

INTERNATIONAL GCSE MATHEMATICS

9260/1E

Extension Tier Paper 1E

Mark scheme

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Key to mark types and abbreviations

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[a, b]	Accept values between a and b inclusive.
[a, b)	Accept values $a \leq \text{value} < b$
3.14 ...	Accept answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Q	Answer	Mark	Comments
1	180 split into factors where at least one factor is prime	M1	eg 2 and 90 or $2 \times 3 \times 90$ or $180 \div 5 = 36$ may be seen on a factor tree or in repeated division
	2 and 2 and 3 and 3 and 5 identified	M1dep	may be seen on a factor tree or in repeated division
	$2^2 \times 3^2 \times 5$	A1	any order
	Additional Guidance		
	M1 be awarded for correct work with no or incorrect answer, even if this is seen among multiple attempts		
	Allow any number of 1s for up to M2		
	Condone full stops as multiplication signs for M1M1A1		
	Condone + instead of $\times$ for up to M2		
	For M1, allow one strand to be incorrect if a previous value completes the product eg 18×10 followed by $6 \times 2 \times 2 \times 5$ scores M1 for implied $18 \times 2 \times 5$		M1M0A0
	$2^2 \times 3^2 \times 5$, but answer given in a different format		M1M1A0

Q	Answer	Mark	Comments
2	$13x + 14y$ or $14y + 13x$	B2	B1 $15x + 20y$ or $-2x - 6y$ or $13x + ay$ where a is not 0 or 14 or $bx + 14y$ where b is not 0 or 13
	Additional Guidance		
	B2 response followed by further incorrect work is B1 eg $13x + 14y = 27xy$		B1
	B1 response followed by further incorrect work is B1 eg $15x + 20y = 35xy$		B1
	For B1 terms may be seen in a grid		
	Allow terms only seen as products for B1 but need full simplification for B2		

Q	Answer	Mark	Comments
3	$\frac{19}{7}$ or $1 \div 2\frac{5}{7}$	M1	oe
	$\frac{7}{19}$	A1	SC1 reciprocal of an incorrect improper fraction given as a fraction oe fraction eg $\frac{14}{38}$
	Additional Guidance		
	SC1 eg $2\frac{5}{7} = \frac{25}{7}$ with answer $\frac{7}{25}$		SC1
	0.368(4...) or 0.37		M1A0
	0.4 with no other working		M0A0

Q	Answer	Mark	Comments
4	$\frac{7}{7+13+10}$ or $\frac{7}{30}$ or $\frac{15}{15+19+16}$ or $\frac{15}{50}$	M1	oe fraction, decimal or percentage
	$\frac{7}{30}$ and $\frac{15}{50}$ in a comparable form and Class B	A1	eg 0.2(3...) and 0.3 and Class B or $\frac{35}{150}$ and $\frac{45}{150}$ and Class B or $\frac{7}{30}$ and $\frac{9}{30}$ and Class B

Q	Answer	Mark	Comments
5(a)	8^2 and 13^2 or 233	M1	oe eg 64 and 169 implied by 105 or $\sqrt{105}$ or 10.2(...)
	$\sqrt{8^2 + 13^2}$ or $\sqrt{64 + 169}$ or $\sqrt{233}$	M1	oe
	15.2(6...) or 15.3 with M1 seen	A1	accept 15 with M1 seen
	Additional Guidance		
	15.2(6...) with no working		M0M0A0
	15.2(6...) using trigonometry or accurate/scale drawing only		M0M0A0

