## MARK SCHEME for the October/November 2012 series

## 0580 MATHEMATICS

0580/21
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.

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 |
| :--- | :--- |
| cso | correct solution only |
| dep | dependent |
| ft | follow through after error |
| isw | ignore subsequent working |
| oe | or equivalent |
| SC | Special Case |
| www | without wrong working |


| Qu. | Answers | Mark | Part Marks |
| :---: | :---: | :---: | :---: |
| 1 | -16 | 2 | M1 for $4 \times 6.5$ |
| 2 | $[0] .852 \text { or } \frac{23}{27}$ | 2 | B1 for 85.56 or $\frac{2139}{25}$ |
| 3 | (a) 3 <br> (b) 4 | $1$ |  |
| 4 | $\begin{aligned} & \frac{17}{\frac{9}{2}} \text { or } \frac{17}{9} \div \frac{5}{2} \\ & \frac{17}{9} \times \frac{2}{5}=\frac{34}{45} \end{aligned}$ | M1 <br> M1 | $\begin{aligned} & \frac{\frac{34}{18}}{\frac{45}{18}} \text { or } \frac{34}{18} \div \frac{45}{18} \\ & \frac{34}{18} \times \frac{18}{45}=\frac{34}{45} \end{aligned}$ |
| 5 | $a^{(1)}-b^{(1)}$ www cao | 2 | M1 for $a^{1 / 2} a^{1 / 2}-a^{1 / 2} b^{1 / 2}+a^{1 / 2} b^{1 / 2}-b^{1 / 2} b^{1 / 2}$ oe |
| 6 | 144 | 2 | M1 for $A B C=72$ or $A O C$ reflex $=216$ Angles must be fully stated or marked in correct place on diagram |
| 7 | 16 | 2 | M1 for $768 \div 48$ |
| 8 | 543.19 | 3 | M2 for $500 \times 1.028^{3}$ oe or long method or M1 for $500 \times 1.028^{n}, n=2$ or 4 |
| 9 | $x \leqslant 39$ www | 3 | M1 correct first move <br> M1 correct 2nd move <br> M1 correct move to answer line |
| 10 | 70 | 3 | B1 24.5 or 0.35 seen M1 their LB $\div$ their UB |
| 11 | 2.5 | 3 | M1 $R=k / d^{2} \mathbf{A 1} k=40$ or M1 $R d^{2}=k \mathbf{A 1} k=40$ |
| 12 | 112 or 112.3 to 112.33 | 3 | M2 for $\pi \times 6^{2}-\pi \times 0.5^{2}$ <br> or M1 for $\pi \times 6^{2}$ or $\pi \times 0.5^{2}$ seen |


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| 13 | $\left(\begin{array}{cc}0 & -1 \\ 1 & 0\end{array}\right)$ cao | 3 | $\mathbf{M} \mathbf{2} \text { for }\left(\begin{array}{ll} 0 & 1 \\ 1 & 0 \end{array}\right)\left(\begin{array}{rr} 1 & 0 \\ 0 & -1 \end{array}\right)$ <br> or $\mathbf{B 1}$ for one matrix seen |
| :---: | :---: | :---: | :---: |
| 14 | 114.6 or 114.57 (67027..) to 114.59 (1155..) | 3 | M2 $2 \times \pi \times 4 \times x /$ <br> $360=8$ <br> Or M1 $2 \times \pi \times 4 \times x /$ <br> 360 M2 $x / 360=8 / 2 \pi 4$ <br> or B1 $8 / 2 \pi 4$ or $2 \pi 4 /$  <br> 8 seen  |
| 15 | 180 www | 3 | M1 $1 / 2 \times 60 \times 14$ oe <br> M1 their $420-4 \times 60$ |
| 16 | $\frac{4 y+2}{y-1}$ oe | 4 | M1 $x y-4 y=x+2$ <br> M1 collecting terms in $x$ on one side <br> M1 factorising <br> M1 dividing by coeff of $x$ |
| 17 | (a) <br> (b) | 2 1 1 1 | B1 for correct line, on each side of $A B$ (longer than dash at $C$ ) <br> B1 for 2 pairs of intersecting arcs <br> Intention to draw a full correct circle <br> R shaded must be a closed region |
| 18 | (a) $\frac{7}{25}$ or $\frac{84}{300}$ oe <br> (b) (i) 62 <br> (ii) 52 <br> (iii) 19 to 20 <br> (iv) 125 | 1 1 1 | B1 for 175 seen |
| 19 | (a) $\left(\begin{array}{rr}17 & -32 \\ 16 & 1\end{array}\right)$ <br> (b) $\left[\begin{array}{cc}10 & -8 \\ 4 & 6\end{array}\right]$ <br> (c) 23 cao <br> (d) $\frac{1}{23}\left(\begin{array}{rr}3 & 4 \\ -2 & 5\end{array}\right)$ | 2 1 1 2 | M1 any 2 entries correct $\text { M1 }\left(\begin{array}{rr} 3 & 4 \\ -2 & 5 \end{array}\right) \text { or } \frac{1}{(\mathbf{c})}\left(\begin{array}{ll} a & b \\ c & d \end{array}\right) \text { seen }$ |


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| $\mathbf{2 0}$ | (a) 12 | $\mathbf{1}$ |  |
| :---: | :--- | :---: | :--- |
|  | (b) $2 x^{3}$ cao | $\mathbf{2}$ | M1 clear evidence of adding 1 then <br> multiplying by 4 to $\mathrm{g}(x)$ <br> M1 each correct move |
| $\mathbf{2 1}$ | (c) $\sqrt[3]{2(x+1)}$ oe | $\mathbf{3}$ | (a) triangle at $(1,1),(1,-1),(2,-1)$ |
|  | (b) triangle at $(-1,-1)(1,-1),(1,-2)$ |  |  |
|  | (c) reflection in the $x$ axis | $\mathbf{2 f t}$ | SC1 triangle at $(-1,-1),(-1,1),(-2,1)$ <br> correct or reflection of their triangle in <br> $y=-x$ <br> B1 reflection $\mathbf{B 1} x$ axis or $y=0$ |
|  |  | $\mathbf{7 0}$ |  |

