Cambridge Assessment International Education

Non-Calculator Practice Questions - Extended

Cambridge IGCSE™ / IGCSE (9–1)

Mathematics 0580 / 0980

For examination from 2025



Cambridge Pathway

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Introduction

These practice questions have been compiled by Cambridge International ahead of the first examination of the revised Cambridge IGCSE Mathematics 0580/0980 syllabus in 2025. These practice questions have been selected from past papers for Cambridge IGCSE Mathematics 0580 and are intended to provide further practice resources for the non-calculator components.

The revised syllabus and specimen papers are available at https://www.cambridgeinternational.org/programmes-and-qualifications/cambridge-igcse-mathematics-0580/

Further support materials, including a second set of Specimen Papers, a set of Practice Papers and Specimen Paper Answers are available from the School Support Hub at http://www.cambridgeinternational.org/support

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Mark Scheme Abbreviations

Types of mark

M	Method mark, awarded for a valid method applied to the problem.
A	Accuracy mark, given for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.
B	Mark for a correct result or statement independent of Method marks.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
SC	special case
soi	seen or implied

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Number

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1 A train journey starts at 23 40 and finishes at 06 50.

Work out the time taken for this journey.

..... h ..... min [1]

[Total: 1]

2 Violet and Wilfred recorded their times to run 200 m, correct to the nearest second.
Violet took 36 seconds and Wilfred took 39 seconds.

Work out the upper bound of the difference between their times.

..... s [2]

[Total: 2]

3 Write 180 as a product of its prime factors.

..... [2]

[Total: 2]

4 Write down a prime number between 30 and 40.

..... [1]

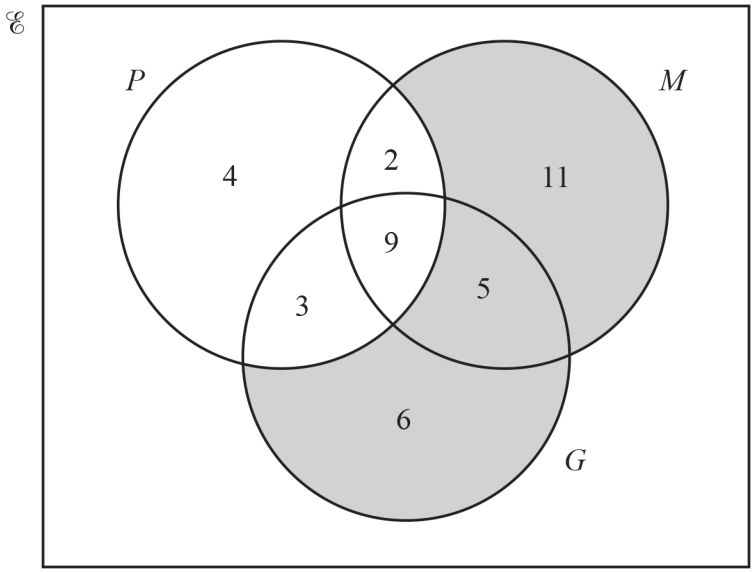
[Total: 1]

5 Find the highest common factor (HCF) of $12a^3b$ and $20a^2b^2$.

..... [2]

[Total: 2]

6 The Venn diagram shows the number of students in a class of 40 who study physics (P), mathematics (M) and geography (G).



(a) Use set notation to describe the shaded region.

..... [1]

(b) Find $\mathrm{n}((P \cap G) \cup M')$.

..... [1]

(c) A student is chosen at random from those studying geography.

Find the probability that this student also studies physics or mathematics but not both.

..... [2]

[Total: 4]

7 **Without using a calculator**, work out $\frac{2}{9} \div \frac{5}{6}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

[Total: 2]

8 Figs cost 43 cents each.
Lyra has $5 to buy some figs.

Calculate the largest number of figs Lyra can buy and the amount of change, in cents, she receives.

..... figs and ..... cents change [3]

[Total: 3]

9 Neha has a piece of ribbon of length 23 cm, correct to the nearest cm.
From this ribbon she cuts off a piece with length 87 mm, correct to the nearest mm.

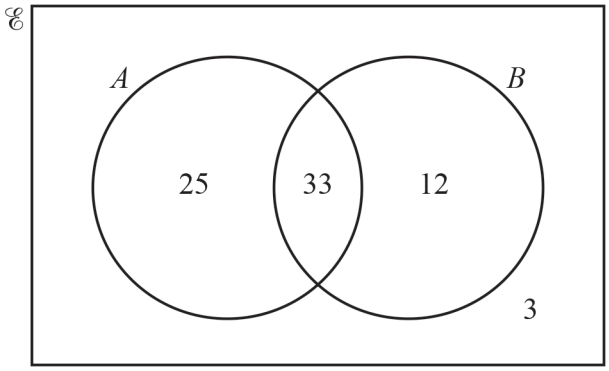
Work out the lower bound and the upper bound for the length of the remaining ribbon.
Give your answer in centimetres.

Lower bound = ... cm

Upper bound = ... cm [3]

[Total: 3]

10

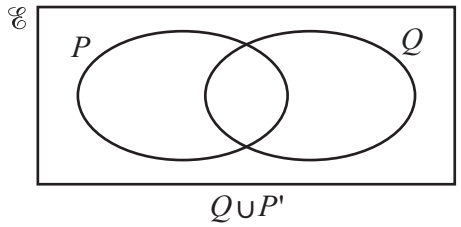


Find $\mathrm{n}(A \cap B)'$.

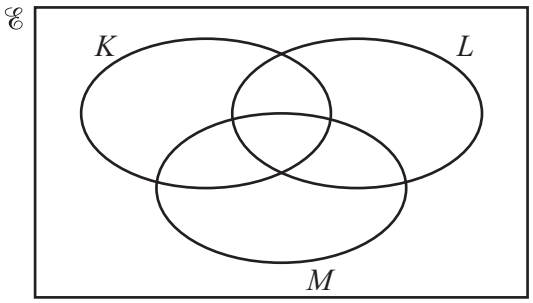
..... [1]

[Total: 1]

11 Shade the correct region in each Venn diagram.



$Q \cup P'$



$(K \cup L) \cap M'$

[2]

[Total: 2]

12 Alex, Bobbie and Chris share strawberries in the ratio Alex : Bobbie : Chris = 3 : 2 : 2.
Chris receives 12 strawberries.

Calculate the total number of strawberries shared.

..... [2]

[Total: 2]

13 Write $0.\dot{2}\dot{7}$ as a fraction.

..... [1]

[Total: 1]

14 Find the lowest common multiple (LCM) of 30 and 75.

..... [2]

[Total: 2]

15 A company makes 40 600 headphones in one year.

Write this number

(a) in words,

..... [1]

(b) in standard form.

..... [1]

[Total: 2]

16 Write $0.\dot{0}\dot{4}$ as a fraction in its simplest form.

..... [1]

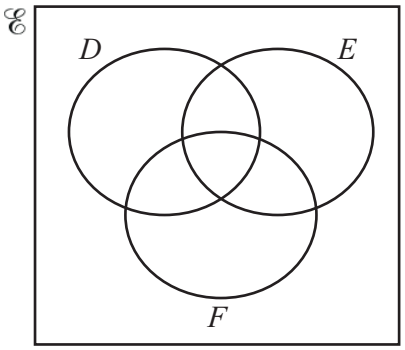
[Total: 1]

17 Simplify $2.1 \times 10^{p} + 2.1 \times 10^{p-1}$.
Give your answer in standard form.

..... [2]

[Total: 2]

18 Shade the region $D' \cup (E \cap F)'$.



[1]

[Total: 1]

19 Find the highest common factor (HCF) of 36 and 84.

..... [2]

[Total: 2]

20 Write $0.\dot{3}\dot{7}$ as a fraction.

..... [1]

[Total: 1]

21 At noon the temperature in Maseru was 21 °C.
At midnight the temperature had fallen by 26 °C.

Work out the temperature at midnight.

..... °C [1]

[Total: 1]

22 Ella's height is 175 cm, correct to the nearest 5 cm.

Write down the upper bound of Ella's height.

..... cm [1]

[Total: 1]

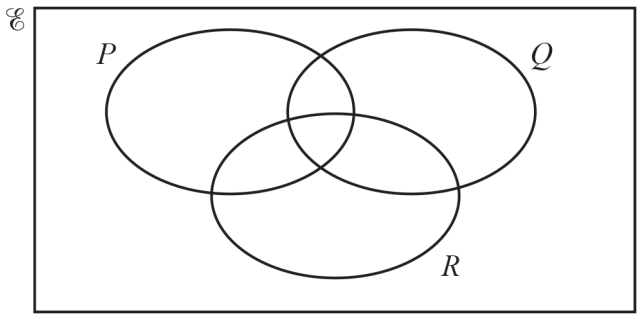
23 A train journey takes 5 hours 54 minutes.
The journey starts at 09 15.

Find the time that the journey ends.

..... [1]

[Total: 1]

24 Shade the region $P \cup (Q \cap R)'$.



[1]

[Total: 1]

25 Divide \$24 in the ratio 7 : 5.

\$ ..... , \$ ..... [2]

[Total: 2]

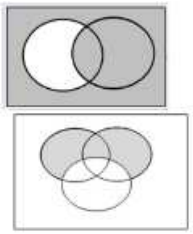
Mark Scheme

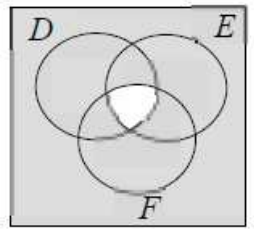
Question	Answer	Marks	AO Element	Notes	Guidance
1	7 h 10 min	**1**			
2	4 nfww	**2**		**M1** for 39 + 0.5 or 36 – 0.5 or 39 – 0.5 or 36 + 0.5 or better seen	
3	$2 \times 2 \times 3 \times 3 \times 5$ oe	**2**		**B1** for 2, 2, 3, 3, 5 or **M1** for correct factor tree/diagram/table	
4	31 or 37	**1**			
5	$4a^2b$ final answer	**2**		**M1** for two correct parts out of three from 4, a^2 and b in final answer	
6(a)	$(M \cup G) \cap P'$	**1**			
6(b)	22	**1**			
6(c)	$\frac{8}{23}$ oe	**2**		**M1** for $\frac{k}{23}$ or $\frac{k}{3+9+5+6}$ or $\frac{8}{c}$ or $\frac{3+5}{c}$ $c \neq 1$ or for 8 and 23 identified	

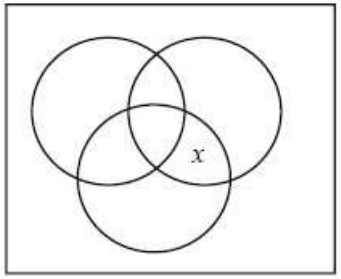
Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
7	**M1** for $\frac{2}{9} \times \frac{6}{5}$ or $\frac{4}{18} \div \frac{15}{18}$ oe **A1** for $\frac{4}{15}$ cao	**2**			
8	11 27	**3**		**M1** for 500 ÷ 43 oe **M1** for 500 – *their* 11 × 43 oe *their* 11 must be an integer from 2 to 11	
9	13.75 14.85	**3**		**B2** for one correct answer or both correct answers seen in working then rounded to 3sf or both correct but reversed or **M1** for 2 correct seen from 23 + 0.5, 23 – 0.5, 8.7 + 0.05 or 8.7 – 0.05 or better	
10	40	**1**			

