Mark Scheme (Results)

January 2021

Pearson Edexcel International GCSE
Mathematics A (4MA1)
Paper 1H

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
  Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

- **Types of mark**
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)

- dep – dependent
- indep – independent
- awrt – answer which rounds to
- eeoo – each error or omission

- **No working**

  If no working is shown then correct answers normally score full marks

  If no working is shown then incorrect (even though nearly correct) answers score no marks.

- **With working**

  If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

  If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review. If there is a choice of methods shown, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

  If there is no answer on the answer line then check the working for an obvious answer.

- **Ignoring subsequent work**

  It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

International GCSE Maths					
Apart from questions 5(b), 15, 17, 18, 19, 23 and 24 (where the mark scheme states otherwise) the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method					
Q	**Working**	**Answer**	**Mark**	**Notes**	
1	e.g. 0.7 × 20 160 oe (= 14 112) **or** 0.3 × 20 160 oe (= 6048)		4	M1	
	e.g. "14 112" ÷ (9 + 5 + 2) (= 882) **or** (20 160 − "6048") ÷ (9 + 5 + 2) (= 882)			M1	M2 for $\frac{9-2}{9+5+2}$ × "14 112" oe
	e.g. 9 × "882" – 2 × "882"			M1	
		6174		A1	
					Total 4 marks

2	(a)		$70 < s \leq 80$	1	B1	
	(b)	$10 \times 45 + 16 \times 55 + 19 \times 65 + 23 \times 75 + 12 \times 85$ **or** $450 + 880 + 1235 + 1725 + 1020$ (= 5310)		4	M2	f × d for at least 4 products with correct mid-interval values and intention to add. If not M2 then award M1 for d used consistently for at least 4 products within interval (including end points) and intention to add **or** for at least 4 correct products with correct mid-interval values with no intention to add
		"5310" ÷ 80			M1	dep on at least M1 allow division by their $\sum f$ provided addition or total under column seen
			66.4		A1	accept 66.37 – 66.4
						Total 5 marks

3	e.g. 30 × 20 × 125 (= 75 000) **or** 85 × 40 × 125 (= 425 000) **or** $(60\times30+(85-30)\times40)\times125(=500\ 000)$ oe		4	M1	for a method to find the volume of water already pumped out **or** the volume of water left **or** the total volume of the container
	"75 000" ÷ 1.5 (= 50 000) **or** "75 000" ÷ 90 (= 833.3... or $\frac{2500}{3}$) **or** $"425000"\div"75000"(=5.66...$ or $\frac{17}{3})$ **or** $"500000"\div"75000"(=6.66...$ or $\frac{20}{3})$			M1	M2 for $\frac{"425000"}{"75000"}\times 1.5$ oe (= 8.5) **or** $\frac{"500000"}{"75000"}\times 1.5$ oe (= 10)
	"425 000" ÷ "50 000" (= 8.5) **or** "425 000" ÷ ("833.3..." × 60) oe (= 8.5) **or** "5.66…" × 1.5 (= 8.5) **or** "6.66…" × 1.5 (= 10)			M1	
		20 30		A1	Allow 8 30 (pm)
					Total 4 marks

4	(i)		21, 27	1	B1
	(ii)		21, 23, 24, 25, 27, 29	1	B1
					Total 2 marks

5	(a)		$5y^3(3y + 4u)$	2	B2	for $5y^3(3y + 4u)$
					(B1	for $5y(3y^3 + 4uy^2)$ **or** $5y^2(3y^2 + 4uy)$ **or** $y^2(15y^2 + 20uy)$ **or** $y^3(15y + 20u)$ **or** $5y^3(\ldots)$ where there is only one mistake in the brackets)
	(b)	$4\times(4-3x)=5-8x$ oe **or** $16-12x=5-8x$ oe **or** $4-3x=\frac{5}{4}-2x$ oe		3	M1	for removal of fraction in a correct equation
		e.g. $16-5=12x-8x$ **or** $11=4x$ oe **or** $4-\frac{5}{4}=3x-2x$			M1	for terms in x on one side **and** numbers on the other side in an equation, allow correct rearrangement of their equation in the form $ax + b = cx + d$
			2.75		A1	(dep on M1) oe e.g. $2\frac{3}{4}$ or $\frac{11}{4}$
						Total 5 marks

