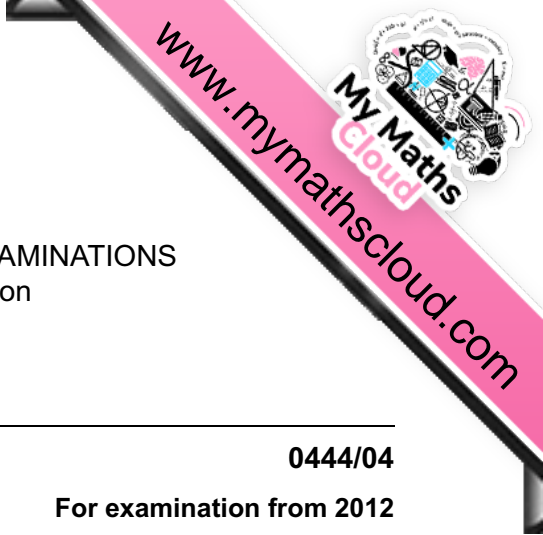




UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education



CAMBRIDGE IGCSE MATHEMATICS (US)

0444/04

Paper 4 (Extended)

For examination from 2012

SPECIMEN SCORING GUIDE

MAXIMUM SCORE: 130

This document consists of **8** printed pages.



Types of score

M scores are given for a correct method.

A scores are given for an accurate answer following a correct method.

B scores are given for a correct statement or step.

D scores are given for a clear and appropriately accurate drawing.

P scores are given for accurate plotting of points.

E scores are given for correctly explaining or establishing a given result.

SC scores are given for special cases that are worthy of some credit.

Abbreviations

art	anything rounding to
cao	correct answer only
cso	correct solution only
ft	follow through
isw	ignore subsequent working
oe	or equivalent
soi	seen or implied
ww	without working
www	without wrong working

1 (a)	350, 250, 200	B3	M1 for $800 \div (7 + 5 + 4)$ Implied by 50 and M1 dep their $50 \times$ any one of 7, 5, or 4
(b)	275 cao	B3	B1 for 100 or 250 (may be implied in next step) and M1 for $\frac{\text{their } 250 \times 5 \times 2}{200}$ seen
(c)	200	B2 ft	ft $0.8 \times$ their 250 from (a) oe correctly evaluated M1 for $0.8 \times$ their 250 from (a)
(d)	11 : 8 : 4 or 2.75 : 2 : 1 cao	B2	M1 for 275 or their (b) : 200 or their (c) : 100 [10]

2 (a)	14 46 or 2 46 pm cao	B3	M1 for $\frac{60 + 40}{35}$ (2.857...) could be in part and M1 for correct method to convert a decimal time to minutes ft a decimal either full answer or decimal part $\times 60$ (e.g., 51.(428), 171.(4...) or 2hrs 51 or 51 m)
(b) (i)	260	B1	
(ii)	145	B1 ft	ft their (b)(i) – 115
(c)	85(.0) cao www	B4	M2 for $(AC^2 =) 40^2 + 60^2 - 2 \times 40 \times 60 \times \cos 115$ or M1 for correct implicit version and M1 dep $(AC =) \sqrt{\quad}$ of a correct combination
(d)	39.76 to 39.8 cao www	B3	M2 for $(\sin A =) \frac{\sin 115}{\text{their (c)}} \times 60$ or M1 for $\frac{\sin A}{60} = \frac{\sin 115}{\text{their (c)}}$ Could use cosine rule as alt method
(e)	73.76 – 73.81 cao	B3	M2 for $40 \sin 80 + 60 \sin 35$ oe (39.4) (34.4) or their (c) $\times \sin(100 - \text{their (d)})$ or their (c) $\times \cos(\text{their (d)} - 10)$ or M1 for either $40 \sin 80$ or $60 \sin 35$ or implicit trig version using their (c)