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
11		**2**		**B1** for each	
12	42	**2**		**M1** for $12 \div 2$ or better	
13	$\frac{27}{99}$ oe fraction	**1**			
14	150	**2**		**B1** for answer $150k$ or **M1** for prime factors of 30 or 75 seen or a list of multiples of both 30 and 75 with at least 3 of each or for $\frac{30 \times 75}{15}$ oe or for answer $2 \times 3 \times 5^2$	
15(a)	Forty thousand six hundred	**1**			
15(b)	4.06×10^4	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
16	$\frac{4}{99}$ cao	**1**			
17	2.31×10^{p}	**2**		**B1** for $21 \times 10^{p-1}$ or 0.21×10^{p} or answer with figs 231	
18		**1**			
19	12	**2**		**M1** for $2^2 \times 3^2$ and $2^2 \times 3 \times 7$ or for $2 \times 2 \times 3$ final answer or **B1** for 2, 3, 4 or 6 as final answer	
20	$\frac{37}{99}$ oe fraction	**1**			
21	-5	**1**			

Question	Answer	Marks	AO Element	Notes	Guidance
22	177.5	**1**			
23	15 09	**1**		Accept 3 09 pm	
24		**1**		Shade whole rectangle except for region containing *x*	
25	14, 10	**2**		**M1** for 24 ÷ (7 + 5)	
					[Total: 43]

Algebra and graphs

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1 Simplify $18x^{18} \div 9x^9$.

..... [2]

[Total: 2]

2 Factorise completely.

$1 + x - y - xy$

..... [2]

[Total: 2]

3 Factorise completely.

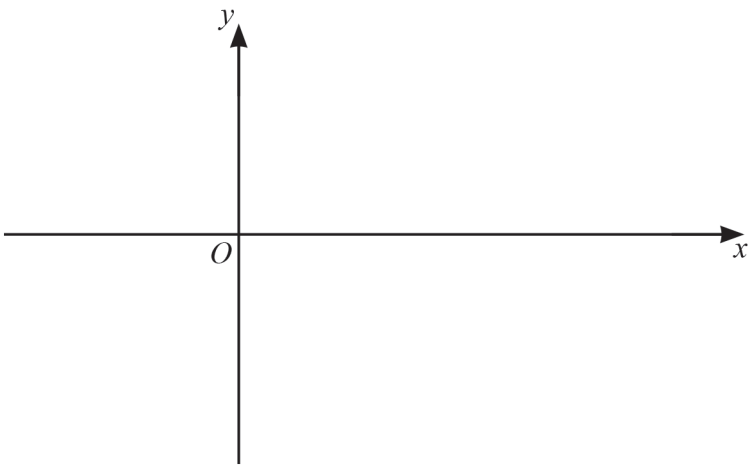
$2x^3 - 18xy^2$

..... [3]

[Total: 3]

4 The graph of a cubic function has two turning points.
When $x < 0$ and when $x > 4$ the gradient of the graph is positive.
When $0 < x < 4$ the gradient of the graph is negative.
The graph passes through the origin.

Sketch the graph.



[2]

[Total: 2]

5 Solve the simultaneous equations.

$$x - 3y = 7$$
$$2x - 3y = 11$$

x = ...

y = ... [2]

[Total: 2]

6 $s = \frac{1}{2}at^2$

Rearrange the formula to find t in terms of s and a.

$t =$ ..... [2]

[Total: 2]

7 Factorise completely.

$5x^2 - 20y^2$

..... [3]

[Total: 3]

8 Find the nth term of this sequence.

8, 17, 32, 53, 80, ...

..... [2]

[Total: 2]

9 $y = 3x^2 - 12x + 7$

(a) Find the value of $\frac{\mathrm{d}y}{\mathrm{d}x}$ when $x = 5$.

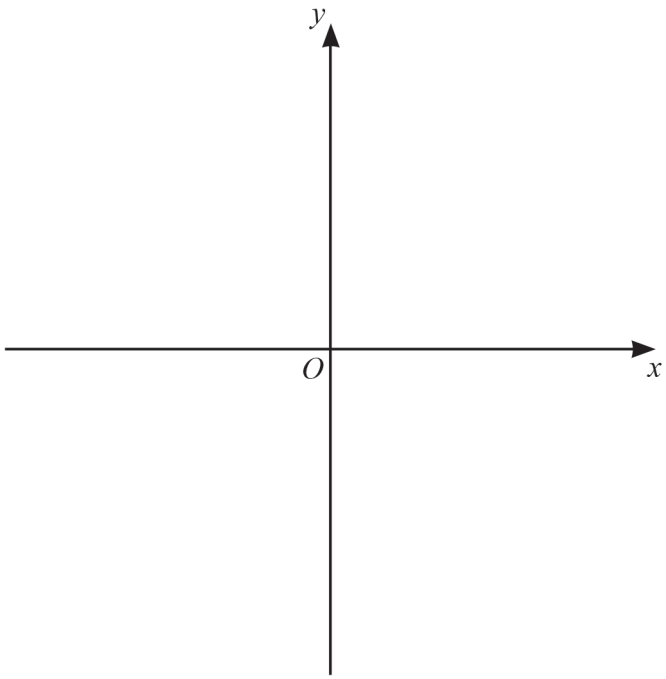
..... [3]

(b) Find the coordinates of the point on the graph of $y = 3x^2 - 12x + 7$ where the gradient is 0.

(..... , ...) [2]

[Total: 5]

10 Sketch the graph of $y = (x + 1)(3 - x)(3 + x)$, indicating the coordinates of the points where the graph crosses the x-axis and the y-axis.



[4]

[Total: 4]

11 Expand and simplify.

$(2x - 3)\,(x + 6)\,(x - 4)$

..... [3]

[Total: 3]

12 Simplify.

$a - 2b - 3a + 7b$

..... [2]

[Total: 2]

13 Write as a single fraction in its simplest form.

$$\frac{3}{x - 5} - \frac{7}{2x}$$

..... [3]

[Total: 3]

14 Solve.

$$\frac{13 - 4x}{3} = 6 - x$$

$x =$ ..... [3]

[Total: 3]

15 Factorise completely.

$12a^3 - 21a$

..... [2]

[Total: 2]

16 These are the first four terms of a sequence.

15 7 −1 −9

Find the nth term of this sequence.

..... [2]

[Total: 2]

17 $a^8 \div a^p = a^2$

Find the value of p.

$p =$ ..... [1]

[Total: 1]

18 The nth term of a sequence is $n^2 + 7$.

Find the first three terms of this sequence.

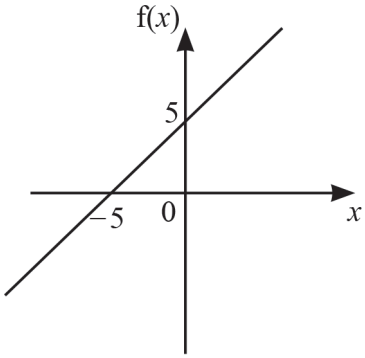
..... , ... , ... [2]

[Total: 2]

19 The diagrams show the graphs of two functions.

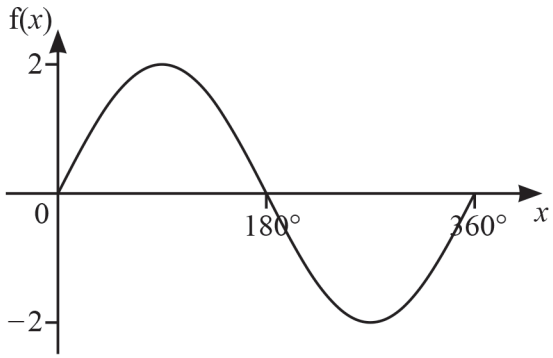
Write down each function.

(a)



f(x) = ... [2]

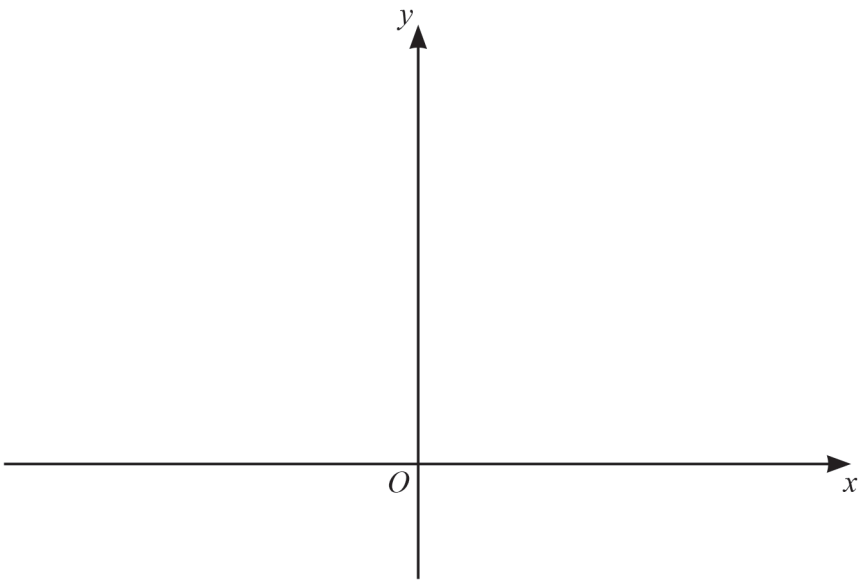
(b)



f(x) = ... [2]

[Total: 4]

20



On the diagram,

(a) sketch the graph of $y = (x - 1)^2$, [2]

(b) sketch the graph of $y = \frac{1}{2}x + 1$. [2]

[Total: 4]

21 Solve the equation.

$$\frac{2x + 5}{3 - x} = \frac{14}{15}$$

$x =$ ..... [3]

[Total: 3]

22 Simplify.

$$\frac{5}{3x} \times \frac{9x}{20}$$

..... [2]

[Total: 2]

23 Solve.

$$4\,(5 - 3x) = 23$$

$x =$ ..... [3]

[Total: 3]

24 Expand and simplify.

$(3x - 5y)(2x + y)$

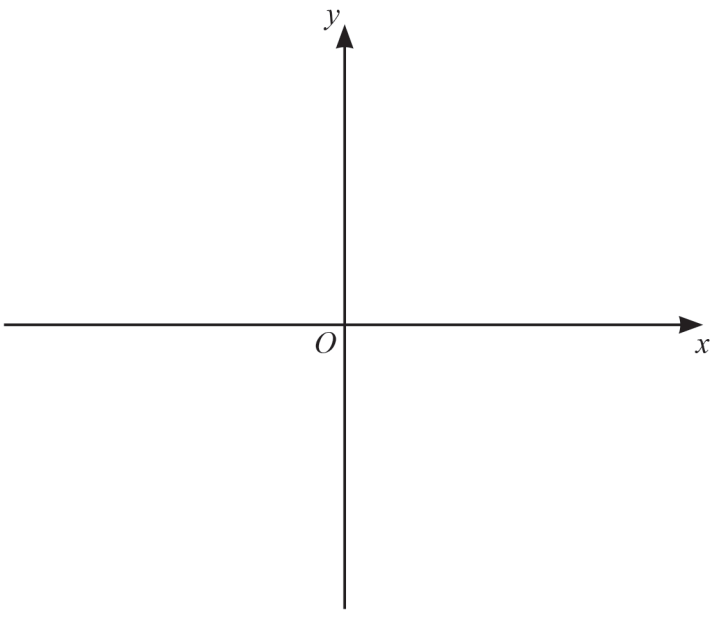
..... [2]

[Total: 2]

25 **(a)** Write $x^2 + 10x + 14$ in the form $(x + a)^2 + b$.

