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Mark Scheme (Results)
November 2010

IGCSE

IGCSE Mathematics (4400)
Paper 4H Higher Tier

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November 2010 IGCSE Mathematics (4400) Mark Scheme – Paper 4H

Apart from Questions 18, 20 and 21(b)(ii) (where the mark scheme states otherwise), the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method.

Question	Working	Answer	Mark		Notes
1. a	$\frac{10.73}{5.3} + 1.4 = 2.0245\ldots + 1.4$		2	M1	for 10.73 or 2.0245… or 1.6014…
		3.424528302		A1	for at least first 5 figures
b		3.42	1	B1	ft from (a) if non-trivial
					Total 3 marks

2.	248 × 1.25 oe		3	M2	M1 for 248 × 1.15 or 285.2 or 248 × 75 or 18 600
		310		A1	cao
					Total 3 marks

3. a		(7, 6)	2	B2	B1 for 7 B1 for 6
b		*C* (3, 10) *D* (11, 2) or *C* (11, 2) *D* (3, 10)	2	B2	B1 for (3, 10) B1 for (11,2)
					Total 4 marks

Question	Working	Answer	Mark		Notes
4 a	1 − (0.3 + 0.1)		2	M1	
		0.6		A1	cao
b	0.1 + "0.6" or 1 − 0.3		2	M1	do not award if ans to (a) > 1
		0.7		A1	ft from (a) if ans to (b) < 1
c	0.3 × 160		2	M1	for 0.3 × 160 or 0.3 × 200 or $\frac{48}{60}$
		48		A1	cao
					Total 6 marks

5.	50 × 0.72 × 221		2	M1	for × 0.72 or × 221
		7956		A1	cao
					Total 2 marks

6. a	$\frac{2}{3} \times 2.6 \times 1.5^2$		2	M1	for correct substitution
		3.9		A1	cao
b	$35 = \frac{2}{3} \times h \times 2.5^2$ or $(h =) \frac{35}{\frac{2}{3} \times 2.5^2}$ oe		2	M1	for correct substitution or correct rearrangement
		8.4		A1	cao
c	$y^2 = \frac{3V}{2h}$		2	M1	for $y^2 = \frac{3V}{2h}$ oe
		$\sqrt{\frac{3V}{2h}}$		A1	for $\sqrt{\frac{3V}{2h}}$ or $\pm\sqrt{\frac{3V}{2h}}$ oe
					Total 6 marks

Question	Working	Answer	Mark		Notes
7. a		**Q** correct Vertices (6, 10) (9, 10) (6, 16)	3	B3	B2 for translation of correct shape or 2 correct vertices B1 for right-angled triangle with base 3 or height 6 in the same orientation as **P**
b		**R** correct Vertices (10, 2) (13, 2) (10, 8)	2	B2	for **R** correct or ft their **Q** B1 for translation of 4 to the right or 8 down ft their **Q**
c	Enlargement with scale factor 3 and centre (1, 8)		2	B2	B1 for Enlargement 3 B1 for (1, 8) Award no marks if answer is not a single transfn
					Total 7 marks

8.	$\frac{19.6\times 50000}{100\times 1000}$		3	M1	for 19.6 × 50000 or 980 000 or number with digits 98 or $\frac{50000}{100\times 1000}$ or ½ km
				M1	for completing calculation $\frac{"980000"}{100\times 1000}$ or 19.6 × ½
		9.8		A1	cao
					Total 3 marks

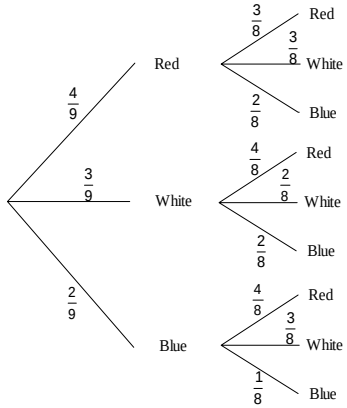
Question	Working	Answer	Mark		Notes
9.		$x \geq 1$	3	B1	for $x \geq 1$ or $x > 1$ oe
		$y \geq 2$		B1	for $y \geq 2$ or $y > 2$ oe
		$x + y \leq 8$ oe		B1	for $x + y \leq 8$ or $x + y < 8$ oe
					SC B1 if all inequalities reversed
					Total 3 marks

10.		$\angle ACO = 21°$ or $\angle COB = 42°$ or $\angle ACB = 90°$		4	B1	Angles may be stated or marked on diagram
		$\angle OCP = 90°$ or $\angle CBP = 111°$ or $\angle BCP = 21°$			B1	
		180 − 21 − (90 + 21) or 180 − 42 − 90 or 180 − 21 − 111			M1	
			48		A1	Award 4 marks for an answer of 48, unless obtained by a clearly incorrect method.
						Total 4 marks

