

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the March 2015 series****0580 MATHEMATICS****0580/42**

Paper 4 (Paper 42 – Extended), maximum raw mark 130

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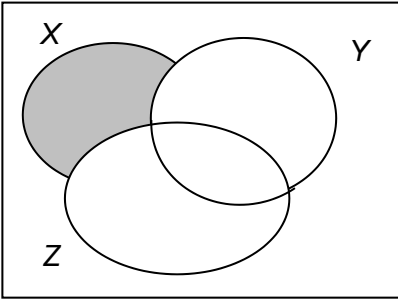
Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

### 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

Qu.	Answers	Mark	Part Marks
1	(a) $\frac{1.5}{100} \times 450\,000$ oe	1	Accept equivalent methods
	(b) 6000	3	<b>M2</b> for $\frac{6750}{112.5} \times 100$ oe or <b>M1</b> for 112.5% associated with 6750 oe
	(c) 376.25 cao final answer	2	<b>B1</b> for 21.5 and 17.5 seen
	(d) 22.4	2	<b>M1</b> for $200^2$ or $2^2$ seen oe
	(e) 5184	2	<b>M1</b> for $12 \times 16 \times 27$
	(f) 9023	3	<b>M1</b> for $12000 \div 1.33$ <b>A1</b> for 9022.55 to 9022.56 or 9022.6 or 9020 <b>B1indep</b> for their answer rounded to the nearest euro if possible
2	(a) (i)	3	<b>B2</b> for 8 or 9 numbers correct <b>B1</b> for 6 or 7 numbers correct
	(ii) $\in$ cao	1	
	{3}	1FT	FT <i>their</i> intersection of all 3 sets – <i>their</i> diagram
	$\emptyset$ or {}	1	
	(iii) 5	1FT	FT <i>their</i> set B on diagram
	(b) (i) $\subset$	1	

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

(ii)		1	
3 (a)	2 0 -2 2	3	<b>B2</b> for 3 correct <b>B1</b> for 2 correct
(b)	smooth correct curve through correct points	4	<b>B3FT</b> for 8 or 9 correct plots <b>B2FT</b> for 6 or 7 correct plots <b>B1FT</b> for 4 or 5 correct plots  FT <i>their</i> table
(c)	line $y = \frac{1}{2}(x+1)$ ruled <u>and</u> -2.85 to -2.95 -1 0.85 to 0.95	4	Line must be fit for purpose  <b>B3</b> for correct line and 2 correct values or <b>B2</b> for correct line and 1 correct value or <b>B1</b> for correct line or <b>SC2</b> for no/wrong line and 3 correct values or <b>SC1</b> for no/wrong line and 2 correct values
(d)	tangent ruled  - 1.1 to - 1.5	<b>B1</b>  2	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 $x = -1.85$ and $x = -1.65$  dep on <b>B1</b> <b>M1</b> for rise/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 Accept <b>M1</b> for answer in range 1.1 to 1.5 after <b>B1</b>
4 (a)	$(11y - m)(11y + m)$ final answer	2	<b>B1</b> for $11y$ seen
(b)	$\frac{3x^2 + 5x - 14}{(3x - 5)(x - 1)}$ final answer	3	<b>B1</b> for denom $(3x - 5)(x - 1)$ oe isw and <b>B1</b> for $3x^2 + 6x - 5x - 10$ soi