..... [2]

25 **(b)** On the axes, sketch the graph of $y = x^2 + 10x + 14$, indicating the coordinates of the turning point.



[3]

[Total: 5]

26 Simplify.

$$\frac{p}{2q} \times \frac{4pq}{t}$$

..... [2]

[Total: 2]

27 Make y the subject of the formula.

$h^2 = x^2 + 2y^2$

$y =$ ..... [3]

[Total: 3]

28 Expand and simplify $(x + 3)(x - 5)(3x - 1)$.

..... [3]

[Total: 3]

29 Factorise.

$4x^2 - y^4$

..... [2]

[Total: 2]

30 These are the first five terms of a sequence.

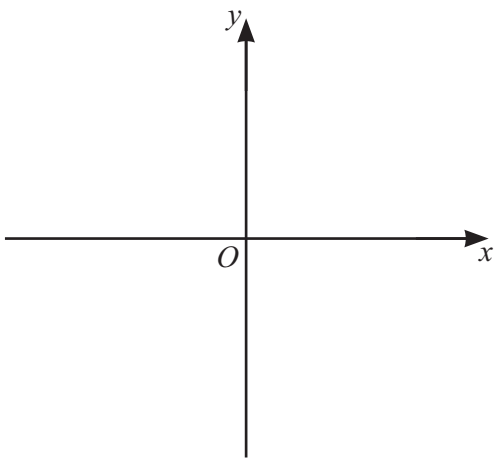
4 7 12 19 28

Find the nth term.

..... [2]

[Total: 2]

31 On the axes, sketch the graph of the function $y = 2^{-x}$.



[2]

[Total: 2]

32 These are the first five terms of a sequence.

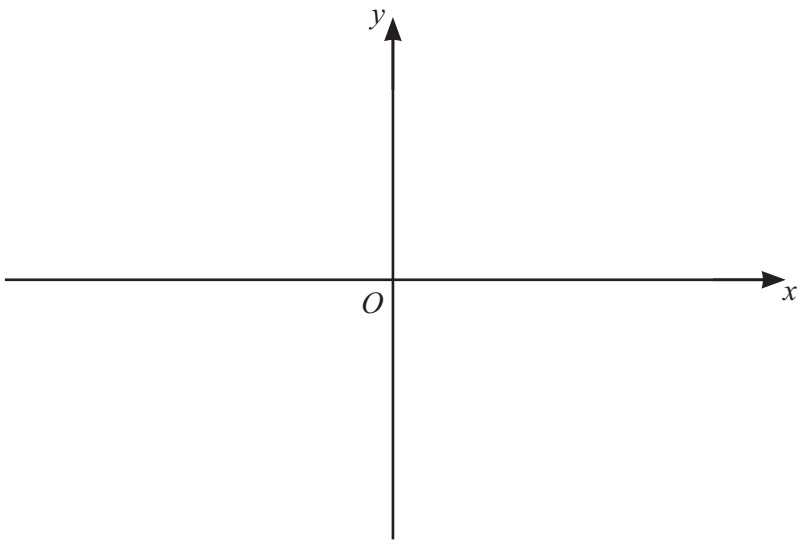
25 18 11 4 −3

Find the nth term of this sequence.

..... [2]

[Total: 2]

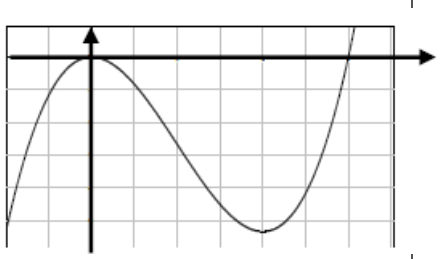
33 Sketch the curve $y = x^3 - 4x$.



[3]

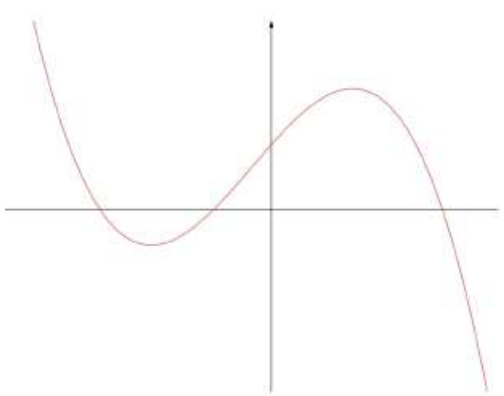
[Total: 3]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	$2x^9$ final answer	**2**		**B1** for kx^9 or $2x^k$ as final answer or $2x^9$ spoiled	
2	$(1+x)(1-y)$ final answer	**2**		**B1** for $1+x-y(1+x)$ or $1-y+x(1-y)$	
3	$2x(x+3y)(x-3y)$ final answer	**3**		**B2** for $2x\left(x^2-9y^2\right)$ or correctly factorising into two brackets e.g. $\left(2x^2+6xy\right)(x-3y)$, $\left(x^2-3xy\right)(2x+6y)$ or **B1** for $2\left(x^3-9xy^2\right)$ or $x\left(2x^2-18y^2\right)$ or for $(x+3y)(x-3y)$	
4	Correct sketch with maximum at origin and minimum in fourth quadrant 	**2**		**B1** for any cubic with exactly 2 distinct turning points	

Mark Scheme

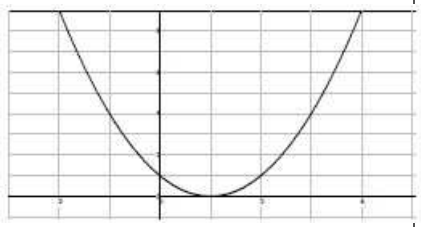
Question	Answer	Marks	AO Element	Notes	Guidance
5	$[x =]\ 4$ $[y =]\ -1$	**2**		**B1** for each	
6	$[\pm]\sqrt{\frac{2s}{a}}$ final answer	**2**		**M1** for $\frac{s}{a} = \frac{1}{2}t^2$ or $2s = at^2$ or better	
7	$5\,(x - 2y)\,(x + 2y)$ final answer	**3**		**B2** for $(5x - 10y)\,(x + 2y)$ or $(x - 2y)\,(5x + 10y)$ or correct answer seen then spoilt or **B1** for $5\left(x^2 - 4y^2\right)$ or for $(x - 2y)\,(x + 2y)$	
8	$3n^2 + 5$ oe final answer	**2**		**M1** for correctly finding second differences or an answer that is a quadratic sequence	
9(a)	18	**3**		**B2** for $6x - 12$ or **B1** for $6x$ or -12	
9(b)	$(2, -5)$	**2**		**B1** for each If 0 scored, **M1** for *their* $6x - 12 = 0$ or states $\frac{\mathrm{d}y}{\mathrm{d}x} = 0$	

Question	Answer	Marks	AO Element	Notes	Guidance
10	Correct sketch of negative cubic crossing the x-axis at –3, –1 and 3 and crossing the y-axis at 9 	**4**		**B1** for any negative cubic shape with two turning points **B2** for three intercepts only with x-axis labelled at –3, –1 and 3 or **B1** for one or two correctly labelled x-intercepts **B1** for intercept with y-axis labelled at 9 If no graph drawn, **SC1** for all four intercepts labelled on axes.	
11	$2x^3 + x^2 - 54x + 72$ final answer	**3**		**B2** correct expansion of three brackets unsimplified or for final answer of correct form with 3 out of 4 terms correct or **B1** correct expansion of two brackets with at least three terms out of four correct	
12	$5b - 2a$ final answer	**2**		**B1** for $5b$ or $-2a$ in final answer or for $5b - 2a$ seen	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
13	$\frac{35-x}{2x(x-5)}$ or $\frac{35-x}{2x^2-10x}$ oe final answer nfww	**3**		**B1** for $3(2x)-7(x-5)$ or better isw **B1** for $2x(x-5)$ as common denominator isw, allow expanded	
14	-5	**3**		**M1** for $13-4x=18-3x$ oe or $\frac{-4x}{3}+x=6-\frac{13}{3}$ oe **M1FT** for $-4x+3x=18-13$ oe or for $\frac{-x}{3}=\frac{5}{3}$	
15	$3a\left(4a^2-7\right)$ final answer	**2**		**B1** for $3\left(4a^3-7a\right)$ or $a\left(12a^2-21\right)$ or for $3a\left(4a^2-7\right)$ seen then spoilt	
16	$23-8n$ oe final answer	**2**		**B1** for $j-8n$ or $23-kn\ \ k\neq 0$ or $23-8n$ seen then spoilt	
17	6	**1**			

Mark Scheme

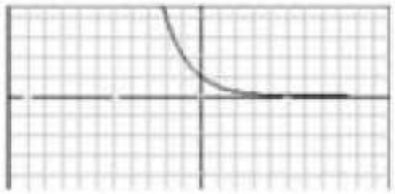
Question	Answer	Marks	AO Element	Notes	Guidance
18	8 11 16	**2**		**B1** for two correct	
19(a)	$x + 5$	**2**		**B1** for linear equation with positive gradient or intercept 5	
19(b)	$2 \sin x$ oe	**2**		**B1** for recognition of sin or $\cos(x - 90)$	
20(a)	Correct sketch 	**2**		**B2** for correct quadratic curve with min touching x-axis or **B1** for parabola vertex downwards	

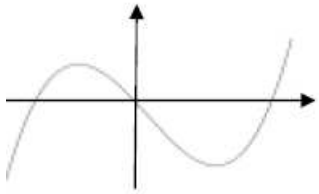
Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
20(b)	Correct sketch 	**2**		**B2** for correct straight line intersecting curve on y-axis or **B1** for straight line with positive gradient and positive y-intercept	
21	$x = -0.75$ oe	**3**		**M1** for $15(2x + 5) = 14(3 - x)$ **B1** for $30x + 75 = 42 - 14x$ or better	
22	$\frac{3}{4}$	**2**		**B1** for $\frac{45x}{60x}$ oe single fraction	
23	-0.25 or $-\frac{1}{4}$	**3**		**M1** for $20 - 12x = 23$ or for $5 - 3x = \frac{23}{4}$ **M1** for correct completion to $ax = b$ **FT** *their* first step	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
24	$6x^2 - 7xy - 5y^2$	**2**		**M1** for 3 terms out of 4 from $6x^2 - 10xy + 3xy - 5y^2$	
25(a)	$(x + 5)^2 - 11$	**2**		**M1** for $(x + 5)^2 + k$ or $(x + \textit{their } 5)^2 + 14 - (\textit{their } 5)^2$ or $a = 5$	
25(b)	Sketch of U-shaped parabola with a minimum indicated at (–5, –11) with no part of graph in 4th quadrant	**3**		**FT** *their* $(x + 5)^2 - 11$ provided in that form **B1** for U shape curve **B1FT** for turning point at (–5, k) or (k, –11)	
26	$\frac{2p^2}{t}$	**2**		**B1** for correct unsimplified answer	
27	$[\pm]\sqrt{\frac{h^2 - x^2}{2}}$	**3**		**M1** for correct rearrangement for y or y^2 term **M1** for correct square root **M1** for correct division by 2 or $\sqrt{2}$	

