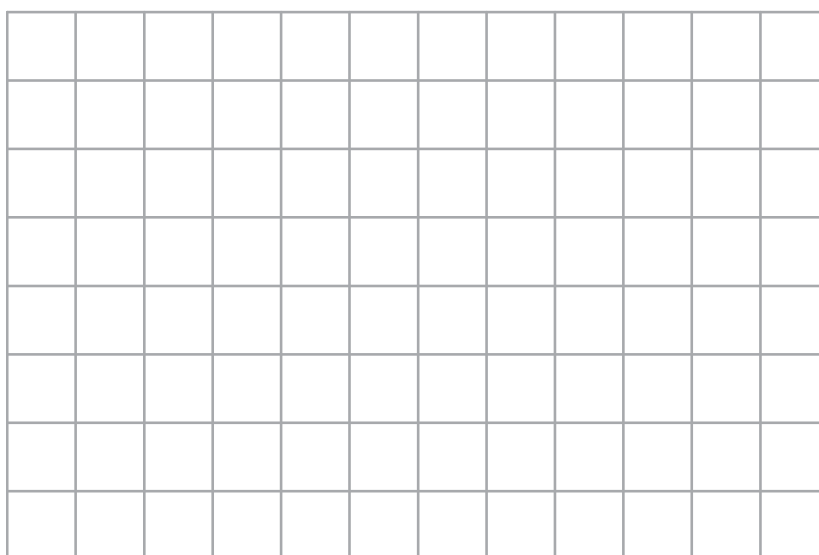
TOTAL FOR PAPER IS 80 MARKS



30 Here are two column vectors.

$$\mathbf{a} = \begin{pmatrix} 5 \\ 2 \end{pmatrix} \quad \mathbf{b} = \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

On the grid below, draw and label the vector $\mathbf{a} - 2\mathbf{b}$



(Total for Question 30 is 3 marks)

TOTAL FOR PAPER IS 80 MARKS

30 $\mathbf{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ $\mathbf{c} = \begin{pmatrix} 4 \\ 1 \end{pmatrix}$

(a) Work out as a column vector

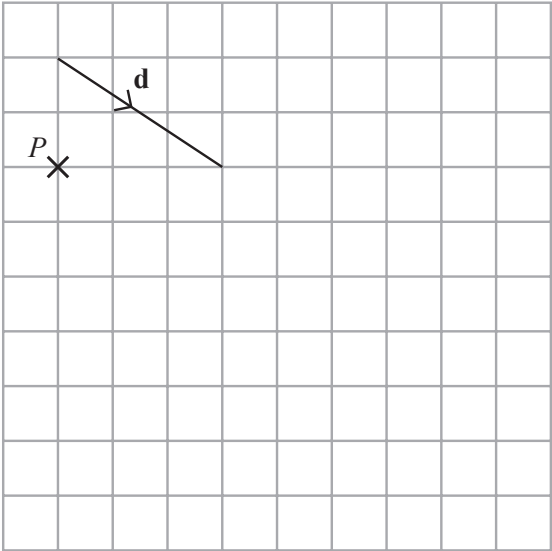
(i) $\mathbf{a} + \mathbf{b}$

(1)

(ii) $2\mathbf{a} - \mathbf{c}$

(2)

The vector $\mathbf{d}$ is drawn on the grid.



(b) From the point P , draw the vector $2\mathbf{d}$

(1)

(Total for Question 30 is 4 marks)

TOTAL FOR PAPER IS 80 MARKS



MARK SCHEMES

official mark schemes, in the same order as the questions



Paper: IMA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
8	Yes with correct figures	P1 P1 P1 C1	begins to work with proportion eg $20 \div 2 (=10)$ or $20 \div 5 (=4)$ or $2.38 \div 2 (=1.19)$ or $5.60 \div 5 (=1.12)$ full process to find the cost of 20 pens or 20 folders eg. $20 \div 2 \times 2.38 (=23.8)$ or $20 \div 5 \times 5.60 (=22.4)$ or $2.38 \div 2 \times 20 (=23.8)$ or $5.60 \div 5 \times 20 (=22.4)$ full process to find total price or amount remaining eg “23.8” + “22.4” (=46.2) or $50 - “23.8” - “22.4” (=3.8)$ Yes with correct figures eg 46.2 or 3.8 (left)	Throughout monetary units not required; trailing zeros not needed. Can work in pence throughout ‘Yes’ might be implied from working eg $46.2 < 50$ or a statement that 3.8 is left, but 46.2 alone must also show an answer such as ‘Yes’ (may be written elsewhere). Working leading to 46.2 must be shown for this mark.
9	(a) Trapezium	B1	cao	Accept in either order.
	(b) C and D	B1	cao	
10	Reflection drawn	C1	for accurate reflection drawn	Can be hand drawn. Need not be shaded.
11	40	P1 P1 A1	for $100 - 30 (=70)$ or $1 - 0.3 (=0.7)$ or $1 - \frac{3}{10} (= \frac{7}{10})$ or $28 \div 7 \times 3 (=12)$ for a complete process eg $28 \div (“70” \div 10) \times 10$ oe or $28 + “12”$ cao	