6	(a)		2.84×10^9	1	B1	
	(b)		0.000 25	1	B1	
						Total 2 marks

7 (a)	for 0.035 × 40 000 oe (= 1400) **or** 1.035 × 40 000 oe (= 41 400)	**OR**		3	M1	for finding 3.5% **or** 103.5% of 40 000	**OR** M2 for 40 000 × 1.035^3 **or** 40 000 × 1.035^4 (= 45 900.92) (M1 for 40 000 × 1.035^2 (= 42 849))
	1.035 × "41 400" oe (= 42 849) 1.035 × "42 849" oe (= 44 348.72)	40 000 × 1.035^3			M1	for completing method to find total amount in the account	
			44 349		A1	accept 44 348 – 44 349	
						SC: if no other marks gained award M1 for 0.105 × 40 000 oe **or** 4200 **or** 44 200 accept (1 + 0.035) as equivalent to 1.035 throughout	
(b)	e.g. 30 481 ÷ (1 – 0.065) **or** 30 481 ÷ 0.935			3	M2	for a complete method	
					(M1)	for 30 481 ÷ (100 – 6.5) (= 326) **or** (100 – 6.5)% = 30 481 **or** 93.5% = 30 481 **or** e.g. (1 – 0.065)x = 30 481	
			32 600		A1		
							Total 6 marks

8	$2 \times \pi \times 7$ (= 43.982… or 14π) **or** $(2 \times \pi \times 7) \div 2$ (= 21.991… or 7π) **or** $2 \times \pi \times 9$ (= 56.548… or 18π) **or** $(2 \times \pi \times 9) \div 2$ (= 28.274… or 9π)		3	M1	for finding the circumference of either the full circle or the length of the arc for either semicircle
	e.g. "21.991" + "28.274" (= 50.26…) **or** "7π" + "9π" (=16π) **or** "21.991" + "28.274" + 2 (= 52.26…) **or** "7π" + "9π" + 2 (= 52.26…) **or** "21.991" + "28.274" + 2 + 2 **or** "7π" + "9π" + 2 + 2			M1	for a method to find the length of the two arcs with intention to add
		54.3		A1	accept 54.2 – 54.3
					Total 3 marks

9	(a)		$16x^{12}y^{20}$	2	B2	B1 for an answer in the form ax^ny^m with 2 correct from $a = 16$, $n = 12$, $m = 20$
	(b)(i)	$(x \pm 9)(x \pm 4)$		2	M1	for $(x \pm 9)(x \pm 4)$ **or** for $(x + a)(x + b)$ where $ab = -36$ or $a + b = 5$
			$(x + 9)(x – 4)$		A1	
	(ii)		–9, 4	1	B1	ft from (b)(i)
						Total 5 marks

10	e.g. $\sin 65 = \frac{16}{AB}$ **or** $\cos 25 = \frac{16}{AB}$ **or** $\frac{AB}{\sin 90} = \frac{16}{\sin 65}$ **or** $\tan 65 = \frac{16}{AD}$ **or** $\tan 25 = \frac{AD}{16}$ **or** $\frac{AD}{\sin 25} = \frac{16}{\sin 65}$		4	M1	for a correct trig ratio for AB **or** AD accept 180 – 90 – 65 for 25
	e.g. $(AB =) \frac{16}{\sin 65} (= 17.654\ldots)$ **or** $(AB =) \frac{16}{\cos 25} (= 17.654\ldots)$ **or** $(AB =) \frac{16 \sin 90}{\sin 65} (= 17.654\ldots)$ **and** $(AD =) \frac{16}{\tan 65} (= 7.460\ldots)$ **or** $(AD) = 16 \times \tan 25 (= 7.460\ldots)$ **or** $(AD =) \frac{16 \sin 25}{\sin 65} (= 7.460\ldots)$			M1	for finding AB **and** AD Allow use of Pythagoras $(AD =) \sqrt{"17.654..."^2 - 16^2}$ $(= 7.460\ldots)$ or $(AB =) \sqrt{"7.460..."^2 + 16^2}$ $(= 17.654\ldots)$
	("17.654…" × 2) + ("7.460…" × 2) oe			M1	for a complete method to find the perimeter
		50.2		A1	accept 49.6 – 50.6
					Total 4 marks