Question	Answer	Marks	AO Element	Notes	Guidance
28	$3x^3 - 7x^2 - 43x + 15$	**3**		**B2** for correct expansion and simplification of two of the brackets or **B1** for correct expansion of two brackets with at least 3 terms correct	
29	$\left(2x - y^2\right)\left(2x + y^2\right)$ final answer	**2**		**M1** for answer in form $(a + b)(a - b)$ or **B1** for correct answer seen	
30	$n^2 + 3$ oe	**2**		**M1** for any quadratic or second differences = 2	
31	Correct sketch 	**2**		**B1** for correct shape but crossing x-axis or for correct shape but just drawn in one quadrant	
32	$32 - 7n$ oe final answer	**2**		**B1** for $32 - kn$ oe $k \neq 0$ or $j - 7n$ oe or $32 - 7n$ seen then spoilt	

Question	Answer	Marks	AO Element	Notes	Guidance
33	correct shape and passes through origin 	**3**		**B1** for any positive cubic shape **B1** for sketch with one max and one min and with 3 roots including zero If 0 scored, **SC1** for $x\,(x+2)\,(x-2)$ soi	
					[Total: 87]

Coordinate geometry

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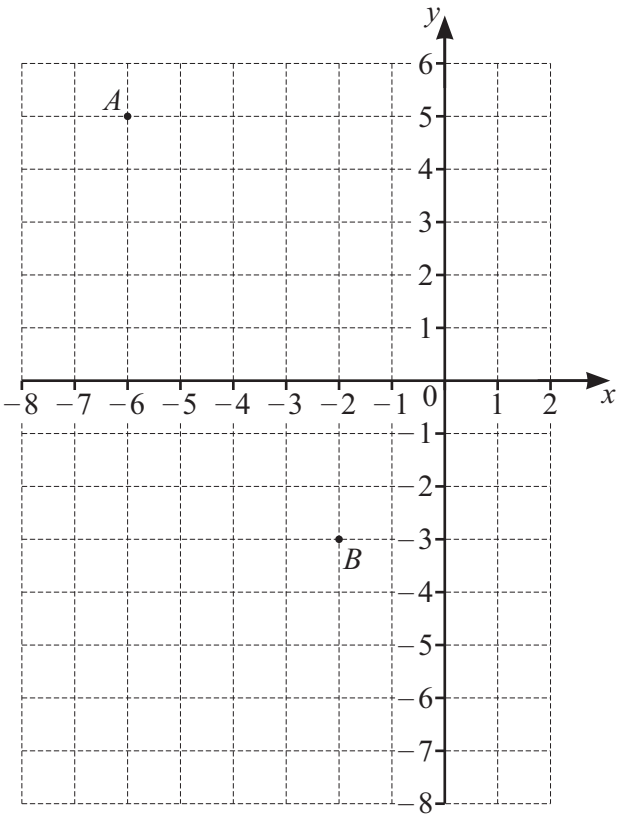
1



A is the point $(-6, 5)$ and B is the point $(-2, -3)$.

(a) Find the equation of the straight line, l, that passes through point A and point B.
Give your answer in the form $y = mx + c$.

$y =$ ..... [2]

(b) Find the equation of the line that is perpendicular to l and passes through the origin.

..... [2]

[Total: 4]

2 Find the gradient of the line that is perpendicular to the line $3y = 4x - 5$.

..... [2]

[Total: 2]

3 A is the point $(5, -5)$ and B is the point $(9, 3)$.

Find the coordinates of the midpoint of AB.

(....., ...) [2]

[Total: 2]

4 A is the point $(5, 7)$ and B is the point $(9, -1)$.

Find the equation of the line AB.

..... [3]

[Total: 3]

5 The line $y = 3x - 2$ crosses the y-axis at G.

Write down the coordinates of G.

(..... , ...) [1]

[Total: 1]

6 The equation of line L is $3x - 8y + 20 = 0$.

(a) Find the gradient of line L.

..... [2]

(b) Find the coordinates of the point where line L cuts the y-axis.

(..... , ...) [1]

[Total: 3]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	$[y =] -2x - 7$ final answer	**2**		**B1** for $-2x + c$ or $kx - 7,\ k \neq 0$ final answer	
1(b)	$y = \frac{1}{2}x\ [\pm 0]$ final answer	**2**		**FT** $-\frac{1}{\textit{their gradient in (a)}}$ **B1** for $y = kx\ [\pm 0]$ oe, $k \neq 0$ or $y = \textit{their}\ \frac{1}{2}x + c$ oe for any c or $\textit{their}\ \frac{1}{2}x\ [\pm 0]$ oe	
2	$-\frac{3}{4}$ or -0.75	**2**		**M1** for $y = \frac{4x - 5}{3}$ or better or for $\frac{-1}{\textit{their gradient}}$	
3	$(7, -1)$	**2**		**B1** for each	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
4	$y = -2x + 17$ oe final answer	**3**		**B2** for answer $-2x + 17$ OR **M1** for $\frac{-1-7}{9-5}$ oe **M1** for correct substitution of (5, 7) or (9, –1) into $y = \textit{their}\ mx + c$ oe	
5	(0, –2)	**1**			
6(a)	$\frac{3}{8}$	**2**		**M1** for $8y = 3x + 20$ or better	
6(b)	(0, 2.5) oe	**1**			
					[Total: 15]

Geometry

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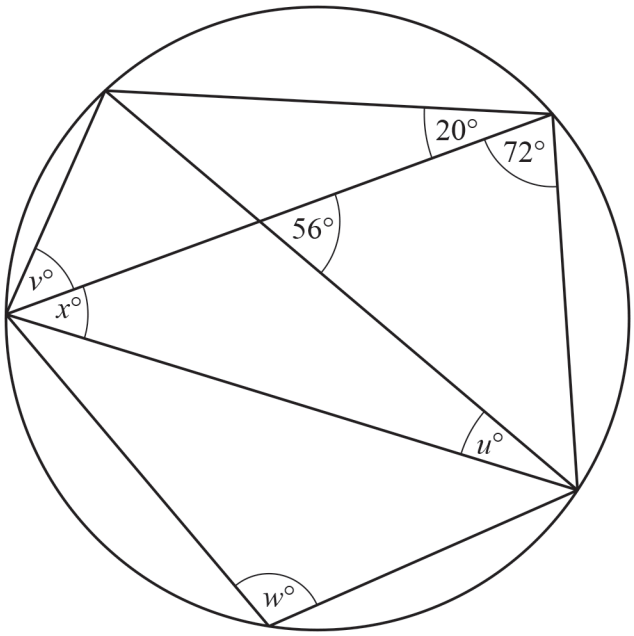
1 Draw the lines of symmetry of the rectangle.



[2]

[Total: 2]

2



NOT TO SCALE

The diagram shows a circle and eight chords.

Calculate the values of u, v, w and x.

u = ...

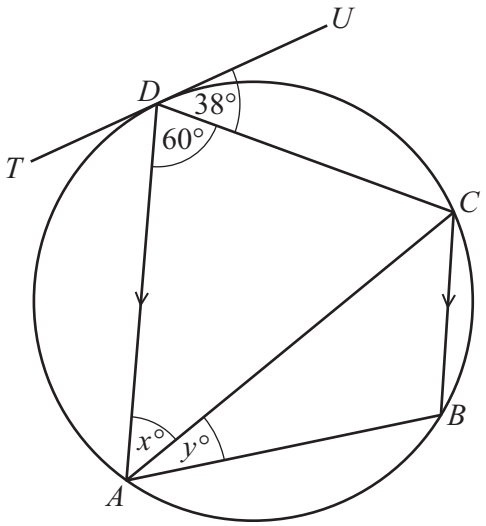
v = ...

w = ...

x = ... [4]

[Total: 4]

3



NOT TO SCALE

A, *B*, *C* and *D* are points on a circle.
TU is a tangent to the circle at *D*.
DA is parallel to *CB*.

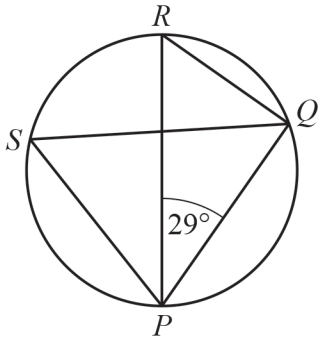
Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [3]

[Total: 3]

4



NOT TO SCALE

The points P, Q, R and S lie on a circle with diameter PR.

Work out the size of angle PSQ, giving a geometrical reason for each step of your working.

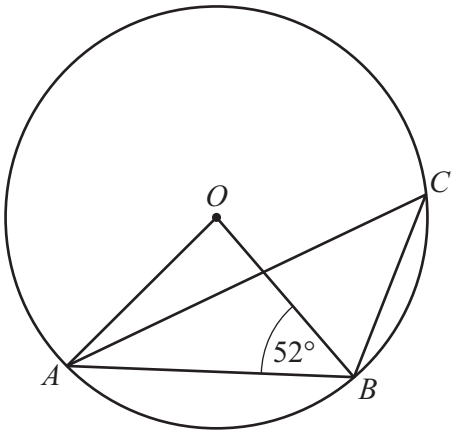
.....

.....

..... [3]

[Total: 3]

5



NOT TO SCALE

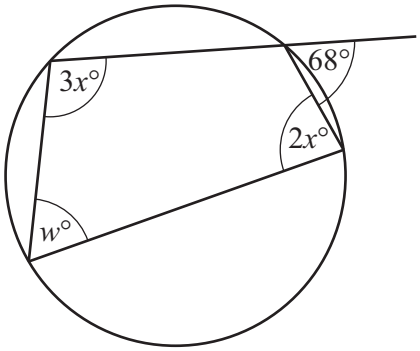
A, B and C lie on a circle, centre O.
Angle $OBA = 52°$.

Calculate angle ACB.

Angle ACB = ... [2]

[Total: 2]

6



NOT TO SCALE

The diagram shows a cyclic quadrilateral with an exterior angle of 68°.