Question	Working	Answer	Mark		Notes		
11. a	1350 – 1269 or 81		3	M1		or	or
	$\frac{81}{1350}\times 100$ or $\frac{81}{1269}\times 100$			M1	for $\frac{81}{1350}$ or $\frac{81}{1269}$ or 0.06 or 0.0638...	M1 for $\frac{1269}{1350}$ or 0.94 or 94 M1 for 1–"0.94" or 100–"94"	M1 for $\frac{1350}{1269}$ or 1.06... or 106.... M1 for "1.06..."–1 or "106"–100
					Award both method marks for an answer of 6.4, 6.38 or better.		
		6		A1	cao Do not award this mark if a denominator of 1269 used.		
b	$\frac{9519}{1.14}$ or $9519\times\frac{100}{114}$ oe		3	M2	M2 for $\frac{9519}{1.14}$ or $9519\times\frac{100}{114}$ oe M1 for $\frac{9519}{114}$, 83.5 seen, 114% = 9519, $\frac{9519}{x}=1.14$, $9519=1.14x$		
		8350		A1	cao		
							Total 6 marks

Question	Working	Answer	Mark		Notes	
12. a	$-\frac{5-1}{2}$ oe		3	M1	for clear attempt to use $\frac{\text{vert difference}}{\text{horiz difference}}$	SC If M0A0, award B2 for linear expression in which the coefficient of x is −2 or for L = linear expression in which the coefficient of x is −2 oe inc L+2x = k
	m = −2			A1	for m = −2	
		y = −2x + 5 oe		B1	ft from their m SC If M0A0, award B1 for $y = mx + 5$	
b	y = "−2"x + c		2	M1	$c \neq 5$	SC If M0, award B1 for −2x + 6 or L = −2x + 6 ft
		y = −2x + 6 oe		A1	ft from (a)	
						Total 5 marks

Question	Working	Answer	Mark		Notes
13.	$11x + x = 180$ or $12x = 180$ or for $\frac{360}{n}$ or $\frac{180(n-2)}{n}$		4	M1	May be implied by $\frac{180}{12}$ or 15
	(exterior angle =) 15 or $\frac{360}{n} \times 11 = \frac{180(n-2)}{n}$ oe or $180 - \frac{360}{n} = 11 \times \frac{360}{n}$			A1	
	$\frac{360}{"15"}$ or simplified correct equation in which n appears only once eg $360 \times 11 = 180(n - 2)$ or $360 \times 11 = 180n - 360$ or $12 \times \frac{360}{n} = 180$			M1	
		24		A1	cao Award 4 marks for an answer of 24 unless clearly obtained by an incorrect method.
					Total 4 marks

Question	Working	Answer	Mark		Notes	
14. a			3	B3	B1 $\frac{3}{9}$ and $\frac{2}{9}$ correct on LH branches B2 All RH branches correct (B1 one RH branch correct ie 3 probabilities)	
b	$\frac{4}{9} \times \frac{2}{8} + \frac{2}{9} \times \frac{4}{8}$ oe		3	M1	for $\frac{4}{9} \times$ "$\frac{2}{8}$" or "$\frac{2}{9}$" $\times$ "$\frac{4}{8}$" oe	Award for correct use of probabilities (must be < 1) from their tree diagram.
				M1	for sum of both products	
		$\frac{16}{72}$ or $\frac{2}{9}$ oe		A1	for $\frac{16}{72}$ or $\frac{2}{9}$ oe	
						Total 6 marks

Question	Working	Answer	Mark		Notes
15. a		3.6×10^{15}	1	B1	cao
bi	Correct expression for xy stated or clearly implied with 7×5 evaluated eg $35 \times 10^{m+n}$ $3.5 \times 10^{(1)} \times 10^{m} \times 10^{n}$		5	M1	
	States or clearly implies that $xy = 3.5 \times 10^{m+n+1}$ oe or $3.5 \times 10^{(1)} \times 10^{m+n}$ oe or $m + n + 1$*			A1	SC If A1 not scored, award B1 for 35×10^{11} seen. *dep on $(3.5 \times) 10^{(1)} \times 10^{m} \times 10^{n}$ $= (3.5 \times) 10^{12}$
bii	$m - n = 27$ oe			B1	for $m - n = 27$ oe inc $m = n + 27$
	$2m = 38$ or $2n = -16$			M1	Adding or subtracting $m + n = 11$ and $m - n = 27$
		$m = 19 \quad n = -8$		A1	for both values correct Award 3 marks for both values correct, unless clearly obtained by an incorrect method.
					Total 6 marks

Question	Working	Answer	Mark		Notes
16. a	$P = \frac{k}{V}$		3	M1	for $P = \frac{k}{V}$ but not for $P = \frac{1}{V}$ Also award for a correct equation in P, V and a constant or P = some numerical value $\times \frac{1}{V}$
	$18 = \frac{k}{24}$			M1	for $18 = \frac{k}{24}$ or for correct substitution into an equation which scores first method mark (may be implied by correct evaluation of the constant)
		$P = \frac{432}{V}$		A1	Award 3 marks if answer is $P = \frac{k}{V}$ but k is evaluated as 432 in *any* part
b	$3V^2 = 432$ or $3V \times V = 432$		2	M1	for $3V^2 = 432$ or $3V \times V = 432$ or $V^2 = 144$
		12		A1	Also accept ± 12
					Total 5 marks