11 (a)			2	M1	for use of cf at 45
		146		A1	accept in the range 145 – 147
(b)	93.75 ÷ 3.75 (= 25)		3	M1	
	Using cf diagram at 90 – "25" (= 65)			M1	for use of cf at "65"
		151		A1	accept in the range 150 – 152
					Total 5 marks

12	(a)	$\frac{4(x+1)-3(x-2)}{(x-2)(x+1)}$ **or** $\frac{4(x+1)}{(x-2)(x+1)}-\frac{3(x-2)}{(x-2)(x+1)}$		3	M1	for expressing both fractions correctly with a common denominator.
		$\frac{4x+4-3x+6}{(x-2)(x+1)}$ **or** $\frac{4x+4-3x+6}{x^2-x-2}$			M1	for removing brackets in a single fraction with a correct denominator. Allow denominator to be expanded. Allow one error in the expansion of the numerator.
			$\frac{x+10}{(x-2)(x+1)}$		A1	accept $\frac{x+10}{x^2-x-2}$ oe
	(b)	$2x(x-5)=2x^2-10x$ **or** $2x(x-3)=2x^2-6x$ **or** $(x-5)(x-3)=x^2-5x-3x+15\left(=x^2-8x+15\right)$		3	M1	for multiplying 2x by a bracket with both terms correct **or** the 2 brackets with at least 3 out of 4 terms correct or at least 2 out of 3 terms correct
		$(2x^2-10x)(x-3)=2x^3-6x^2-10x^2+30x$ **or** $(2x^2-6x)(x-5)=2x^3-10x^2-6x^2+30x$ **or** $2x(x^2-5x-3x+15) = 2x^3-10x^2-6x^2+30x$ **or** $2x(x^2-8x+15)=2x^3-16x^2+30x$			M1	(dep) for multiplying the product of 2x and the 1st bracket (ft from the 1st stage) by the 2nd bracket and getting at least 3 out of 4 terms correct **or** multiplying the product of the 2 brackets (ft from the 1st stage) by the 2x, and getting at least 3 out of 4 or 2 out of 3 terms correct
			$2x^3-16x^2+30x$		A1	
						Total 6 marks

13	(a)	$\frac{8--4}{5-9}\left(=\frac{12}{-4}\right)$ oe or $\frac{-4-8}{9-5}\left(=\frac{-12}{4}\right)$ oe		2	M1	condone correct gradient embedded in an equation e.g. $y = -3x + c$ **or** expression e.g. $-3x$ **or** for an answer of 3
			-3		A1	
	(b)		$\frac{1}{4}$	1	B1	accept 0.25 or $-\frac{1}{-4}$ oe
						Total 3 marks

14	(a)	0.6×0.9		2	M1	oe
			0.54		A1	oe e.g. $\frac{27}{50}, \frac{54}{100}$, 54%
	(b)	0.6×0.1 (= 0.06) **or** 0.4×0.25 (= 0.1) **or** 0.4×0.75 (= 0.3)		3	M1	oe
		$0.6 \times 0.1 + 0.4 \times 0.25$ **or** $1 - (0.4 \times 0.75)$ – "0.54"			M1	oe, ft their answer from (a)
			0.16		A1	oe e.g. $\frac{4}{25}, \frac{8}{50}, \frac{16}{100}$, 16%
						Total 5 marks

15	9.55 **or** 9.65 **or** 3.75 **or** 3.85 **or** 1.835 **or** 1.845		3	B1	accept $9.64\dot{9}$ for 9.65, $3.84\dot{9}$ for 3.85, $1.844\dot{9}$ for 1.845
	$a = \frac{UB_v - LB_u}{LB_t}$ e.g. $a = \frac{9.65 - 3.75}{1.835} (= 3.2152...)$			M1	for correct substitution of $9.6 < UB_v \leq 9.65$ **and** $3.75 \leq LB_u < 3.8$ **and** $1.835 \leq LB_t < 1.84$
		3.22		A1	accept 3.21 – 3.22 from correct working
					Total 3 marks

