

MARK SCHEME for the October/November 2014 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.

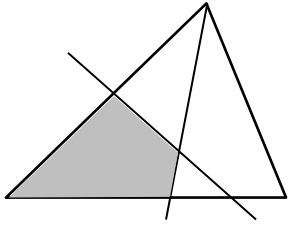
Cambridge will not enter into discussions about these mark schemes.

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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
- nfwf not from wrong working
- soi seen or implied

| Qu. | Answers | Mark | Part Marks |
|-------|---|------------------------|---|
| 1 | 8.1722 cao | 2 | B1 for 8.17 or 8.172 or 8.1721 or 8.17215... |
| 2 | 3 3.14 π 3.142 $\frac{22}{7}$ | 2 | B1 for 3.141[5...] to 3.1416 and 3.1428 to 3.1429 or 3.143 seen or SC1 for 4 in correct order |
| 3 (a) | E B A cao | 1 | |
| (b) | Z cao | 1 | |
| 4 (a) | -3 | 1 | |
| (b) | 4 | 1FT | FT their numerical mode |
| 5 | $\frac{3}{12}$ and $\frac{2}{12}$ $\frac{5}{12}$ cao | M1 A1 | Equivalent denominators can be used, working must be shown. |
| 6 (a) | 15.1 cao | 1 | |
| (b) | 20 cao | 1 | |
| 7 | 2.5[0] or 2.501... nfwf | 3 | M2 for $2.1 \times \left(1 + \frac{6}{100}\right)^3$ oe or M1 for $2.1 \times \left(1 + \frac{6}{100}\right)^n$ oe where $n \geq 2$ or for figs $21 \times \left(1 + \frac{6}{100}\right)^3$ oe |
| 8 | 0.29 cao | 3 | M2 for $30 - (24 \times 1.2378)$ or $(24 \times 1.2378) - 30$ or M1 for 24×1.2378 |
| 9 (a) | 280 | 1 | |
| (b) | 5×10^6 | 2 | B1 for 5 000 000 oe or B1 for answer $k \times 10^6$ or 5×10^k |

| | | | |
|------------|---|---|---|
| 10 | 3.75 oe | 3 | M2 for $3 \times 5 = 7x - 3x$ oe or M1 for $3(x + 5) = 7x$ or $x + 5 = \frac{7}{3}x$ or $1 + \frac{5}{x} = \frac{7}{3}$ or better |
| 11 (a) | x^6 | 1 | |
| (b) | $\frac{x^2}{3}$ | 2 | B1 for answer kx^2 or $\frac{x^k}{3}$ or $\frac{1}{3}$ |
| 12 | 5 -5 nfw | 3 | M1 for correctly eliminating one variable A1 for $x = 5$ A1 for $y = -5$ If zero scored SC1 for correct substitution and evaluation to find the other variable |
| 13 | $[\pm] 8$ nfw | 3 | M1 for $y = k\sqrt{x+5}$ A1 for $k = [\pm] 2$ or M2 for $\frac{4}{\sqrt{-1+5}} = \frac{y}{\sqrt{11+5}}$ oe |
| 14 | $\begin{pmatrix} 4 & 16 \\ 2 & 8 \end{pmatrix}$ | 3 | M2 for $\begin{pmatrix} 12 & 48 \\ 6 & 24 \end{pmatrix}$ and $\begin{pmatrix} 8 & 32 \\ 4 & 16 \end{pmatrix}$ or M1 for $\begin{pmatrix} 12 & 48 \\ 6 & 24 \end{pmatrix}$ or for $\begin{pmatrix} 8 & 32 \\ 4 & 16 \end{pmatrix}$ |
| 15 (a) (i) |  | 2 | B2 for correct ruled bisector with correct arcs or B1 for correct bisector with no/incorrect arcs |
| (ii) | | 2 | B2 for correct ruled bisector with correct arcs or B1 for correct bisector with no/incorrect arcs |
| (b) | | 1 | correct shading |
| 16 | 142 or 142.0... | 5 | B1 for $CBD = 30$ M2 for $[\sin D =] \frac{6 \times \sin \text{their} B}{8}$ oe or M1 for $\frac{6}{\sin D} = \frac{8}{\sin(\text{their} 30)}$ oe A1 for $[D =] 22$ or 22.0 or 22.02... B1FT for $90 + (\text{their} 30 + \text{their} 22)$ evaluated correctly for their final answer or for $360 - 90 - \text{their} BCD$ evaluated correctly for their final answer |

| | | | |
|---------|--------------------------------|-----|---|
| 17 | 890 or 890.1 to 890.2... | 5 | <p>M4 for $\frac{1}{2} \times \left(\frac{4}{3} \times \pi \times 5^3 \right) + \pi \times 5^2 \times 8$</p> <p>or M3 for $\frac{1}{2} \times \left(\frac{4}{3} \times \pi \times 5^3 \right)$ and $\pi \times 5^2 \times 8$</p> <p>or M2 for $\frac{1}{2} \times \left(\frac{4}{3} \times \pi \times 5^3 \right)$ or $\pi \times 5^2 \times 8$</p> <p>or M1 for $\frac{4}{3} \times \pi \times 5^3$</p> |
| 18 (a) | 0.6 0.2 0.8 in correct places | 2 | <p>B1 for 0.6 in correct place</p> <p>B1 for 0.2 and 0.8 in correct places</p> |
| (b) | 0.52 oe nfw | 3 | <p>M2FT for $1 - (\text{their } 0.6 \times \text{their } 0.8)$ oe</p> <p>or M1FT for a correct product from <i>their</i> tree in (a)</p> |
| 19 (a) | CBA and BDA are equilateral oe | 1 | |
| (b) | 67[.0] or 67.02 to 67.03 | 2 | <p>M1 for $\frac{120}{360} \times \pi \times 8^2$ oe</p> |
| (c) (i) | 39.3 or 39.28 to 39.33 | 3 | <p>M2FT for $\text{their}(b) - \frac{1}{2} \times 8^2 \times \sin 120$ oe</p> <p>or M1 for $\frac{1}{2} \times 8^2 \times \sin 120$ oe</p> |
| (ii) | 78.6 or 78.7 or 78.56 to 78.66 | 1FT | <p>FT $2 \times \text{their}(c)(i)$ correctly evaluated</p> |
| 20 (a) | 0.4 or $\frac{2}{5}$ | 2 | <p>B1 for $[f(2) =] 4$</p> <p>or M1 for $\frac{2}{(3x-2)+1}$ or better</p> |
| (b) | -0.8 or $-\frac{4}{5}$ | 2 | <p>M1 for $2 = 10(x+1)$ or better</p> |
| (c) | $3x - 6$ or $3(x-2)$ nfw | 3 | <p>M2 for $3(2x) - 2 - (3(x+2) - 2)$</p> <p>or M1 for $[f(2x) =] 3(2x) - 2$ or $[f(x+2)] = 3(x+2) - 2$</p> |