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Mark Scheme (Results)
November 2010

IGCSE

IGCSE Mathematics (4400)
Paper 3H Higher Tier

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November 2010 IGCSE Mathematics (4400) Mark Scheme – Paper 3H

The following questions require a seen valid method before the accuracy mark can be awarded: Q6, Q12, Q14b, Q16b,Q21b

For all other questions a correct answer implies a correct method

Question		Working	Answer	Mark		Notes
1.		1x4 +2x9 +3x8 +5x4 (=66) "66" ÷ (4+9+8+4)	 2.64	 3	M1 M1 A1	Any 3 correct products with the intention to add dep allow 3 with working 3 without working = M0M0A0 2.6 without working =M2 A0
						Total 3 marks

2.	ai		$4c - 12$	1	B1	
	aii		$d^3 + 4d$	2	B2	B1 each term
	b		$x(3 - 2x)$	2	B2	B1 for x(expression with one correct term)
						Total 5 marks

3.			BAC= 70 isosceles triangle ABC = 40 or PAC = 110 or PA(CA ext)= 70 x = 40	 4	B1 B1 B1 B1	(can be marked on diagram) dep on prev B1. Must not contain incorrect statements. look for values on diagram dep on reason. Either alternate (with ABC) or angles between parallel lines (=180) or alternate (with 110) or corresponding (with 70) answer only = B1B0B1B0
						Total 4 marks

Question		Working	Answer	Mark		Notes
4.	a	$\pi \times 8.9^2$	248.8….. m^2 or sq metres oe	3	M1 A1 B1	or $3.14... \times 8.9^2$ or $^{22}/_7 \times 8.9^2$ awrt 248.7 to 248.9 ind
	b		250	1	B1ft	ft (a) if given to $\geq$ 3 sig figs (ignore units). Do not award marks from part a).
						Total 4 marks

5.	a	$^6/_7 \times {}^1/_4$ $^6/_{28}$ or $^3/_7 \times {}^1/_2$		2	M1 A1	or $^6/_7 \div {}^{28}/_7$ answer $\equiv {}^3/_{14}$ (but not = $^3/_{14}$) or cancelling
	b	$^{51}/_{15}$ and $^{25}/_{15}$ any multiple of 15 valid $^{51}/_{15} - {}^{25}/_{15}$ correct fractions subtracted $^{26}/_{15}$		3	M1 M1 A1	$^6/_{15}$ and $^{10}/_{15}$ dep $^{-4}/_{15}$ or $^6/_{15} - {}^{10}/_{15}$ (dep on M2) $2 - {}^4/_{15}$ oe (but not $1^{11}/_{15}$)
						Total 5 marks

6.	a	$7x - 2x = -4 - 3$ $5x = -7$	-1.4	3	M1 M1 A1	correct gathering of terms Accept -7/5 (not -7 ÷ 5) No working: M0A0
	b	$16 - 5y = 2 \times 3$ $-5y = -10$ oe	2	3	M1 M1 A1	16/3 – 2 =5y/3 10/3 = 5y/3 Accept -10/-5 (not -10 ÷ -5) No working: M0A0
						Total 8 marks

Question		Working	Answer	Mark		Notes
7.	ai		Mr Smith's hats	1	B1	
	aii		0	1	B1	none or zero, Ø or { }, "empty set" etc; allow "There aren't any"
	bi		*B*	1	B1	
	bii		Є	1	B1	
						Total 4 marks

8.	a	$^{x}/_{9}$ = tan 36° or tan 36° or 0.726.. seen 9 × tan 36°	 6.54	 3	M1 M1 A1	$x^2 + 9^2 = (9/\cos 36)^2$ oe (e.g. $x^2 + 9^2 = 11.12^2$) $\sqrt{((9/\cos 36)^2 - 9^2)}$ awrt 6.54 use isw if better seen in body
	b	$10^2 = 4.5^2 + y^2$ oe $\sqrt{(10^2 - 4.5^2)}$ or $\sqrt{79.75}$	 8.93	 3	M1 M1 A1	or $10^2 - 4.5^2$ M2 for 4.5 x tan ($\cos^{-1}$ $^{4.5}/_{10}$) awrt 8.93 use isw if better seen in body
						Total 6 marks

9.	a		1, 5, 6	2	B2	B1 three positive whole nos with med 5 or mean 4
	b		5, 5, 7, *x*	2	B2	$x > 7$ B1 four nos with single mode 5 or med 6
						Total 4 marks

10.	a	14 × 15 ÷ 21 oe	 10	 2	M1 A1	Correct use of s.f. 2/3 or 3/2 or 5/7 or 7/5
	b	18 × 21 ÷ 15 oe	 25.2	 2	M1 A1	Correct use of s.f. 5/7, 7/5, 6/5, 5/6 , 18/"10", "10"/18, 14/"10", "10"/14 cao
						Total 4 marks