16	$(BC^2 =)\ 150^2 + 275^2 - (2 \times 150 \times 275 \times \cos 120)\ (= 139\,375)$		5	M1 for correct substitution into the cosine rule
	$(BC =)\ \sqrt{150^2 + 275^2 + 41250}$ oe or $\sqrt{139375}$ or $25\sqrt{223}$ or 373.…			M1 for correct order of operations and square root
	e.g. $\frac{\sin ABC}{275} = \frac{\sin 120}{"373..."}$ **or** $275^2 = 150^2 + "373..."^2 - (2 \times 150 \times "373..." \times \cos ABC)$ **or** $\cos ABC = \frac{150^2 + "373..."^2 - 275^2}{2 \times 150 \times "373..."}$ **or** $\frac{\sin ACB}{150} = \frac{\sin 120}{"373..."}$ **or** $150^2 = 275^2 + "373..."^2 - (2 \times 275 \times "373..." \times \cos ACB)$ **or** $\cos ACB = \frac{275^2 + "373..."^2 - 150^2}{2 \times 275 \times "373..."}$			M1 (dep on 1st M1) ft 373… for a correct trig statement involving angle ABC **or** angle ACB
	$(ABC =) \sin^{-1}\left(\frac{\sin 120}{"373..."} \times 275\right) (= 39.6\ldots)$ **or** $(ABC =) \cos^{-1}\left(\frac{150^2 + "373..."^2 - 275^2}{2 \times 150 \times "373..."}\right) (= 39.6\ldots)$ **or** $(ACB =) \sin^{-1}\left(\frac{\sin 120}{"373..."} \times 150\right) (= 20.3\ldots)$ **or** $(ACB =) \cos^{-1}\left(\frac{275^2 + "373..."^2 - 150^2}{2 \times 275 \times "373..."}\right) (= 20.3\ldots)$			M1 for a complete method to find angle ABC **or** angle ACB
		140		A1 accept 140 – 140.4
				Total 5 marks

17	e.g. (V =) $\frac{1}{2}\left(\frac{4}{3}\pi x^3\right)+\pi x^2(20-4x)$ **or** (V =) $\frac{2}{3}\pi x^3+20\pi x^2-4\pi x^3$		5	M1 for a correct expression
	e.g. $\frac{1}{3}\pi y=\frac{1}{2}\left(\frac{4}{3}\pi x^3\right)+\pi x^2(20-4x)$ **or** $\frac{1}{3}\pi y=\frac{2}{3}\pi x^3+20\pi x^2-4\pi x^3$			M1 for a correct equation
	$y=60x^2-10x^3$ oe			A1 for writing y in terms of x
	e.g. $\left(\frac{dy}{dx}=\right)120x-30x^2=0$ oe			M1 for differentiating their $ax^2 + bx^3$ and equating to 0
		320		A1 (dep on M3) cao
				Total 5 marks

18	e.g. $40+8\sqrt{x}-5\sqrt{x}-\sqrt{x}\sqrt{x}$ **or** $40+8\sqrt{x}-5\sqrt{x}-\left(\sqrt{x}\right)^2$ **or** $40+8\sqrt{x}-5\sqrt{x}-x$ **or** $40+3\sqrt{x}-x$		3	M1 for a correct expansion with at least 3 out of 4 terms correct oe or all 3 terms correct
		x = 19		A1 (dep on M1) for x = 19
		y = 3		B1 for y = 3
				Total 3 marks

19	$(1-2y)^2-9y-(1-2y)=2y^2-12$	$x^2-9\left(\frac{1-x}{2}\right)-x=2\left(\frac{1-x}{2}\right)^2-12$		5	M1 substitution of linear equation into quadratic
	e.g. $2y^2-11y+12(=0)$ oe allow $2y^2-11y=-12$ oe	e.g. $x^2+9x+14(=0)$ oe allow $x^2+9x=-14$ oe			A1 (dep on M1) writing the correct quadratic expression in the form $ax^2 + bx + c\ (= 0)$ allow $ax^2 + bx = c$
	e.g. $(2y-3)(y-4)(=0)$ $(y=)\ \frac{11\pm\sqrt{(-11)^2-4\times2\times12}}{2\times2}$ e.g. $2\left[\left(y-\frac{11}{4}\right)^2-\left(\frac{11}{4}\right)^2\right]=-12$ oe	e.g. $(x+7)(x+2)(=0)$ $(x=)\ \frac{-9\pm\sqrt{9^2-4\times1\times14}}{2}$ e.g. $\left(x+\frac{9}{2}\right)^2-\left(\frac{9}{2}\right)^2=-14$			M1 (dep on M1) for a complete method to solve their 3-term quadratic equation (allow one sign error and some simplification – allow as far as $\frac{11\pm\sqrt{121-72}}{4}$ or $\frac{-9\pm\sqrt{81-56}}{2}$)
	$y=\frac{3}{2}$ oe and $y = 4$	$x = -7$ and $x = -2$			A1 (dep on M1) both x-values **or** both y-values
			$x = -2$, $y=\frac{3}{2}$ oe and $x = -7$, $y = 4$		A1 (dep on first M1) must be paired correctly
					Total 5 marks

