

# 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	$\frac{10.73}{5.3} + 1.4 = 2.0245\dots + 1.4$		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
					<b>Total 3 marks</b>

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

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)
					<b>Total 4 marks</b>

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

5.	$50 \times 0.72 \times 221$		2	M1	for $\times 0.72$ or $\times 221$
		7956		A1	cao
					<b>Total 2 marks</b>

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
					<b>Total 6 marks</b>

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
					<b>Total 7 marks</b>

8.	$\frac{19.6 \times 50000}{100 \times 1000}$		3	M1	for $19.6 \times 50000$ or 980 000 or number with digits 98 or $\frac{50000}{100 \times 1000}$ or $\frac{1}{2}$ km
				M1	for completing calculation "980000" $\frac{980000}{100 \times 1000}$ or $19.6 \times \frac{1}{2}$
		9.8		A1	cao
					<b>Total 3 marks</b>

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
					<b>Total 3 marks</b>

10.		$\angle ACO = 21^\circ$ or $\angle COB = 42^\circ$ or $\angle ACB = 90^\circ$		4	B1	Angles may be stated or marked on diagram
		$\angle OCP = 90^\circ$ or $\angle CBP = 111^\circ$ or $\angle BCP = 21^\circ$			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.
						<b>Total 4 marks</b>

Question	Working	Answer	Mark		Notes
11. a	1350 - 1269 or 81		3	M1	
	$\frac{81}{1350} \times 100$ or $\frac{81}{1269} \times 100$			M1	for $\frac{81}{1350}$ or $\frac{81}{1269}$ or 0.06 or 0.0638... or M1 for $\frac{1350}{1269}$ or 0.94 or 94 M1 for 1-“0.94” ” or 100-“94” ” or M1 for $\frac{1350}{1269}$ or 1.06... or 106... M1 for “1.06...”-1 or “106”-100 0
					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
					<b>Total 6 marks</b>

Question	Working	Answer	Mark		Notes
12. a	$-\frac{5-1}{2}$ oe		3	M1	for clear attempt to use <u>vert difference</u> <u>horiz difference</u>
	$m = -2$			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	$c \neq 5$
		$y = -2x + 6$ oe		A1	ft from (a)
					SC If M0, award B1 for $-2x + 6$ or $L = -2x + 6$ ft
<b>Total 5 marks</b>					



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 "15" 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.
					<b>Total 4 marks</b>

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)
				M1	for sum of both products from their tree diagram.
		$\frac{16}{72}$ or $\frac{2}{9}$ oe		A1	for $\frac{16}{72}$ or $\frac{2}{9}$ oe
<b>Total 6 marks</b>					

Question	Working	Answer	Mark		Notes
15. a		$3.6 \times 10^{15}$	1	B1	cao
bi	Correct expression for $xy$ stated or clearly implied with $7 \times 5$ 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 $35 \times 10^{11}$ 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 $m - n = 27$
		$m = 19$ $n = -8$		A1	for both values correct Award 3 marks for both values correct, unless clearly obtained by an incorrect method.
					<b>Total 6 marks</b>

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 $P = \text{some numerical value} \times \frac{1}{V}$
	$18 = \frac{k}{24}$			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 <i>any</i> 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 $\pm 12$
					<b>Total 5 marks</b>

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

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 $2 \times 3$ 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...)
					<b>Total 3 marks</b>

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

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)
					<b>Total 5 marks</b>

21. ai		<b>a + b</b>	3	B1	
aii		<b>3a - b</b>		B1	
aiii	$\frac{3}{4} \mathbf{a} + \frac{3}{4} \mathbf{b}$ or $\mathbf{b} + \frac{1}{4}(3\mathbf{a} - \mathbf{b})$ or $3\mathbf{a} - \frac{3}{4}(3\mathbf{a} - \mathbf{b})$ oe		B1		
bi	collinear, in a (straight) line oe	2	B1		
bii		$\frac{3}{4}$		B1	dep on B1 in both (a)(i) and (a)(iii)
					<b>Total 5 marks</b>

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	
					<b>Total 4 marks</b>

				<b>TOTAL FOR PAPER: 100 MARKS</b>
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