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

<p>(c)</p> $\frac{-2 \pm \sqrt{2^2 - 4(3)(-7)}}{2 \times 3}$ <p>- 1.90 1.23 final answers</p> <p>(d) (i)</p> $\frac{1}{2}(x+4+3x+2)(x+1)=15$ $4x^2 + 4x + 6x + 6 = 30$ <p>or <math>2x^2 + 2x + 3x + 3 = 15</math></p> $2x^2 + 5x - 12 = 0$ <p>(ii)</p> <p>1.5 or <math>\frac{3}{2}</math>, -4</p> <p>(iii)</p> <p>6.5 or <math>\frac{13}{2}</math></p>	<p>2</p> <p>1, 1</p> <p>M1</p> <p>M1</p> <p>A1</p> <p>3</p> <p>1FT</p>	<p><b>B1</b> for <math>\sqrt{2^2 - 4(3)(-7)}</math> or better seen</p> <p>and if in form <math>\frac{p+or-\sqrt{q}}{r}</math></p> <p><b>B1</b> for <math>p = -2</math> and <math>r = 2 \times 3</math></p> <p><b>SC1</b> for -1.9, -1.896 or -1.897 and 1.2 or 1.230 or -1.23 and 1.90 final answers or -1.90 and 1.23 seen in working</p> <p>Allow <math>\frac{1}{2}(4x+6)(x+1)=15</math></p> <p>Dep on 1<sup>st</sup> M1</p> <p>With no errors or omissions</p> <p><b>B2</b> for <math>(2x-3)(x+4)</math> or <math>\frac{-5 \pm \sqrt{5^2 - 4(2)(-12)}}{2 \times 2}</math></p> <p>or <b>SC1</b> for <math>(2x+a)(x+b)</math> where <math>a</math> and <math>b</math> are integers and <math>a + 2b = 5</math> or <math>ab = -12</math> or <math>\frac{\sqrt{5^2 - 4(2)(-12)}}{r}</math> or <math>\frac{p+or-\sqrt{q}}{r}</math> where <math>p = -5</math> and <math>r = 2 \times 2</math></p> <p>FT 3 <math>\times</math> <i>their</i> pos root from (d)(ii) + 2</p>
<p>5 (a)</p> <p><math>\frac{1}{2} \times 16 \times 5.4 \times \sin 62</math> oe</p> <p>38.14...</p> <p>(b)</p> <p>95.6 or 95.64 to 95.65</p>	<p>M1</p> <p>A1</p> <p>4</p>	<p><b>M2</b> for <math>\frac{6.7 \times \sin 48}{8.4}</math></p> <p>or <b>M1</b> for implicit form</p> <p>and <b>M1dep</b> for <math>180 - 48 - \textit{their}</math> 36.4</p>

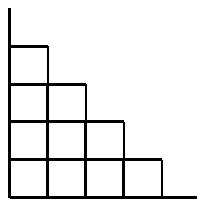
Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

(c)	286 or 285.7 to 285.8	5	<p><b>B1</b> for [Angle <math>APB=</math>] <math>83^\circ</math></p> <p><b>M2</b> for  <math>180^2 + 245^2 - 2 \times 180 \times 245 \times \cos \text{their } 83</math></p> <p>or <b>M1</b> for implicit form  <b>and A1</b> for [<math>AB^2 =</math>] 81676[.1...]</p> <p>After 0 scored, <b>SC2</b> for ans 406.87 to 406.88 or 406.9 or 407 if <math>146^\circ</math> used in cos rule  Or <b>SC1</b> for  <math>180^2 + 245^2 - 2 \times 180 \times 245 \times \cos 146</math></p>
6 (a)	$\frac{4}{15}$	1	
(b)	80	1FT	FT $300 \times \text{their (a)}$
(c) (i)	$\frac{40}{225}$ oe $\left[ \frac{8}{45} \right]$	3	<p><b>M2</b> for <math>\frac{5}{15} \times \frac{4}{15} \times 2</math> oe</p> <p>or <b>M1</b> for <math>\frac{5}{15} \times \frac{4}{15}</math></p>
(ii)	$\frac{121}{225}$	3	<p><b>M2</b> for <math>\frac{11}{15} \times \frac{11}{15}</math> oe</p> <p>or <b>M1</b> for <math>\frac{11}{15}</math> or <math>1 - \frac{4}{15}</math> seen</p>
(d) (i)	$\frac{108}{210}$ oe $\left[ \frac{18}{35} \right]$	3	<p><b>M2</b> for <math>\frac{6}{15} \times \frac{9}{14} + \frac{9}{15} \times \frac{6}{14}</math> oe</p> <p>or <b>M1</b> for <math>\frac{6}{15} \times \frac{9}{14}</math> oe or <math>\frac{9}{15} \times \frac{6}{14}</math> oe</p> <p>or <math>\frac{6}{15} \times \frac{5}{14}</math> oe or <math>\frac{6}{15} \times \frac{4}{14}</math> oe</p>
(ii)	$\frac{148}{210}$ oe $\left[ \frac{74}{105} \right]$	4	<p><b>M3</b> for <math>\frac{5}{15} \times \frac{10}{14} + \frac{6}{15} \times \frac{9}{14} + \frac{4}{15} \times \frac{11}{4}</math> oe</p> <p>or <math>1 - \frac{5}{15} \times \frac{4}{14} - \frac{6}{15} \times \frac{5}{14} - \frac{4}{15} \times \frac{3}{14}</math></p> <p>or <b>M2</b> for equivalent of 2 of above products added together oe</p> <p>or <b>M1</b> for one correct relevant product oe</p>
7 (a) (i)	Rotation [centre] (0, 0) or origin $90^\circ$ [anticlockwise] oe	1 1 1	

