

INTERNATIONAL AS MATHEMATICS

MA01

(9660/MA01) Unit P1 Pure Mathematics

Mark scheme

June 2025

Version: 0.1 Pre-Standardisation



2 5 6 X M A 0 1 / M S

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this mark scheme are available from www.oxfordaqa.com

Copyright information

OxfordAQA retains the copyright on all its publications. However, registered schools/colleges for OxfordAQA are permitted to copy material from this booklet for their own internal use, with the following important exception: OxfordAQA cannot give permission to schools/colleges to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Copyright © 2025 OxfordAQA International Examinations and its licensors. All rights reserved.

Key to mark scheme abbreviations

M	Mark is for method
m	Mark is dependent on one or more M marks and is for method
A	Mark is dependent on M or m marks and is for accuracy
B	Mark is independent of M or m marks and is for method and accuracy
E	Mark is for explanation
✓ or ft	Follow through from previous incorrect result
CAO	Correct answer only
CSO	Correct solution only
AWFW	Anything which falls within
AWRT	Anything which rounds to
ACF	Any correct form
AG	Answer given
SC	Special case
oe	Or equivalent
A2, 1	2 or 1 (or 0) accuracy marks
–x EE	Deduct x marks for each error
NMS	No method shown
PI	Possibly implied
SCA	Substantially correct approach
sf	Significant figure(s)
dp	Decimal place(s)
ISW	Ignore subsequent working

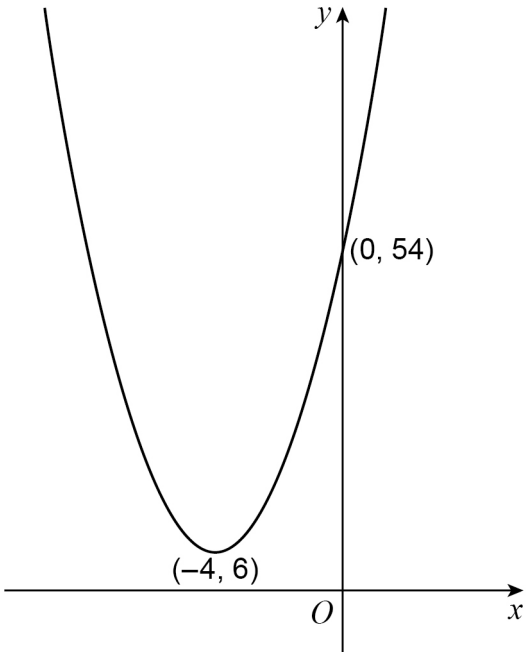
Q	Answer	Marks	Comments
1(a)(i)	$16p^{\frac{7}{6}}$	B1	
		1	

Q	Answer	Marks	Comments
1(a)(ii)	$6p^{\frac{11}{24}}$	B1	
		1	

Q	Answer	Marks	Comments
1(b)	$\left[(a - 5\sqrt{7})^2 = \right]$ $a^2 - 10\sqrt{7}a + 175$ or $a^2 - 5\sqrt{7}a - 5\sqrt{7}a + 175$ $\left[-10\sqrt{7}a = -30\sqrt{7} \Rightarrow a = \right] 3$ $\left[a = 3 \Rightarrow b = a^2 + 175 = \right] 184$	M1 A1 A1ft	Correct expansion of LHS simplified or unsimplified with $(5\sqrt{7})^2$ evaluated CAO ft Their a provided it is an integer
		3	

	Question 1 Total	5	
--	------------------	---	--

Q	Answer	Marks	Comments
2(a)	$(x+4)^2 \dots$	M1	Allow
	$3(x+4)^2 - 48 + 54$	A1	$3((x+4)^2 - 16) + 54$ $3((x+4)^2 - 16 + 18)$ $3((x+4)^2 + 2)$ Must have correct use of brackets
	$3(x+4)^2 + 6$	A1	CAO
		3	