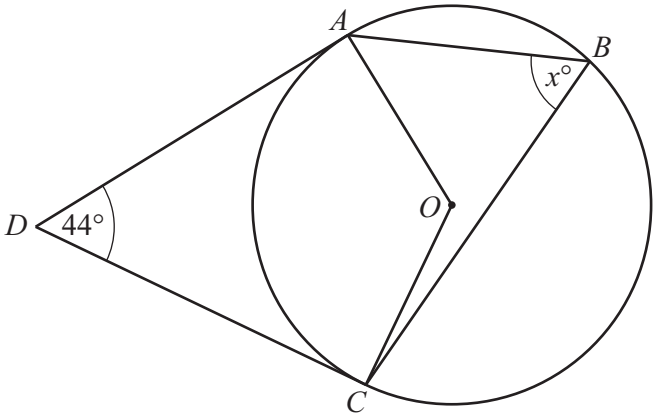
Find the value of w and the value of x.

w = ...

x = ... [3]

[Total: 3]

7



NOT TO SCALE

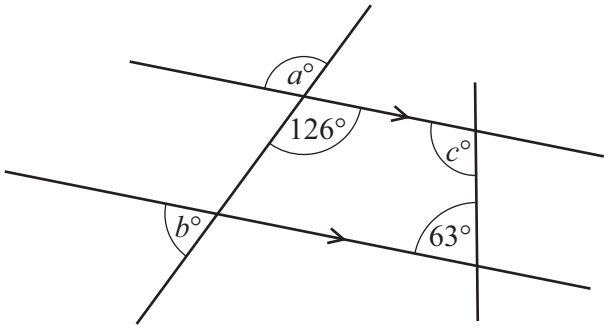
A, B and C are points on a circle, centre O.
DA and DC are tangents.
Angle $ADC = 44°$.

Work out the value of x.

$x =$ ..... [3]

[Total: 3]

8



NOT TO SCALE

The diagram shows two straight lines intersecting two parallel lines.

Find the values of a, b and c.

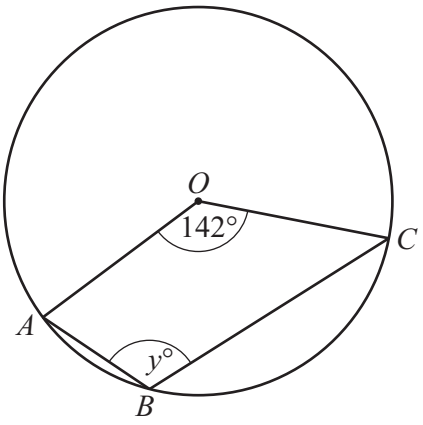
a = ...

b = ...

c = ... [3]

[Total: 3]

9



NOT TO SCALE

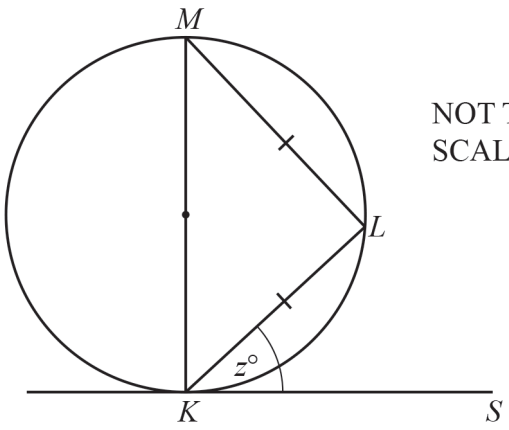
Points A, B and C lie on a circle, centre O.
Angle $AOC = 142°$.

Find the value of y.

y = ... [2]

[Total: 2]

10



K, *L* and *M* are points on the circle.
KS is a tangent to the circle at *K*.
KM is a diameter and triangle *KLM* is isosceles.

Find the value of z.

z = ... [2]

[Total: 2]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	Correct lines drawn	**2**		**B1** for one correct with no incorrect lines	
2	[u =] 20 [v =] 52 [w =] 108 [x =] 36	**4**		**B1** for each	
3	[x =] 38 [y =] 22	**3**		**B1** for [x =] 38 and **B2** for [y =] 22 or **M1** for angle ACB = *their x* or angle BAD = 60 or angle CBA = 120	
4	**B1** for PQR = 90 angle in semi-circle **B1** for PRQ = 61 angle sum of triangle [= 180] **B1** for PSQ = 61 angle in same segment	**3**		If 0 scored **SC1** for PSQ = PRQ [= 61] soi	
5	38	**2**		**B1** for AOB = 76	

Question	Answer	Marks	AO Element	Notes	Guidance
6	[w =] 68 [x =] 36	**3**		**B1** for 68 **B2** for 36 or **M1** for $3x + 2x + 68 + 112 = 360$ or better	
7	68	**3**		**M1** for correctly identifying 90° angle soi or *DAC* / *DCA* = 68 **M1** for [obtuse angle] *AOC* identified as $2x$ soi or x = their *DAC* / *DCA*	
8	126 54 117	**3**		**B1** for each	
9	109	**2**		**B1** for 218 or 71 in correct places or correctly labelled	
10	45	**2**		**B1** for angles at *M* or *K* = 45 or angle at *L* = 90	
					[Total: 27]

Mensuration

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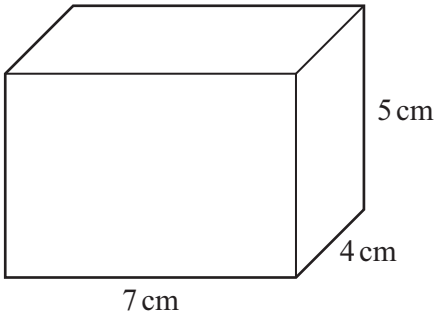
1



NOT TO SCALE

Calculate the total surface area of this cuboid.

..... cm^2 [3]

[Total: 3]

2 A solid cylinder has radius x cm and height $\frac{7x}{2}$ cm.
The surface area of a sphere with radius R cm is equal to the total surface area of the cylinder.

Find an expression for R in terms of x.
[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

R = ... [3]

[Total: 3]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	166	**3**		**M2** for [2 ×] (7 × 4 + 4 × 5 + 5 × 7) or **M1** for 7 × 4 or 4 × 5 or 5 × 7	
2	$\frac{3x}{2}$ or $1.5x$ or $1\frac{1}{2}x$	**3**		**B2** for $4R^2 = 9x^2$ oe or better or **M1** for $4\pi R^2 = 2\pi x^2 + \pi \times 2x \times \frac{7x}{2}$	
[Total: 6]					

Trigonometry

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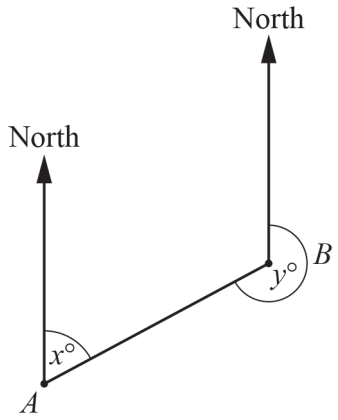
1 The bearing of B from A is $x°$.
The bearing of A from B is $y°$.
$x : y = 2 : 7$

Calculate the value of y.

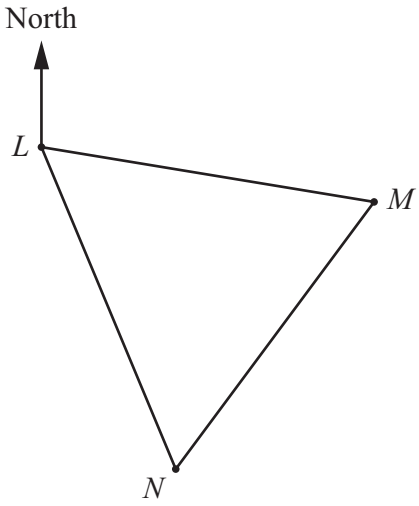


NOT TO SCALE

$y =$ ..... [3]

[Total: 3]

2



NOT TO SCALE

On a map, the positions of the towns L, M and N form an equilateral triangle.
The bearing of M from L is 103°.

Work out the bearing of L from N.

..... [2]

[Total: 2]

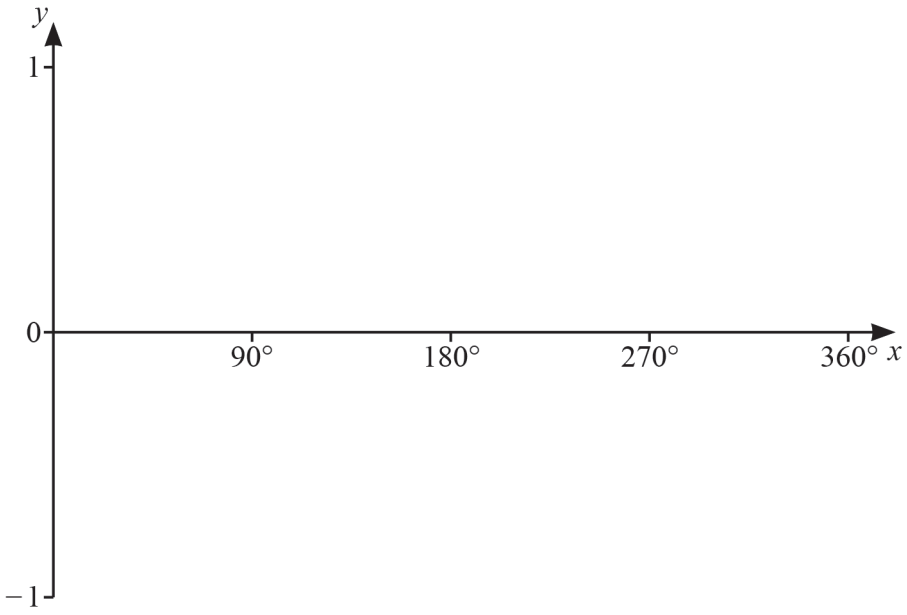
3 The bearing of X from Y is 274°.

Calculate the bearing of Y from X.

..... [2]

[Total: 2]

4 **(a)** On the axes, sketch the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.



[2]

(b) Describe fully the symmetry of the graph of $y = \sin x$ for $0° \leqslant x \leqslant 360°$.

.....

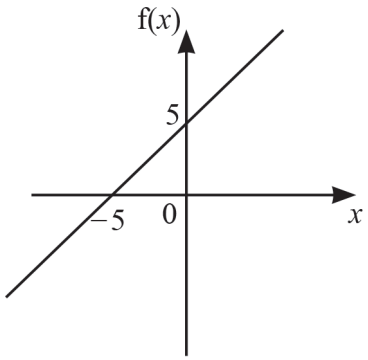
..... [2]

[Total: 4]

5 The diagrams show the graphs of two functions.

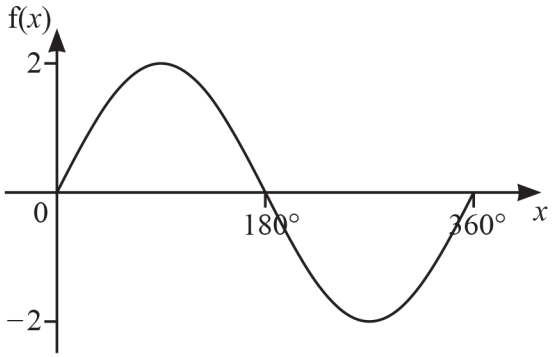
Write down each function.

