Version 1.0

Level 2 Certificate in Further Mathematics

Practice Paper Set 1

Paper 2 8360/2

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 2 - Calculator

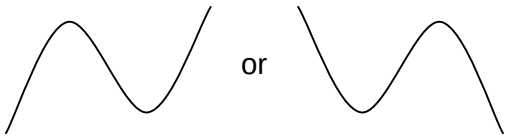
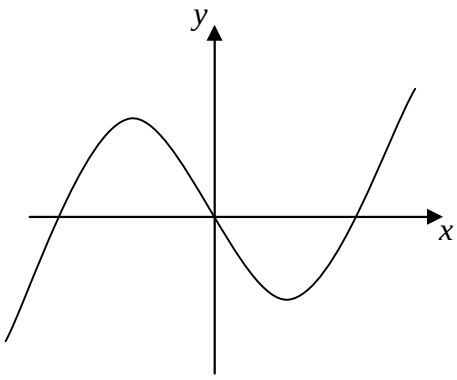
Q	Answer	Mark	Comments
1(a)	Finds an equivalent ratio to 3 : 5 eg, 6 : 10	M1	$\frac{m}{m+12} = \frac{3}{5}$
	18 : 30	A1	(m =) 18 or (f =) 30
	48	A1 ft	ft Their 18 + their 30
Alt 1(a)	$\frac{12}{5-3} = 6$	M1	
	6 ×(3+5)	A1	
	48	A1ft	
1(b)	$\frac{a}{100} \times b$ or $\frac{b}{100} \times a$	M1	
	$\frac{a}{100} \times b$ and $\frac{b}{100} \times a$	A1	$\frac{ab}{100}$ and $\frac{ba}{100}$
1(c)	16 × 1.1	M1	Implied by 16×1.1^n where n is an integer
	4	A1	
2(a)(i)	$8x + 12 + 2x - 14$	M1	3 terms correct
	$10x - 2$	A1	
2(a)(ii)	$m^4 + 2m^3$	B2	B1 For 1 term correct
2(b)	$9 - 2d = 4(1 - d)$	M1	
	$9 - 2d = 4 - 4d$	M1	oe
	$-2\frac{1}{2}$	A1	

Q	Answer	Mark	Comments
3(a)(i)	$4(n + 1) - 10$	M1	Explains that the terms increase by 4
	$4n + 4 - 10$	A1	
3(a)(ii)	$4n - 10 + 4n - 6$	M1	
	$8n - 16 = 8(n - 2)$	A1	oe eg, $8n - 16$ and states that 8 and 16 are divisible by 8
3(b)(i)	$\frac{3n}{n+5} = 1$	M1	
	$3n = n + 5$	M1	oe
	$(n =) 2\frac{1}{2}$ and n should be an integer	A1	
3(b)(ii)	$\frac{\frac{3n}{n}}{\frac{n}{n} + \frac{5}{n}}$ $\left(= \frac{3}{1 + \frac{5}{n}}\right)$	M1	Substitutes large value for n (eg, 1000) or states for large n, $n + 5 \rightarrow n$
	3	A1	

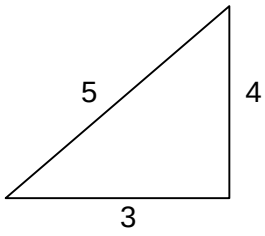
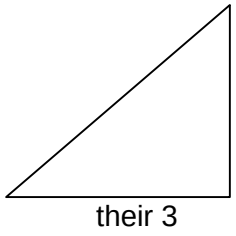
Q	Answer	Mark	Comments
4	(*BC* =) $\sqrt{8}$	B1	
	Midpoint of *BC* attempted $(\frac{7+5}{2}, \frac{4+6}{2})$	M1	(6, 5)
	AM^2 attempted (their 6 – 2)^2 + (their 5 – 1)^2	M1	32 or $AM = \sqrt{32}$
	$\frac{1}{2}$ × their $\sqrt{8}$ × their $\sqrt{32}$	M1	
	8	A1 ft	ft From B0 M3
Alt 4	Surrounding 5 × 5 square drawn	M1	
	Any one of $\frac{1}{2} \times 3 \times 5$ or $\frac{1}{2} \times 2 \times 2$ or $\frac{1}{2} \times 5 \times 3$	M1	
	All three of $\frac{1}{2} \times 3 \times 5$, $\frac{1}{2} \times 2 \times 2$, $\frac{1}{2} \times 5 \times 3$	A1	
	25 – their 7.5 – their 2 – their 7.5	M1	
	8	A1	
5(a)	$(x + a)(x + b)$ where $ab = 28$	M1	
	$(x - 4)(x - 7)$	A1	
	(x =) 4 and (x =) 7	A1 ft	ft If M1 gained
5(b)	$\sqrt{x}$ = their 4 and $\sqrt{x}$ = their 7	M1	
	16 and 49	A1 ft	ft From their two values found in (a)

Q	Answer	Mark	Comments
6	$\frac{\sin x}{9} = \frac{\sin 71}{10}$	M1	
	$\sin x = \frac{\sin 71}{10} \times 9$	M1	0.85(...)
	(x =) 58.3(...)	A1	
	50.7 or 50.68(…)	A1 ft	ft 180 – 71 – their x
7(a)	$\tan 35 = \frac{12}{BC}$ or $\tan 23 = \frac{12}{BD}$	M1	$\tan 55 = \frac{BC}{12}$ or $\tan 67 = \frac{BD}{12}$
	(BC =) $\frac{12}{\tan 35}$ or (BD =) $\frac{12}{\tan 23}$	M1	(BC=) 12 tan 55 or (BD=) 12 tan 67
	(BC =) 17.13(7 ...) or 17.14	M1	
	(BD =) 28.27(02 ...)	A1	
	$\sqrt{\text{their } 17.14^2 + \text{their } 28.27^2}$	M1	
	33.05(...) or 33.1	A1 ft	ft their BC and their BD
7(b)	$\tan\theta = \frac{\text{their } 28.3}{\text{their } 17.1}$	M1	
	58.7° to 58.9°	A1	
	149°	A1 ft	ft their 58.7° if M1 earned
8(a)	$22 - 7p = -13$	M1	
	5	A1	
8(b)(i)	$(x - 2)^2$	B1	
	1	B1 ft	ft 5 – (their 2)^2
8(b)(ii)	(g(x)) ≥ their 1	B1 ft	Allow $y \geq$ their 1