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<p>3 (a) $(x - 3)(x - 1) [= 0]$ 1 and 3 www B2</p> <p>(b) Correct first step of rearrangement $\frac{x+1}{2}$ oe</p> <p>(c) $x^2 - 6x + 4 = 0$ $\frac{p \pm \sqrt{q}}{r}$ with $p = 6$ and $r = 2$ and $q = (-6)^2 - 4.1.4$ oe or 20 5.24 cao 0.76 cao www</p> <p>(d) 29</p> <p>(e) $(2x - 1)^2 - 4(2x - 1) + 3$ $4x^2 - 12x + 8$ final answer</p>		<p>M1 A1</p> <p>M1 A1</p> <p>M1 B1 ft B1 ft B1 B1</p> <p>B2</p> <p>M1 A2</p>	<p>$\frac{4 \pm \sqrt{(-4)^2 - 4.1.3}}{2}$ or $(x - 2)^2 = 1$ or better</p> <p>e.g., $y + 1 = 2x$ or $x + 1 = 2y$ or better</p> <p>Can be implied by later work (method marks)</p> <p>ft if in the form $ax^2 + bx + c (= 0)$ with $a \neq 0$</p> <p>$[(x - 3)^2 - 5 = 0$ B1 then $x = (\pm)\sqrt{5} + 3$ B1 is the equivalent for completing the square]</p> <p>SC1 for both answers “correct” but not to 2 dp (5.236 067 977, 0.763 932 022) Can be truncated or correctly rounded</p> <p>SC1 for $[f(-2) =]$ 15 seen or $2x^2 - 8x + 5$ oe seen</p> <p>Or correctly factorized After A0, SC1 for $4x^2 - 12x + 8$ seen</p> <p style="text-align: right;">[14]</p>
<p>4 (a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(b)</p>	<p>153.86 to 153.96 or 154</p> <p>179.5 to 179.62 or 180</p> <p>1005 to 1006 or 1008 or 1010 (g)</p> <p>9.78 to 9.79</p>	<p>B2</p> <p>B2</p> <p>B2 ft</p> <p>B4</p>	<p>M1 for $4\pi 3.5^2$</p> <p>M1 for $\frac{4}{3}\pi 3.5^3$</p> <p>ft their (ii) $\times 5.6$ correct to 3sf or better (allow in kg) M1 for their (ii) $\times 5.6$</p> <p>M1 for $\pi 8^2 \times 8$ (1608 – 1609) <u>Alt</u> $\pi 8^2 d = 2 \times$ their (ii) M1 and M1 dep for $\pi 8^2 h = 2 \times$ their (ii) $+ \pi 8^2 \times 8$ <u>Alt</u> $(2 \times$ their (a)(ii)) $\div (\pi 8^2)$ M1 dep and M1 dep $(2 \times$ their (ii) $+ \pi 8^2 \times 8) \div (\pi 8^2)$ <u>Alt</u> add 8 M1 dep</p> <p style="text-align: right;">[10]</p>

<p>5 (a) -6.1(11...), 5, 11.9 (11.88)</p> <p>(b) 16 correct points</p> <p>Smooth curves through 14 points Ignoring $x = \pm 0.3$ Graph does not cross the y-axis</p> <p>(c) (i) $0.45 \leq x \leq 0.5$</p> <p>(ii) $-2.4 \leq x \leq -2.1$ $-0.5 \leq x \leq -0.4$ $0.3 \leq x \leq 0.4$</p> <p>(d) $g(x) = 3x + 3$ correct, ruled, full range (1mm accuracy at ends)</p> <p>(e) (i) Gets closer</p> <p>(ii) Answer rounds to 3.00</p>	<p>B1 B1 B1</p> <p>P3</p> <p>D1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p> <p>B1</p>	<p>P2 ft for 13 to 15 correct (in correct square) P1 ft for 10 to 12 correct</p> <p>D1 Correct shape, not ruled, within $\frac{1}{2}$ small square (curves could be joined)</p> <p>B1 Indep but needs 2 “curves”</p> <p>If 0 scored, SC1 for evidence of $f(x) = -4$</p> <p>B2 Allow SC1 for any one of correct but short, slope of 3, y-intercept 3 on sloping line, “good” freehand</p> <p>B1 Any correct comment isw dep on $g(x)$ correct or freehand</p> <p>B1</p> <p>[16]</p>
<p>6 (a) 108(.16) (allow 108.2(0)) www</p> <p>(b) 148(.02...), 324(.3...)</p> <p>(c) 5 correct pts 100, 148 ft, 219, 324 ft, 480</p> <p>Smooth exponential curve, correct shape, through 5 points</p> <p>(d) (i) 265 – 270</p> <p>(ii) 17 or 18 cao</p> <p>(e) (i) $\frac{(100) \times 7 \times 20}{(100)}$ oe 100 + 7 × 20 or better</p> <p>(ii) 380</p> <p>(iii) Correct straight ruled line for x-range 0 to 35</p> <p>(f) 27 – 29 cao</p>	<p>B2</p> <p>B1 B1</p> <p>P3</p> <p>D1</p> <p>B1</p> <p>B1</p> <p>M1</p> <p>E1</p> <p>B1</p> <p>D2</p> <p>B1</p>	<p>M1 for 100×1.04^2 oe</p> <p>P2 ft for 4 correct, P1 ft for 3 correct Points must be in correct square vertically, including on line</p> <p>B1 If out of range, then ft their graph at 25 years</p> <p>E1 No errors</p> <p>P1 ft for 2 of (0, 100), (20, 240), (40, 380) ft correctly plotted</p> <p>[16]</p>