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

	(ii) Enlargement [centre] $(-2, 1)$ [s.f.] $-2$	1 1 1	
	(b) vertices at $(-3, 4)$ $(-3, 5)$ $(-3, 6)$ $(-2, 6)$	2	SC1 for translation by $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 1 \end{pmatrix}$
	(c) vertices at $(7, 3)$ $(7, 4)$ $(7, 5)$ $(6, 5)$	2	SC1 for reflection in $y = 1$ or reflection in any vertical line
	(d) reflection $x$ -axis oe	1 1	
8	(a) (i) 47.7 or 47.74 to 47.75	3	M1 for [arc =] $68 - 2 \times 24$ or $24 + 24 + \frac{x}{360} \times 2\pi \times 24 = 68$ M1 for [x =] <i>their</i> arc $\times 360 \div (2 \times \pi \times 24)$
	(ii) 252 or 252.3 to 252.4....	6	M1 for $r = \frac{20}{2\pi}$ or $\left(\frac{\text{their } 47.7}{360} \times 2 \times \pi \times 24\right) \div (2\pi)$ A1 for $r = 3.18$ or 3.182 to 3.183... or $\frac{10}{\pi}$  M1 for $h^2 = 24^2 - \text{their } r^2$ A1 for $h = 23.8$ or 23.78... to 23.79  M1dep on M1 earned for $V = \frac{1}{3}\pi \times \text{their } h \times \text{their } r^2$
	(b) 139 or 139.3 to 139.4... nfw	5	M4 for $8^2 + \frac{1}{4}\pi \times 8^2 + \frac{1}{2}\pi \times \left(\frac{8}{2}\right)^2$ or M1 for $\frac{1}{4}\pi \times 8^2$ and M1 for $\frac{1}{2}\pi \times \left(\frac{8}{2}\right)^2$ and M1 for $8^2$ added to at least one term with $\pi$
9	(a) $140 < h \leq 144$	1	
	(b) 144.875 nfw	4	M1 for at least 4 correct mid-values soi  M1 for $\sum fx$ where $x$ is in the correct interval, allow one further error/omission  M1 dep for $\div 40$ dependent on second method mark

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2015	0580	42

(c)	4 correct blocks	4	<b>B3</b> for 3 correct blocks <b>B2</b> for 2 correct blocks <b>B1</b> for 1 correct block or at least 3 correct frequency densities (1.4, 1, 1, 0.65)
<b>10 (a)</b>	$4x + 10y < 80$	1	With no errors seen
<b>(b)</b>	$y > x$	1	
	$y \leq 6$ or $y < 7$	1	Accept $0 \leq y \leq 6$ or $0 < y \leq 6$ or $0 \leq y < 7$ or $0 < y < 7$
<b>(c)</b>	ruled broken line through (5, 6) to (10,4)	<b>B2</b>	<b>SC1</b> for correct only at (5, 6) or (10, 4)
	ruled broken line $y = x$	<b>B1</b>	
	ruled solid line $y = 6$ or broken $y = 7$	<b>B1</b>	Must be consistent with <i>their (b)</i>
	correct region indicated	<b>B1</b>	
<b>(d)</b>	76	2	<b>SC1</b> for (4, 6) indicated or  $4x + 10y$ evaluated for (x, y) in <i>their</i> region, x, y integers
<b>11 (a)</b>		1	
<b>(b)</b>	30 10	1 1	
<b>(c)</b>	$n(n+1)$ oe	2	<b>B1</b> for $an^2 + bn + c$ a, b, c numeric $a \neq 0$
<b>(d)</b>	$\frac{1}{2}n(n-1)$ oe	2	<b>B1</b> for using $\frac{1}{2}$ oe in expression of form $\frac{1}{2}(an^2 + bn + c)$ $a \neq 0$ or $kn(n-1)$ $k \neq 0$