Question		Marking	Answer	Mark		Notes
11.	a	Read at cf = 20 or 20.5	15 →15.5	2	M1 A1	answer only = M1 A1
	b	Read at cf = 10 & 30	28 → 30	2	M1 A1	or 34 → 35, and 6 → 7 seen answer only = M1A1
	c		4	1	B1	
						Total 5 marks

12.		2 lines where coefficients of x or y are equal	$x = 1.5$, $y = -2$	3	M1 A1 A1	e.g $6x - 15y = 39$, or $6x - 15y = 39$ $6x + 3y = 3$ $30x + 15y = 15$ and then add/subtract (condone 1 arithmetic error) leads to $18y = -36$ or $36x = 54$ or make x or y subject and substitute correctly
						Total 3 marks

13.	a		$(x - 5)(x - 3)$	2	B2	B1 for one bracket correct or $(x+5)(x+3)$
	b		$(x - 7)(x + 7)$	1	B1	
						Total 3 marks

Question		Working	Answer	Mark		Notes
14.	a		0.2 to 0.3, 3.7 to 3.8	2	B2	inclusive; B1 for each
	b	Draw $y = x + 1$			M1	for $0 \le x \le 5$
			0.4 to 0.5 &		A1	inclusive dep on M1
			4.5 to 4.6	3	A1	inclusive dep on M1
						Total 5 marks

15.		$\pi \times 1.5^2 \times 4$ (= 28.2…)			M1	Volume of cylinder
		$^4/_3 \times \pi \times 1.5^3$ (=14.1…)			M1	Volume of sphere
		"14.1" × 0.5 (=7.06…)			M1	0.5 × their sphere vol
		cyl vol + hemisphere vol			M1	dep M1M1
						(allow cyl volume + sphere volume if hemisphere not calculated)
			35.3	5	A1	35.3 to 35.4 (not 11.25π)
						Total 5 marks

16.	a		$3x^2 + 6x - 24$	3	B3	B1 each term
	b	"$3x^2 + 6x - 24$" = 0			M1ft	Must be a 3 term quadratic
		$(3x + 12)(x - 2)$ oe			M1ft	or " $\frac{-6 \pm \sqrt{6^2 - 4 \times 3 \times -24}}{2 \times 3}$ " condone 1 sign error
		$x = -4$ or 2			A1	cao
		sub both x values			M1ft	
			(-4, 80), (2, -28)	5	A1	cao (needs first 2 M's)
						Total 8 marks

Question		Working	Answer	Mark		Notes
17	a	$(^1/_6)^3$	$^1/_{216}$ oe	2	M1 A1	 (or 0.00463 or better)
	b	$^1/_6 \times (^5/_6)^2$ $3 \times {}^1/_6 \times (^5/_6)^2$	$^{75}/_{216}$ oe	3	M1 M1 A1	1 correct combination 1, ~1, ~1 oe 25/72 (or 0.347 or better)
						Total 5 marks

18.		$xP = 100(y - x)$ or $P = \frac{100y-100x}{x}$ $xP = 100y - 100x$ $x(P + 100) = 100y$	$\frac{100y}{P+100}$ oe	4	M1 M1 M1 A1	$P = 100y/x - 100x/x$ $P + 100 = 100y/x$ $x(P+100) = 100y$
						Total 4 marks

19.		$^{\sin A}/_5 = {}^{\sin 40}/_6$ oe $\sin A = {}^{5\sin 40}/_6$ or 0.535… A = 32.3 to 32.4 (B=) 180– 40 –"32.4" (= 107.6 to 107.7) 0.5 × 5 × 6 × sin "107.6" (2 sides & a trapped angle)	14.3	6	M1 M1 A1 M1 ft M1ft A1	 dep on M2. or Height = 5 sin 40 (=3.21) and base = 6 cos "32.4" + 5 cos 40 (= 8.9) 0.5 x 3.21 x "8.9" (must be a correct calculation for height and base) awrt 14.3
						Total 6 marks

Question		Working	Answer	Mark		Notes
20.	a	2^4 or -4 seen	2^{-4}	2	M1 A1	
	b	2^3 or $^1/_3$ seen	$8^{1/3}$	2	M1 A1	accept $8^{0.3rec}$
	c	$\frac{(a+\sqrt{a})}{\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}}$	$\sqrt{a} + 1$	2	M1 A1	multiply numerator & denominator by $\sqrt{a}$ or $(a\sqrt{a} + a)/a$
						Total 6 marks

21.	a	$y = 2x + 1$ $x = \frac{y-1}{2}$	$f^{-1}(x) = {}^{(x-1)}/_2$ oe	2	M1 A1	$x = 2y + 1$ $y = \frac{x-1}{2}$ answer only = M1A1
	b	$(2 + x)^2 = x^2$ $4 + 4x + x^2 = x^2$	$x = -1$	3	M1 M1 A1	M1 for $(2 + x)^2$ or $2 + x = -x$ (from rooting both sides) Answer only = M0A0A0
						Total 5 marks

						TOTAL FOR PAPER : 100 MARKS

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