Q	Answer	Marks	Comments
2(b)		M1	Correctly orientated symmetrical quadratic parabola
		A1ft	Vertex labelled as $(-4, 6)$ ft Their $(-b, c)$ from part (a) Accept correctly positioned vertex with $x = -4$ and $y = 6$ indicated on the axes
		B1	$(0, 54)$ labelled on y -axis. Condone given as y -value only
		3	

Q	Answer	Marks	Comments
2(c)	Translation $\begin{bmatrix} 9 \\ 0 \end{bmatrix}$	E1 E1ft	Must be given as a vector ft Their x -coordinate of the vertex of C from part (b)
		2	
	Question 2 Total	8	

Q	Answer	Marks	Comments
3(a)	$\frac{y-6}{0-4}$ $\frac{y-6}{0-4} = -\frac{1}{4}$ and $[y =] \ 7$	M1 A1	oe Correct method for finding the gradient of AB oe Setting the expression for the gradient equal to $-\frac{1}{4}$ and AG

Q	Answer	Marks	Comments
3(a) ALT	$y-6 = -\frac{1}{4}(x-4)$ or $y = -\frac{1}{4}x + c$ $[x=0 \Rightarrow] y-6 = -\frac{1}{4}(0-4)$ and $[y =] \ 7$ or $[x=4 \text{ and } y=6 \Rightarrow] 6 = -\frac{1}{4} \times 4 + c$ and $[c =] \ 7$	M1 A1	oe Correct equation for AB or Recognising that equation of AB is of the form $y = -\frac{1}{4}x + c$ oe oe Substituting $x=0$ into the correct equation for AB and AG or oe Substituting $x=4$ and $y=6$ into $y = -\frac{1}{4}x + c$ and AG
		2	

Q	Answer	Marks	Comments
3(b)	[Gradient of $AD =$] 4 $y - 6 = 4(x - 4)$ or $y = 4x - 10$ $\left[y = -\frac{1}{4}x - \frac{3}{2} \text{ and } y = 4x - 10 \Rightarrow \right]$ $(2, -2)$	B1 M1 A1	oe Uses gradient and coordinates of A to form a correct equation for line AD Solves equations simultaneously to give correct coordinates Condone not given as coordinates but must be clearly identified
		3	

Q	Answer	Marks	Comments
3(c)	$(4 - 0)^2 + (7 - 6)^2$ or $\sqrt{(4 - 0)^2 + (7 - 6)^2}$ or $(4 - 2)^2 + (6 - (-2))^2$ or $\sqrt{(4 - 2)^2 + (6 - (-2))^2}$ $[AB =] \sqrt{17}$ $[AD =] 2\sqrt{17}$ $[\text{Perimeter} = 2(\sqrt{17} + 2\sqrt{17}) =] 6\sqrt{17}$	M1 A1 A1 A1	oe Correct method for finding $ AB $ or $ AB ^2$ or $ AD $ or $ AD ^2$ ft Their coordinates of D Correct exact length of AB Correct exact length of AD Allow $\sqrt{68}$ CAO Correct perimeter
		4	

	Question 3 Total	9	
--	------------------	---	--

Q	Answer	Marks	Comments
4(a)	$u_2 = k - 8$	M1	May be embedded in expression for u_3 but must be seen
	$u_3 = k - \frac{16}{k-8}$ or $\frac{k^2 - 8k - 16}{k-8}$	M1	Expression for u_3 simplified or unsimplified
	$[3u_3 = 5u_2 + 4 \Rightarrow]$ $3\left(k - \frac{16}{k-8}\right) = 5(k-8) + 4$	M1	oe Substitutes their u_2 and u_3 into $3u_3 = 5u_2 + 4$
	$3k^2 - 24k - 48 = 5k^2 - 76k + 288$	M1	oe Fraction cleared and brackets expanded
	$2k^2 - 52k + 336 = 0$ and $k^2 - 26k + 168 = 0$	A1	Rearranged into unsimplified quadratic equation before AG
		5	

