

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2015 series**

**0580 MATHEMATICS**

**0580/22**

Paper 2 (Extended), maximum raw mark 70

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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### Abbreviations

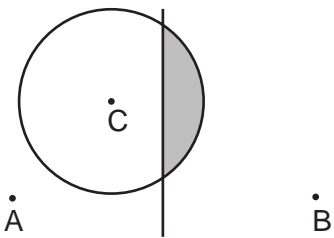
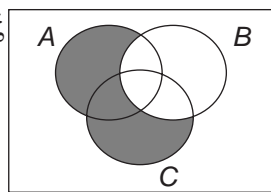
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part marks
<b>1</b>	$5.34 \times 10^7$	<b>1</b>	
<b>2</b>	9 [h] 30 [min] cao	<b>1</b>	
<b>3</b>	$\frac{1}{4}$ or 0.25	<b>1</b>	
<b>4 (a)</b>	7	<b>1</b>	
<b>(b)</b>	Any number except 3, 7 or 20	<b>1</b>	
<b>5</b>	0.2 oe	<b>2</b>	<b>M1</b> for $1 - (0.15 + 0.3 + 0.35)$
<b>6</b>	$8 \times 10^3$ or 8000 nfw	<b>2</b>	<b>M1</b> for $w + 4 \times 10^3 = 1.2 \times 10^4$ oe or $5w + 20 \times 10^3 = 6 \times 10^4$ oe
<b>7</b>	Parallel	<b>1</b>	
	Same length	<b>1</b>	
<b>8</b>	$2n^2 + 3$ oe final answer	<b>2</b>	<b>M1</b> for a quadratic expression as final answer or $2n^2 + 3$ oe in working
<b>9</b>	$\frac{23}{90}$ oe, must be fraction	<b>2</b>	<b>M1</b> for $25.5 - 2.5$ oe e.g. $2.55^r - 0.25^r$ or <b>B1</b> for $\frac{k}{90}$
<b>10</b>	7	<b>2</b>	<b>B1</b> for 120.5 or 113.5 seen
<b>11</b>	$\frac{1}{5} \begin{pmatrix} -2 & -1 \\ 11 & 3 \end{pmatrix}$ oe	<b>2</b>	<b>M1</b> for $k \begin{pmatrix} -2 & -1 \\ 11 & 3 \end{pmatrix}$ soi or $\frac{1}{5} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or $\det = 5$ soi

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12	$\frac{8}{3}$ $\frac{4}{5} \times \text{their } \frac{3}{8}$ oe $\frac{3}{10}$ cao	<b>B1</b> <b>M1</b> <b>A1</b>	or $\frac{40}{15}$ accept $\frac{3}{8}$ or $\frac{15}{40}$ or $\frac{12}{15} \div \text{their } \frac{40}{15}$ or equivalent division with fractions with common denominators
13	(a) 11 (b) 8	<b>1</b> <b>2FT</b>	<b>FT</b> $30 - 2 \times \text{their (a)}$ or <b>M1</b> for $4 \times 7 = 2(x - 1) + FG$ oe or $4(x - 4) = 2(x - 1) + FG$ oe or $2 \times 7 + 2(x - 4) = 2(x - 1) + FG$ oe Allow $x$ to be <i>their (a)</i> in each
14	684	<b>3</b>	<b>M2</b> for $0.95 \times 4 \times 3 \times 60$ or <b>M1</b> for $0.95 \times 4 [\times 3]$ or $4 \times 3 \times 60$ or $0.95 \times 3 \times 60$ or $0.95 \times 4 \times 60$
15	$\frac{2x - 23}{(x + 2)(2x - 5)}$ final answer	<b>3</b>	<b>B1</b> for a common denominator of $(x + 2)(2x - 5)$ <b>B1</b> for $3(2x - 5) - 4(x + 2)$ or better or <b>SC2</b> for final answer $\frac{2x - 7}{(x + 2)(2x - 5)}$ or <b>SC1</b> for numerator of $2x - 7$ in final answer
16	(a) (i) $0.5$ or $-0.5$ or $\frac{1}{2}$ or $-\frac{1}{2}$ (ii) 4 (b) 1.37 or 1.37[4...]	<b>1</b> <b>1</b> <b>1</b>	
17	(a) $[y =] 2x + 3$ cao (b) $-\frac{1}{2}$ oe	<b>3</b> <b>1FT</b>	<b>M2</b> for correct unsimplified equation or <b>B1</b> for gradient = $(11 - 3) \div (4 - 0)$ or better and <b>B1</b> for $c = 3$ $-1 \div \text{their } m$

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18	(a)	78	3	<p><b>M2</b> for <math>5 \times 12 + \frac{1}{2} \times 12 \times (8 - 5)</math> or <math>\frac{1}{2} \times 6 \times (5 + 8) \times 2</math> oe</p> <p>or <b>M1</b> for <math>5 \times 12, \frac{1}{2} \times 12 \times (8 - 5), \frac{1}{2} \times 6 \times (5 + 8)</math> or <math>12 \times 8 - (\dots)</math></p>
	(b)	1170	<b>1FT</b>	$15 \times \text{their (a)}$
19	(a)		1	Correct circle, radius 4 cm centre $C$
	(b)		2	<b>B2</b> for correct bisector with 2 pairs of correct arcs or <b>B1</b> for correct bisector with no/wrong arcs
	(c)		1	Correct complete boundary and correct shading. Dep on at least <b>B1</b> in (b)
20	(a) (i)	4	1	
	(ii)	{3, 9}	1	
	(iii)	fewer than 6 numbers from {1, 3, 5, 7, 9, 11} or $\emptyset$	1	
	(b)		1	
21	(a)	$m = 2$ $n = -10$	2	<p><b>B1</b> for <math>m = 2</math></p> <p><b>B1</b> for <math>n = -10</math></p> <p>If 0 scored <b>SC1</b> for <math>(x + 2)^2</math> in working or <math>x^2 + 2mx + m^2 + n</math> and equating coefficients <math>2m[x] = 4[x]</math> or <math>m^2 + n = -6</math></p>
	(b)	1.16 or 1.16[2...] from completing square	<b>2FT</b>	<p><b>FT</b> dep on negative <math>n</math></p> <p><b>B1</b> for <math>(x + \text{their } m)^2 = -\text{their } n</math></p> <p>or <b>SC1</b> for correct answer from using formula</p> <p>or for both answers 1.16 <b>and</b> -5.16 whatever method used</p>

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22	(a)	44	2	M1 for 48 soi
	(b)	24	2	M1 for 40 or 16 or both lines drawn from 15 and 45 across and down to the horizontal axis
	(c)	5	2	M1 for answer 55 or line or mark on graph indicating 55
23	(a)	0.4 or $\frac{2}{5}$	1	
	(b)	1430	3	M2 for correct, complete, area statement e.g. $120 \times 10 + \frac{1}{2} \times 20 \times 8 + \frac{1}{2} \times 30 \times 10$ oe or M1 for one area calculation e.g. $10 \times 120$ or $\frac{1}{2} \times 20 \times 8$ or $\frac{1}{2} \times 30 \times 10$
	(c)	11.9 or 11.91 to 11.92	1FT	their (b) $\div 120$
24	(a)	$9x^2$	1	
	(b)	$\frac{x-5}{3}$	2	M1 for correct first algebraic step e.g. $y-5=3x$ or $\frac{y}{3}=x+\frac{5}{3}$ or better or for interchanging $x$ and $y$ , e.g. $x=3y+5$ , this does not need to be the first step
	(c)	$9x+20$ cao final answer	2	M1 for $3(3x+5)+5$