17. a		18	1	B1	cao
b	(2.5-4) bar height 19 little squares		2	B1	Allow $\pm$ ½ sq
	(4-6) bar height 6 little squares			B1	Allow $\pm$ ½ sq
					Total 3 marks

Question	Working	Answer	Mark		Notes
18.	$\frac{-8 \pm \sqrt{8^2 - 4 \times 3 \times 2}}{2 \times 3}$ or for this expression with one or more of 8^2, $4 \times 3 \times 2$ or 2×3 correctly evaluated		3	M1	for correct substitution
	obtains $\sqrt{40}$ or $\sqrt{64-24}$ or $2\sqrt{10}$ or 6.32...			M1	(independent)for correct simplification of discriminant
		−0.279, −2.39		A1	dep on <u>both</u> method marks for values rounding to −0.279 and −2.39 (−0.27924... , −2.38742...)
					Total 3 marks

Question	Working	Answer	Mark		Notes
19. a	$AE \times 4 = 16 \times 5$		2	M1	
		20		A1	cao
bi		12	5	B1	cao
bii	$(\cos x^\circ =) \dfrac{5^2 + 8^2 - 12^2}{2 \times 8 \times 5}$ or $\dfrac{5^2 + OE^2 - "12"^2}{2 \times OE \times 5}$ $(\cos \angle OEC =) \dfrac{16^2 + 8^2 - 12^2}{2 \times 16 \times 8}$ or $\dfrac{16^2 + OE^2 - "12"^2}{2 \times 16 \times OE}$ or, using the midpoint of CD, $\cos \angle OEC = \dfrac{5.5}{8}$ or $\dfrac{5.5}{OE}$ or complete, correct method of finding sin $\angle OEC$ or tan $\angle OEC$		M2	M1 for $12^2 = 5^2 + 8^2 - 2 \times 8 \times 5 \cos x^\circ$ or $"12"^2 = 5^2 + OE^2 - 2 \times OE \times 5 \cos x^\circ$ or $12^2 = 16^2 + 8^2 - 2 \times 16 \times 8 \times \cos \angle OEC$ or $"12"^2 = 16^2 + OE^2 - 2 \times 16 \times OE \times \cos \angle OEC$	
		133.4		A2	for answer rounding to 133.4 (133.4325…) A1 for $\dfrac{-55}{80}$ oe or −0.6875 If $\angle OEC$ is used, award A1 for $\dfrac{176}{256}$ oe or 0.6875 or value rounding to 46.6 seen. If midpoint of CD is used, award A1 for $\dfrac{5.5}{8}$ oe or 0.6875 or value rounding to 46.6 seen.
					Total 7 marks

Question	Working	Answer	Mark		Notes
20.	$x^2 = 7x - 10$ (may be implied by 2nd M1)		5	M1	$y = \left(\frac{y+10}{7}\right)^2$
	$x^2 - 7x + 10$ (= 0) oe			M1	$y^2 - 29y + 100$ (= 0) oe
	$(x - 5)(x - 2)$ (= 0) oe or $\frac{7 \pm \sqrt{9}}{2}$ or $\frac{7 \pm \sqrt{49-40}}{2}$ or $\frac{7 \pm 3}{2}$			M1	$(y - 4)(y - 25)$ (= 0) or $\frac{29 \pm \sqrt{441}}{2}$ or $\frac{29 \pm \sqrt{841-400}}{2}$ or $\frac{29 \pm 21}{2}$
		$x = 2,\ x = 5$		A1	$y = 4,\ y = 25$ dep on all method marks
		$x = 2, y = 4$ $x = 5, y = 25$		A1	dep on all method marks (may be implied by 2nd M1)
					Total 5 marks

21.	ai		**a** + **b**	3	B1	
	aii		3**a** − **b**		B1	
	aiii	¾ **a** + ¾ **b** or **b** + ¼(3**a** − **b)** or **3**a **− ¾(3**a **− b**) oe		B1		
	bi	collinear, in a (straight) line oe	2	B1		
	bii		¾		B1	dep on B1 in both (a)(i) and (a)(iii)
						Total 5 marks

Question	Working	Answer	Mark		Notes
22.	$1+\frac{(x+3)(x-2)}{(x+4)(x-2)}$ or $\frac{(x+4)(x-2)+x^2+x-6}{(x+4)(x-2)}$ or $\frac{(x+4)(x-2)+x^2+x-6}{x^2+2x-8}$		4	B1	for correct factorisation or for correct single fraction, even if unsimplified
	$1+\frac{x+3}{x+4}$ or $\frac{2x^2+3x-14}{(x+4)(x-2)}$ or $\frac{2x^2+3x-14}{x^2+2x-8}$ or $\frac{(x-2)[(x+4)+(x+3)]}{(x+4)(x-2)}$			B1	
	$\frac{x+4+x+3}{x+4}$ or $\frac{x+4}{x+4}+\frac{x+3}{x+4}$ or $\frac{(2x+7)(x-2)}{(x+4)(x-2)}$			B1	
		$\frac{2x+7}{x+4}$		B1	
					Total 4 marks

					TOTAL FOR PAPER: 100 MARKS

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