

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the March 2016 series**

### **0580 MATHEMATICS**

**0580/22**

Paper 2 (Paper 22 – 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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the March 2016 series for most Cambridge IGCSE<sup>®</sup> and Cambridge International A and AS Level components.

© IGCSE is the registered trademark of Cambridge International Examinations.

<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – March 2016</b>	<b>0580</b>	<b>22</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

Qu.	Answers	Mark	Part Marks
1	7, - 4	1	
2	$2x(1 - 2y)$ final answer	2	<b>M1</b> for $2(x - 2xy)$ or $x(2 - 4y)$ or for correct answer then spoilt
3	75.1 or 75.09 to 75.10	2	<b>M1</b> for $\cos [\dots] = \frac{0.9}{3.5}$
4	$n < 1.5$ oe final answer	2	<b>B1</b> for 1.5 oe in answer or <b>M1</b> for $3 > 8n - 6n$ oe
5	9.1 oe	2	<b>M1</b> for $\frac{5.2}{PQ} = \frac{12.4}{21.7}$ oe
6	$\frac{4}{9}$ oe, must be fraction	2	<b>M1</b> for $10 \times 0.\dot{4} - 0.\dot{4}$ oe
7	130 or 130.0 to 130.1	2	<b>M1</b> for $\frac{1}{2} \times 22.3 \times 27.6 \times \sin 25$
8	$\frac{1}{5} \begin{pmatrix} 7 & 2 \\ 8 & 3 \end{pmatrix}$ oe isw	2	<b>M1</b> for $\frac{1}{5} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ soi or $k \begin{pmatrix} 7 & 2 \\ 8 & 3 \end{pmatrix}$ $k \neq 0$ or $\det = 5$ soi
9	$\frac{35(\text{or } 95)}{60} + \frac{39}{60}$ $2\frac{7}{30}$	<b>M1</b> <b>A2</b>	accept $\frac{35k(\text{or } 95k)}{60k} + \frac{39k}{60k}$ or <b>A1</b> for $\frac{67}{30}$ or $\frac{134k}{60k}$ or $1\frac{74k}{60k}$ or $2\frac{14k}{60k}$
10	64 000	3	<b>M2</b> for $\frac{1.6 \times 20000^2}{100^2}$ oe or <b>M1</b> for figs 64 in answer or $1 \text{ cm}^2 = 40000 \text{ m}^2$

<b>Page 3</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – March 2016</b>	<b>0580</b>	<b>22</b>

<b>Qu.</b>	<b>Answers</b>	<b>Mark</b>	<b>Part Marks</b>
<b>11</b>	16.58 cao	<b>3</b>	<b>B2</b> for 16.6 or 16.580 to 16.583 final answer or 16.58 not as final answer or <b>M1</b> for $\frac{38}{360} \times 2 \times \pi \times 25$ and <b>B1</b> for rounding their more accurate answer correctly to 4sf
<b>12</b>	87 cao nfw	<b>3</b>	<b>B2</b> for 87.04.... or 87.0 nfw or <b>M1</b> for 500.5 or 5.75 seen or for $(500 + 0.5) \div (5.8 - 0.05)$ and <b>B1</b> for <b>truncating</b> their decimal answer to an integer
<b>13 (a)</b>	$2^5 \times 3^2 \times 7$ oe final answer	<b>3</b>	<b>B2</b> for product of two of $2^5, 3^2, 7$ or <b>B1</b> for 2, 3 and 7 seen or <b>M1</b> for $2 \times 1008$ or $3 \times 672$ or $7 \times 288$ soi
<b>(b)</b>	$2.016 \times 10^3$	<b>1</b>	
<b>14 (a)</b>	$x^8 y^7$ final answer	<b>2</b>	<b>B1</b> for answer $x^8 y^k$ or $x^k y^7$ ( $k \neq 0$ )
<b>(b)</b>	$27 p^6 m^{15}$ final answer	<b>2</b>	<b>B1</b> for 2 correct of 27, $p^6, m^{15}$ in a product as answer
<b>15</b>	111.2 or 111.1 to 111.2	<b>4</b>	<b>M2</b> for [cos =] $\frac{2.8^2 + 3.6^2 - 5.3^2}{2 \times 2.8 \times 3.6}$ or <b>M1</b> for implicit form <b>A1</b> for [cos =] $-0.362$ to $-0.361$
<b>16</b>	44.1 or 44.07...	<b>4</b>	<b>M1</b> for 4 of mid-values 15 30 45 55 75 soi  <b>M1</b> for $\sum fx$ for any $x$ in intervals including boundaries  <b>M1 dep</b> for $\sum fx \div 70$ <b>Dep</b> on 2nd <b>M</b> mark earned

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2016	0580	22

Qu.	Answers	Mark	Part Marks
17	$\frac{-(-11) \pm \sqrt{(-11)^2 - 4(3)(4)}}{2 \times 3}$  0.41 and 3.26 final ans cao	2     <b>B1B1</b>	<b>B1</b> for $\sqrt{(-11)^2 - 4(3)(4)}$ or better  and, if in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ , <b>B1</b> for $p = -(-11)$ and $r = 2(3)$  <b>SC1</b> for 0.4 and 3.3 or 0.409... and 3.257... or -0.41 and -3.26  or 0.41 and 3.26 seen in working
18 (a)	47	1	
(b)	117	2	<b>M1</b> for $360 - (115 + 85 + 97)$
(c)	244	2	<b>B1</b> for 116 seen at centre or 122 seen at circumference
19	$y < 2$ oe and $x \geq -2$ oe  $y \geq \frac{1}{2}x + 1$ oe and $y \leq -x + 3$ oe	2  3	<b>B1</b> for either correct  <b>B2</b> for either $y \geq \frac{1}{2}x + 1$ oe or $y \leq -x + 3$ oe or <b>SC2</b> for $y = \frac{1}{2}x + 1$ oe <b>and</b> $y = -x + 3$ oe or <b>SC1</b> for $y = \frac{1}{2}x + 1$ oe <b>or</b> $y = -x + 3$ oe  or <b>SC4</b> for $y \leq 2$ oe, $x > -2$ oe, $y > \frac{1}{2}x + 1$ oe and $y < -x + 3$ oe
20 (a)	$9a + 3b$	1	
(b)	$36a + 6b = 96$ or $9a + 3b = 21$  for correct method to eliminate one variable  $a = 3$ $b = -2$	<b>B1</b>  <b>M1</b>  <b>A1</b> <b>A1</b>	If <b>M0 A0 A0</b> scored <b>SC1</b> for  2 values satisfying $36a + 6b = 96$ or $9a + 3b = 21$ or if no working shown, but 2 correct answers given

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2016	0580	22

Qu.	Answers	Mark	Part Marks
21 (a)	$\frac{2}{3}$ oe	1	
(b)	their $\frac{2}{3}$ , $\frac{7}{8}$ , $\frac{5}{8}$ oe	2	<b>B1</b> for either $\frac{7}{8}$ or $\frac{5}{8}$
(c) (i)	$\frac{1}{24}$ oe	2	<b>M1</b> for $\frac{1}{3} \times \frac{1}{8}$ seen
(ii)	$\frac{17}{24}$ oe	3	<b>M2FT</b> for $\frac{1}{3} \times \frac{7}{8} + \frac{2}{3} \times \frac{5}{8}$ or <b>M1FT</b> for $\frac{1}{3} \times \frac{7}{8}$ or $\frac{2}{3} \times \frac{5}{8}$