20	$\sqrt[3]{\frac{4352}{1836}}$ **or** $\frac{4}{3}$ **or** 1.33(33...) **or** 4:3 **or** $\sqrt[3]{\frac{1836}{4352}}$ **or** $\frac{3}{4}$ **or** 0.75 **or** 3:4		3	M1	for a correct length scale factor or a correct length ratio
	e.g. $1120 \div \left("\frac{4}{3}"\right)^2$ oe **or** $1120 \times \left("\frac{3}{4}"\right)^2$ oe			M1	(dep on M1) for a correct method to work out the surface area of A
		630		A1	
					Total 3 marks

21	(a)(i)		(−12, 15)	1	B1	
	(ii)		(−9, 5)	1	B1	
	(b)		a = 2 and b = 90	2	B2	for both values correct (B1 for a = 2 **or** b = 90 **or** a = −2 **and** b = −90)
						Total 4 marks

22	$y = (x-4)^2 - 4^2\ (+5)$ oe **or** $x = (y-4)^2 - 4^2\ (+5)$		3	M1	for a correct first step in order to complete the square
	$y = 4 \pm \sqrt{11+x}$ **or** $x = 4 \pm \sqrt{11+y}$			A1	allow $y = 4+\sqrt{11+x}$ **or** $x = 4+\sqrt{11+y}$
		$4-\sqrt{x+11}$		A1	oe
					Total 3 marks

22 ALT	$x^2 - 8x + (5-y) = 0$ $(x=)\dfrac{8 \pm \sqrt{(-8)^2 - 4\times1\times(5-y)}}{2\times1}$ **or** $y^2 - 8y + (5-x) = 0$ $(y=)\dfrac{8 \pm \sqrt{(-8)^2 - 4\times1\times(5-x)}}{2\times1}$		3	M1	for a correct first step in preparation for use of quadratic formula and substitution into the quadratic formula (allow one sign error)
	$y = 4 \pm \sqrt{11+x}$ **or** $x = 4 \pm \sqrt{11+y}$			A1	allow $y = 4+\sqrt{11+x}$ **or** $x = 4+\sqrt{11+y}$
		$4-\sqrt{x+11}$		A1	oe
					Total 3 marks

22 ALT	Using $ax^2+bx+c=a(x+p)^2+q$			
	$\left(p=\frac{b}{2a}\right)=\frac{-8}{2}(=-4)$ **and** $q=(4)^2-8(4)+5(=-11)$		3	M1 for finding p and q
	$y=4\pm\sqrt{11+x}$ **or** $x=4\pm\sqrt{11+y}$			A1 allow $y=4+\sqrt{11+x}$ **or** $x=4+\sqrt{11+y}$
		$4-\sqrt{x+11}$		A1 oe
				Total 3 marks

