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General Certificate of Secondary Education
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Mathematics 43602H

Higher

Unit 2

Final

Mark Scheme

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The following abbreviations are used on the mark scheme:

M	Method marks awarded for a correct method.
M dep	A method mark which is dependent on a previous method mark being awarded.
A	Accuracy marks awarded when following on from a correct method. It is not necessary always to see the method. This can be implied.
B	Marks awarded independent of method.
Q	Marks awarded for quality of written communication.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special Case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent.
[*a*, *b*]	Accept values between a and b inclusive.

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1a	41 37 33	B2	B1 for one or two correct
1b	Sequence continued correctly for at least 2 more terms (29, 25, …) Subtracts 4 correctly at least twice or correctly trials at least two integer values for n greater than 3 or $45 - 4n = 0$ or $45 - 4n < 0$	M1	 oe oe
	–3	A1	Answer of 12 or testing $n = 12$ is SC1

2	$\frac{(5\times-4)-(-8)}{-4+2}$	M1	oe Allow one error
	–20 + 8 or –12 in numerator or –2 in denominator	A1	
	6	A1	

3	Attempts to process one piece of information	M1	eg 2 : 9 or 4 : 16 0.22… or 0.25 $\frac{6}{27} = \frac{2}{9}$ or $\frac{8}{32} = \frac{4}{16}$ $\frac{6}{27} \times 100$ or $\frac{8}{32} \times 100$ $\frac{24}{108}$ or $\frac{24}{96}$ $\frac{192}{864}$ or $\frac{216}{864}$ or 8 goals in 32 games is 1 goal every 4 games $4\frac{1}{2}$ or 4 oe
	Writes both pieces of information in a form that allows for comparison	A1	eg 2 : 9 and 2 : 8 0.22 … and 0.25 (1 : 4.5 and 1 : 4 are acceptable) $4\frac{1}{2}$ and 4 $\frac{2}{9}$ and $\frac{2}{8}$ $\frac{24}{108}$ and $\frac{24}{96}$ $\frac{8}{36}$ and $\frac{9}{36}$ $\frac{192}{864}$ and $\frac{216}{864}$ oe
	Correct decision from their working	Q1	Strand (iii) Dependent on M1

4	$\frac{1}{3}$ or $\frac{3}{4}$ or $1 - \frac{2}{3}$ or $1 - \frac{1}{4}$ seen	M1	oe
	18 = $\frac{3}{4}$ or $\frac{1}{4} = 6$ or $\frac{1}{3} = 6$ or $\frac{1}{2}$ or 6×3 (= 18) or $\frac{2}{3} \times \frac{3}{4}$ seen	M1 dep	
	6×4 or $\frac{\text{their } 18}{3} \times 4$ or $18 + 6$	M1 dep	Calculation leading to a final answer of 24
	24	A1	SC1 for $\frac{11}{12}$ SC2 for 72 (£)6 = $\frac{2}{3}$ → (£)9 then $\frac{9 \times 4}{3} = 12$ is SC3

5	12 500 – 11 750 or 750	M1	
	$\frac{\text{their } 750}{12500} \times 100$	M1 dep	oe eg $\frac{750}{125}$
	6	A1	SC2 for 94
	Alternative method		
	$\frac{11750}{12500} \times 100$	M1	
	100 – their 94	M1 dep	
	6	A1	SC2 for 94

6	100 × 0.84 or 60 × 1.1(0)	M1	84 or 66 or 150	Money out
	their 150 × 1.4 (= 210)	M1 dep	oe dep on first M1	Required total sales income
	100 × 1.2(0) or 40 × 1.6(0)	M1	120 or 64 or 184	Money in after 40 packs sold
	(their 210 – their 184) ÷ 20	M1 dep	dep on 2nd and 3rd M1	Money needed ÷20
	1.30	A1	Do not accept 1.3	
	Alternative method 1			
	100 × 0.84 or 60 × 1.1(0)	M1	84 or 66 or 150	Money out
	100 × 1.2(0) or 40 × 1.6(0)	M1	120 or 64 or 184	Money in after 40 packs sold
	their 184 – their 150	M1 dep	34 if correct dep on 1st and 2nd M1	Profit after 40 packs sold
	(0.4 × their 150 – their 34) ÷ 20	M1 dep	dep on 3rd M1	Money needed ÷20
	1.30	A1	Do not accept 1.3	
	Alternative method 2			
	100 × 0.84 or 60 × 1.1(0)	M1	84 or 66 or 150	Money out
	100 × 0.36 or 40 × 0.50	M1	36 or 20 or 56	Profit so far
	(0.4 × their 150 – their 56) ÷ 20	M1 dep	0.20 if correct dep on 1st and 2nd M1	Profit per pack needed
	their 0.20 + 1.10	M1 dep	dep on 3rd M1	Cost price + profit per pack
	1.30	A1	Do not accept 1.3	
	Alternative method 3			
	100 × 1.2(0) or 100 × 0.84	M1	120 or 84 or 36	Profit
	40 × 1.6(0) or 60 × 1.1(0)	M1	64 or 66 or –2	Profit
	their 36 + their (–2)	M1 dep	34 if correct dep on 1st and 2nd M1	Profit after 40 packs sold
	(0.4 × their 150 – their 34) ÷ 20	M1 dep	dep on 3rd M1	Money needed ÷20
	1.30	A1	Do not accept 1.3	