Q	Answer	Marks	Comments
4(b)	$[k^2 - 26k + 168 = 0 \Rightarrow]$ $(k-12)(k-14) [=0]$	M1	Correct attempt to solve the quadratic equation. Could be seen as correct substitution into the quadratic formula, simplified or unsimplified
	$k = 12$ and $k = 14$	A1	Award mark if only $k = 14$ seen and no incorrect value of k seen
	$[u_4 =] 14 - \frac{16}{14 - \frac{16}{14-8}}$	M1	Substitutes their k into expression for u_4
	$[u_4 =] \frac{214}{17}$	A1	CAO
		4	

	Question 4 Total	9	
--	-------------------------	----------	--

Q	Answer	Marks	Comments
5(a)	$[x - 2 \leq 3x + 6 \leq x + 34 \Rightarrow]$	M1	oe Correctly eliminating x from the endpoints PI
	$-2 \leq 2x + 6 \leq 34$		
	$-4 \leq x \leq 14$	A1	oe CAO
		2	

Q	Answer	Marks	Comments
5(b)(i)	$[(6x - 5)(x + 14) =]$	M1	Correct expansion simplified or unsimplified
	$6x^2 + 79x - 70$		
	$[6x^2 + 79x - 70 > 126x - 147 \Rightarrow]$	M1	Correct rearrangement set > 0
	$6x^2 - 47x + 77 > 0$		
	$(3x - 7)(2x - 11) > 0$	A1	CAO
		3	

Q	Answer	Marks	Comments
5(b)(ii)	$x < \frac{7}{3}$ or $x > \frac{11}{2}$	B1ft	ft Their answer to part (b)(i) oe
		1	

Q	Answer	Marks	Comments
5(c)	$-4 \leq x < \frac{7}{3}$ or $\frac{11}{2} < x \leq 14$	M1	ft Their answers to parts (a) and (b)(ii)
		A1ft	M1 : One correct inequality A1 : Both correct inequalities and no others
		2	

	Question 5 Total	8	
--	-------------------------	----------	--

[illegible]

Q	Answer	Marks	Comments
7(c)(ii)	$5.14 + \frac{1}{3} \times 5.14$	M1	ft Their answer to part (a) and their scale factor from part (c)(i)
	6.85	A1	CAO
		2	
	Question 7 Total	9	

Q	Answer	Marks	Comments
8(a)	$\left[\frac{dy}{dx} = \right] 6x - \frac{11}{2} - \frac{10}{x^2}$ $\left[x = 2 \Rightarrow \frac{dy}{dx} = \right] (6)(2) - \frac{11}{2} - \frac{10}{2^2} [= 4]$ $y - 6 = 4(x - 2)$ and $y = 4x - 2$	M1 A1 M1 A1	oe M1 : Two correct terms A1 : Correct derivative Substitutes $x = 2$ into their derivative to obtain gradient of L oe Uses gradient and coordinates of P to form an equation leading to the required result May see $y = 4x + c$ and substitution of coordinates of P to find c but must be a complete method
		4	

Q	Answer	Marks	Comments
8(b)(i)	$[m =] -\frac{1}{4}$ or $[m =] a - 3$ $-\frac{1}{4} = 3^2 - 4(3) + a$ or $-\frac{1}{a - 3} = 4$ $[a =] \frac{11}{4}$	B1 M1 A1	Correct gradient of tangent to D at $x = 3$ given as value or in terms of a Substitutes $x = 3$ and $\frac{dy}{dx} = -\frac{1}{4}$ into $\frac{dy}{dx} = x^2 - 4x + a$ or Sets expression for gradient of normal in terms of a equal to 4 CAO
		3	

