Version 1.0

Level 2 Certificate in Further Mathematics

Practice Paper Set 1

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.

Set and published by the Assessment and Qualifications Alliance.

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 $\frac{1}{2}$

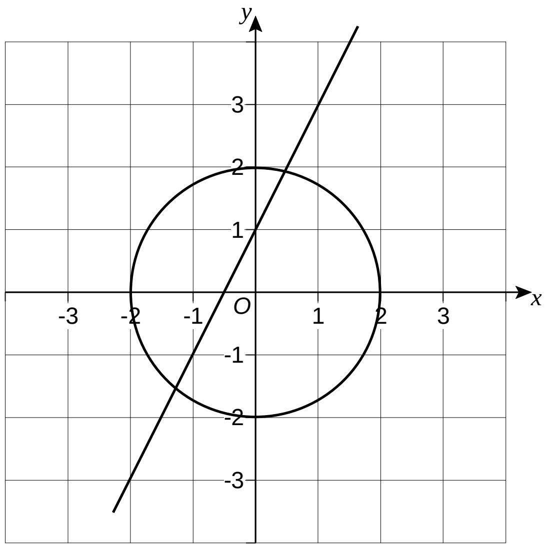
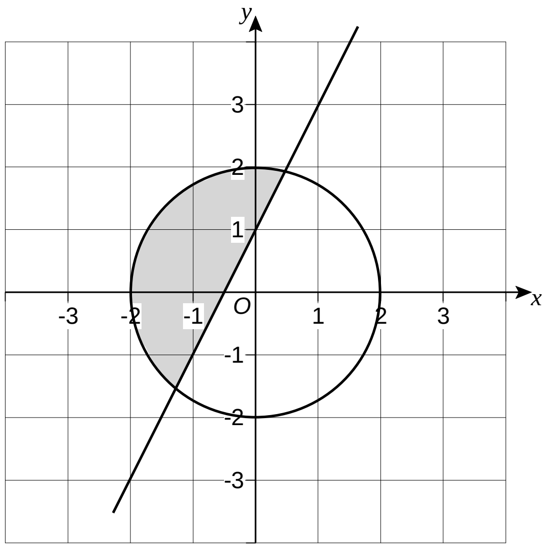
Paper 1 - Non-Calculator

Q	Answer	Mark	Comments
1(a)	$\frac{6}{3}$ (< x ≤) $\frac{20}{3}$	M1	oe
	3 4 5 6	A2	A1 For any 3 correct or all 4 correct with one incorrect
1(b)(i)	Any value of n where $1 < n < 2$	B1	
1(b)(ii)	Any value of n where $0 < n < 1$	B1	Condone (n =) 0
1(b)(iii)	Any value of n where $-1 < n < 0$	B1	

Q	Answer	Mark	Comments
2(a)	Fully correct graph 	B3	B1 Straight line from (0, 3) to (2, 3) B1 Straight line from (2, 3) to (4, 5) B1 Straight line from (4, 5) to (9, 0)
2(b)	$0 \le y \le 5$	B1ft	ft Their graph in (a)

Q	Answer	Mark	Comments
3	(tan x) = $\frac{18}{30} = \frac{m}{65}$	M1	oe eg, $\frac{65}{30} = \frac{m}{18}$
	$m = \frac{18}{30} \times 65$	M1	
	39	A1	
	(65 – 30 =) 35 and their 39 and Yes	B1ft	

Q	Answer	Mark	Comments
4(a)	$\sqrt{\frac{12}{48}}$ or $2\sqrt{3}$ or $4\sqrt{3}$	M1	$\sqrt{\frac{12}{48}} \times \sqrt{\frac{48}{48}}$
	$\sqrt{\frac{1}{4}}$ or $\frac{2\sqrt{3}}{4\sqrt{3}}$ or $\frac{2}{4}$	M1	$\frac{\sqrt{12} \times \sqrt{12} \times \sqrt{4}}{48}$ or $\frac{2\sqrt{3} \times 4\sqrt{3}}{48}$ or $\frac{24}{48}$ $\sqrt{\frac{1}{4}}$ is M2
	$\frac{1}{2}$ or 0.5	A1	
4(b)	$\sqrt{6}\ \sqrt{6}$ (+ $\sqrt{6}\ \sqrt{2}$ – $\sqrt{6}\ \sqrt{2}$) – $\sqrt{2}\ \sqrt{2}$	M1	oe eg, $\sqrt{36} - \sqrt{4}$
	4	A1	

Q	Answer	Mark	Comments
5(a)	Two correct sketches 	B2	B1 Circle, centre O radius 2 B1 Straight line, gradient 2 through (0, 1)
5(b)	Correct region shaded 	B1ft	ft If two graphs attempted in (a)