Q	Answer	Mark	Comments
9	Gradient = -2	B1	
	$y - 7$ = their $-2(x - -3)$	M1	oe eg, y = their $-2x + c$ and substitutes $x = -3$, $y = 7$ to find c
	$y = 0 \rightarrow -7$ = their $-2(x - -3)$	M1	oe eg, $0 = -2x + 1$
	$\frac{1}{2}$	A1 ft	ft From B0 M2
10(a)	$n(n^2 - 1)$	M1	
	$n(n + 1)(n - 1)$	A1	
10(b)	$(n - 1)$, n and $(n + 1)$ are (three) consecutive integers	B1	
	Any three consecutive integers include a multiple of 2 and a multiple of 3 and $2 \times 3 = 6$	B1	
11(a)	$5^m \times 5^2$	M1	
	$25x$	A1	
11(b)	$\frac{x}{y}$	B1	oe
11(c)	y^3 or $y \times y \times y$	B1	
11(d)	$x^{\frac{1}{2}} y^{\frac{1}{2}}$	B2	oe eg, $\sqrt{xy}$ B1 $x^{\frac{1}{2}}$ or $y^{\frac{1}{2}}$ or $\sqrt{x}$ or $\sqrt{y}$ or $5^{\frac{m}{2}} \times 5^{\frac{n}{2}}$
12	Identifies right-angled triangle with sides R and r	M1	
	$R^2 = r^2 + r^2$	M1	oe
	$R^2 = 2r^2 \rightarrow R = r\sqrt{2}$	A1	

Q	Answer	Mark	Comments
13(a)	$5y - 2y < 6 + 4$	M1	Allow one sign error
	$y < \frac{10}{3}$	A1	oe
13(b)	$(x - 3)(x + 1)$	M1	Allow $(x \pm a)(x \pm b)$ where $ab = 3$
	3 and -1	A1	
	U-shaped parabola graph showing their 3 and their -1 on x-axis	M1	Number line showing their 3 and their -1 with three indications of signs of their $(x - 3)(x + 1)$
	$x \leq -1$ and $x \geq 3$	A1 ft	
14(a)	$3x^2 - 12$	B1	
	Their $3x^2 - 12 = 0$	M1	
	$x = 2$ and $x = -2$	A1	(2, –16) or (–2, 16)
	(2, –16) and (–2, 16)	A1 ft	ft Their two x values substituted into $y = x^3 - 12x$ to calculate two y values
14(b)	Correct shape	M1	 or
	Correct shape passing through (0, 0)	M1	Either of the above passing through (0, 0)
	Correct shape passing through (0, 0) with min in 4th quadrant and max in 2nd quadrant 	A1	

Q	Answer	Mark	Comments
15	$(2x - 1)$ or $(x - 5)$	M1	$(2kx - k)$ or $(kx - 5k)$ where k is an integer
	$2x^2 - 10x - x + 5$	M1	Their two brackets expanded to 4 terms including x^2 term with 3 terms correct
	$2x^2 - 11x + 5$ or any positive integer multiple of this expression	A1	$a = 2$ $b = -11$ $c = 5$ or all three values multiplied by any positive integer SC2 $x^2 - 5.5x + 2.5$ or $a = 1$ $b = -5.5$ $c = 2.5$
16(a)	53.1(…)	B1	
	126.9 or 126.87 or 126.869(…)	B1 ft	ft 180 – their 53.1(...)
16(b)	$\tan x = -\frac{3}{2}$	M1	
	$\tan^{-1}$ their $-\frac{3}{2}$ (= –56.3(…))	M1	
	123.7	A1	
	303.7	A1 ft	ft Their –56.3 + 360 or their 123.7 + 180
17	$6x^2 - 2x$	M1	
	$6 - 2$ (= 4)	M1	
	$-\frac{1}{\text{their } 4}$ $(= -\frac{1}{4})$	M1	
	$y - 2 =$ their $-\frac{1}{4}(x - 1)$	M1	oe
	$y = -\frac{1}{4}x + \frac{9}{4}$	A1	

Q	Answer	Mark	Comments
18	6 or 3 identified	B1	
	(x coordinate of centre =) $2 + \frac{1}{2}$ × their 6 or Recognition of 3, 4, 5 triangle  	M1	Use of Pythagoras to find radius  their $3^2 + 4^2 = r^2$
	Centre (5, 4)	A1	
	$(x$ – their 5$)^2 + (y$ – their 4$)^2$ or clearly state radius = 5	M1	
	$(x – 5)^2 + (y – 4)^2 = 25$	A1	oe eg, $x^2 + y^2 – 10x – 8y + 16 = 0$
19	Substituting 1 into equation $1 – 1 + a + b = 0$	M1	oe $a + b = 0$
	Substituting 2 into equation $8 – 4 + 2a + b = 0$	M1	oe $2a + b = – 4$
	$a = – 4$ and $b = 4$	A1	
	Substitutes other x-values into their cubic	M1	or factorises their cubic $(x – 1)(x – 2)(x + 2)$
	–2	A1	