Q	Answer	Marks	Comments
8(b)(ii)	$\left[\frac{dy}{dx} = x^2 - 4x + \frac{11}{4} \Rightarrow \right]$ $[y =] \frac{1}{3}x^3 - 2x^2 + \frac{11}{4}x + c$ $10 = \frac{1}{3}(3^3) - 2(3^2) + \frac{11}{4}(3) + c$ $y = \frac{1}{3}x^3 - 2x^2 + \frac{11}{4}x + \frac{43}{4}$	M1 A1ft M1 A1	ft Their value of a from part (b)(i) M1: Two correct terms A1: Fully correct integration and must have $+c$ oe Substitutes the coordinates into their integral CAO
		4	
	Question 8 Total	11	

Q	Answer	Marks	Comments
9(a)	$[p(-3) =] (-3)^3 + b(-3)^2 - 31(-3) - 52$ $(-27) + 9b + 93 - 52 = 77$ and $b = 7$	M1 A1	oe Substitutes $x = -3$ into $p(x)$ oe Powers and product evaluated and set equal to 77 AG Must use the Remainder Theorem
		2	

Q	Answer	Marks	Comments
9(b)(i)	$[p(4) =] (4)^3 + 7(4)^2 - 31(4) - 52$ $64 + 112 - 124 - 52 = 0$	M1 A1	oe Substitutes $x = 4$ into $p(x)$ oe Powers and product evaluated before setting equal to zero Must use the Factor Theorem
		2	

Q	Answer	Marks	Comments
9(b)(ii)	$\left[x^3 + 7x^2 - 31x - 52 = \right]$ $(x - 4)(x^2 + 11x + 13)$ $x^{\frac{1}{2}} + 11x^{-\frac{1}{2}} + 13x^{-\frac{3}{2}}$ $\left[\int x^{\frac{1}{2}} + 11x^{-\frac{1}{2}} + 13x^{-\frac{3}{2}} dx = \right]$ $\frac{2}{3}x^{\frac{3}{2}} + 2(11)x^{\frac{1}{2}} + (-2)(13)x^{-\frac{1}{2}} \quad [+c]$ $\left[\int x^{\frac{1}{2}} + 11x^{-\frac{1}{2}} + 13x^{-\frac{3}{2}} dx = \right]$ $\frac{2}{3}x^{\frac{3}{2}} + 22x^{\frac{1}{2}} - 26x^{-\frac{1}{2}} + c$	M1 A1 M1 M1 A1	Expresses $p(x)$ as the product of $(x - 4)$ and a quadratic factor M1: Coefficient of x or constant term correct A1: Correct expression PI oe ft Their factorised numerator Correct integrand with fraction cleared ft Their integrand Two correct terms simplified or unsimplified CAO Coefficients simplified Must have $+c$
		5	
	Question 9 Total	9	

Q	Answer	Marks	Comments
10	$\left[\frac{ar^4}{ar} = \frac{12}{96} \Rightarrow r = \right] \frac{1}{2}$ $[a =] 192$ $\frac{192}{1 - \frac{1}{2}} \quad \text{or} \quad \frac{192 \left(1 - \left(\frac{1}{2} \right)^k \right)}{1 - \frac{1}{2}}$ $\frac{192}{1 - \frac{1}{2}} - \frac{192 \left(1 - \left(\frac{1}{2} \right)^k \right)}{1 - \frac{1}{2}}$ $\left[384 \times \left(\frac{1}{2} \right)^k = \right] 3 \times 2^{7-k}$	B1 B1ft M1 M1 M1 A1	Correct value of r Correct value of a ft Their r PI oe Correct expression for the sum to infinity or the sum of the first k terms with values substituted ft Their values for a and r PI oe Correct expression for $\sum_{n=1}^{\infty} u_n - \sum_{n=1}^k u_n$ with values substituted Must be working with correct values of a and r M1: Expression in correct form with at least two of a, b or c correct A1: Correct answer in the correct form
	Question 10 Total	6	