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
1	400	B1	cao	
2	$4e$	B1	for $4e$ oe	e^4 gets no marks, where the 4 is clearly a power
3	Reflection shown	B1	cao	
4	6000	B1	for 6000 oe	Accept six (6) thousand(s) or just thousand(s)
5	45%, $\frac{1}{2}$, 0.55	B1	Accept equivalent notation eg $\frac{45}{100}$, $\frac{50}{100}$, $\frac{55}{100}$ or 45%, 50%, 55% or 0.45, 0.5, 0.55 or a combination of notation	Do NOT accept reverse order
6	8	B1	cao	
7	7	P1 P1 A1	for $20 - 6 (= 14)$ or $20 \div 2 (=10)$ and $6 \div 2 (=3)$ for " 14 " $\div 2 (= 7)$ or " 10 " $-$ " 3 " $(= 7)$ cao	May be seen as a build-up method or by a method of repeated subtraction, listing multiples of 2



Paper: 1MA1/2F				
Question	Working	Answer	Mark	Notes
18 (a)		31.4	P1	for working with circumference formula, eg $\pi \times 80$ (=251.(...)) oe
			A1	for answer in the range 31.4 to 31.5 accept 10π
(b)		No (supported)	C1	Mean distance stays the same with reason, eg total distance remains unchanged or same number of points
19		$\frac{1}{11}$	P1	for starting the process, eg by writing down a correct ratio or using a given number of cubes for one relationship, eg 2B 1Y or B:Y = 2:1 or 4G 1B or G:B = 4:1 or 8G, 1Y or G:Y = 8:1 oe or yellow = 2, blue = 4, or states 2:1:8 oe in any order (can be algebraic)
			P1	for complete process to find possible number of each colour or equivalent ratio, eg 8G 2B 1Y or G:B:Y = 8:2:1 oe or yellow = 2, blue = 4, green = 16 oe (can be algebraic)
			A1	$\frac{1}{11}$ oe
20 (a)		(-2, 1) (-4, 1) (-2, 2) (-5, 2)	B1	Shape labelled A
(b)		(1, -4) (3, -4) (1, -5) (4, -5)	B1	Shape labelled B



Paper: 1MA1/3F				
Question	Working	Answer	Mark	Notes
14		Reflection	B1	for reflection
		in the x-axis (or $y = 0$)	B1	for x-axis (or $y = 0$) NB: award no marks if more than one transformation is given
15		(£6), 18, 24, 27	M1	demonstrates a proportional method to find at least one cost for cotton, eg. $£6 \div 2 \times 9$ (= (£)27) or a correct entry in the table.
		15, 45, 60, 67.50	M1	demonstrates a proportional method to find at least one cost for silk, eg. $£6 \div 2 \times 5$ (= (£)15) or a correct entry in the table.
			A1	for a fully correct table (accept 67.5(0))



Paper: 1MA1/2F					
Question	Answer	Mark	Mark scheme		Additional guidance
18	Correct description	B2 (B1)	reflection and y axis or reflection and $x = 0$ reflection or y axis or $x = 0$		If more than 1 transformation given award B0
19	4378.2(0)	P1 P1 P1 P1 A1	for a process to find the circumference of the circle or the semi circle, eg $\pi \times 50 (= 157.0796327)$ or $0.5 \times \pi \times 50 (= 78.53981634)$ for a complete process to find the perimeter of the field, eg $(0.5 \times \pi \times 50) + 50 (= 128.5...)$ OR for working with one cost eg "157.07..." $\times 29.86 (= 4690.11...)$ or "78.5..." $\times 29.86 (= 2345.198...)$ or $50 \times 29.86 (= 1493)$ or $3 \times 180 (= 540)$ For finding the costs of two different aspects eg 2 of "78.5..." $\times 29.86 (= 2345.1...)$ or $50 \times 29.86 (= 1493)$ or $3 \times 180 (= 540)$ for a adding at least 2 costs eg "2345.1..." + "540" $(= 2885.1...)$ or "1493" + "540" $(= 2033)$ or "128.5..." $\times 29.86 (= 3838.2...)$ for answer in the range 4377 – 4392		Figures may be truncated or rounded May use circle at this point, figures imply method One cost is 1 length or labour Figures may be truncated or rounded Two different aspects means arc and straight edge or arc and labour or straight edge and labour Condone circle and labour or circle and straight edge. Finding the cost of the perimeter is two costs added and so implies the previous P1 The circle is not allowed to be counted as one of the two costs for this mark



Paper: IMA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
18	Jan's store (supported)	P1	process to reduce £5 by 20% (= £4) or increase 400 by 30% (= 520)	May work in pence throughout Accept any correct appropriate percentage process
		P1	process to reduce £5 by 20% (= £4) and increase 400 by 30% (= 520)	
		P1	(dep P2) process to find comparable values, eg $400 \div "4"$ and $"520" \div 5$	May use £/g or any other comparable values
		C1	'Jan's store' fully supported by correct comparative values, eg 100 (g/£) and 104 (g/£)	Do not award without correct comparable values and full working.
19	Shape drawn	B2	for shape with vertices at (4, -3), (5, -4), (5, -5), (4, -5)	Shape does not have to be shaded. Allow some tolerance on vertices as long as they are nearest to the desired points.
		(B1)	for rotation of 180° about wrong centre	This is shown by the orientation of the shape.
20	9	M1	for a correct first step, using the laws of indices to simplify eg 3^2 or $3^{7+ -2}$ or 3^{7-3} or 3^{-2-3} OR for using exact values, eg $2187 \times \frac{1}{9}$ (= 243) or $2187 \div 27$ (= 81) or $\frac{1}{27 \times 9}$ (= $\frac{1}{243}$)	
		A1	cao	
21 (a)	6 or -6	M1	for $12^2 + 2 \times -3 \times 18$ (= 36)	Terms may be partially evaluated.
		A1	for 6 or -6, accept ± 6	Only one value is required for full marks
(b)	$s = \frac{v^2 - u^2}{2a}$	M1	for subtracting u^2 from both sides or dividing all terms by $2a$ as the first step	Must see this step carried out, not just the intention shown
		A1	$s = \frac{v^2 - u^2}{2a}$ oe	