(a)



f(x) = ... [2]

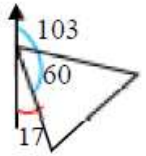
(b)



f(x) = ... [2]

[Total: 4]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	252	**3**		**M2** for 180 ÷ (7 – 2) oe OR **M1** for 180 – x + y = 360 oe **M1** for correct use of ratio	
2	343	**2**		**B1** for 103 in correct position **and** 60 or 17 in correct position 	
3	[0]94	**2**		**M1** for 86 or 274 – 180 or for sketch with 274 marked correctly	
4(a)	Correct sketch	**2**		**B1** for correct shape but inaccurate	
4(b)	Rotational [symmetry] order 2 [centre] (180, 0)	**2**		**B1** for rotational [symmetry]	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
5(a)	$x + 5$	**2**		**B1** for linear equation with positive gradient or intercept 5	
5(b)	$2\sin x$ oe	**2**		**B1** for recognition of sin or $\cos(x - 90)$	
					[Total: 15]

Transformations and vectors

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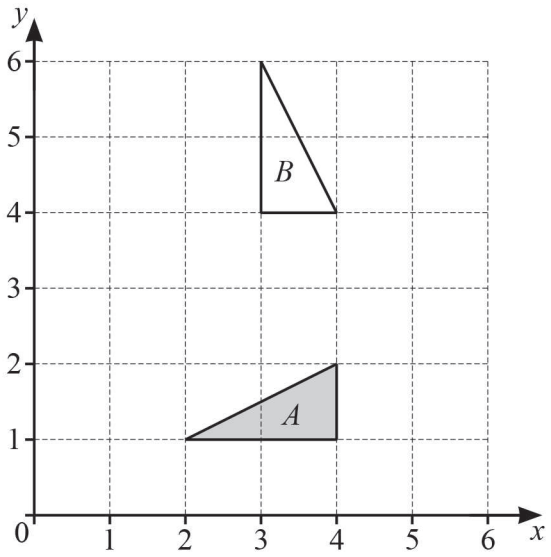
1



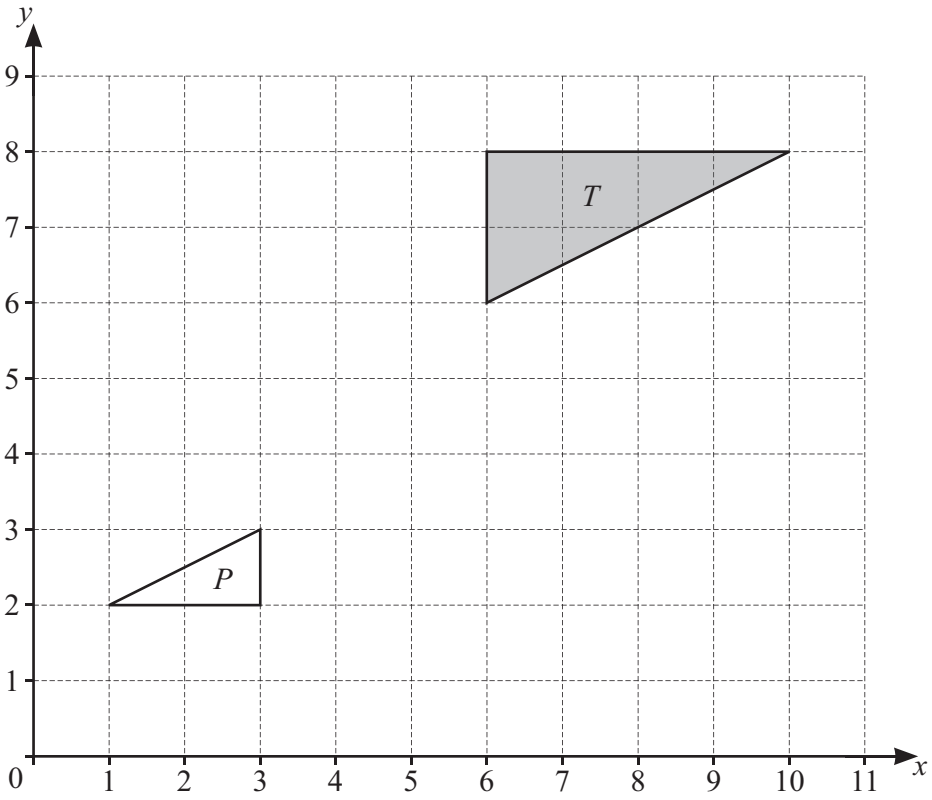
Describe fully the **single** transformation that maps triangle *A* onto triangle *B*.

.....

..... [3]

[Total: 3]

2



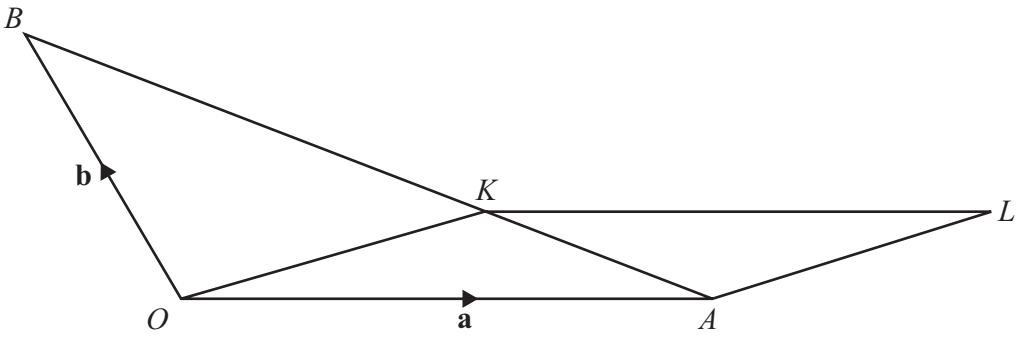
Describe fully the **single** transformation that maps triangle *T* onto triangle *P*.

.....

..... [3]

[Total: 3]

3



NOT TO SCALE

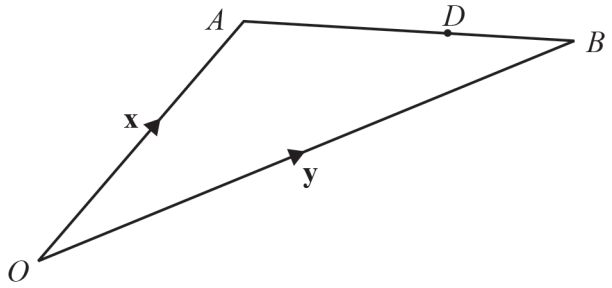
The diagram shows a triangle OAB and a parallelogram $OALK$.
The position vector of A is **a** and the position vector of B is **b**.
K is a point on AB so that $AK : KB = 1 : 2$.

Find the position vector of L, in terms of **a** and **b**.
Give your answer in its simplest form.

..... [4]

[Total: 4]

4



NOT TO SCALE

$\overrightarrow{OA} = \mathbf{x}$, $\overrightarrow{OB} = \mathbf{y}$ and $\overrightarrow{OD} = \frac{3}{7}\mathbf{x} + \frac{4}{7}\mathbf{y}$.

Calculate the ratio $AD : DB$.

..... : ..... [2]

[Total: 2]

5 **(a)** Draw the image of triangle T after a reflection in the line $y = x$. [2]

(b) Draw the image of triangle T after a translation by the vector $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$. [2]

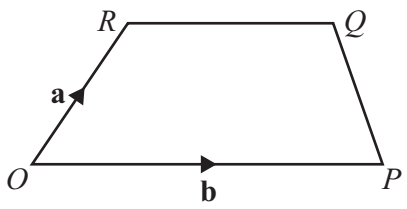
(c) Describe fully the **single** transformation that maps triangle T onto triangle A.

.....

..... [3]

[Total: 7]

6



NOT TO SCALE

The diagram shows a trapezium $OPQR$.

O is the origin, $\overrightarrow{OR} = \mathbf{a}$ and $\overrightarrow{OP} = \mathbf{b}$.

$$\left|\overrightarrow{RQ}\right| = \frac{3}{5}\left|\overrightarrow{OP}\right|$$

(a) Find $\overrightarrow{PQ}$ in terms of **a** and **b** in its simplest form.

$\overrightarrow{PQ} =$ ..... [2]

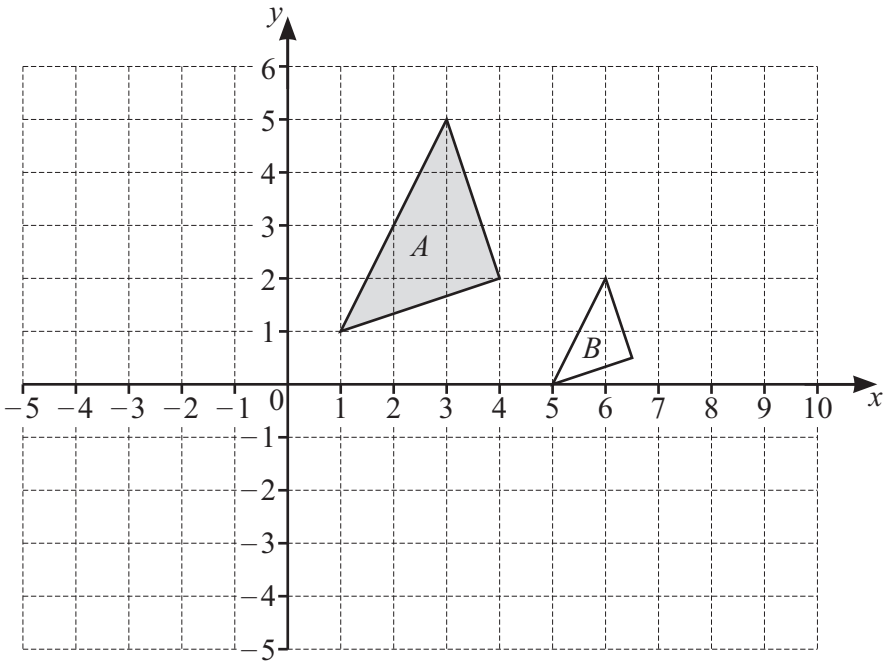
(b) When PQ and OR are extended, they intersect at W.

Find the position vector of W.

..... [2]

[Total: 4]

7



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

.....

..... [3]

[Total: 3]

8 **(a)** Describe fully the **single** transformation that maps

(i) triangle *A* onto triangle *B*,

.....

..... [3]

(ii) triangle *A* onto triangle *C*.

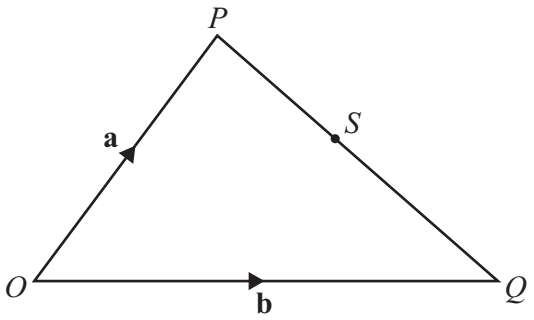
.....

..... [3]

(b) Draw the image of triangle *A* after a translation by the vector $\begin{pmatrix} 2 \\ 10 \end{pmatrix}$. [2]

[Total: 8]

9



NOT TO SCALE

S is a point on PQ such that $PS : SQ = 4 : 5$.

Find $\overrightarrow{OS}$, in terms of **a** and **b**, in its simplest form.