7a	$C = 10d + 20$	B1	
7b	Plots at least two correct points ($\pm\frac{1}{2}$ sq)	M1	
	Correct line from (0, 30) at least to intersection at (5, 70)	A1	
7c	First Cars	B1 ft	Strict ft
	Cheaper (check graph) Graph lower down Roys Rentals = 90 and First Cars = 86	B1 ft	oe

8a	$12 - x = 15$ or $12 - x = 5 \times 3$	M1	oe $4 - \frac{x}{3} = 5$
	$-x$ = their 15 – 12 or x = 12 – their 15	M1	or $4 - 5 = \frac{x}{3}$ $-1 = \frac{x}{3}$ or $5 - 4 = \frac{-x}{3}$
	–3	A1	
8b	$3t = s - 4$ or $\frac{s}{3} = t + \frac{4}{3}$	M1	oe
	$(t =) \frac{s-4}{3}$ or $(t =) \frac{s}{3} - \frac{4}{3}$ or $(t =) \frac{4-s}{-3}$	A1	oe SC1 $(t =) \frac{4-s}{3}$ or $(t =) \frac{s+4}{3}$

9	–3, –2, –1, 0, 1, 2	B2	One error or omission B1 $-4 < n \leq 2$ B1

10	$3x + 4$ (+) $3x$ (+) x (+) x (+) $x - 7$ (= 150)	M1	oe 4 or 5 correct terms
	$3x + 4 + 3x + x + x + x - 7 = 150$	M1 dep	oe ft their terms
	$9x - 3 = 150$ or $9x = 150 + 3$	A1 ft	oe ft their equation
	$x = 17$	A1	SC3 for solution by trial and improvement

11	$(3m + k)(3m - k)$	B2	B1 for $(9m \ldots k)(m \ldots k)$ or $(3m + k)(3m + k)$ or $(3m + k)^2$ or $(3m - k)(3m - k)$ or $(3m - k)^2$

12	$16a - 40$ seen	B1	
	$4a - 8$ or $4b - 8$ or $4(a - 2)$ or $4(b - 2)$	M1	
	$4(4a - 8) - 8$ or $16a - 32 - 8$	A1	
	Complete algebraic solution including $b = 4a - 8$ **and** either $c = 4b - 8$ or $c = 16a - 40$	Q1	Strand (ii) Numerical verification scores zero marks

13	$3x^4y^6$	B2	B1 for two parts correct Do not accept × signs between terms (counts as one error)

14a	$(3n + a)(n + b)$	M1	Where $ab = \pm 4$ or $3b + a = \pm 7$
	$(3n + 4)(n + 1)$	A1	
14b	Sight of 34 and 11 or 22 and 17 or 2 and 187	M1	Seen on factor tree or correct division by primes
	$2 \times 11 \times 17$	A1	oe must see multiplication signs

15a	$\sqrt{80} = 4\sqrt{5}$ or $\sqrt{16\times5}$ or $\sqrt{4\times20}$ $\sqrt{180} = 6\sqrt{5}$ or $\sqrt{36\times5}$ or $\sqrt{9\times20}$ or $\sqrt{4\times45}$	M1	oe or better eg $3\sqrt{20}$ Can be written as separate roots eg $\sqrt{36}$ (×) $\sqrt{5}$
	$10\sqrt{5}$	A1	
15b	$\frac{77}{\sqrt{11}} \times \frac{\sqrt{11}}{\sqrt{11}}$ or $\frac{77\times\sqrt{11}}{11}$	M1	
	$7\sqrt{11}$	A1	

16	$(\sqrt[3]{64})^2$ or $\sqrt[3]{(64^2)}$ or 4^2 or $\sqrt[3]{4096}$	M1	
	16	A1	

17a	$(3x + 1)^2 = 9x^2 + 3x + 3x + 1$	B1	
17b	$9x^2 + 3x + 3x + 1 = 4x^2 – x + 7$ or $9x^2 + 6x + 1 = 4x^2 – x + 7$	B1	oe
	$5x^2 + 7x – 6 = 0$	M1	ft their expansion of $(3x + 1)^2$ with all terms correctly collected on one side of the equation
	$(5x – 3)(x + 2)$ (= 0) or $(5x + a)(x + b)$ (= 0)	M1	$ab = ±6$ or $5b + a = ±7$ ft their quadratic or quadratic formula allowing one substitution error
	$x = 0.6$ and $x = –2$ or $x = 0.6$ and $y = 2.8$	A1	oe
	$y = 2.8$ and $y = –5$ or $x = –2$ and $y = –5$	A1	oe

18	$3y + 12 = 0$	M1	Attempt to find y-intercept or the value of y when $x = 0$ or $y = \frac{–4x}{3} – 4$
	$y = –4$	A1	May be seen on diagram
	Gradient = $\frac{4}{6}$ $\left(=\frac{2}{3}\right)$ or $\frac{0–(–4)}{6–0}$	M1	oe ft their –4 Gradient must be positive
	$y = \frac{2}{3}x – 4$	A1 ft	oe SC3 for $y = \frac{–2}{3}x – 4$