Q	Answer	Mark	Comments
5(b)	Alternative method 1: uses or states cos or sin		
	cos stated or used or $\frac{\sin 90}{21} = \frac{\sin(90 - y)}{7}$	M1	oe eg $\frac{\sin 90}{21} = \frac{\sin(y)}{\sqrt{21^2 - 7^2}}$
	$\cos y = \frac{7}{21}$ or $\cos y = 0.333\dots$ or $90 - \sin^{-1} \frac{7}{21}$	M1	oe eg $90 - [19, 19.5]$
	[70, 71] with M2 seen	A1	
	Alternative method 2: works out opposite side first		
	$\tan y = \frac{\sqrt{21^2 - 7^2}}{7}$ or $\sin y = \frac{\sqrt{21^2 - 7^2}}{21}$	M2	oe eg $\tan^{-1} \frac{\sqrt{392}}{7}$ or $\sin^{-1} \frac{\sqrt{392}}{21}$ allow [19.7, 19.8] for $\sqrt{21^2 - 7^2}$
	[70, 71] with M2 seen	A1	
	Additional Guidance		
	Alt 1 SOHCAHTOA with CAH selected (eg circled)		M1
	[70.5, 71] with no working		M0M0A0
	[70.5, 71] from accurate/scale drawing only		M0M0A0

Q	Answer	Mark	Comments
6	Three correct matches	B3	B2 two correct matches B1 one correct match
	Additional Guidance		
	Two lines from an equation is choice for that equation		

Q	Answer	Mark	Comments
7(a)	An appropriate line of best fit passing between (7.5, [18, 23]) and (17.5, [26, 29])	B1	accept if clear intention to draw a straight line allow a curve or dotted line not zig/zags ignore anything either side of the gates
	Correct reading for their line of best fit	B1ft	ft their line of best fit if increasing throughout $\pm$ half a small square
	Additional Guidance		
	Ignore working lines drawn on the graph		
	No line of best fit drawn		B0B0

Q	Answer	Mark	Comments
7(b)	Valid reason	B1	eg out of range (of data) extrapolation is not reliable no other data that far along
	Additional Guidance		
	It is not reliable (no reason given)		B0

Q	Answer	Mark	Comments
8(a)	21 000 000 000 or 50 000 or (2.1 ÷ 5 =) 0.42 or $10^{10} \div 10^4 = 10^6$ or correct value not in standard form	M1	eg 420 000
	4.2×10^5	A1	
	Additional Guidance		
	Condone $10^5 \times 4.2$		M1A1
	Ignore an incorrect conversion to an ordinary number in working from the correct value in standard form eg $0.42 \times 10^6 = 4.2 \times 10^5 = 42\,000$, with answer 4.2×10^5		M1A1

Q	Answer	Mark	Comments
8(b)	2.7×10^{-5} , 9.6×10^{-5} , 8.3×10^{-4} , 3.5×10^3 with no incorrect conversions seen	B2	B1 one value out of order or reverse order
	Additional Guidance		
	If three of the values have been placed in the answer space the fourth is implied		
	Answers may be given in ordinary form or a mixture		

Q	Answer	Mark	Comments
9	$3b - 5$	B1	oe implied by $6b - 10$ or correct answer
	$2 \times (\text{their } 3b - 5)$ or $6b - 10$	M1	oe
	$7b - 10$	A1ft	ft their $3b - 5$
	Additional Guidance		
	Any subject, eg P = at the start of an expression can be ignored		
	Do not ignore further work after $7b - 10$ seen		

Q	Answer	Mark	Comments
10	Alternative method 1: works with given angles		
	Correctly identify the value of any angle not given	M1	may be on the diagram
	Correctly identify an angle or angles that could be used to show a contradiction	M1dep	may be on the diagram
	Contradiction shown with M2 awarded	A1	
	Alternative method 2: assumes lines are parallel		
	Correct identify the value of any angle not given assuming lines AB and CD are parallel	M1	may be on the diagram
	Correctly identify an angle or angles based on the assumption that could be used to show a contradiction	M1dep	may be on the diagram
	Contradiction shown with M2 awarded	A1	