23	$\overrightarrow{AB} = 2\mathbf{b} - 2\mathbf{a}$ oe **or** $\overrightarrow{BA} = 2\mathbf{a} - 2\mathbf{b}$ oe **or** $\overrightarrow{AM} = \mathbf{b} - \mathbf{a}$ oe **or** $\overrightarrow{MA} = \mathbf{a} - \mathbf{b}$ oe **or** $\overrightarrow{BM} = \mathbf{b} - \mathbf{a}$ oe **or** $\overrightarrow{MB} = \mathbf{a} - \mathbf{b}$ oe		6	M1	for finding $\overrightarrow{AB}$ **or** $\overrightarrow{BA}$ **or** $\overrightarrow{AM}$ **or** $\overrightarrow{MA}$ **or** $\overrightarrow{BM}$ **or** $\overrightarrow{MB}$
	e.g. $\overrightarrow{OM} = 2\mathbf{a} + (\mathbf{b} - \mathbf{a})\ (= \mathbf{a} + \mathbf{b})$ oe **or** $\overrightarrow{MO} = (\mathbf{b} - \mathbf{a}) - 2\mathbf{b}\ (= -\mathbf{a} - \mathbf{b})$ oe **or** $\overrightarrow{AN} = \frac{4}{3}\mathbf{b} - 2\mathbf{a}$ oe **or** $\overrightarrow{NA} = 2\mathbf{a} - \frac{4}{3}\mathbf{b}$ oe			M1	for finding $\overrightarrow{OM}$ **or** $\overrightarrow{MO}$ **or** $\overrightarrow{AN}$ **or** $\overrightarrow{NA}$
	e.g. $\overrightarrow{OP} = 2\mathbf{a} + \lambda\left(\frac{4}{3}\mathbf{b} - 2\mathbf{a}\right)$ oe **or** $\overrightarrow{OP} = \frac{4}{3}\mathbf{b} + \lambda\left(2\mathbf{a} - \frac{4}{3}\mathbf{b}\right)$ oe **or** $\overrightarrow{OP} = \mu(\mathbf{a} + \mathbf{b})$ oe **OR** $\overrightarrow{MP} = \mathbf{a} - \mathbf{b} + \mathrm{k}\left(\frac{4}{3}\mathbf{b} - 2\mathbf{a}\right)$ oe **or** $\overrightarrow{MP} = \mathbf{b} - \mathbf{a} - \frac{2}{3}\mathbf{b} + \mathrm{k}\left(2\mathbf{a} - \frac{4}{3}\mathbf{b}\right)$ oe **or** $\overrightarrow{MP} = \mathrm{t}(-\mathbf{a} - \mathbf{b})$ oe			M1	for finding $\overrightarrow{OP}$ **or** $\overrightarrow{PO}$ **or** $\overrightarrow{MP}$ **or** $\overrightarrow{PM}$
	e.g. $2\mathbf{a} + \lambda\left(\frac{4}{3}\mathbf{b} - 2\mathbf{a}\right) = \mu(\mathbf{a} + \mathbf{b})$ oe **or** $\frac{4}{3}\mathbf{b} + \lambda\left(2\mathbf{a} - \frac{4}{3}\mathbf{b}\right) = \mu(\mathbf{a} + \mathbf{b})$ oe **or** $\mathbf{a} - \mathbf{b} + \mathrm{k}\left(\frac{4}{3}\mathbf{b} - 2\mathbf{a}\right) = \mathrm{t}(-\mathbf{a} - \mathbf{b})$ oe **or** $\mathbf{b} - \mathbf{a} - \frac{2}{3}\mathbf{b} + \mathrm{k}\left(2\mathbf{a} - \frac{4}{3}\mathbf{b}\right) = \mathrm{t}(-\mathbf{a} - \mathbf{b})$ oe			M1	for setting up an equation for $\overrightarrow{OP}$ **or** $\overrightarrow{MP}$
	$\mu = \frac{4}{5}$ **or** $\mathrm{t} = \frac{1}{5}$			M1	for finding μ or t for either $\overrightarrow{OP} = \mu\overrightarrow{OM}$ **or** $\overrightarrow{MP} = \mathrm{t}\overrightarrow{MO}$
		4 : 1		A1	cao (dep on M3)
					Total 6 marks

24	$\frac{2n}{2}\left[2a+(2n-1)d\right]$ oe		4	M1	for a correct expression for S_{2n}
	$\frac{2n}{2}\left[2a+(2n-1)d\right]=4\times\frac{n}{2}\left[2a+(n-1)d\right]$ oe			M1	dep on M1 for setting up a correct equation for $S_{2n} = 4 \times S_n$
	$2a-d=4a-2d$ oe			M1	for a correct linear expression in a and d
		$\frac{d}{2}$		A1	(dep on M2) for $\frac{d}{2}$ oe
					Total 4 marks

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