Paper: IMA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
15	2.5	M1	for $(R = \frac{100I}{PT})$ or $600 \times 5 (= 3000)$ or $75 \times 100 (= 7500)$ or $75 \div 5 (= 15)$ or $75 \div 600 (= 0.125)$	Calculations may be done in stages. May work in decimals or in percentages
		M1	for $\frac{75 \times 100}{600 \times 5}$ or	
		A1	OR $\frac{15}{600} (= 0.025)$ or $"0.125" \div 5 (= 0.025)$ or 1.025 cao	
16	Reflection in x-axis	B1	for reflection	Award no marks if more than one transformation is given
		B1	for x-axis or $y = 0$	
17	2 bags of stone	P2	for a complete process to work out how many bags of each material is required eg $180 \div 25 (= 7.2 \text{ or } 8)$, $375 \div 22.5 (= 16.6.. \text{ or } 17)$, $1080 \div 50 (= 21.6 \text{ or } 22)$ or a complete process to work out the total weight of each element that he has eg $25 \times 10 (= 250)$, $20 \times 22.5 (= 450)$, $50 \times 20 (= 1000)$	The correct figures do not need to be seen to award the process marks
		(P1	for a correct start to the process, eg for at least one correct calculation	
		C1	correct conclusion eg 2 bags of stone, with no incorrect working	

Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
16	blue 0.15 green 0.2	P1	for $1 - 0.4 - 0.25$ ($=0.35$) oe	May work in percentages, condone missing % sign If the two numbers in the table sum to 0.35 that implies P1 One correct value in the table implies P2 7 can come from 3+4 Accept answers given in decimals, fractions or percentages.
		P1	for using the ratio, eg " $0.35 \div (3 + 4)$ " ($=0.05$) or " $0.35 \times \frac{3}{7}$ " ($=0.15$) or " $0.35 \times \frac{4}{7}$ " ($=0.2$)	
		P1	for a complete process $3 \times "0.05"$ ($=0.15$) and $4 \times "0.05"$ ($=0.2$) or " $0.35 - "0.15"$ " ($=0.2$) or " $0.35 - "0.2"$ " ($=0.15$) or green 0.15, blue 0.2	
		A1	oe	
17	(a) -10, -6, 2, 6 (b) Graph drawn	B2	for 4 values correct -10, -6, (-2), 2, 6, (10)	
		(B1	for 2 or 3 values correct)	
		M1	(ft from (a) if B1 awarded) for at least 5 points correctly plotted.	
		A1	correct graph drawn from $x = -1$ to 4	
18	Correct reflection	B2	correct triangle drawn with vertices (1, 2) (2, 2) (1, -1)	
		(B1	for a correct reflection in the line $y = a$ or a correct reflection in the line $x = 3$, or triangle in correct orientation with 2 of 3 vertices correct)	

Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
9 (a)	$\frac{3}{7}$	B1	oe	
(b)	1 : 2.5	M1	for appropriate method shown eg $30 \div 12 (= 2.5)$ or for a method that involves simplification of 12 : 30 approaching 1 : n , eg. 4 : 10 or 6 : 15 or 2 : 5 or for 2.5 : 1 or $2\frac{1}{2}$: 1	
		A1	for 1 : 2.5 or 1 : $2\frac{1}{2}$ or for $n = 2.5$	Accept a fraction equivalent to $2\frac{1}{2}$, eg. 1 : $\frac{30}{12}$ 2.5 alone gets M1A0
10	660	P1	for a process to work out the number of large marbles eg $12 \div 4 (=3)$ or the number of small marbles eg $12 - [\text{number of large marbles}]$ or $12 \times (1 - \frac{1}{4}) (=9)$	[number of large marbles] could come from an incorrect method for finding $\frac{1}{4}$ of 12
		P1	(dep) for a process to work out the weight of large marbles eg $"3" \times 70 (=210)$ or to work out the weight of small marbles eg $"9" \times 50 (=450)$	
		P1	for a complete process eg $(12 \div 4) \times 70 + 12 \times (1 - \frac{1}{4}) \times 50$ oe	
		A1	cao	
11	Reflection	M1	for a correct reflection of the shape in any line or a correct reflection of at least 3 vertices	Allow hand-drawn
		A1	cao	

Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	5	P1	for finding the number of oranges required eg $8 \div 2 \times 30 (=120)$ oe or for finding the number of oranges left from use of at least 2 boxes eg $24 \times 2 - 30 (=18)$ or $24 \times 4 - 90 (=6)$ or finds the correct amount of juice possible from at least two boxes eg $24 + 24$ is 2 litres or $24 + 24 + 24$ is 4 litres	A build up method with no process shown must use fully correct figures
		P1	for a complete process eg " $120 \div 24 (=5)$ oe or $30 + 30 + 30 + 30 (=120)$ and $24 + 24 + 24 + 24 (=120)$ or $24 \times 2 - 30 = 18$, $18 + 24 = 42$, $42 - 30 = 12$, $12 + 24 = 36$, $36 - 30 = 6$, $6 + 24 = 30$	
		A1	cao with no arithmetic errors seen	
	9 : 2		SCB1 for an answer of 10 supported by working	This mark cannot be awarded if the supporting work has an arithmetic error An answer only and no working is no marks
		M1	for a partially simplified correct ratio eg $126 : 28$ or any other equivalent ratio or $2 : 9$	
		A1	cao	
18	Rotation 180° about $(-1, 0)$	C2	rotation 180° about $(-1, 0)$ or enlargement sf -1 centre $(-1, 0)$	Award no marks if more than one transformation is given
		(C1	rotation 180° or rotation about $(-1, 0)$ OR enlargement sf -1 or enlargement centre $(-1, 0)$)	