Q	Answer	Mark	Comments
11	Alternative method 1: works out the cost of 3 batteries from 4 pack		
	$\frac{12.60}{4} \times 3$ or 9.45	M1	oe
	10.8(0) – their 9.45 or 1.35 or $\frac{\text{their } 9.45}{10.80} (\times 100)$ or 0.875 or 87.5	M1dep	oe accept their 9.45 – 10.8(0)
	$\frac{\text{their } 1.35}{10.80}$ or 1 – their 0.875 or 0.125 or 100 – their 87.5	M1dep	oe accept their 0.875 – 1
	12.5	A1	allow 13 with M3 awarded
	Alternative method 2: unitary method		
	$\frac{12.60}{4}$ or 3.15 and $\frac{10.80}{3}$ or 3.6(0)	M1	oe
	their 3.6(0) – their 3.15 or 0.45 or $\frac{\text{their } 3.15}{\text{their } 3.6(0)} (\times 100)$ or 0.875 or 87.5	M1dep	oe accept their 3.15 – 3.6(0)
	$\frac{\text{their } 0.45}{\text{their } 3.6(0)}$ or $\frac{3 \times \text{their } 0.45}{10.8(0)}$ or 1 – their 0.875 or 0.125 or 100 – their 87.5	M1dep	oe accept their 0.875 – 1
	12.5	A1	allow 13 with M3 awarded

Q	Answer	Mark	Comments
12	Equates coefficients or makes x the subject in one equation or makes y the subject in one equation	M1	eg $15x - 18y = 102$ and $15x + 20y = 45$ or eg $x = 6.8 + 1.2y$ or $x = \frac{34 + 6y}{5}$ or eg $y = 2.25 - 0.75x$ or $y = \frac{9 - 3x}{4}$
	Correct method to eliminate one variable	M1dep	$-18y - 20y = 102 - 45$ or $3(6.8 + 1.2y) + 4y = 9$ or $7.6y = -11.4$ or $5x - 6(2.25 - 0.75x) = 34$ or $9.5x = 47.5$ or $\frac{34 + 6y}{5} = 3 - \frac{4}{3}y$ or $\frac{9 - 3x}{4} = \frac{5}{6}x - \frac{17}{3}$
	$x = 5$ and $y = -1.5$ with valid working seen	A2	oe A1 $x = 5$ with valid working seen or $y = -1.5$ with valid working seen
	Additional Guidance		
	Up to M2 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	If equation coefficients for M1 the intention to subtract is sufficient for M1dep eg $15x - 18y = 102$ _ <u>$15x + 20y = 45$</u>		M1M1
	Correct values embedded in both equations		M2A1
	Correct values embedded in one equation		M2A0

Q	Answer	Mark	Comments
13(a)	23 – 12 or 11 or 12 – 8 or 4	M1	
	7	A1	

Q	Answer	Mark	Comments
13(b)	65 – 23 or 42 or $\frac{a}{65}$ where $0 < a < 65$	M1	may be seen within a calculation eg $1 - \frac{23}{65}$
	$\frac{42}{65}$	A1	oe fraction, decimal or percentage eg 0.646(...)
	Additional Guidance		
	Ignore further incorrect simplification after correct answer seen		

Q	Answer	Mark	Comments
14	(angle ABC =) $180 - 20 - 20$ or 140 or exterior angle = $20 + 20$ or 40	M1	oe eg $(90 - 20) \times 2$ may be seen on the diagram
	$360 \div (180 - \text{their } 140)$ or $360 \div (\text{their } 40)$ or $\frac{180(n-2)}{\text{their } 140} = n$	M1dep	oe oe equation
	9	A1	
	Additional Guidance		
	9 from incorrect working eg $180 \div 20 = 9$		M0A0

Q	Answer	Mark	Comments
15	Alternative method 1: works out the coordinates of all three points		
	$2a - 6 = 0$ or $\frac{a + 5 + 4}{2} = a + 3$ or $\frac{5a + 3 + 2a - 6}{2} = 9$ or $\frac{5a + 3 - 9}{a + 5 - (a + 3)} = \frac{9 - (2a - 6)}{a + 3 - 4}$	M1	<p>uses A is on the y-axis</p> <p>assumes B is the midpoint and uses the x-coordinates</p> <p>assumes B is the midpoint and uses the y-coordinates</p> <p>equates the gradients of AB and BC</p>
	$a = 3$ and $A = (4, 0)$ and $B = (6, 9)$ and $C = (8, 18)$	M1dep	may be implied by working
	Correct starting equation and $a = 3$ and $\frac{8 + 4}{2} = 6$ and $\frac{18(-0)}{2} = 9$ or $4 + 2 = 6$ and $6 + 2 = 8$ or $0 + 9 = 9$ and $9 + 9 = 18$ or $(9 - 0)^2 + (6 - 4)^2 = 85$ and $(18 - 9)^2 + (8 - 6)^2 = 85$	A1	oe

