

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2015 series**

**0580 MATHEMATICS**

**0580/42**

Paper 4 (Extended), maximum raw mark 130

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<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – October/November 2015</b>	<b>0580</b>	<b>42</b>

**Abbreviations**

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part marks</b>
<b>1 (a) (i)</b>	$\frac{512}{7+11+14} \times 14$	<b>M2</b>	or <b>M1</b> for $\frac{512}{7+11+14}$
<b>(ii)</b>	112	<b>1</b>	
<b>(b)</b>	10 100	<b>2</b>	<b>M1</b> for $224 \times 45$ soi by 10080
<b>(c)</b>	19	<b>2</b>	<b>M1</b> for $224 \div 12$ soi by 18.66 to 18.67 or 18.7 or $18\frac{2}{3}$
<b>(d) (i)</b>	4093000	<b>1</b>	
<b>(ii)</b>	$4.093 \times 10^6$	<b>1FT</b>	<b>FT</b> <i>their</i> <b>(d)(i)</b>
<b>(e)</b>	198 or 198.1 to 198.2	<b>3</b>	<b>M2</b> for $\frac{8.2-2.75}{2.75} \times 100$ oe or <b>M1</b> for $\frac{8.2}{2.75} \times 100$ or $\frac{8.2-2.75}{2.75}$
<b>2 (a)</b>	0    4    0.625    0.875	<b>1,1,1,1</b>	
<b>(b)</b>	Fully correct smooth curve	<b>4</b>	<b>B3 FT</b> for 8 or 9 points or <b>B2 FT</b> for 6 or 7 points or <b>B1 FT</b> for 4 or 5 points
<b>(c)</b>	line $y = x + 1$ ruled and 0.2 to 0.3 and 1.8 to 1.95	<b>3</b>	Line must be fit for purpose ie at least from $x = 0$ to $x = 2$  <b>B2</b> for correct line and 1 correct value or <b>B1</b> for correct line or <b>SC1</b> for no/wrong line and 2 correct values

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	42

(d)	Tangent ruled at $x = -1.5$  2.2 to 5	<b>B1</b>  <b>2</b>	No daylight between tangent and curve at point of contact. Consider point of contact as midpoint between two vertices of daylight, the midpoint must be between $x = -1.6$ and $x = -1.4$  <b>dep on B1</b> <b>M1</b> for $\frac{\text{rise}}{\text{run}}$ <b>also dep on</b> any tangent drawn or close attempt at tangent at any point Must see correct or implied calculation from a drawn tangent
<b>3</b> (a)	Correct diagram	<b>3</b>	<b>B1</b> for correct vertical plots and <b>B1</b> for correct horizontal plots and <b>B1 dep on at least B1</b> for reasonable <u>increasing</u> curve or polygon through <i>their</i> 6 points  If zero scored, <b>SC1</b> for 5 out of 6 correct plots
(b) (i)	32 to 34	<b>1</b>	
(ii)	120 – reading at $r = 50$	<b>2FT</b>	<b>B1FT</b> for reading at $r = 50$ seen
(c)	8 18 27	<b>2</b>	<b>B1</b> for 2 correct
(d)	35.2 or $35\frac{1}{6}$ or 35.16 to 35.17 nfw	<b>4</b>	<b>M1</b> for mid-values soi <b>M1 FT</b> for $\sum fx$ with $x$ in the correct interval including boundaries <b>M1dep</b> for $\sum fx \div 120$ dependent on second <b>M1</b> earned
(e)	1.6  1.35  0.3	<b>4FT</b>	<b>FT</b> from (c) <i>their</i> $8 \div 5$ and <i>their</i> $27 \div 20$  <b>B3FT</b> for any 2 correct or <b>B2FT</b> for first or second answer correct or <b>B1</b> for 0.3 only
<b>4</b> (a)	1.6[0] or 1.601 to 1.602	<b>3</b>	<b>M2</b> for $\frac{0.6}{\cos 68}$ oe or <b>M1</b> for $\cos 68 = \frac{0.6}{AC}$
(b)	43.5 or 43.6 or 43.49 to 43.56	<b>4</b>	<b>M2</b> for $\frac{1.9^2 + 2.3^2 - \text{their} 1.6^2}{2 \times 1.9 \times 2.3}$ or <b>M1</b> for implicit statement <b>A1</b> for [cos = ] 0.724 to 0.726

