**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2012 question paper

# for the guidance of teachers

## 0580 MATHEMATICS

**0580/22** 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.

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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
soi seen or implied

| Qu | Answers | Mark | Part marks | |
|---|---|---|---|---|
| **1** | Wednesday<br>22 15 or 10 15pm | **2** | **B1**<br>**B1** | |
| **2 (a)** | I cao | **1** | | |
| **(b)** | I N cao | **1** | | |
| **3** | $x$ – 5 $\frac{x}{5}$ $\frac{5}{x}$ $5x$ | **2** | **M1 evaluating** all 4 expressions for one value in the range. (1 and 2 are out of range) | |
| **4** | 25 (correct working essential) | **2** | **M1** for 18 + 4 + 3 with denominator 12 must be soi (oe is possible) | |
| **5** | 64000 or $6.4 \times 10^4$ | **2** | **SC1** for 63800 or $6.38 \times 10^4$ **or** figs 64 or $6.4 \times 10^k$ in answer space. | |
| **6** | 1, 2, 3, 4 | **3** | **M1** $10x < 45$ **A1** $x < 4.5$ | |
| **7** | 4.46 or 4.456 to 4.459 cao | **3** | **B1** for 28 seen<br>**M1**ft for $\frac{their 28}{2\pi}$ oe or better. | |
| **8** | 13500 408 | **3** | **M1** $135 \times 10^2$ or $408000 \div 10^3$ oe **A1 A1** | |
| **9** | 452 | **3** | **M1** $\tan 78.3 = \frac{x}{58.4}$<br>**M1** "282" + 170 | **SC2** 282 in **answer space** |
| **10 (a)** | 50 | **1** | | |
| **(b)** | 15 | **2** | **M1** finding area under graph **SC1** 15000 | |
| **11** | 196 | **3** | **M1** $y = k(x-3)^2$<br>**A1** $k = 4$ | **M1** $y = \frac{(x-3)^2}{k}$<br>**A1** $k = \frac{1}{4}$ |

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| | | | | |
|---|---|---|---|---|
| **12** | **(a)** | 10(.0) | **2** | **M1** $\frac{1}{2} \times 8 \times 5 \times \sin 150$ |
| | **(b)** | 210 | **2** | **M1** 30° correctly placed at $B$ or $C$ oe |
| **13** | **(a)** | 15 | **2** | **M1** for $\frac{(9-3)}{0.4}$ oe |
| | **(b)** | 11.7(0) | **2** | **M1** for $9 \times 1.3$ oe |
| **14** | **(a)** | Shear, SF2, $x$ axis invariant | **3** | **B1** shear **B1** SF2 **B1** $x$ axis invariant |
| | **(b)** | $\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ | **2ft** | $\begin{pmatrix} 1 & k \\ 0 & 1 \end{pmatrix}$<br>2 marks if $k = 2$ or their SF in (a)<br>1 mark for any other $k$, $k \neq 0$ |
| **15** | **(a)** | 29 to 29.5 | **1** | |
| | **(b)** | 20 to 20.5 | **1** | |
| | **(c)** | 14 to 14.5 | **1** | |
| | **(d)** | $\frac{13}{15}$ oe or 0.867 | **2** | **M1** 8 seen |
| **16** | **(a)** | 0.7 to 0.8 and 5.2 to 5.4 | **2** | **B1 B1** |
| | **(b)** | –2 to –1 but must have a tangent at $x = 1$ for full marks | **3** | **M1** drawing tangent at $x = 1$<br>**M1** for using $y$step/$x$step on their tangent wherever it is drawn |
| **17** | **(a)** | (–5, 0) | **2** | **B1** ($k$, 0) or (–5, $k$) |
| | **(b)** | –2 | **1** | |
| | **(c)** | $2\frac{1}{2}$ or $\frac{5}{2}$ | **2** | **M1** $\frac{5}{4} = \frac{k}{2}$ oe |
| **18** | **(a)** | $2(x + 2)^3$ or $2x^3 + 12x^2 + 24x + 16$ | **2** | **M1** v. clear evidence of f($x$) × 2 then add 10 |
| | **(b)** | $\sqrt[3]{(x + 5)} - 2$ | **3** | **M1** correct first step **M1** correct second step |
| | **(c)** | 0 | **2** | **M1** g(–5) seen or $2 \times -5 + 10$ |
| **19** | **(a)** | $3\frac{1}{2}$ | **2** | **M1** $2x - 7 = 0$ |
| | **(b)** | 3 and –3 | **3** | **M1** $x^2 - 8 = 1$ **A1** $x = 3$ **A1** $x = -3$ |
| | **(c)** | 5 | **2** | **M1** $x - 2 = 3$ |

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