The mark scheme for question 15 continues on the next page

15 cont	Alternative method 2: uses an expression for the coordinates of the midpoint		
	$2a - 6 = 0$ or $\frac{a + 5 + 4}{2} = a + 3$ or $\frac{5a + 3 + 2a - 6}{2} = 9$ or $\frac{5a + 3 - 9}{a + 5 - (a + 3)} = \frac{9 - (2a - 6)}{a + 3 - 4}$	M1	<p>uses A is on the y-axis</p> <p>assumes B is the midpoint and uses the x-coordinates</p> <p>assumes B is the midpoint and uses the y-coordinates</p> <p>equates the gradients of AB and BC</p>
	$\frac{a + 5 + 4}{2}$ and $\frac{5a + 3 + 2a - 6}{2}$	M1	<p>oe</p> <p>eg $\frac{a + 9}{2}$ and $\frac{7a - 3}{2}$</p>
	<p>Correct starting equation</p> <p>and</p> <p>$a = 3$</p> <p>and</p> <p>$\frac{3 + 5 + 4}{2} = 6$ and $3 + 3 = 6$</p> <p>or $\frac{15 + 3 + 6 - 6}{2} = 9$</p>	A1	

The mark scheme for question 15 continues on the next page

15 cont	Alternative method 3: uses vectors		
	$2a - 6 = 0$ or $\frac{a + 5 + 4}{2} = a + 3$ or $\frac{5a + 3 + 2a - 6}{2} = 9$ or $\frac{5a + 3 - 9}{a + 5 - (a + 3)} = \frac{9 - (2a - 6)}{a + 3 - 4}$	M1	uses A is on the y-axis assumes B is the midpoint and uses the x-coordinates assumes B is the midpoint and uses the y-coordinates equates the gradients of AB and BC
	$\begin{pmatrix} a + 3 - 4 \\ 9 - 2a + 6 \end{pmatrix}$ and $\begin{pmatrix} a + 5 - a - 3 \\ 5a + 3 - 9 \end{pmatrix}$	M1dep	oe vectors for $\overrightarrow{AB}$ and $\overrightarrow{BC}$
	Correct starting equation and $a = 3$ and $\begin{pmatrix} 3 + 3 - 4 \\ 9 - 2 \times 3 + 6 \end{pmatrix} = \begin{pmatrix} 2 \\ 9 \end{pmatrix}$ and $\begin{pmatrix} 3 + 5 - 3 - 3 \\ 5 \times 3 + 3 - 9 \end{pmatrix} = \begin{pmatrix} 2 \\ 9 \end{pmatrix}$	A1	oe
	Additional Guidance		
	Follow the principles of the scheme for other valid methods		

Q	Answer	Mark	Comments
16	No and reason	B1	eg No and need to square root or No and counter-example given
	Additional Guidance		
	No and power of $\frac{1}{2}$ means you square root		B1
	No and $9^{\frac{1}{2}}$ is 3 (which is not half of 9)		B1
	No and $16^{\frac{1}{2}}$ is 4 (not 8)		B1
	No and $16^{\frac{1}{2}}$ is not 8		B0
	No and it does not always work		B0

Q	Answer	Mark	Comments
17	$n - 1$	B2	B1 (number of) edges = $2n$ or $n + n$ or (number of) faces = $n + 1$ or correct number of edges and faces for a value of n