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
8	7	P1 P1 A1	for $6 + 4 + 5 + 8 + 7 + 5 (= 35)$ for " $35 \div 5$ " cao	Working may be seen on the diagram Allow one error in the 6 readings; intention to add must be clear.
9	Explanation	C1	for explanation, Acceptable examples Answer should be 14 Should work out 3×4 first Alec should times first instead of adding Not used BIDMAS/BODMAS BIDMAS/BODMAS He has done it in the wrong order Alec needs to use brackets so $2 + (3 \times 4)$ Because you always do multiplication or division first Not acceptable examples Because the answer is wrong It is $2 + (3 \times 4) = 15$ It needs brackets Because working out should only be one sum	
10	$\frac{17}{30}$	B1	for $\frac{17}{30}$ or any equivalent fraction	
11	Reflection	M1 A1	for a correct reflection of the shape in any horizontal line other than the given mirror line for a fully correct reflection	Allow free hand drawing



Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	
16	Enlargement centre (1,1) scale factor 4	B2 (B1)	Enlargement, centre (1,1) and scale factor 4 two of Enlargement, centre (1,1), scale factor 4 with nothing incorrect)	
17	(a) $y^2 + 5y$ (b) $2(2a - 3)$ (c) 2.9	B1 B1 M1 M1 A1	cao cao for a correct first stage eg. expanding the brackets, $2 \times 5x - 2 \times 4 (= 10x - 8)$ or division of both sides by 2, eg $\frac{2(5x - 4)}{2} = \frac{21}{2}$ for isolating terms in x eg $10x = 21 + 8$ oe	
(d)	$20e^3f^4$	M1 A1	for any two of $4 \times 5 (=20)$, $e^{2+1} (=e^3)$, $f^{1+3} (=f^4)$ in a product or written as individual terms cao	
18	10 000	B1	cao	
19	34 cm ²	P1	for finding one area eg $8 \times 8 (= 64)$ or $0.5 \times 3 \times 5 (=7.5)$	for first stage in working with Pythagoras eg sight of $3^2 + 5^2$ or $9 + 25$
		P1	for a complete process to find the area eg "64" – $4 \times "7.5" (=34)$	for full use of Pythagoras eg $\sqrt{3^2 + 5^2}$ or $\sqrt{34}$ or 5.83...
		A1	for an answer in the range 33.6 to 34	
		B1	(indep) for cm ²	
			Can be awarded with incorrect units stated Can be awarded with an incorrect or absent numerical answer	

Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
20 (a)	0.87, 0.94, 0.94	B2	for all probabilities correct	Accept any equivalent fraction, eg $\frac{87}{100}, \frac{47}{50}$ or equivalent percentage form 87%, 94%
		(B1	for 0.87 or 0.94 correctly placed)	
		M1	for 0.13×0.06 oe	
		A1	0.0078 oe	
21 (a)	x^{15}	B1	cao	Accept any equivalent fraction, eg $\frac{39}{5000}$ or equivalent percentage form 0.78% or 7.8×10^{-3}
		(b)		
		40 – 10x	M1	
			for method to expand one bracket or collect like terms, eg $4 \times x + 4 \times 3 (= 4x + 12)$ or $7 \times 4 - 7 \times 2x (= 28 - 14x)$ or $4 \times x - 7 \times 2x (= 4x - 14x)$ and $4 \times 3 + 7 \times 4 (= 12 + 28)$	
		A1	oe	
		(c)		
22	translation $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	M1	for $3(5x^3 + x^2y)$ or $x(15x^2 + 3xy)$ or $3x(5x^2 + xy)$ or $x^2(15x + 3y)$ or $3x^2(ax + by)$	Where $a \geq 1$ and $b \geq 1$
		A1	cao	
		B1	for translation	
		B1	for vector $\begin{pmatrix} -5 \\ 6 \end{pmatrix}$	
				Award no marks if more than one transformation is given
				Do not accept as a coordinate $(-5, 6)$

Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
16	Comments	C1	makes some comment about the labels Acceptable examples states what labels should be (not angles) labels are missing The label in the table does not match the label with the pie chart Not acceptable examples angles not marked on the pie chart	
		C1	comments about the inaccuracy of the angles in the pie chart Acceptable examples pie chart is not accurate / should be 108, 126, 126 angles drawn inaccurately They haven't converted the number of potatoes to angles Need to scale the numbers in the table Not acceptable examples pie chart is wrong/ sectors are the wrong size (the angles) do not add up to 360	
17	(a)	B1	cao	
	(b)	M1	for 33.81 or 2.5 or $\frac{3381}{250}$ or digits 13524	
		A1	cao	
18	Rotation drawn	B2	correct shape drawn at (2,-1), (2,-4), (4,-2), (4,-1)	
		(B1	for a correct shape drawn clockwise 90° about (0,0) or a shape drawn in the correct quadrant with the correct orientation or a shape with at least 3 vertices correct	



