**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**International General Certificate of Secondary Education**

# MARK SCHEME for the May/June 2011 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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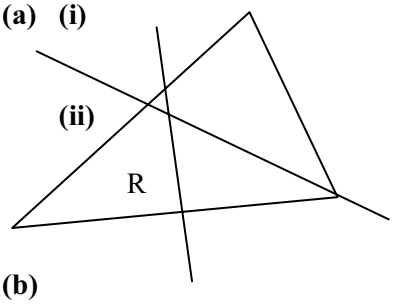
UNIVERSITY of CAMBRIDGE
International Examinations

**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 Mark |
|---|---|---|---|
| **1** | 53.1 | **2** | **B1** C = 36.9 seen, must have C stated or marked on the diagram<br>or **M1** $\sin A = \frac{4}{5}$ or $\tan A = \frac{4}{3}$ but must have $A$ stated |
| **2** | $\sqrt{3}+\sqrt{6}$ , $\pi$ | **2** | –1 for each error or omission |
| **3** | Working must be shown | **2** | **M1** $\frac{14}{9}$ and $\frac{16}{9}$ **M1** $\frac{14}{16}=\frac{7}{8}$ oe<br>or visible cancelling |
| **4** | $0.8^2$ | **2** | **M1** conversion of $\frac{16}{27}$ (= 0.5(9...)) and<br>$0.8^2$ (= 0.64) to decimals seen |
| **5** | (6)€ or euros (with correct working) | **2** | **M1** one of 6 × 1.9037 or 11.5 ÷ 1.9037<br>or 11.5 ÷ 6 seen |
| **6** | 3.322 cao | **2** | **B1** 3.3219(…) or 3.32(20) seen |
| **7** | $1.85 \times 10^4$ | **3** | **B2** 18500 oe seen or **M1** $4x = 74000$<br>or $x = 2 \times 10^4 - 1.5 \times 10^3$ |
| **8** | 16 | **3** | **M1** $p = k\sqrt{q}$<br>**A1** $k$ = 1.6 or 8/5 |
| **9** | 1275, 1425 | **3** | **B1** 85 or 95 or 0.85 or 0.95<br>**M1** their LB or UB × 1500<br>where 85 ⩽ LB < 90 90 < UB ⩽ 95 |
| **10** | **(a)** (0)700 or 7 am<br>**(b)** 1700 or 5 pm | **2**<br>**1** | **M1** 100 – (5 × their(22 – 6) + their(13 – 8))<br>or better soi |
| **11** | $\frac{4+bc}{c}$ or $\frac{4}{c}+b$ cao | **3** | **M1** correct move completed<br>**M1** second correct move completed<br>**M1** third correct move completed |
| **12** | $x$ = 1<br>$y$ = 0.2 or $\frac{1}{5}$ only | **3** | **M1** consistent mult and add/subtraction<br>**A1** one value correct after **M** awarded |
| **13** | **(a)** 72<br>**(b)** 36<br>**(c)** 54 | **1**<br>**1**<br>**2ft** | ft 90 – **(b)** **M1** $POQ$ = 108 |

| | | | |
|---|---|---|---|
| **14** | **(a)** 84 | **1** | |
| | **(b)** 15 | **1** | |
| | **(c)** 6.28 | **2** | **M1** $\frac{120}{360} \times 2 \times \pi \times 3$ oe |
| **15** | $\frac{1-3x}{(x+1)(x+5)}$ www | **4** | **M1** $(x+1)^2 - x(x+5)$ oe **B1** $x^2 + x + x + 1$<br>**B1** denominator(s) $(x+1)(x+5)$ or $x^2 + 6x + 5$ |
| **16** | **(a)** $\frac{1}{2}$ **a** – $\frac{1}{2}$ **c** oe | **2** | **M1** correct but unsimplified e.g. $\frac{1}{2}$ **a** + – $\frac{1}{2}$ **c** |
| | **(b)** $\frac{3}{4}$ **a** + $\frac{3}{4}$ **c** oe | **2** | **M1** correct but unsimplified |
| **17** | **(a)** $4x^{-24}$ or $\frac{4}{x^{24}}$ | **2** | **B1** $4x^n$ **B1** $\frac{k}{x^{24}}$ or $kx^{-24}$ for any numerical $k$, $n$ |
| | **(b)** $\frac{x^2}{16}$ | **2** | **B1** $\frac{x^2}{k}$ or **B1** $\frac{x^n}{16}$ **SC1** $(\frac{x}{4})^2$ |
| **18** | **(a)** (6, 1½) | **1** | |
| | **(b)** $y = -\frac{1}{5}x + 4$ oe | **3** | **B1** correct numerical format **B1** correct $m$<br>**B1** correct $c$ |
| **19** | **(a)** 8 | **1** | |
| | **(b)** $4x - 9$ | **2** | **M1** $2(2x - 3) - 3$ seen |
| | **(c)** $2^{2(x+1)}$ or $2^{2x+2}$ or $4^{x+1}$ | **2** | **M1** $(2^{x+1})^2$ seen |
| **20** | **(a)** **(i)**  | **2** | **B1** correct line<br>**B1** 2 sets of correct arcs |
| | **(ii)** | **2** | **B1** correct line<br>**B1** two sets of correct arcs |
| | **(b)** | **1** | correct region, shaded or shown by the letter R |
| **21** | **(a)** **(i)** (0) brackets essential | **2** | **M1** $6 \times 2 + 3 \times -4$ or $12 + -12$ |
| | **(ii)** $\begin{pmatrix} 12 & 18 \\ -8 & -12 \end{pmatrix}$ | **2** | **M1** any 2 × 2 matrix with 2 elements correct |
| | **(b)** $\frac{1}{2}\begin{pmatrix} 1 & -1 \\ -1 & 3 \end{pmatrix}$ | **2** | **B1** $\frac{1}{2}\begin{pmatrix} a & c \\ b & d \end{pmatrix}$ seen<br>or<br>**B1** $k\begin{pmatrix} 1 & -1 \\ -1 & 3 \end{pmatrix}$ seen |