Practice Tests Set 7 – Paper 3H mark scheme – Spring 2018

Qn		Working	Answer	Mark	Notes
1	(a)	8.5×5	42.5	1	B1 cao
	(b)		110°	1	B1 cao
	(c)		Correct ×	2	M1 bearing of 40° or at distance 4 cm
					A1 correctly marked ×
2	(a)		Salt: 60 grams Sugar: 90 grams	3	M1 Salt: $\frac{2}{5} \times 150$ OR Sugar: $\frac{3}{5} \times 150$
					A1 cao
					A1 cao
	(b)		1.71 : 1	2	M1 "90"+30 : "60"+10 OR Sugar = "90"+30 and Salt = ""60"+10 B1 ft
					M1 120: 70 OR 12 : 7 OR 4 : 2.33
					B1 cao
3	(i)		$2^2 \times 5$	3	B1 for $2^2 \times 5$ oe or 20
	(ii)		$2^3 \times 3 \times 5^2$		B2 for $2^3 \times 3 \times 5^2$ oe or 600
					(B1 for any product using powers of 2 and 3 and 5 **or** at least 300, 600… **and** 40, 80, 120 …)
4	(a)		Correct box plot drawn	3	B1 for median (28), B1 for quartiles (20, 42), B1 for whiskers.
	(b)		Two comparisons	2	e.g. range of men's ages is smaller than women's, median age greater than women's, IQR of men's ages smaller than women's

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5		Vertices at (3, 2) (3, 4) (4, 4) (4, 3)	2	B2 B1 for shape of correct size and orientation **OR** a correct enlargement scale factor $\frac{1}{2}$, centre (1, 3)
6	$-4 \times 2 + 3k = 7$	5	2	M1 A1
7		28	5	M1 attempt to find radius or diameter of the circle M1 finding radius or diameter of circle M1 for finding area of circle or semi-circle M1 for complete method A1 cao
8		3	3	M1 for sight of 2800×1.025^n; finding at least two correct interest payments (i.e. 70 and 71.75) M2 for an attempt to evaluate 2800×1.025^n for at least two values of n A1 cao

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9				4	C1 correct expansion of brackets
					C1 arrives at $n^2 - 2n - n^2 + 4n - 4$
					C1 reduces to $2(2n - 3)$ or $4n - 6$
					C1 for conclusion
10		$k^2 = \dfrac{5m + 2e}{3e}$ **or** $k\sqrt{3e} = \sqrt{5m + 2e}$ $3ek^2 = 5m + 2e$ $3ek^2 - 2e = 5m$ or $-5m = 2e - 3ek^2$ $e(3k^2 - 2) = 5m$ or $-5m = e(2 - 3k^2)$	$e = \dfrac{5m}{3k^2 - 2}$	4	M1 Squaring both sides **or** clearing fraction M1 Clearing fraction **and** squaring both sides M1 Isolating terms in e in a correct equation A1 cao
11	(a)			2	C1 Initial cost, cost of travelling 0 miles
	(b)				C1 Charge per km, cost per 1 km

Qn		Working	Answer	Mark	Notes
12	(a)	$f(x) = x^3 + 4x - 1$ $f(0) = -1, f(1) = 4$	Shown	2	M1 Method to establish at least one root in [0, 1] eg. $x^3 + 4x - 1(= 0)$ and $f(0) (= -1)$, $f(1) (= 4)$ oe A1 Since there is a sign change there must be at least one root in $0 < x < 1$ (as f is continuous)
	(b)	$4x = 1 - x^3$ or $\quad \dfrac{x^3}{4} + x = \dfrac{1}{4}$	Shown	1	C1 for at least one correct step and no incorrect ones
	(c)	$x_1 = \dfrac{1}{4} - \dfrac{0}{4} = \dfrac{1}{4}$ $x_2 = \dfrac{1}{4} - \dfrac{\left(\frac{1}{4}\right)^3}{4} = \dfrac{1}{4} - \dfrac{1}{256}$	0.246(09375) or $\dfrac{63}{256}$	3	M1 $x_1 = \dfrac{1}{4}$ M1 for $x_2 = \dfrac{1}{4} - \dfrac{\left(\frac{1}{4}\right)^3}{4}$ A1 for 0.246(09375) or $\dfrac{63}{256}$ oe
13	(a)		$\dfrac{5}{8}$	3	M1 for $x(y - 3) = 4$ M1 for $xy = 4 + 3x$ A1 cao
	(b)		$-\dfrac{1}{3}$	3	M1 correct expression for fg(a) M1 correct equation where fraction has been removed A1 cao