$\overrightarrow{OS}$ = ... [2]

[Total: 2]

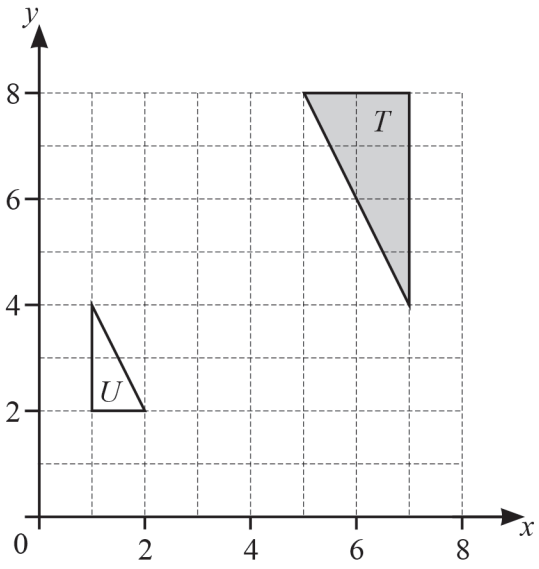
10 $\mathbf{m} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$

Find $3\mathbf{m}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

[Total: 1]

11



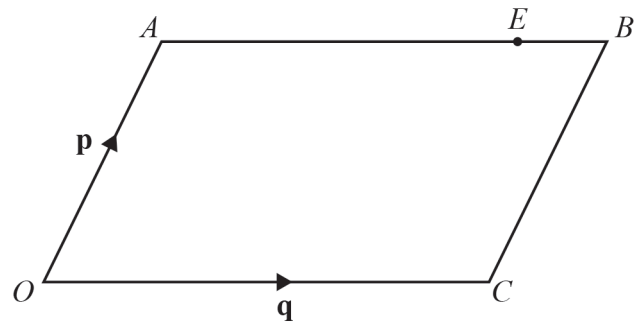
Describe fully the **single** transformation that maps triangle T onto triangle U.

.....

..... [3]

[Total: 3]

12



NOT TO SCALE

OABC is a parallelogram.

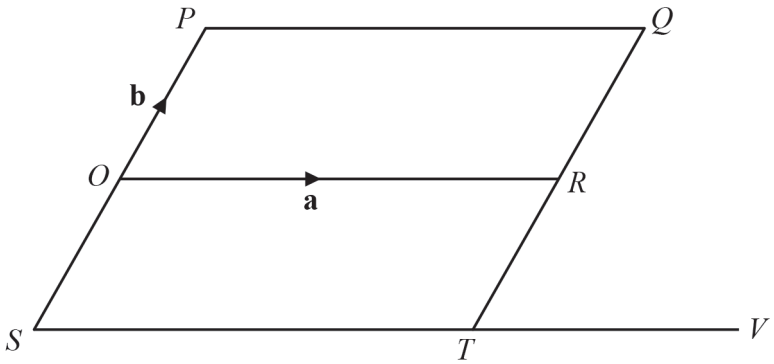
$\overrightarrow{OA} = \mathbf{p}$ and $\overrightarrow{OC} = \mathbf{q}$.
E is the point on *AB* such that *AE* : *EB* = 3 : 1.

Find $\overrightarrow{OE}$, in terms of **p** and **q**, in its simplest form.

$\overrightarrow{OE}$ = ... [2]

[Total: 2]

13



NOT TO SCALE

O is the origin and *OPQR* is a parallelogram.
SOP is a straight line with *SO* = *OP*.
TRQ is a straight line with *TR* = *RQ*.
STV is a straight line and *ST* : *TV* = 2 : 1.
$\overrightarrow{OR} = \mathbf{a}$ and $\overrightarrow{OP} = \mathbf{b}$.

(a) Find, in terms of **a** and **b**, in its simplest form,

(i) the position vector of T,

..... [2]

(ii) $\overrightarrow{RV}$.

$\overrightarrow{RV}$ = ... [1]

(b) Show that PT is parallel to RV.

[2]

[Total: 5]

14 $\mathbf{p} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$

(a) Find $2\mathbf{p} + \mathbf{q}$.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(b) Find $|\mathbf{p}|$.

..... [2]

[Total: 4]

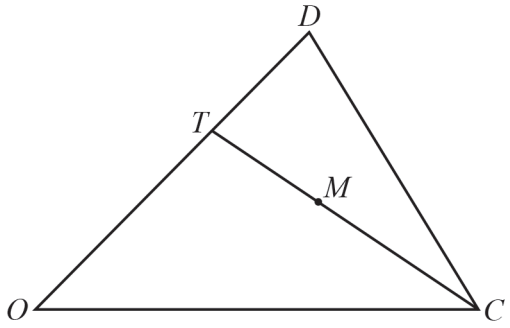
15 A is the point (4, 1) and $\overrightarrow{AB} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$.

Find the coordinates of B.

(..... , ...) [1]

[Total: 1]

16



NOT TO SCALE

In the diagram, O is the origin, $OT = 2TD$ and M is the midpoint of TC.
$\overrightarrow{OC} = \mathbf{c}$ and $\overrightarrow{OD} = \mathbf{d}$.

Find the position vector of M.
Give your answer in terms of **c** and **d** in its simplest form.

..... [3]

[Total: 3]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	Rotation (5, 3) 90° clockwise oe	**3**		**B1** for each	
2	Enlargement [sf] $-\frac{1}{2}$ [centre] (4, 4)	**3**		**B1** for each	
3	$\frac{5}{3}\mathbf{a}+\frac{1}{3}\mathbf{b}$ final answer	**4**		**M1** for $\overrightarrow{AK}=-\frac{1}{3}\mathbf{a}+\frac{1}{3}\mathbf{b}$ or $\overrightarrow{BK}=\frac{2}{3}\mathbf{a}-\frac{2}{3}\mathbf{b}$ **M1** for $\overrightarrow{AL}\left(\text{or } \overrightarrow{OK}\right)=\mathbf{a}+their\ \overrightarrow{AK}$ oe soi or $\overrightarrow{OK}\left(\text{or } \overrightarrow{AL}\right)=\mathbf{b}+their\ \overrightarrow{AK}$ oe soi or $\overrightarrow{BL}=\mathbf{a}+their\ \overrightarrow{AK}$ oe soi **M1** for a correct route e.g. $\overrightarrow{OL}$, $\mathbf{a}+\overrightarrow{AL}$, $\mathbf{b}+\overrightarrow{BL}$	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
4	4 : 3 oe	**2**		**M1** for $\overrightarrow{AD} = -\frac{4}{7}\mathbf{x} + \frac{4}{7}\mathbf{y}$ oe or $\overrightarrow{DB} = -\frac{3}{7}\mathbf{x} + \frac{3}{7}\mathbf{y}$ oe	
5(a)	Triangle drawn at (2, –1), (2, –4), (3, –4)	**2**		**B1** for two correct points If 0 scored, **SC1** for reflection of triangle T in $y = -x$	
5(b)	Triangle drawn at (–5, 6), (–2, 5), (–5, 5)	**2**		**B1** for translation by $\begin{pmatrix} -1 \\ k \end{pmatrix}$ or by $\begin{pmatrix} k \\ 3 \end{pmatrix}$ If 0 scored **SC1** for triangle drawn at (–4.5, 3.5), (–4.5, 4.5) and (–1.5, 3.5)	
5(c)	Enlargement [SF] –1.5 oe [centre] (0, 3)	**3**		**B1** for each	
6(a)	$\mathbf{a} - \frac{2}{5}\mathbf{b}$ oe simplified	**2**		**M1** for $-\mathbf{b} + \mathbf{a} + \frac{3}{5}\mathbf{b}$ or a correct route	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
6(b)	$\frac{5}{2}$ **a** oe	**2**		**B1** for ka where $k > 1$ or $\frac{5}{2}\overrightarrow{OR}$	
7	enlargement [sf] $\frac{1}{2}$ [centre] (9, –1)	**3**		**B1** for each	
8(a)(i)	Rotation 90° anticlockwise oe (0, – 1)	**3**		**B1** for each	
8(a)(ii)	enlargement [s.f.] $\frac{1}{3}$ (6, 6)	**3**		**B1** for each	
8(b)	triangle at (– 4, 7) (– 4, 1) (– 1, 1)	**2**		**B1** for translation by $\begin{pmatrix} k \\ 10 \end{pmatrix}$ or $\begin{pmatrix} 2 \\ k \end{pmatrix}$	
9	$\frac{5}{9}$ **a** + $\frac{4}{9}$ **b**	**2**		**M1** for $\frac{4}{9}$ (**b** – **a**) or $\frac{5}{9}$ (**a** – **b**) or a correct route	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
10	$\begin{pmatrix} 15 \\ 21 \end{pmatrix}$	**1**			
11	Enlargement [scale factor] $-\frac{1}{2}$ [centre] (3, 4)	**3**		**B1** for each	
12	$\mathbf{p} + \frac{3}{4}\mathbf{q}$	**2**		**M1** for a correct route or for $\overrightarrow{AE} = \frac{3}{4}\mathbf{q}$	
13(a)(i)	$\mathbf{a} - \mathbf{b}$ or $-\mathbf{b} + \mathbf{a}$	**2**		**B1** for a correct route or identifying $\overrightarrow{OT}$	
13(a)(ii)	$\frac{1}{2}\mathbf{a} - \mathbf{b}$ or $-\mathbf{b} + \frac{1}{2}\mathbf{a}$	**1**			
13(b)	**M1** for $\overrightarrow{PT} = \mathbf{a} - 2\mathbf{b}$ oe **A1** for $\overrightarrow{PT} = 2\overrightarrow{RV}$	**2**		Dep on correct vector *RV* Accept in words	
14(a)	$\begin{pmatrix} 6 \\ 17 \end{pmatrix}$	**2**		**B1** for each	
14(b)	6.4[0] or 6.403...	**2**		**M1** for $4^2 + 5^2$	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
15	(1, 2)	**1**			
16	$\frac{1}{2}\mathbf{c} + \frac{1}{3}\mathbf{d}$	**3**		**B2** for correct unsimplified answer or **M1** for $\overrightarrow{CT} = -\mathbf{c} + \frac{2}{3}\mathbf{d}$ oe or $\overrightarrow{TC} = \mathbf{c} - \frac{2}{3}\mathbf{d}$ oe or for correct route	
					[Total: 55]

Probability

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1 A bag contains 5 red balls, 4 blue balls and 3 green balls.

(a) Megan picks a ball at random.

Write down the probability that the ball is red or blue.

..... [1]

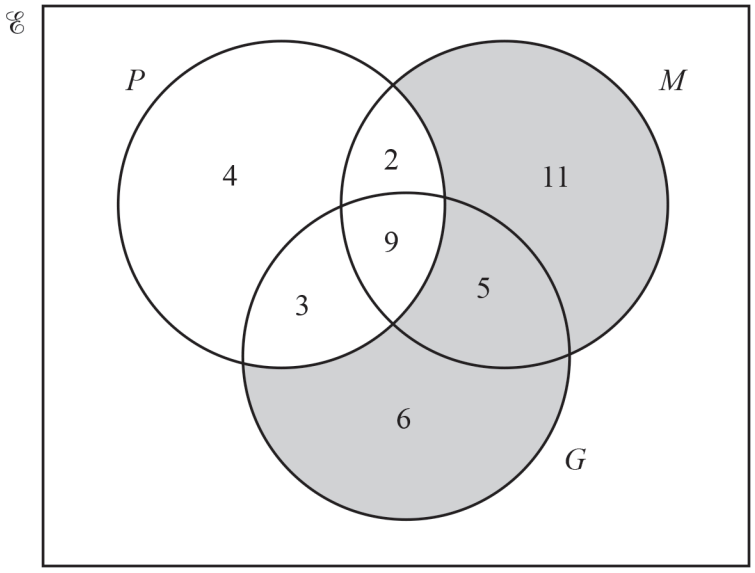
(b) Megan replaces the ball.
She picks a ball at random, notes the colour and replaces the ball.
She repeats this 60 times.