Q	Answer	Mark	Comments
18	Converts to a common denominator with at least one numerator correct eg $\frac{35}{7a^2} - \frac{3a}{7a^2}$ or $\frac{35a}{7a^3} - \frac{3a^2}{7a^3}$	M1	
	$\frac{35 - 3a}{7a^2}$	A1	
	Additional Guidance		
	$\frac{35 - 3a}{7a^2}$ followed by further incorrect work		M1A0

Q	Answer	Mark	Comments
19	$\frac{3}{4}$ and -1	B2	oe B1 one correct

Q	Answer	Mark	Comments
20	$y(1 - 3x) = x$ or $y - 3xy = x$	M1	oe equation with fraction eliminated
	$y = x + 3xy$ or $y = x(1 + 3y)$ or $\frac{y}{3y+1}$ or $\frac{-y}{-3y-1}$	M1dep	oe equation with terms involving x collected and isolated
	$x = \frac{y}{3y+1}$	A1	oe equation with x as subject eg $x = \frac{-y}{-3y-1}$
	Additional Guidance		
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	Condone eg $x = \frac{y}{3y+1}$ seen in working with $\frac{y}{3y+1}$ on answer line		M2A1
	M2A1 response followed by incorrect further work is M2A0 eg $x = \frac{y}{3y+1}$ in working with $x = \frac{1}{3} + y$ on answer line		M2A0

Q	Answer	Mark	Comments
21	Correct equation in PQ	M1	eg $\frac{PQ}{\sin 79} = \frac{5.4}{\sin(180 - 79 - 45)}$ oe for $\sin 79$, allow [0.98, 0.982] for $5.4 \sin 79$ allow [5.29, 5.303] for $\sin(180 - 79 - 45)$, allow [0.829, 0.83]
	$(PQ =) \frac{5.4 \sin 79}{\sin(180 - 79 - 45)}$ or $(PQ =) \frac{5.4 \sin 79}{\sin(\text{their } 56)}$	M1	oe correct expression for PQ their 56 is their angle RPQ , which must be identified if wrong eg on diagram their angle RPQ must not be 79 or 45
	[6.38, 6.4]	A1	allow 6 with at least M1 awarded and no errors
	Additional Guidance		
	Allow use of any letter for PQ , eg x		
	Ignore incorrect notation only if recovered eg $\sin x = \frac{10 \sin 81}{\sin 32}$ with answer 18.6		
	M0M1 is possible here, eg angle RPQ identified as 60 followed by $\frac{5.4 \sin 79}{\sin(60)}$		M0M1

Q	Answer	Mark	Comments
22	Alternative method 1: works out total value of the 2000 over 3 years		
	2000×1.0125 or 2025	M1	oe
	2000×1.0125^3 or 2075(.9...) or 2076	M1	oe implies previous M mark
	$3400 - 2000 \times 1.0125^3$ or $3400 - \text{their } 2075(.9...)$ or 1324(.0...)	M1dep	oe dep on M2
	$\frac{\text{their } 1324(.0...)}{1.0125^2}$ or 1291(.5...)	M1dep	oe complete method
	1292	A1	
	Alternative method 2: works out value needed at end of year 1 to get 3400		
	$\frac{3400}{1.0125}$ or 3358(.0...)	M1	oe may be embedded within a larger calculation or part of an equation
	$\frac{3400}{1.0125^2}$ or 3316(.56...)	M1	oe implies previous M mark may be embedded within a larger calculation or part of an equation
	2000×1.0125 or 2025	M1	oe may be seen at any stage
	their 3316(.56...) – their 2025 or 1291(.5...)	M1dep	oe complete method dep on M3
	1292	A1	

Mark scheme and Additional Guidance continues on the next page

Q	Answer	Mark	Comments
22 cont	Alternative method 3: sets up and solves an equation		
	2000×1.0125 or 2025	M1	oe
	$(x + \text{their } 2025) \times 1.0125^2 (= 3400)$	M1dep	oe may be seen within an equation/inequality
	$1.0125^2 x = 3400 - 2025 \times 1.0125^2$ or $1324(.05\dots)$ or $x + 2025 = \frac{3400}{1.0125^2}$ or $3316(.56\dots)$	M1dep	oe
	$(x =) \frac{\text{their } 1324(.05\dots)}{1.0125^2}$ or $(x =) \text{their } 3316(.56\dots) - \text{their } 2025$ or $(x =) 1291(.5\dots)$	M1dep	oe complete method
	1292	A1	
	Additional Guidance		
	Allow use of an inequality in place of =		