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
12 (a)	Line drawn	B1	for correct line shown on diagram, provided unambiguous	
12 (b)	Explanation	C1	for explanation, eg he has reflected in the y-axis (not the x-axis) Acceptable examples Alex didn't reflect in/on the x-axis She/he drew it on the y-axis or he didn't draw it on the x-axis It should be in the bottom right box Used a mirror on the y-axis (not x-axis) It needs to be reflected down not across Vertical (reflection) instead of horizontal (reflection) Drawn in the correct position on grid and statement "it should be here" Not acceptable examples the reflection is facing the wrong way It's in the wrong box or it should be on the bottom She/he has flipped it wrong It needs to go down not across She/he (should have) used a mirror There is no label or label in the wrong place Alex reflected the shape	
13	800	M1 A1	for method to work with fraction and 50, eg 16×50 or $50 \div \frac{1}{16}$ or $16 \times 50 + 50$ or $16 \times 50 - 50$ or cao	$\frac{1}{16} = 0.0625$ 750 or 850 without working scores no marks



Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
15	175	M1	for a complete method eg $35 \times (4 + 1)$ oe	
		A1	cao	
16	Rotation of 90° , centre (0,0)	B2	Rotation of 90 about (0,0) or Rotation of 270, clockwise about centre (0,0)	Accept “origin” or “O” for (0,0)
		(B1	Rotation and 90 or Rotation and 270, clockwise or Rotation about (0,0))	
17	Drawing	B1	for drawing point <i>R</i> from <i>T</i> at a distance of 5.5 cm.	Unless ambiguous point <i>R</i> can be indicated by a cross, dot, or interpreted as the end of a line drawn from <i>T</i> .
		B1	for drawing point <i>R</i> from <i>T</i> on a bearing of 65°	
18	4	M1	for a correct first step eg shows $4 \times 2x - 4 \times 3$ or $8x - 12$ or $2x - 3 = \frac{20}{4}$	
		M1	for isolating terms in <i>x</i> eg $2x = 5 + 3$	
		A1	cao	



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
10	Yes and 750	P1	for beginning to work with proportion eg $60 \div 20 (= 3)$ or $900 - 250 (= 650)$ or $250 \div 20 (= 12.5 \text{ oe})$ or $900 \div 60 (= 15)$	Sugar = 600 (g) or Small eggs = 6 (eggs) implies P1 Sight of 750 gains P2
		P1	for a complete process to see if there is enough peanut butter eg $"3" \times 250 (= 750)$ or $900 \div "3" (= 300)$ or $"650" - 250 - 250 (= 150)$ oe or $"12.5" \times 60 (= 750)$ or for a complete process to work out how many cookies he can make eg $900 \div "12.5" (= 72)$ or for process to work out how much peanut butter is needed for one cookie and how much peanut butter he can use per cookie eg $250 \div 20 (= 12.5 \text{ oe})$ and $900 \div 60 (= 15)$	
		C1	Yes and accurate figure to compare eg 750 (g needed) or 150 (g over) or 300 (g per batch available) or 72 (cookies can be made) or 12.5 (g peanut butter per cookie needed) and 15 (g peanut butter per cookie available)	
11	Diagram	M1	for a correct base length (6 cm) drawn or correct height (9 cm) drawn or a fully correct enlargement of a scale factor not equal to 3	
		A1	fully correct enlargement	



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
20 (a)	4 0 -2 -2 0 4	B2	for all 4 correct values	Accept a freehand curve drawn that is not made of line segments.
		(B1)	for 2 or 3 correct values)	
(b)	Graph	M1	fit (dep B1) for plotting at least 4 points correctly	
		A1	for a fully correct curve drawn	
21	Reflection $y = -x$	B1	for reflection	Score B0 for more than one transformation
		B1	for line $y = -x$ oe	
22 (a)	$13y - 1$	M1	for method to expand one bracket or collect like terms eg $3 \times 2y - 3 \times 5 (= 6y - 15)$ or $7 \times y + 7 \times 2 (= 7y + 14)$ or $3 \times 2y + 7 \times y (= 6y + 7y)$ or $3 \times -5 + 7 \times 2 (= -15 + 14)$	May be implied by $13y$ or -1
(b)	$3x(2x + 5)$	A1	oe	
		B2	oe	May be seen in different equivalent form
		(B1)	for $3(2x^2 + 5x)$ or $x(6x + 15)$ or $3x(ax + b)$	
(c)	$g = \frac{f-11}{3}$	M1	for correct first step to rearrange eg $f-11 = 3g + 11 - 11$ or $f-11 = 3g$ or eg $\frac{f}{3} = \frac{3g}{3} + \frac{11}{3}$ or $-3g = 11 - f$ or answer ambiguously shown, eg $g = f-11 \div 3$ or given as $\frac{f-11}{3}$	
		A1	oe	

Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
17	3.5	M1	for correct expansion of brackets, ie $8x - 10$ or dividing throughout by 2 as a first step to solve equation, eg $4x - 5 = 9$	For M marks step must be carried out not just intention shown. For example, if you see $\begin{array}{r} 2(4x - 5) = 18 \\ \div 2 \qquad \qquad \div 2 \end{array}$ Award M1 for: $4x - 5 = k$ with $k \neq 18, 36$
		M1	for isolating terms in x , eg $8x = 18 + 10$ or $4x = 9 + 5$	ft their equation of the form $ax \pm b = c$ For example, if you see $\begin{array}{r} 8x - 10 = 18 \\ +10 \qquad \qquad +10 \end{array}$ Award M1 for: $8x = k$ with $k \neq 8, 18$
		A1	for 3.5 or $3\frac{1}{2}$ oe or $\frac{7}{2}$ oe	
18	1	B1	cao	
19	Translation $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$	B1	for translation	
		B1	for $\begin{pmatrix} 5 \\ -4 \end{pmatrix}$ NB: award no marks if more than one transformation is given	Do not accept 5 across, 4 down or 5 right, 4 down. Condone omission of brackets around vector. Do not accept vector given as coordinate.
20	$4n - 3$	B2	for $4n - 3$ oe	Accept a different variable eg $4x - 3$ Accept $u_n = 4n - 3$, $T = 4n - 3$ etc
		(B1	for $4n + k$ where $k \neq -3$ or is absent unambiguously shown)	$n = 4n - 3$ or $4n^{\text{th}} - 3$ gets B1 only



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
17 (a)	265.05	M1	for $285 \times (7 \div 100) (= 19.95)$ oe or $(100 - 7) \div 100 (= 0.93)$	Accept £265.05p
		M1	for $285 - "19.95"$ or $285 \times "0.93"$ oe	
		A1	cao	
	8000	P1	for start of process, eg $2100 - 1700 (= 400)$	
		P1	for using $"400" = 5\%$, eg $(1\% =) "400" \div 5 (= 80)$ or $(10\% =) "400" \times 2 (= 800)$ or $(50\% =) "400" \times 10 (= 4000)$ or $"400" \div 5 \times 100$	
		A1	cao	
18	enlargement, scale factor 2, centre (0, 0)	B2	enlargement, scale factor 2, centre (0, 0)	Award no marks if more than one transformation is given
		(B1)	for 2 correct aspects)	
19 (a)	$5w(3w - 1)$	B2	for $5w(3w - 1)$	
		(B1)	for $5(3w^2 - w)$ or $w(15w - 5)$ or $5w(aw - b)$ where a and b are integers or $(3w - 1)$ as a factor)	
		M1	for drawing a line from -2 to 4 or for an open circle at -2 or for a closed circle at 4	
		A1	cao	



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
26	$c = -6$ $d = -1$	M1	for reflection in x-axis shown on diagram	Vertices (3, -2), (5, -2), (3, -5)
		A1	for $c = -6$ or $d = -1$	One correct value is M1A1 regardless of second value or diagram
		A1	for both $c = -6$ and $d = -1$	
			SCB2 for $c = -1$ and $d = -6$	
27	96	P1	for process to find the ratio of the number of pens of each colour sold, eg $2 \times 7 : 5 \times 3 : 6 \times 4$ (= 14 : 15 : 24)	Does not have to be seen as a ratio but all three needed
		P1	for process to find the proportion of green pens sold, eg $\frac{212}{"14"+"15"+"24"}$ or $\frac{"24"}{"14"+"15"+"24"}$	
		P1	for a complete process to find the number of green pens sold, eg $\frac{212}{"14"+"15"+"24"} \times "24"$ or $\frac{"24"}{"14"+"15"+"24"} \times 212$	P3 can be implied by the values 56, 60 and 96
		A1	cao	



Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
18 (a)	Rotation drawn	B2	correct shape drawn at $(-4, -2)$, $(-2, -2)$, $(-1, -4)$, $(-5, -4)$	
		(B1	for rotation of the shape by 180° about any centre or for any 3 out of 4 vertices correct)	
(b)	Explanation	C1	for explanation of why answer is wrong Acceptable examples he has reflected (in the line) $y = 3$ / he has used $y = 3$ he reflected shape A with equation $y = 3$ $x = 3$ is supposed to be vertical $x = 3$ means the line of reflection should go through 3 on the x -axis it should be on the right of A , not beneath it correct reflection in line $x = 3$ shown on diagram with supporting comment eg it should be here Not acceptable examples he has not reflected the shape (in the line $x = 3$) he has reflected in the wrong line / the reflection line isn't on $x = 3$ because the shape is the wrong way he drew it wrong he has used the y -axis instead of the x -axis	



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
9	(a)	bar at 11 for cricket	M1 for reading from graph of 12 or 17	Where [12] and [17] are their attempt at reading from the graph. May be implied by bar of height $40 - ([12] + [17])$ Condone bar of different width to those given or freehand bar. Shading not required. Bar of height 11 drawn implies M1M1C1 Accept other equivalent fractions. Do not accept equivalent decimals or percentages
			M1 (dep) for $40 - ([12] + [17]) (=11)$	
			C1 for bar drawn at 11 for cricket	
	(b)	$\frac{3}{10}$	M1 for $\frac{12}{40}$ or $\frac{6}{20}$	
			A1 cao	
	(c)	$\frac{5}{9}$	B1 for $\frac{5}{9}$ or equivalent fraction	Accept $n = 1.25$ Do not accept 1.25 alone or $n : 1.25$
	(d)	1.25 : 1	B1 for $1.25 : 1$ or $\frac{5}{4} : 1$ or $1\frac{1}{4} : 1$	
10	(a)	reflection	B2 (B1 for a fully correct reflection for a correct reflection in any single mirror line or for at least two correct reflected lines)	
	(b)	$y = 1$	B1 $y = 1$ oe	