7	(a) (i)	36 (36.0 – 36.4)	B1	
	(ii)	50 (50.0 – 50.4)	B1	
	(iii)	29 (28.6 – 29.4)	B1	
	(iv)	20	B2	If B0 , SC1 for 19 or 21 or 180 seen
	(b) (i)	$p = 16, q = 4$	B1 B1	If B0 , SC1 if p and q add up to 20
	(ii)	36.1 cso www	B4	Answer 36 scores 4 marks after some correct working shown with no incorrect working seen M1 for using mid-values at least four correct from 5, 15, 25, 35, 45, 55, 65, 75 M1 (dep on x values within the correct class including the boundaries) for Σfx (at least four correct products soi) M1 (dependent on 2nd M1) for dividing sum by 200 or 180 + their p + their q
(c)	8.2 (8.19 – 8.20), 11.4, 5 (5.00 – 5.01)	B4	B3 for 2 correct or B2 for 1 correct After B0 , SC2 for fd's 2.7(3...) oe, 3.8 oe, 1.6(6...) oe or SC1 for 2 of fd's correct	

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<p>8 (a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>$x = 78$ alternate angles</p> <p>either $y = 144$ or $z = 102$ (opposite angles of) cyclic quad (= 180) and $z = 102$ or $y = 144$ angles (in (a)) quadrilateral (= 360) or (opp angles of) cyclic quad (= 180)</p> <p>Their $z + 36 \neq 180$ oe</p> <p>72 or 288</p> <p>Similar (or enlargement)</p> <p>9.8 (9.79 to 9.81) www</p> <p>4 www</p>	<p>B1 E1</p> <p>B1 E1</p> <p>B1 E1</p> <p>E1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B2</p>	<p>Dep on B1 Accept <u>Z angle</u>, extras can spoil Accept longer reasons using correct language and clarity with angles used, e.g., allied angles gives 102° and angles on a straight line = 180°</p> <p>Dep on B1, extras can spoil</p> <p>Dep on B1, extras can spoil</p> <p>Could also use their angles x and y provided $x + y \neq 180$ Could be a longer reason involving angles, must be clearly explained.</p> <p>M1 for $(\frac{7}{10})^2$ or $(\frac{10}{7})^2$ oe seen (0.49), (2.04) It is possible to do (iii) then (ii) and full marks can still be scored</p> <p>M1 for $\frac{1}{2} \times 10 \times \text{height} = 20$</p>
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<p>9 (a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(c) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(iv)</p>	<p>Sketch of 4 by 4 diagram</p> <p>25, 40</p> <p>n^2 $(n + 1)^2$ oe $(n + 1)^2 + n^2 - 1$ or $2n^2 + 2n$ or $2n(n + 1)$ oe</p> <p>$\frac{2}{3} + f + g = 4$</p> <p>$\frac{2}{3} \times 2^3 + f \times 2^2 + g \times 2$ oe $4f + 2g = \frac{32}{3}$</p> <p>$2f + 2g = \frac{20}{3}$, $4f + 2g = \frac{32}{3}$ $(f =) 2$, $(g =) \frac{4}{3}$ oe cao www B3</p> <p>880 cao</p>	<p>B1</p> <p>B1 B1</p> <p>B1</p> <p>B1</p> <p>B2</p> <p>B1</p> <p>M1</p> <p>E1</p> <p>M1</p> <p>A1 A1</p> <p>B1</p>	<p>Any one of these oe isw and if B0 allow SC1 for their $(n + 1)^2 +$ their $(n^2) - 1$ or an expression containing $2n^2$ as the highest order term, soi</p> <p>ie for substituting 2</p> <p>No errors</p> <p>for correctly setting up for elimination of one variable</p> <p>Accept $\frac{6}{3}$ for 2</p>
<p>10 (a)</p> <p>(b)</p> <p>(c)</p>	<p>$s = \frac{1}{3}$, $t = \frac{1}{4}$, $u = \frac{5}{6}$</p> <p>$\frac{2}{3} \times \frac{3}{4}$</p> <p>$\frac{1}{2}$ oe cao</p> <p>$\frac{2}{3} \times$ their $\frac{1}{4} +$ their $\frac{1}{3} \times$ their $\frac{5}{6}$ $\frac{4}{9}$ oe cao (0.444...)</p>	<p>B1 B1 B1</p> <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>All correctly placed on tree or clearly indicated</p> <p>Accept all probabilities as frac/dec/% -1 once for words or 2 sf, do not accept ratios isw cancelling after correct answer</p> <p>Follow through method provided $0 < P < 1$</p>

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