Q	Answer	Mark	Comments
23	Alternative method 1: converts ratio to fraction		
	$\frac{2b}{3c} = \frac{4}{5}$	M1	oe equation
	$10b = 12c$ or $\frac{b}{c} = \frac{6}{5}$	M1	oe equation with integer coefficients
	6 : 5	A1	SC2 for answer 5 : 6
	Alternative method 2: divides given ratio		
	$b : 3c = 2 : 5$ or $2b : c = 4 : \frac{5}{3}$	M1	oe unsimplified ratio eg $b : 1.5c = 4 : 5$
	$(b : c) = \frac{4}{2} : \frac{5}{3}$	M1dep	oe unsimplified ratio
	6 : 5	A1	SC2 for answer 5 : 6
	Alternative method 3: uses a value of b to find c or a value of c to find b		
	A method to find values such that $2b : 3c = 4 : 5$ eg $b = 3$, then $c = 3 \times \frac{2 \times 5}{4 \times 3}$	M1	implied by correct values eg $b = 3$ and $c = \frac{5}{2}$ or $b = 12$ and $c = 10$
	$(b : c) = 3 : \frac{5}{2}$	M1dep	oe unsimplified ratio implies previous M mark
	6 : 5	A1	SC2 for answer 5 : 6
	Additional Guidance		
	M1 may be awarded for correct work with no answer or incorrect answer, even if this is seen amongst multiple attempts		
	SC2 reverse ratio		

Q	Answer	Mark	Comments
24		B2	B1 for a triangle of correct size and orientation in an incorrect position or 3 vertices correctly plotted but not joined

Q	Answer	Mark	Comments
25	4.8×10 or 48 or 5.8×5 or 29 or 3.6×10 or 36 or 2.6×15 or 39 or 0.8×15 or 12 or 3.6×5 or 18	M1	one correct area calculation or frequency value may be seen on diagram
	$(4.8 \times 10) + (5.8 \times 5) + (3.6 \times 5)$	M1dep	oe
	95	A1	SC2 69
	Additional Guidance		
	SC2 greater than 20 miles		

Q	Answer	Mark	Comments
26	$4x$ or -9	M1	oe eg $2(2)x^{2-1}$ or $-9x^{1-1}$
	$\left(\frac{dy}{dx} = \right) 4x - 9$	A1	implied by correct answer
	$4(5) - 9$ or 11	M1dep	substitutes 5 into their two-term linear $\frac{dy}{dx}$ dep on M1
	$4x - 9 = \frac{\text{their } 11}{3}$	M1dep	forms equation, dep on M1M1 oe equation
	$\frac{19}{6}$ or $3.16(66\dots)$ or 3.17	A1	oe fraction SC3 10.5 oe
	Additional Guidance		
	Accept 3.2 with working seen		
	SC3 gradient at Q = 3 × gradient at P		

Q	Answer	Mark	Comments
27	904.5 or 905.5 or (4 h) 12.5 or (4 h) 17.5 or $\frac{12.5}{60}$ or $\frac{17.5}{60}$ oe or 252.5 or 257.5	M1	for a correct bound implied by 4.208... or 4.21 or 4.29...
	their $904.5 \div \left(4 + \frac{\text{their } 17.5}{60}\right)$ or $\frac{\text{their } 904.5}{\text{their } 257.5} (\times 60)$ or $3.5(1\dots) (\times 60)$	M1	oe calculation of speed in km/h or km/min their 904.5 must be in [904.5, 905) their 17.5 must be in (15, 17.5] their 257.5 must be in (255, 257.5]
	[210.6, 211] with M2 scored	A1	