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	42

(c)	1.33 or 1.332...nfww	4	<p><b>M2</b> for <math>\sqrt{2.3^2 - \left(\frac{1}{2} \times 1.2\right)^2}</math> or <b>M1</b> for <math>2.3^2 = h^2 + (0.5 \times 1.2)^2</math></p> <p>and <b>M1</b> for <math>\frac{1}{2} \times 1.2 \times \text{their } 2.22</math> (<i>their 2.22</i> must come from attempt at Pythag or from trig in triangle <i>BCD</i>)</p>
(d)	41.1 or 41.13 to 41.14	3	<p><b>M2</b> for <math>\sin = \frac{1.25}{1.9}</math> oe or <b>M1</b> for correct angle identified</p>
5 (a) (i)	$4x(3x+13) - 2x(4x - \{3x-9\}) = 24$ oe  $12x^2 + 52x - 2x^2 - 18x$  $5x^2 + 17x - 12 = 0$	<b>M1</b>	<p><b>M1</b> Correct removal of all <i>their</i> brackets Dep on two <b>areas</b> added or subtracted</p> <p><b>A1</b> with no errors or omissions seen and at least one more line of working showing collection of like terms or division by 2</p> <p><b>M2</b> <b>M1</b> for <math>(5x+a)(x+b)</math> where <math>ab = -12</math> or <math>5b+a = 17</math> [<math>a, b</math> integers]</p> <p><b>A1</b> If zero scored <b>SC1</b> for correct answers with no working or from other methods.</p> <p><b>M1</b></p> <p><b>A1</b> <b>SC1</b> if no working shown, but 2 correct answers given <b>A1</b> If zero scored <b>SC1</b> for 2 values satisfying one of the original equations</p> <p><b>5</b> <b>M1</b> for <math>2(t+3)(t+3) - t^2</math> or better seen <b>M1</b> for denominator[s] <math>t(t+3)</math> isw or for <math>t(t+3)</math> isw on RHS <b>M1dep</b> for <math>2t^2 + 12t + 18 - t^2 = t^2 + 3t</math> oe dependent on both numerators and denominator expanding to give quadratics  <b>A1</b> for <math>9t + 18 = 0</math> oe</p>
(ii)	$(5x-3)(x+4) [= 0]$  $\frac{3}{5}$ oe, $-4$	<b>M2</b> <b>A1</b>	
(b)	For correctly eliminating one variable  $x = 3$ $y = -7$	<b>M1</b> <b>A1</b> <b>A1</b>	
(c)	$t = -2$ nfww	<b>5</b>	

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	42

6	(a)	(i)	43	1	
		(ii)	62	1	
			Isosceles triangle or $OYZ$ is isosceles	1	
			Angle at centre is twice angle at circumference	1	
	(iii)	30	2	M1 for $p + 5p = 180$ oe	
		[Opposite angles of a]cyclic quadrilateral [add up to $180^\circ$ ]	1		
	(b)	(i)	1 : 2 oe	1	
		(ii)	$OQ$	1	
			$MQ = NQ$	1	
			$OM = ON$	1	
		Centre or $O$	1	Not origin	
7	(a)	(i)	Rotation	1	
			[+]90 or 90 anticlockwise oe	1	
			$(0, 2)$	1	Not as column vector
	(ii)	Reflection	1		
		$y = 1$ oe	1		
	(iii)	Enlargement	[s f]	1	
			$-\frac{1}{2}$ oe	1	
			Origin oe	1	
	(b)		$\begin{pmatrix} -\frac{1}{2} & 0 \\ 0 & -\frac{1}{2} \end{pmatrix}$ oe	2FT	FT their s f from (a)(iii) SC1 for $\begin{pmatrix} k & 0 \\ 0 & k \end{pmatrix}$ , $k \neq 1$ or 0
	(c)		Image at $(4, 1)$ $(6, 1)$ $(6, 5)$ $(4, 3)$	2	ruled or good freehand SC1 for translation $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ or for 4 correct vertices not joined
	(d)		Reflection	1	
		$y = x$ oe	1		

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	42

8	(a)	(4, 6)	1, 1	
	(b)	4.47 or 4.472	3	<b>M2</b> for $\sqrt{(8-4)^2 + (5-3)^2}$ or better or <b>M1</b> for $(8-4)^2 + (5-3)^2$ or better
	(c)	$y = 2x - 2$ oe	3	<b>B2</b> for $2x - 2$ or $y = 2x + c$ oe or <b>M1</b> for $[m = ] \frac{8-4}{5-3}$ oe soi by $2x$ <b>and M1</b> for (3, 4) or (5, 8) or <i>their</i> midpoint substituted into <i>their</i> $y = mx + c$ with <i>m</i> numerical
	(d)	-3	3	<b>M1</b> for use of gradient $\times$ <i>their</i> $m = -1$ soi by $-\frac{1}{2}$ <b>M1</b> for $r = \text{their gradient} \times 6$ [+0]
9	(a) (i)	11	1	
	(ii)	256	2	<b>M1</b> for $[g(3) = ] 8$ or $2^3$ or $2^{2^x}$
	(b)	$\frac{x-5}{2}$ oe final answer	2	<b>M1</b> for $x = 2y + 5$ or $2x = y - 5$ or better or $\frac{y}{2} = x + \frac{5}{2}$
	(c)	$19 - 6x$ final answer	2	<b>M1</b> for $2(7 - 3x) + 5$
	(d)	-1, 0, 1, 2	3	Additional values count as errors <b>B2</b> for one error /omission or <b>B1</b> for two errors/omissions  or <b>M2</b> for $-2 < x \leq 2$ oe seen or <b>M1</b> for $-2 < x$ or $x \leq 2$ or $x = -2$ and $x = 2$ or $-4 < 2x \leq 4$
10	(a)	8 25 17	2	<b>B1</b> for 2 correct
	(b)	$n + 2$ oe	1	
	(c) (i)	$(n - 1)^2$ oe	2	<b>M1</b> for $(n + k)^2$ for integer $k$
	(ii)	92	2	<b>M1</b> for $\sqrt{8281}$ or 91 seen
	(d) (i)	$n^2 - 3n - 1$ final answer	2	<b>M1</b> for <i>their</i> $(n - 1)^2 - \text{their } (n + 2)$ soi
	(ii)	39	1	

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2015	0580	42

(e)	$1$ and $-\frac{1}{2}$ oe	<b>1</b>	
	$\frac{1}{4}$ oe	<b>1</b>	
	$-\frac{1}{8}$ oe	<b>1</b>	