Calculate the number of times the ball is expected to be red or blue.

..... [1]

[Total: 2]

2 The Venn diagram shows the number of students in a class of 40 who study physics (P), mathematics (M) and geography (G).



(a) Use set notation to describe the shaded region.

..... [1]

(b) Find $\mathrm{n}\left((P \cap G) \cup M'\right)$.

..... [1]

(c) A student is chosen at random from those studying geography.

Find the probability that this student also studies physics or mathematics but not both.

..... [2]

[Total: 4]

3 Some cards have either a square, a circle or a triangle drawn on them.
Piet chooses one of the cards at random.

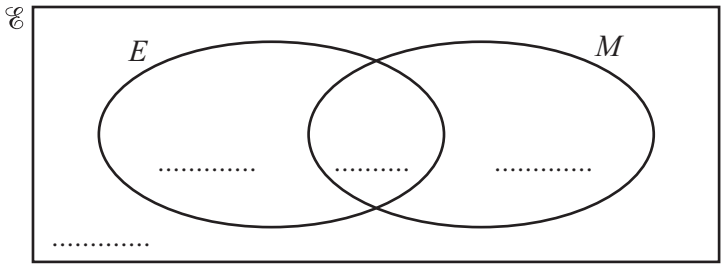
Complete the table to show the probability of choosing a card with each shape.

Shape	Square	Circle	Triangle
Probability	0.2	0.32	

[2]

[Total: 2]

4



50 students are asked if they like English (E) and if they like mathematics (M).
3 say they do not like English and do not like mathematics.
33 say they like English.
42 say they like mathematics.

(a) Complete the Venn diagram. [2]

(b) A student is chosen at random.

Find the probability that this student likes English and likes mathematics.

..... [1]

(c) Two students are chosen at random.

Find the probability that they both like mathematics.

..... [2]

(d) Two students who like English are chosen at random.

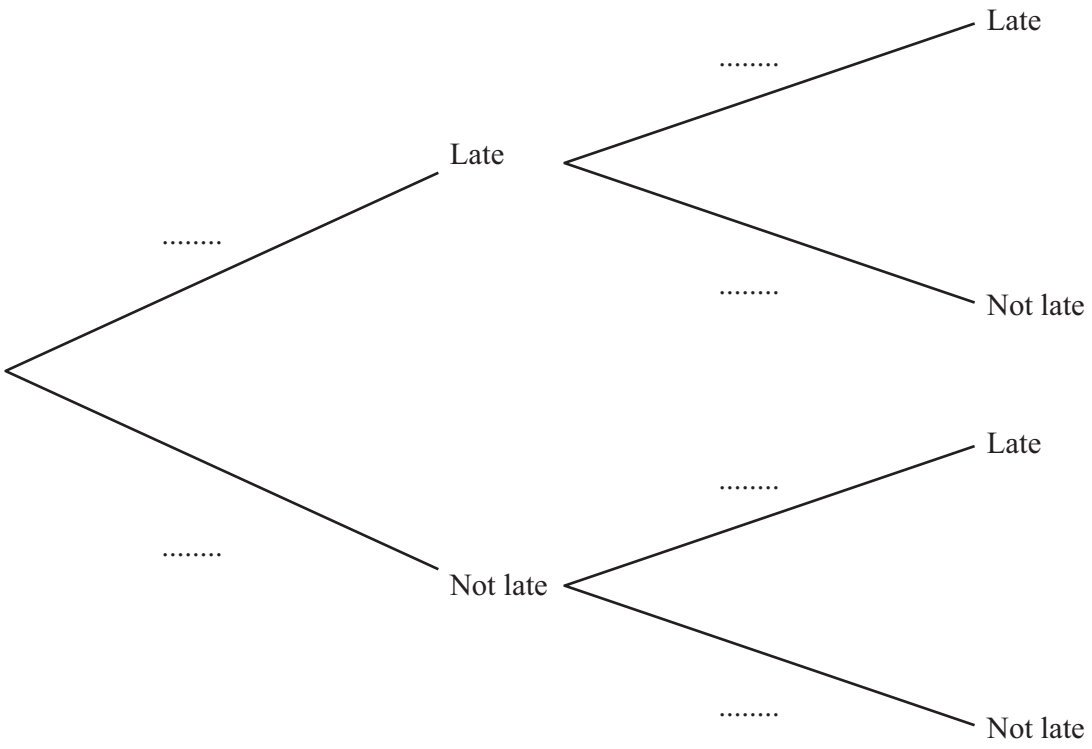
Find the probability that they both also like mathematics.

..... [2]

[Total: 7]

5 The probability that Shalini is late for school on any day is $\frac{1}{6}$.

(a) Complete the tree diagram for Monday and Tuesday.



[2]

(b) Calculate the probability that Shalini is late on Monday but is not late on Tuesday.

..... [2]

[Total: 4]

6 The probability that Jane wins a game is .

Jane plays this game 50 times.

Find the number of times she is expected to win the game.

..... [1]

[Total: 1]

7 Sofia has a bag containing 8 blue beads and 7 red beads only.
She takes one bead out of the bag at random and replaces it.
She does this 90 times.

Find the number of times she expects to take a red bead.

..... [2]

[Total: 2]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	$\frac{3}{4}$ oe	**1**			
1(b)	45	**1**		**FT** $60 \times$ *their* **(a)** correctly evaluated	
2(a)	$(M \cup G) \cap P'$	**1**			
2(b)	22	**1**			
2(c)	$\frac{8}{23}$ oe	**2**		**M1** for $\frac{k}{23}$ or $\frac{k}{3+9+5+6}$ or $\frac{8}{c}$ or $\frac{3+5}{c}$ $c \neq 1$ or for 8 and 23 identified	
3	0.48 oe	**2**		**M1** for $1 - (0.2 + 0.32)$ oe	
4(a)	3, 5, 28, 14 correctly placed	**2**		**B1** for 28 in the intersection	
4(b)	$\frac{28}{50}$ oe	**1**		**FT** *their* 28 where *their* 28 < 50	
4(c)	$\frac{123}{175}$ oe	**2**		**M1** for $\frac{42}{50} \times \frac{41}{49}$	

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
4(d)	$\frac{63}{88}$ oe	**2**		**FT** *their* 28 **M1** for $\frac{their28}{33} \times \frac{their28 - 1}{32}$	
5(a)	$\frac{1}{6}$ oe on all late branches $\frac{5}{6}$ oe on all not late branches	**2**		**B1** for one correct vertical pair $\frac{1}{6}$ oe and $\frac{5}{6}$ oe	
5(b)	$\frac{5}{36}$ oe	**2**		**FT** *their* tree **M1** for *their* $\frac{1}{6} \times$ *their* $\frac{5}{6}$	
6	35	**1**			
7	42	**2**		**M1** for $\frac{7}{15}$ [$\times$ 90]	
					[Total: 22]

Statistics

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1 The number of passengers on a bus is recorded each day for 14 days.

15	18	22	17	35	38	24
19	19	24	25	31	36	29

(a) Complete the stem-and-leaf diagram.

1	
2	
3	

Key: 1 | 5 represents 15 passengers

[2]

(b) Find the median.

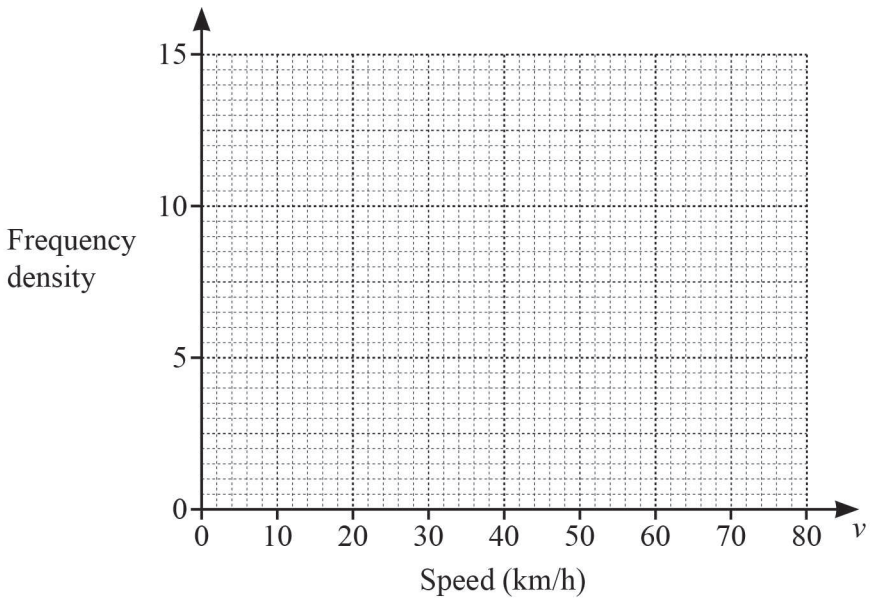
..... [1]

[Total: 3]

2 The speed, v km/h, of each of 200 cars passing a building is measured.
The table shows the results.

Speed (v km/h)	$0 < v \leqslant 40$	$40 < v \leqslant 50$	$50 < v \leqslant 80$
Frequency	50	120	30

On the grid, draw a histogram to show the information in this table.



[3]

[Total: 3]

3 The number of bowls of hot soup sold decreases when the temperature rises.

What type of correlation does this statement describe?

..... [1]

[Total: 1]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1(a)	1 | 5 7 8 9 9 2 | 2 4 4 5 9 3 | 1 5 6 8	**2**		**B1** for two rows correct or for a fully correct unordered stem-and-leaf diagram or for a correct diagram with one leaf incorrect or omitted	
1(b)	24	**1**			
2	Correct histogram	**3**		**B1** for each column If 0 scored **SC1** for correct frequency densities soi 1.25, 12, 1	
3	Negative	**1**			
					[Total: 7]

Surds

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1 DO NOT USE A CALCULATOR IN THIS QUESTION.

Simplify $\dfrac{\sqrt{128}}{\sqrt{72}}$.

[2]

[Total: 2]

Mark Scheme

Question	Answer	Marks	AO Element	Notes	Guidance
1	**M1** $\frac{\sqrt{128}}{\sqrt{72}} = \frac{\sqrt{64 \times 2}}{\sqrt{36 \times 2}}$ or simplifies $\frac{\sqrt{128}}{\sqrt{72}}$ to $\frac{\sqrt{16}}{\sqrt{9}}$ **A1** correct completion to $\frac{4}{3}$	**2**			
[Total: 2]					

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