Version 1.0

Level 2 Certificate in Further Mathematics

Practice Paper Set 2

Paper 1 8360/1

Mark Scheme

Mark Schemes

Principal Examiners have prepared these mark schemes for practice papers. These mark schemes have not, therefore, been through the normal process of standardising that would take place for live papers.

It is not possible to indicate all the possible approaches to questions that would gain credit in a 'live' examination. The principles we work to are given in the glossary on page 3 of this mark scheme.

- Evidence of any method that would lead to a correct answer, if applied accurately, is generally worthy of credit.
- Accuracy marks are awarded for correct answers following on from a correct method. The correct method may be implied, but in this qualification there is a greater expectation that method will be appropriate and clearly shown.

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Glossary for Mark Schemes

These examinations are marked in such a way as to award positive achievement wherever possible. Thus, for these papers, marks are awarded under various categories.

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.
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.
ft	Follow through marks. Marks awarded following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg, accept 0.5 as well as $\frac{1}{2}$

Paper 1 - Non-Calculator

Q	Answer	Mark	Comments
1	$6x^2 - 5$	B2	B1 For one term correct
2(a)	$7n - 3$	B2	B1 For $7n \pm$?
2(b)	Their $7n - 3 < 150$	M1	oe Allow $7n - 3 = 150$
	21	A1	
Alt 2(b)	Substitutes a value of $n \geq 20$	M1	Works out 15 or more terms
	21	A1	
3	$5x + k = 3$	M1	
	$3x - k = 1$	M1	
	$8x = 4$	M1	
	$(x =)$ 0.5	A1	oe
4	$3a + 8 = 2$ or $-3 + 4 = b$	M1	Sight of $b = 1$ or $a = -2$ earns this mark
	$3a + 8 = 2$ and $-3 + 4 = b$	M1	
	$a = -2$ and $b = 1$	A1	
5(a)	$\frac{4}{12}$ or $\frac{1}{3}$	M1	oe
5(b)	$\frac{y}{7} = \frac{4}{12}$	M1	oe
	$(y =)$ $2\frac{1}{3}$	A1	oe
6	$20x^2 + 15xy - 8xy - 6y^2$	M1	oe Must have 4 terms with at least 3 correct
	$20x^2 + 15xy - 8xy - 6y^2$	A1	
	$20x^2 + 7xy - 6y^2$	A1 ft	ft From M1 A0

Q	Answer	Mark	Comments
7(a)	$3(4^2) + 4 - (-3)^2 - (-3)$	M1	
	46	A1	
7(b)	$3x^2 + x - 5^2 - 5$ (= 0)	M1	
	$3x^2 + x - 30$ (= 0)	M1	
	$(3x \pm a)(x \pm b)$ (= 0)	M1	$ab = 30$ or $a + b = 1$
	$\frac{-10}{3}$ and 3	A1	oe
8(a)	Gradient = –2	M1	
	$y + 6 = -2(x - 1)$	M1	
	$y = -2x - 4$	A1	
Alt 8(a)	Gradient = –2	M1	
	$-6 = -2(1) + c$ or $c = -4$	M1	
	$y = -2x - 4$	A1	
8(b)	Gradient = $\frac{1}{2}$	M1	ft Their gradient in (a)
	$y - 4 = \frac{1}{2}(x + 5)$	M1	
	Substituting $y = 0$	M1 Dep	Dep on attempt at straight line equation
	$x = -13$ or $(-13, 0)$	A1	
Alt 8(b)	Gradient = $\frac{1}{2}$	M1	ft Their gradient in (a)
	$4 = \frac{1}{2}(-5) + c$ or $c = 6\frac{1}{2}$	M1	
	$y = \frac{1}{2}x + 6\frac{1}{2}$ and substituting $y = 0$	M1 Dep	Dep on attempt at straight line equation
	$x = -13$ or $(-13, 0)$	A1	

Q	Answer	Mark	Comments
9	$\frac{3x-2(x-3)}{(x-3)(x+6)}$	M1	
	$\frac{3x-2x+6}{(x-3)(x+6)}$	M1	
	$\frac{x+6}{(x-3)(x+6)}$	M1	
	$\frac{1}{(x-3)}$	A1	
10	$x^2 = \frac{y+1}{y-2}$	M1	Square
	$x^2(y-2) = y+1$	M1	Multiply
	$x^2y - y = 2x^2 + 1$	M1	oe Expand and rearrange
	$y(x^2-1) = 2x^2+1$	M1	Factorise
	$y = \frac{2x^2+1}{x^2-1}$	A1	Divide
11(a)	$\sqrt{(1^2+1^2)} = \sqrt{2}$	B1	
11(b)	$\frac{\sin\theta}{\sqrt{3}} = \frac{\sin 45^\circ}{\sqrt{6}}$	M1	or $\frac{\sqrt{6}}{\sin 45^\circ} = \frac{\sqrt{3}}{\sin\theta}$
	$\sin\theta = \frac{\sqrt{3}}{\sqrt{6}} \times \frac{1}{\sqrt{2}}$	M1	
	$\sin\theta = \frac{\sqrt{3}}{\sqrt{12}}$ or $\frac{\sqrt{3}\times\sqrt{12}}{12}$ or $\sqrt{\frac{1}{4}}$	M1	
	$\sin\theta = \frac{1}{2}$	A1	
	$\theta = 30^\circ$	A1	