Q	Answer	Mark	Comments
6	$1 - (\frac{3}{5})^2$	M1	$(\frac{3}{5})^2 + \cos^2\theta = 1$
	$\frac{16}{25}$	A1	
	$\frac{4}{5}$ and $-\frac{4}{5}$	A1 ft	ft If both square roots of their $\frac{16}{25}$
Alt 6	Right-angled triangle drawn with θ marked with opposite 3 and hypotenuse 5	M1	
	3, 4, 5 triangle indicated	A1	eg, by labelling other side 4
	$\frac{4}{5}$ and $-\frac{4}{5}$	A1 ft	ft If $\pm\frac{\text{their adj}}{\text{their hyp}}$
7	Eliminate y from any 2 of the equations	M1	$\frac{1}{2}x + 11 = \frac{1}{3}x + 14$ or $\frac{1}{2}x + 11 = 2x - 16$ or $\frac{1}{3}x + 14 = 2x - 16$
	Manipulates their equation	M1	Allow one error $3x + 66 = 2x + 84$ or $x + 22 = 4x - 32$ or $x + 42 = 6x - 48$
	$x = 18$	A1	
	$y = 20$	A1 ft	
	Checks their (18, 20) in third equation and yes	B1 ft	
8	Angle $BOC = 2x$ Angle at centre = 2 × angle at circumference	M1	
	Angle $BCO = x$ Isosceles triangle	M1	Isosceles triangle
	$x + x + 2x = 180$ Angle sum of triangle = 180	M1	
	$2x = 90$	A1	

Q	Answer	Mark	Comments
9(a)	$(y =)\ \frac{1}{3} \times \pi \times x^2 \times 3x$	B1	
9(b)	$3\pi x^2$	B1	
9(c)	$3 \times \pi \times 5^2$	M1	
	75π	A1 ft	
10	$\frac{(3x-7)(x+2)}{(3x-2)(3x+2)}$	B2	B1 For numerator B1 For denominator
	$(3x^2 + 2x =) \quad x(3x + 2)$	B1	
	(their fraction) × $\frac{x(3x+2)}{x+2}$	M1	
	$\frac{x(3x-7)}{3x-2}$ or $\frac{3x^2 - 7x}{3x-2}$	A1	
11	$\frac{dy}{dx} = 3x^2 + 6x + 3$	M2	M1 One term correct
	$3 \times 1^2 + 6 \times 1 + 3$	M1	Allow these marks for showing substitution into their $\frac{dy}{dx}$
	$3 \times (-3)^2 + 6 \times (-3) + 3$	M1	
	Obtains 12 for both gradients	A1	
12	Multiplies throughout by x or y or 3 or xy or $3x$ or $3y$ or $3xy$	M1	
	$36x = 12y - xy$	A1	
	Collects terms in x on one side from their equation eg, $36x + xy = 12y$	M1	
	Factorises to x(……..) eg, $x(36 + y) = 12y$	M1	
	$x = \frac{12y}{36 + y}$	A1	oe

Q	Answer	Mark	Comments
13	$3 \times 3 \times 2$ or $a = 3$ or $a^2 - 9$ or $x^2 - 9$ or $a^2b = 18$ or 9×2	M1	Find one linear factor
	$(x^2 - 9)(x + 2)$	M1	Find another linear factor
	$(x + 3)(x - 3)(x + 2)$	A1	
14(a)	Square drawn with vertices O (0, 0), A' (0, –1), B' (–1, –1), C' (–1, 0)	B2	B1 Attempt at matrix multiplication to give one or more of the vertices A', B', C' or states reflection $y = -x$ or correct diagram not labelled correctly
14(b)	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	B2	B1 For each column
	Their $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix} \times \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	M1	Attempt at multiplying their two matrices
	$\begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$	A1	

Q	Answer	Mark	Comments
15(a)	Shows 60° angle and a right-angled triangle (with right angle marked) and side 1 (cm) marked	B2	B1 Any 2 of the 3 criteria shown
Alt 15(a)	$2^2 = 2^2 + 2^2 - 2 \times 2 \times 2\cos60$	M1	oe
	$4 = 8\cos60$	A1	
15(b)	$(2x + 1)^2 = (2x + 4)^2 + (x + 3)^2 - 2(2x + 4)(x + 3)\frac{1}{2}$	M1	
	$4x^2 + 2x + 2x + 1 = 4x^2 + 8x + 8x + 16 + x^2 + 3x + 3x + 9 - (2x^2 + 4x + 6x + 12)$	M1	Any of the 4 term expansions or all four with ≤ 3 errors
	$4x^2 + 2x + 2x + 1 = 4x^2 + 8x + 8x + 16 + x^2 + 3x + 3x + 9 - (2x^2 + 4x + 6x + 12)$	A1	All correct
	$x^2 - 8x = 12$ or $x^2 - 8x - 12 = 0$	A1	oe Must be simplified to 3 terms
	$(x - \frac{\text{their } 8}{2})^2 = \text{their } 12 + (\frac{\text{their } 8}{2})^2$ or $\frac{-(-8) \pm \sqrt{(-8)^2 - 4 \times 1 \times -12}}{2 \times 1}$	M1	oe Substitutes $x = 4 + 2\sqrt{7}$ in their equation
	$x = 4 + \sqrt{28}$ Must reject the other solution	A1	Shows substitution satisfies the correct equation.