



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CAMBRIDGE IGCSE MATHEMATICS (US)**

**0444/04**

Paper 4 (Extended)

**For examination from 2012**

SPECIMEN SCORING GUIDE

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**MAXIMUM SCORE: 130**

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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

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

2 (a)	14 46 or 2 46 pm cao	<b>B3</b>	<b>M1</b> for $\frac{60+40}{35}$ (2.857...) could be in parts and <b>M1</b> 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	<b>B1</b>	
(b) (ii)	145	<b>B1 ft</b>	ft their (b)(i) – 115
(c)	85(.0) cao www	<b>B4</b>	<b>M2</b> for $(AC^2 =) 40^2 + 60^2 - 2 \times 40 \times 60 \times \cos 115$ or <b>M1</b> for correct implicit version and <b>M1 dep</b> $(AC =) \sqrt{\quad}$ of a correct combination
(d)	39.76 to 39.8 cao www	<b>B3</b>	<b>M2</b> for $(\sin A =) \frac{\sin 115}{\text{their (c)}} \times 60$ or <b>M1</b> for $\frac{\sin A}{60} = \frac{\sin 115}{\text{their (c)}}$ Could use cosine rule as alt method
(e)	73.76 – 73.81 cao	<b>B3</b>	<b>M2</b> 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 <b>M1</b> for either $40 \sin 80$ or $60 \sin 35$ or implicit trig version using their (c)

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<p><b>3 (a)</b></p> <p><math>(x - 3)(x - 1) [= 0]</math> 1 and 3 <span style="float: right;">www <b>B2</b></span></p> <p><b>(b)</b> Correct first step of rearrangement <math>\frac{x+1}{2}</math> oe</p> <p><b>(c)</b> <math>x^2 - 6x + 4 = 0</math> <math>\frac{p \pm \sqrt{q}}{r}</math> with <math>p = 6</math> and <math>r = 2</math> and <math>q = (-6)^2 - 4.1.4</math> oe or 20  5.24 cao 0.76 cao <span style="float: right;">www</span></p> <p><b>(d)</b> 29</p> <p><b>(e)</b> <math>(2x - 1)^2 - 4(2x - 1) + 3</math> <math>4x^2 - 12x + 8</math> final answer</p>		<p><b>M1</b> <b>A1</b></p> <p><b>M1</b> <b>A1</b></p> <p><b>M1</b> <b>B1 ft</b> <b>B1 ft</b> <b>B1</b> <b>B1</b></p> <p><b>B2</b></p> <p><b>M1</b> <b>A2</b></p>	<p><math>\frac{4 \pm \sqrt{(-4)^2 - 4.1.3}}{2}</math> or <math>(x - 2)^2 = 1</math> or better</p> <p>e.g., <math>y + 1 = 2x</math> or <math>x + 1 = 2y</math> or better</p> <p>Can be implied by later work (method marks)</p> <p>ft if in the form <math>ax^2 + bx + c (= 0)</math> with <math>a \neq 0</math></p> <p><math>[(x - 3)^2 - 5 = 0</math> <b>B1</b> then <math>x = (\pm)\sqrt{5} + 3</math> <b>B1</b> is the equivalent for completing the square]</p> <p><b>SC1</b> 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><b>SC1</b> for <math>[f(-2) =] 15</math> seen or <math>2x^2 - 8x + 5</math> oe seen</p> <p>Or correctly factorized After <b>A0</b>, <b>SC1</b> for <math>4x^2 - 12x + 8</math> seen</p> <p style="text-align: right;"><b>[14]</b></p>
<p><b>4 (a) (i)</b></p> <p><b>(ii)</b></p> <p><b>(iii)</b></p> <p><b>(b)</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><b>B2</b></p> <p><b>B2</b></p> <p><b>B2 ft</b></p> <p><b>B4</b></p>	<p><b>M1</b> for <math>4\pi 3.5^2</math></p> <p><b>M1</b> for <math>\frac{4}{3}\pi 3.5^3</math></p> <p>ft their <b>(ii)</b> <math>\times 5.6</math> correct to 3sf or better (allow in kg) <b>M1</b> for their <b>(ii)</b> <math>\times 5.6</math></p> <p><b>M1</b> for <math>\pi 8^2 \times 8</math> (1608 – 1609) <u>Alt</u> <math>\pi 8^2 d = 2 \times</math> their <b>(ii)</b> <b>M1</b> and <b>M1 dep</b> for <math>\pi 8^2 h = 2 \times</math> their <b>(ii)</b> <math>+ \pi 8^2 \times 8</math> <u>Alt</u> <math>(2 \times</math> their <b>(a)(ii)</b>) <math>\div (\pi 8^2)</math> <b>M1 dep</b> and <b>M1 dep</b> <math>(2 \times</math> their <b>(ii)</b> <math>+ \pi 8^2 \times 8) \div (\pi 8^2)</math> <u>Alt</u> add 8 <b>M1 dep</b></p> <p style="text-align: right;"><b>[10]</b></p>

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

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

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

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