Paper 1MA1: 2F				
Question	Working	Answer	Mark	Notes
11 (a)		29	B1	answer in the range 29 to 30
			M1	for changing 6ft 3 inches to inches e.g. $6 \times 12 + 3 (= 75)$ or changing 1ft to 30 cm
			M1	for a method to convert to cm, e.g. $25 \rightarrow 63$ then $\times 3$, $6 \times 30 + \frac{1}{4} \times 30$
			A1	for answer in the range 186 to 195 or ft from correct use of graph
12		0.0733(03...)	M1 A1	for correct numerator (3.4496.....) or correct denominator (47.0596) or 0.073 for 0.0733(03.....)
13 (a)		Rotation	B2	for a fully correct rotation at $(-4,-1)$, $(-3,-1)$, $(-4,-4)$, $(-1,-2)$
			[B1	for the quadrilateral in correct orientation and size or rotated 90° anticlockwise about the origin]
			B1	for reflection
			B1	for y-axis (or $x=0$)
(b)		Reflection in the y-axis		[A combination of transformations scores 0 marks]



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
10 (a)	5	P1	for correct process, eg $23 \div 4 (= 5.75)$ or adds 4s up to at least 20 or repeatedly subtracts 4 up to a remainder of less than 4	
		A1	cao	
(b)	No (supported)	C1	for No with reason Acceptable examples Can buy 11 jars Can buy an extra jar (for the £3 extra) Can buy 10 jars for £20 He will have £3 left Because he can buy more than twice the number of jars Because $23 \div 2 = 11.5$ Not acceptable examples Yes Can buy 10 / Can buy 12	
11 (a)(i)	2	B1	for 2	Accept $2 \times$ or $\times 2$ oe
(ii)	cross placed	B1	for cross correctly placed or indicated by intersection of construction lines	
(b)(i)	line drawn	B1	for line $y = x$ drawn	Accept line of any length, dotted or dashed and/or drawn freehand
(ii)	$y = x$	B1	for $y = x$ oe, eg, $x = y$ or $y - x = 0$ or $x - y = 0$ or ft their line drawn in (b)(i)	Accept labelled on the diagram



Paper: 1MA1/1F																				
Question	Answer	Mark	Mark scheme	Additional guidance																
25	Line drawn	B3 (B2) (B1)	for a correct line between $x = -3$ and $x = 3$ for a correct straight-line segment through at least 3 of $(-3, 13)$, $(-2, 9)$, $(-1, 5)$, $(0, 1)$, $(1, -3)$, $(2, -7)$, $(3, -11)$ or for all of these points plotted but not joined or for a line drawn with a negative gradient through $(0, 1)$ and clear intention to use a gradient of -4 , eg line through $(0,1)$ and $(0.5, -1)$ for at least 2 correct points stated or plotted or for a line drawn with a negative gradient through $(0, 1)$ or a line with gradient -4	Ignore any incorrect points Table of values <table><tr><td>x</td><td>-3</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>13</td><td>9</td><td>5</td><td>1</td><td>-3</td><td>-7</td><td>-11</td></tr></table> Ignore any incorrect points coordinates may be in a table or in working	x	-3	-2	-1	0	1	2	3	y	13	9	5	1	-3	-7	-11
x	-3	-2	-1	0	1	2	3													
y	13	9	5	1	-3	-7	-11													
26	$\begin{pmatrix} 9 \\ 11 \end{pmatrix}$	M1 A1	for $\begin{pmatrix} 2 \times 5 \\ 2 \times 2 \end{pmatrix} [= \begin{pmatrix} 10 \\ 4 \end{pmatrix}]$ or $2 \times 5 - 1 (= 9)$ or $2 \times 2 + 7 (= 11)$ cao																	



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
27	(a) 5.62×10^{-3}	B1	cao	
	(b) 1452	B1	cao	
28	(a) 24, 39	B1	cao	SC: B1 for 3, 5, 8 seen if M0 scored
	(b) $8a$	M1 A1	for a complete method to find the next 2 terms, eg. $a + 2a (= 3a)$ and $2a + "3a" (= 5a)$ $8a$ oe	
29	$\begin{pmatrix} -2 \\ 1 \end{pmatrix}$	M1 A1	for $4 - 2 \times 3 (= -2)$ or $5 - 2 \times 2 (= 1)$ seen as a calculation OR for $\begin{pmatrix} 4 \\ 5 \end{pmatrix} - \begin{pmatrix} 2 \times 3 \\ 2 \times 2 \end{pmatrix}$ OR for $\begin{pmatrix} -2 \\ b \end{pmatrix}$ where $b \neq 1$ or $\begin{pmatrix} a \\ 1 \end{pmatrix}$ where $a \neq -2$ cao	May be in a column vector

Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
24 (a)	13, (6), 5, 4, -3	B2	for all 4 values correct	Accept a freehand curve drawn that is not made of line segments Line sections outside the required range can be ignored.
		(B1	for 2 or 3 correct values)	
		M1	ft (dep on B1) for plotting at least 4 of the points from their table correctly	
(b)	Correct graph	A1	for a fully correct curve drawn	
25	99.5	M1	for $\sin(34) = \frac{x}{178}$ oe or alternative method to find x	If an answer in the range 99.5 to 99.7 is given in the working space then incorrectly rounded, award full marks
		A1	for answer in range 99.5 to 99.7	
26	$\begin{pmatrix} -9 \\ 14 \end{pmatrix}$	M1	for $2\begin{pmatrix} 3 \\ 4 \end{pmatrix} - 3\begin{pmatrix} 5 \\ -2 \end{pmatrix}$ or $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$ and $\begin{pmatrix} 15 \\ -6 \end{pmatrix}$ or $\begin{pmatrix} -9 \\ y \end{pmatrix}$ or $\begin{pmatrix} x \\ 14 \end{pmatrix}$	May be seen in two separate calculations eg $2 \times 3 + -3 \times 5$ and $2 \times 4 + -3 \times -2$ Condone incorrect notation if method is clear for this mark only
		A1	cao	



