

## **MARK SCHEME for the March 2015 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.

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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
- nfww not from wrong working
- soi seen or implied

Qu.	Answers	Mark	Part Marks
1	Negative	1	
2	96	2	<b>B1</b> for $96k$ or $2^5 \times 3$ or for listing multiples of each up to 96
3	572.4	2	<b>M1</b> for figs $(120 \times 90 \times 53)$
4	$7p(2p + 3q)$	2	<b>B1</b> for $7(2p^2 + 3pq)$ or $p(14p + 21q)$
5	$18 - 5n$ oe	2	<b>M1</b> for $5n$ or $-5n$
6 (a)	Correct arc centre $B$ , radius 5.7	1	
(b)	Shading below $CN$ outside arc	1FT	FT shading below $CN$ outside their arc centre $B$
7	37	2	<b>M1</b> for $180 - 90 - 53$ oe or <b>B1</b> for 53 or the right angle, either marked in correct place on diagram
8 (a)	68	1	
(b)	15	2	<b>M1</b> for $\frac{360}{n} = 24$ or $(n - 2)180 = 156n$
9	400 350 250	3	<b>M1</b> for $\frac{1000}{8 + 7 + 5}$ implied by 50 <b>A1</b> for one clearly assigned correct answer or <b>SC2</b> for 3 correct answers in wrong order
10 (a)	$x + x + 4 + x + 4 = 26$ oe	1	
(b)	6[.00] cao	2	<b>M1</b> for their linear eqn simplified to $ax = b$

11	<p>Correctly eliminating one variable  <math>[x = ] 6</math></p> <p><math>[y = ] \frac{1}{4}</math></p>	<p><b>M1</b> <b>A1</b></p> <p><b>A1</b></p>	<p>If 0 scored <b>SC1</b> for 2 values satisfying one of the original equations  <b>SC1</b> if no working shown but correct answers given</p>
12	44300 cao	3	<p><b>M1</b> for <math>50\,000 \times (0.97)^4</math> oe  and  <b>B1</b> for 44260 or better</p> <p>or  <b>SC1</b> for correct method for 3% increase with final answer of 56300</p>
13	12	3	<p><b>M1</b> for <math>x = k \sqrt[3]{y}</math> oe  <b>A1</b> for <math>k=3</math></p> <p>or <b>M2</b> for <math>\frac{6}{\sqrt[3]{8}} = \frac{x}{\sqrt[3]{64}}</math> oe</p>
14	$3y + x = 19$ oe	3	<p><b>M1</b> for <i>their</i> <math>m \times 3 = -1</math> oe or <math>-\frac{1}{3}</math> soi  <b>M1</b> for <math>4 = 7 \times \textit{their } m + c</math></p>
15 (a)	$\begin{pmatrix} 76 & 30 \\ 40 & 16 \end{pmatrix}$	2	<b>B1</b> for two correct elements
(b)	$\frac{1}{4} \begin{pmatrix} 2 & -3 \\ -4 & 8 \end{pmatrix}$ oe	2	<p><b>B1</b> for <math>k \begin{pmatrix} 2 &amp; -3 \\ -4 &amp; 8 \end{pmatrix}</math> soi or <math>\frac{1}{4} \begin{pmatrix} a &amp; b \\ c &amp; d \end{pmatrix}</math> seen  or <math>\det = 4</math> soi</p>
16	<p><math>\frac{25}{9}</math></p> <p><math>\frac{a}{b} \times \frac{6}{5}</math> where <math>a &gt; b</math></p> <p><i>Their</i> <math>\frac{150}{45}</math> or  <i>their</i> correct full cancelling</p> <p><math>\frac{10}{3}</math> or <math>3\frac{1}{3}</math> nfw</p>	<p><b>B1</b></p> <p><b>M1</b></p> <p><b>M1FT dep</b></p> <p><b>A1</b></p>	<p>(Alt) <math>\frac{25}{9}</math></p> <p><i>their</i> <math>\frac{25 \times 2}{9 \times 2} \div \frac{5 \times 3}{6 \times 3}</math> oe</p> <p><i>their</i> <math>\frac{25 \times 2}{5 \times 3}</math> oe or  <math>\frac{50}{18} \div \frac{15}{18}</math> oe with 18's cancelled</p>

17	(a)	$b - a$	2	M1 if unsimplified or correct route in terms of $P, Q, R, S$
	(b)	$\frac{5}{8}x + \frac{3}{8}y$	2	M1 for a correct route e.g. $OX + XM$ or for $\frac{3}{8}\overrightarrow{XY}$ or $\frac{5}{8}\overrightarrow{YX}$
18		14.4 or 14.36...	4	M3 for $\tan = \frac{6}{\text{their } \sqrt{15^2 + 18^2}}$ oe or better or M1 for $AC = \sqrt{15^2 + 18^2}$ and M1 for identifying required angle
19		95	4	B1 for 2.3 or $2\frac{18}{60}$ M1 for $75 \div 30 (= 2.5)$ M1 for $\frac{381 + 75}{\text{their } 2.3 + \text{their } 2.5}$
20	(a)	35	2	M1 for $[Z = ] 180 - 88 - 57$ or $VWX = 57$ or $YZX = 35$
	(b)	10.8	2	M1 for $\frac{AC}{7.2} = \frac{12.6}{8.4}$ oe
21	(a) (i)	1	1	
	(ii)	$m^7$	1	
	(iii)	$2p^2$	2	SC1 for $2p^k$ or $kp^2$ $k \neq 0$
	(b)	$\frac{2}{5}$ or 0.4	2	B1 for $3^5$ or $3^{5x}$ or $243^{\frac{1}{5}}$ or $243^{\frac{2}{5}}$ seen
22	(a)	17	2	M1 for $[g(-2) = ] 4$ seen or for $5x^2 - 3$
	(b)	$25x^2 - 30x + 9$ or $(5x - 3)^2$ as final answer	2	M1 for $g(5x - 3)$
	(c)	$\frac{x+3}{5}$	2	M1 for $5x = y + 3$ or $x = 5y - 3$ or $\frac{y}{5} = x - \frac{3}{5}$