**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

**0580/21** Paper 2 (Extended), maximum raw mark 70

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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** | 847 | **1** | |
| **2** | correct regions shaded | **1, 1** | |
| **3** | 48 | **2** | **B1** for 3 **and** 16 seen |
| **4** | **(a)** 10<br><br>**(b)** 5.5 oe | **1**<br><br>**1** | |
| **5** | **(a)** 86400<br><br>**(b)** $8.64 \times 10^4$ | **1**<br><br>**1ft** | |
| **6** | 108 | **2** | **M1** for $3^3$ or 27 or $\left(\frac{1}{3}\right)^3$ or $\frac{1}{27}$ seen |
| **7** | 13 | **3** | **B1** for 12, 5 seen **M1** for (their 12)$^2$ + (their 5)$^2$<br>or **M2** $\sqrt{[(-8-4)^2 + (1-6)^2]}$ oe<br>or **M1** if $\sqrt{}$ missing |
| **8** | 6.70 | **3** | **M1** for ( $r^3$ = ) $1260 \times \frac{3}{4\pi}$ oe seen<br>**M1** for $\sqrt[3]{}$ of their $r^3$ seen or implied |
| **9** | 22.5 oe | **3** | **B2** $180 = 5x + 2x + x$ oe or better<br>**B1** for $2x$ or $6x$ marked in the correct place on the diagram. |
| **10** | $x = 13$<br>$y = -9$ | **3** | **M1** for consistent multiplication and addition/subtraction<br>**A1** for $x = 13$ or **A1** for $y = -9$ |
| **11** | **(a)** 85.8<br><br>**(b)** 456.8625 cao | **2**<br><br>**1** | **M1** for 23.25 and 19.65 seen |
| **12** | **(a)** (0)8(.)01 (am)<br><br>**(b)** 78.4 or 78.38 to 78.39 | **1**<br><br>**3** | Not 8.01pm<br><br>**M2** for 827 ÷ 10.55<br>or **M1** for figs 827 ÷ their time |
| **13** | **(a)** 0.54<br><br><br><br>**(b)** 1.61 | **2**<br><br><br><br>**2** | **M1** for $\frac{2.7 \times 20\,000}{10\,0000}$ oe<br>or **SC1** for figs 54 in answer<br><br>**SC1** for figs 161 or **M1** $200^2$ or $20\,000^2$ seen |

| | | | |
|---|---|---|---|
| **14** | –2.64, 1.14 cao with working | **4** | **B1** for $\sqrt{3^2 - 4(2)(-6)}$ or better seen anywhere<br>**B1** for $p = -3$ **and** $r = 2 \times 2$ or better as long as in the form $\frac{p+\sqrt{q}}{r}$ or $\frac{p-\sqrt{q}}{r}$<br>After **B0B0, SC1** for –2.637(45…) and 1.1 or 1.137(45…) |
| **15** | **(a)** 4<br>**(b) (i)** $\frac{12}{36}$ oe 0.333<br>**(ii)** $\frac{11}{36}$, 0.306 or 0.3055 to 0.3056<br>**(c)** $\frac{8}{15}$ oe 0.533(3…) | **1**<br>**1**<br>**1**<br>**1** | |
| **16** | **(a)** Answer given<br>**(b)** $k = (\pm)\sqrt{\frac{4A}{(4-\pi)}}$ or $2\sqrt{\frac{A}{(4-\pi)}}$ | **2**<br>**3** | **M1** $(A =)k^2 - \pi\left(\frac{k}{2}\right)^2$<br>**E1** $A = k^2 - \frac{\pi k^2}{4}$ correctly completed to $4A = 4k^2 - \pi k^2$<br>**M1** factorising (must contain a π)<br>**M1** division (by coefficient of $k^2$)<br>**M1** square root |
| **17** | **(a)** 66°<br>**(b)** 33°<br>**(c)** 123° | **2**<br>**1**<br>**2** | **M1** for 90° clearly identified as *A*<br><br>**B1** for *OBA* or *OAB* = 57° |
| **18** | **(a) (i)** **-r + q** or **q** – **r**<br>**(ii)** ½(3**q** – **r**) oe<br>**(b)** correct working | **1**<br>**1**<br>**3** | Must be simplified<br>**M1** for ***MX*** = ½ **r** + ¾ their (–**r + q**)<br>**M1** using a different route for ***XS*** or ½ ***MS***<br>**E1** dep correct simplification and conclusion |
| **19** | **(a)** 480<br>**(b)** 9900<br>**(c)** 0.125 or $\frac{1}{8}$ | **1**<br>**3**<br>**2** | <br>**M1** for attempt at area under graph<br>**M1** for 0.5 × 15 × (their **(a)** + 14 × 60) oe or 0.5 × 15 × (8 + 14) oe<br>**M1** for numerical vertical/horizontal or numerical use of v = u + at but t ≤ 120 or t ≤ 2 |
| **20** | **(a) (i)** 9<br>**(ii)** $8x^3$ cao<br>**(b)** 4 **www**<br>**(c)** $\frac{x+3}{2}$ | **1**<br>**1**<br>**3**<br>**2** | <br><br>**M1** for $(2x - 3)^3 = 125$ **M1** $2x - 3 = 5$<br>**M1** for $x \pm 3 = 2y$ or $x = \frac{y \pm 3}{2}$ |