

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® and Cambridge International A and AS Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2016	0580	22

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	M1 for $2(x - 2xy)$ or $x(2 - 4y)$ or for correct answer then spoilt
3	75.1 or 75.09 to 75.10	2	M1 for $\cos [\dots] = \frac{0.9}{3.5}$
4	$n < 1.5$ oe final answer	2	B1 for 1.5 oe in answer or M1 for $3 > 8n - 6n$ oe
5	9.1 oe	2	M1 for $\frac{5.2}{PQ} = \frac{12.4}{21.7}$ oe
6	$\frac{4}{9}$ oe, must be fraction	2	M1 for $10 \times 0.\dot{4} - 0.\dot{4}$ oe
7	130 or 130.0 to 130.1	2	M1 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	M1 for $\frac{1}{5} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ soi or $k \begin{pmatrix} 7 & 2 \\ 8 & 3 \end{pmatrix} \quad k \neq 0$ or $\det = 5$ soi
9	$\frac{35(\text{or } 95)}{60} + \frac{39}{60}$ $2\frac{7}{30}$	M1 A2	accept $\frac{35k(\text{or } 95k)}{60k} + \frac{39k}{60k}$ or A1 for $\frac{67}{30}$ or $\frac{134k}{60k}$ or $1\frac{74k}{60k}$ or $2\frac{14k}{60k}$
10	64 000	3	M2 for $\frac{1.6 \times 20000^2}{100^2}$ oe or M1 for figs 64 in answer or $1 \text{ cm}^2 = 40\,000 \text{ m}^2$

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – March 2016	0580	22

Qu.	Answers	Mark	Part Marks
11	16.58 cao	3	B2 for 16.6 or 16.580 to 16.583 final answer or 16.58 not as final answer or M1 for $\frac{38}{360} \times 2 \times \pi \times 25$ and B1 for rounding their more accurate answer correctly to 4sf
12	87 cao nfw	3	B2 for 87.04.... or 87.0 nfw or M1 for 500.5 or 5.75 seen or for $(500 + 0.5) \div (5.8 - 0.05)$ and B1 for truncating their decimal answer to an integer
13 (a)	$2^5 \times 3^2 \times 7$ oe final answer	3	B2 for product of two of $2^5, 3^2, 7$ or B1 for 2, 3 and 7 seen or M1 for 2×1008 or 3×672 or 7×288 soi
(b)	2.016×10^3	1	
14 (a)	$x^8 y^7$ final answer	2	B1 for answer $x^8 y^k$ or $x^k y^7$ ($k \neq 0$)
(b)	$27 p^6 m^{15}$ final answer	2	B1 for 2 correct of 27, p^6 , m^{15} in a product as answer
15	111.2 or 111.1 to 111.2	4	M2 for $[\cos =] \frac{2.8^2 + 3.6^2 - 5.3^2}{2 \times 2.8 \times 3.6}$ or M1 for implicit form A1 for $[\cos =] -0.362$ to -0.361
16	44.1 or 44.07...	4	M1 for 4 of mid-values 15 30 45 55 75 soi M1 for $\sum fx$ for any x in intervals including boundaries M1 dep for $\sum fx \div 70$ Dep on 2nd M 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 B1B1	B1 for $\sqrt{(-11)^2 - 4(3)(4)}$ or better and, if in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$, B1 for $p = -(-11)$ and $r = 2(3)$ SC1 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	M1 for $360 - (115 + 85 + 97)$
(c)	244	2	B1 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	B1 for either correct B2 for either $y \geq \frac{1}{2}x + 1$ oe or $y \leq -x + 3$ oe or SC2 for $y = \frac{1}{2}x + 1$ oe and $y = -x + 3$ oe or SC1 for $y = \frac{1}{2}x + 1$ oe or $y = -x + 3$ oe or SC4 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 $a = 3$ $b = -2$	B1 M1 A1 A1	If M0 A0 A0 scored SC1 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)	<i>their</i> $\frac{2}{3}$, $\frac{7}{8}$, $\frac{5}{8}$ oe	2	B1 for either $\frac{7}{8}$ or $\frac{5}{8}$
(c) (i)	$\frac{1}{24}$ oe	2	M1 for $\frac{1}{3} \times \frac{1}{8}$ seen
(ii)	$\frac{17}{24}$ oe	3	M2FT for $\frac{1}{3} \times \frac{7}{8} + \frac{2}{3} \times \frac{5}{8}$ or M1FT for $\frac{1}{3} \times \frac{7}{8}$ or $\frac{2}{3} \times \frac{5}{8}$