Paper: 1MA1/1F				
Question	Answer	Mark	Mark scheme	Additional guidance
25	$y = -\frac{3}{4}x + 3$	M1	for a correct method to find the gradient of the line, eg $\frac{3-0}{0-4} (= -\frac{3}{4})$ or identifies 3 as the intercept in words or in a partial equation or for $y = [-\frac{3}{4}]x + c$ or for $y - b = [-\frac{3}{4}](x - a)$ where (a, b) is a correct coordinate	Just circling 3 is insufficient $[-\frac{3}{4}]$ must be identifiable as their gradient c must be seen either as a letter or a number
		M1	for $y = -\frac{3}{4}x (+c)$ oe or for $y = "-\frac{3}{4}"x + 3, m \neq 0$ or $(L =) -\frac{3}{4}x + 3$ or $y - y_1 = -\frac{3}{4}(x - x_1)$ or $y - b = "-\frac{3}{4}"(x - a)$ where (a, b) is a correct coordinate or for an answer of $y = \frac{3}{4}x + 3$ oe	
		A1	for $y = -\frac{3}{4}x + 3$ oe provided the equation in the required form	Allow eg $y = 3 - \frac{3}{4}x$ A correct equation not in the required form scores M1M1A0
26	$\binom{20}{5}$	M1	for $2 \binom{7}{4} + 3 \binom{2}{-1}$ or $\binom{14}{8}$ and $\binom{6}{-3}$ or $\binom{20}{y}$ or $\binom{x}{5}$	For M1 condone without bracket and/or with fraction line.
		A1	for $\binom{20}{5}$ or $5\binom{4}{1}$	Correct answer spoilt scores M1A0



Paper: 1MA1/1F				
Question	Working	Answer	Mark	Notes
25		70.5	P1 P1 P1 P1 A1	starts process of Pythagoras e.g. $5^2 + 12^2$ complete process for Pythagoras e.g. $\sqrt{5^2 + 12^2}$ or $\sqrt{25 + 144}$ or $\sqrt{169}$ (=13) (dep P1 for Pythagoras) process of adding all the lengths e.g. $5 + 5 + 12 + 12 + "13"$ (=47) (indep) process of multiplying at least 2 lengths by 1.5 cao SC: any evidence of working with Pythagoras award the P1 or P2
26		comparison	M1 A1	starts to manipulate expression e.g. $3y = 9x - 6$ or $3y = 9x - 5$ gives equation(s) which can be used to show that the gradients of the two lines are the same e.g. $y = 3x - 5/3$
27	(a)	2b	B1	oe
	(b)	b – a	B1	oe
	(c)	– a – b	B1	ft oe



Paper: 1MA1/2F				
Question	Answer	Mark	Mark scheme	Additional guidance
30	Vector drawn	M1	for $5 - 2 \times 3 (= -1)$ or $2 - 2 \times -1 (= 4)$ seen as a calculation OR for $\begin{pmatrix} 5 \\ 2 \end{pmatrix} - \begin{pmatrix} 2 \times 3 \\ 2 \times -1 \end{pmatrix}$ OR for $\begin{pmatrix} -1 \\ b \end{pmatrix}$ or $\begin{pmatrix} a \\ 4 \end{pmatrix}$ OR for $\begin{pmatrix} 5 \\ 2 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ 1 \end{pmatrix}$ or $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$ drawn	May be in a column vector
		M1	for $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$ OR for $\begin{pmatrix} -1 \\ 4 \end{pmatrix}$ drawn with no arrow or incorrect arrow	Condone missing arrows
			OR for $\begin{pmatrix} -1 \\ b \end{pmatrix}$ or $\begin{pmatrix} a \\ 4 \end{pmatrix}$ drawn with arrow, where $b \neq 4$ and $a \neq -1$	
		A1	cao	For this mark the drawn vector must include an arrow showing direction.

Paper: 1MA1/3F				
Question	Answer	Mark	Mark scheme	Additional guidance
29 (a)	0.000675	B1	cao	If the answer (for 2 marks) is seen in working and then rounded or truncated, award full marks.
(b)	6.592×10^5	M1	for 10.5472×10^3 oe or 1.6×10^8 oe or 2.575×10^{-1} oe or for 6.592×10^n where $n \neq 5$ or for 6.59×10^5 or for 6.6×10^5 or for 659200 oe	
		A1	cao	
30 (a)(i)	$\begin{pmatrix} 1 \\ 5 \end{pmatrix}$	B1	for $\begin{pmatrix} 1 \\ 5 \end{pmatrix}$	Need not be shown in brackets at this stage
(ii)	$\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	M1	for substitution of values eg $\begin{pmatrix} 2 \times 2 - 4 \\ 3 \times 2 - 1 \end{pmatrix}$ oe OR for $\begin{pmatrix} 0 \\ b \end{pmatrix}$ or $\begin{pmatrix} a \\ 5 \end{pmatrix}$ where a, b are integer values.	
		A1	for $\begin{pmatrix} 0 \\ 5 \end{pmatrix}$	
(b)	correct vector drawn	C1	for a correct vector drawn from point P	Need not be labelled but do not award if there is any ambiguity.