Q	Answer	Mark	Comments
12	Centre of circle = (7, 4)	B1	
	Radius of circle = 3	B1	
	Distance of *AB* (y = 6) from centre = 2	B1	
	Correct Pythagoras ... Distance from *A* (or *B*) to mid-point of chord = $\sqrt{(3^2 - 2^2)}$	M1	
	AB = $\sqrt{5} + \sqrt{5} = 2\sqrt{5}$	A1	Clearly explained
Alt 12	$(x - 7)^2 + (6 - 4)^2 = 9$	M1	Attempts to solve for x-coordinates of *A* and *B*
	$(x - 7)^2 + 4 = 9$	A1	
	$x - 7 = \pm\sqrt{5}$	A1	
	$x = 7 \pm \sqrt{5}$	A1	or states the two separate x-coordinates of *A* and *B* as $7 - \sqrt{5}$ and $7 + \sqrt{5}$
	AB = $\sqrt{5} + \sqrt{5} = 2\sqrt{5}$	A1	Clearly explained

Q	Answer	Mark	Comments
13	$\frac{\sqrt{(8x)}}{\sqrt{3}} = 4\sqrt{5}$	M1	
	$\sqrt{(8x)} = 4\sqrt{15}$	M1	
	$8x = 16 \times 15$	M1	
	$(x =)$ 30	A1	
Alt 1 13	$\frac{\sqrt{x} \times 2\sqrt{2}}{\sqrt{3}} = 4\sqrt{5}$	M1	
	$\sqrt{x}\sqrt{2} = 2\sqrt{15}$	M1	$x = \frac{15 \times 4}{2}$
	$\sqrt{(2x)} = \sqrt{60}$	M1	
	$(x =)$ 30	A1	
Alt 2 13	$\sqrt{x} = \frac{4\sqrt{5}\sqrt{3}}{\sqrt{8}}$	M1	
	$\sqrt{x} = \frac{4\sqrt{15}}{\sqrt{8}}$	M1	
	$x = \frac{16 \times 15}{8}$	M1	
	$(x =)$ 30	A1	
Alt 3 13	$\sqrt{(8x)} = 4\sqrt{5}\sqrt{3}$	M1	
	$\sqrt{(8x)} = \sqrt{(240)}$	M1	
	$x = \frac{240}{8}$	M1	
	$(x =)$ 30	A1	
Alt 4 13	$\sqrt{\frac{8x}{3}} = 4\sqrt{5}$	M1	
	$\sqrt{\frac{8x}{3}} = \sqrt{80}$	M1	
	$x = \frac{3 \times 80}{8}$	M1	
	$(x =)$ 30	A1	

Q	Answer	Mark	Comments
14	$5^3 - 6(5^2) + 5a - 20 = 0$	M1	
	$125 - 150 + 5a - 20 = 0$	A1	
	$(a =)\ 9$	A1	
15	$y = x^2 - 5x + 6$	B1	
	$\frac{dy}{dx} = 2x - 5$	M1	ft Their expression for y
	Evaluates $\frac{dy}{dx}$ for $x = 2$ or $x = 3$	M1	ft Their expression for $\frac{dy}{dx}$
	When $x = 2$ $\frac{dy}{dx} = -1$ When $x = 3$ $\frac{dy}{dx} = 1$	A1 ft	Correct answers for their expressions
	Explains clearly that (product of gradients) $-1 \times 1 = -1$ so the two tangents are perpendicular	A1	
16	$n^2 + 4n + 4$	M1	
	$n^2 + 2n + 1$	M1	
	$2n^2 + 6n + 4$	A1	
	$2(n^2 + 3n + 2)$	A1	
	$2(n + 1)(n + 2)$	M1	Explaining that $2n^2 + 6n + 4$ or $2(n^2 + 3n + 2)$ is divisible by 2 scores this mark
	$(n + 1)$ and $(n + 2)$ are consecutive numbers so one of them is even. So two factors of 2 … hence divisible by 4	A1	