Q	Answer	Mark	Comments
28	Fully correct graph through $(0^\circ, 0)$, $(90^\circ, 1)$, $(180^\circ, 0)$, $(270^\circ, -1)$ and $(360^\circ, 0)$	B2	B1 graph that has exactly two turning points and goes through at least two of the five correct points
	Additional Guidance		
	Mark intention and ignore graph beyond 360°		

Q	Answer	Mark	Comments
29	$(ABC =) 38 + 26$ or 64 or $(180 - 2 \times 38) + (180 - 2 \times 26)$ or (reflex) $AOC = 232$	M1	oe angles may be seen on the diagram
	(obtuse $AOC =) 2 \times$ their 64 or $360 -$ their 232 or 128 or $(ADC =) 180 -$ their 64 or their $232 \div 2$ or 116	M1dep	oe angles may be seen on the diagram
	$(OAD =) 180 -$ their 128 or $360 -$ their 116 – their 128 – $(180 -$ their 116) or 52	M1dep	oe any complete method to find angle OAD
	52 and all appropriate reasons for their method eg isosceles triangle angle at centre is twice angle at circumference opposite angles in a cyclic quadrilateral add to 180° co-interior angles add to 180° angles in a quadrilateral add to 360°	A1	reasons must be linked to the method only the reasons appropriate for their method should be included
	Additional Guidance		
	Allow any unambiguous notation for angle values, eg allow B instead of ABC , but eg do not allow A to refer to OAD unless made clearer through labelling on diagram or other working		

Q	Answer	Mark	Comments
30	$y \leq \frac{3}{4}x + 5$ and $y \geq 0$	B1	oe equations allow equations in any order as final answers or clear in working and not contradicted
	(gradient of M =) $-\frac{4}{3}$	M1	oe seen or implied
	$(y =) \frac{3}{4} \times 4 + 5$ or 8	M1	y coordinate at intersection
	their $8 = -\frac{4}{3} \times 4 + c$ or $c = \frac{40}{3}$ or $-\frac{4}{3}x + \frac{40}{3}$	M1dep	substitution to find c for line M oe eg $y - \text{their } 8 = -\frac{4}{3}(x - 4)$ dep on M1M1
	$y \leq -\frac{4}{3}x + \frac{40}{3}$	A1ft	ft their equation of line M SC4 for $\leq$ given as $<$ and/or $\geq$ given as $>$ in one or more of the inequalities

Q	Answer	Mark	Comments
31	$1 \times 2^n + 2^n \times 1$ or $2^n + 2^n$ or $2(2^n)$ or $1 \times 0 + 2^n \times 6$ or $6(2^n)$ or $-2 \times 2^n + 0 \times 1$ or $-2(2^n)$ or $-2 \times 0 + 0 \times 6$	M1	oe for a correct expression for any one of the four elements may be seen in the correct position within a matrix
	$1 \times 2^n + 2^n \times 1$ or $2^n + 2^n$ or $2(2^n)$ and $1 \times 0 + 2^n \times 6$ or $6(2^n)$ and $-2 \times 2^n + 0 \times 1$ or $-2(2^n)$ and $-2 \times 0 + 0 \times 6$ or 0	M1	oe for a correct expression for all three non-zero elements may be seen in the correct position within a matrix
	$\begin{pmatrix} 2^{n+1} & 3(2^{n+1}) \\ -1(2^{n+1}) & 0 \end{pmatrix}$ with M2 scored or $r = 3$ and $s = -1$ with M2 scored	A2	A1 $3(2^{n+1})$ or $r = 3$ or $-1(2^{n+1})$ or $s = -1$ allow $-(2^{n+1})$ for $-1(2^{n+1})$

Q	Answer	Mark	Comments
32	$\sqrt[3]{64 + 665}$ or 9 or $\sqrt[3]{\frac{729}{64}}$ or $\frac{9}{4}$ or $\sqrt[3]{\frac{64}{729}}$ or $\frac{4}{9}$ or 4 : 9	M1	oe
	4 : 5	A1	oe
	Additional Guidance		
	$\sqrt[3]{64}$ and/or $\sqrt[3]{665}$ with no other working		M0