Qn		Working	Answer	Mark	Notes
14			2.4 g/cm³	5	B1 for appropriate intervals for measurements
					P1 for correct process to find upper bound
					P1 for correct process to find lower bound
					P1 explanation of correct process to find appropriate degree of accuracy
					A1 cao
15			6		B1 for expression for Carma's share
					B1 for expression for Banu's share
					M1 for adding shares
					A1 cao
16	(a)		320	2	M1 for sight of 1:4 or 4:1
					A1 cao
	(b)		1 373 600	3	M1 for sight of 1:8 of 8:1
					M1 for 8 × 171700
					A1 cao

Qn		Working	Answer	Mark	Notes
17	(a)	$\overrightarrow{BC} = -4\mathbf{a} + 2\mathbf{b} + 8\mathbf{a}\ (= 4\mathbf{a} + 2\mathbf{b})$	$2\mathbf{a} + \mathbf{b}$	2	M1 A1 correct method to find $\overrightarrow{BC}$ in terms of $\mathbf{a}$ and $\mathbf{b}$
	(b)	$\overrightarrow{AM} = 4\mathbf{a} + 2\mathbf{a} + \mathbf{b}\ (= 6\mathbf{a} + \mathbf{b})$ and		2	M1 Correct vectors for $\overrightarrow{AM}$ and $\overrightarrow{AN}$ or for
		$\overrightarrow{AN} = 2\mathbf{b} + 8\mathbf{a} + 4\mathbf{a}\ (= 12\mathbf{a} + 2\mathbf{b})$			$\overrightarrow{AM}$ and $\overrightarrow{MN}$ or for $\overrightarrow{AN}$ and $\overrightarrow{MN}$ (need not be simplified)
		or			ft their $\overrightarrow{BM}$ from (a)
		$\overrightarrow{AM} = 4\mathbf{a} + 2\mathbf{a} + \mathbf{b}\ (= 6\mathbf{a} + \mathbf{b})$ and			
		$\overrightarrow{MN} = \mathbf{b} + 2\mathbf{a} + 4\mathbf{a}\ (= 6\mathbf{a} + \mathbf{b})$			
		or			
		$\overrightarrow{AN} = 2\mathbf{b} + 8\mathbf{a} + 4\mathbf{a}\ (= 12\mathbf{a} + 2\mathbf{b})$			
		and			
		$\overrightarrow{MN} = \mathbf{b} + 2\mathbf{a} + 4\mathbf{a}\ (= 6\mathbf{a} + \mathbf{b})$	Show		A1 For $\overrightarrow{AN} = 2\overrightarrow{AM}$ or $\overrightarrow{AM} = \overrightarrow{MN}$ or $\overrightarrow{AN} = 2\overrightarrow{MN}$ oe
					and there is a <u>common point</u>.

Qn		Working	Answer	Mark	Notes
18	(a)	$5 \times$ "2.5" or $5 \times \frac{27.5}{11}$ or $\frac{RQ}{5} = \frac{27.5}{11}$ oe or $\frac{5}{11} = \frac{RQ}{27.5}$ oe	12.5	2	M1 Correct expression for RQ or correct equation to give RQ. ft their answer to (a) A1 cao
	(b)	$42.5 \div$ "2.5" or $42.5 \times \frac{11}{27.5}$ or $42.5 \times \frac{5}{"12.5"}$ or $\frac{CD}{42.5} = \frac{11}{27.5}$ or $\frac{CD}{42.5} = \frac{5}{"12.5"}$ oe	17	2	M1 Correct expression for CD or correct equation to give CD. ft their RQ, if used. ft their answer to (a) A1 cao
19			$\frac{128}{81}$	4	M1 for finding expression for surface area as surface are for hemisphere plus circle A1 $r = \frac{4}{3}$ M1 for $\frac{128}{81}\pi$ A1 cao

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Qn	Working	Answer	Mark	Notes
20		31.1	5	M1 for $\dfrac{1}{2} \times 8.4 \times x \times \sin 40 = 100$ M1 for $100 \div (0.5 \times 8.4 \times \sin 40)$ $(= 37.(041...))$ M1 (dep on 1st M1) for substituting the appropriate figures into the cosine rule e.g. $8.4^2 + 37.041^2 - 2 \times 8.4 \times 37.041 \cos 40°$ M1 (dep on previous M1) for correct order of evaluation or $(c^2 =)\ 965.(897...)$ A1 $31.07 - 31.1$

Suggested grade boundaries

	9	8	7	6	5	4
Paper 1H	68	60	52	44	35	26
Paper 2H	72	62	52	42	32	22
Paper 3H	58	50	42	34	26	18
Total	198	172	146	120	93	66