**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

**0580/23** 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
soi seen or implied

| Qu | Answers | Mark | Part marks |
|---|---|---|---|
| **1** | 95 | **2** | **B1** for 85 seen<br>or **M1** $x$ = 180 – their angle $ADC$, if it is clearly seen |
| **2** | 120 | **2** | **M1** for $\frac{750\times2\times8}{100}$ oe seen or **SC1** 870 as final answer |
| **3 (a)** | 3.26077… | **1** | seen |
| **(b)** | 3.261 | **1ft** | their (a) to 4 significant figures |
| **4** | $y \varnothing -1.25$ | **2** | **M1** inequality with $y$'s and constants correctly collected |
| **5** | 33 **cao www** | **2** | **M1** any two of 5.5, 9.5, 12.5 seen |
| **6** | 31.7 | **2** | **M1** 0.5 × 9 × 15 × sin 28 |
| **7** | $u$ = 24(.0), $v$ = 0.6 | **2** | **B1** each |
| **8** | 7 cao | **3** | **B1** for 39.5(0) or 31.5(0) or 42<br>**M1** for (their 39.5 – 8) ÷ 4.5 or (their 42 – 10.5) ÷ 4.5 |
| **9** | $\frac{a(2-t)}{3}$ cao oe | **3** | **M1** correct re-arrangement to isolate the term in $w$<br>**M1** correct multiplication by $a$<br>**M1** correct division by their 3<br>An incorrect answer scores a maximum of **M2** |
| **10** | 10 | **3** | **M1** T = k$\sqrt{l}$ **A1** for $k$ = 2 |
| **11** | 17.05 **cao www** | **4** | **M1** for 280 × $(1+\frac{3}{100})^2$ oe<br>**M1** subtracting 280 from 280$(1+\frac{k}{100})^2$ any $k$<br>**A1** for 17.052 or **SC2** 297.05 on answer line |

| | | | | |
|---|---|---|---|---|
| **12** | **(a)** | $\frac{11}{12}-\frac{4}{12}$ oe<br>$\frac{7}{12}$ **cao ww 0** | **2** | **M1** correct use of a common denominator<br>**A1** |
| | **(b)** | $\frac{1}{4}\times\frac{13}{11}$ oe<br>$\frac{13}{44}$ **cao ww 0** | **2** | **M1** inversion and operation change<br>**A1** |
| **13** | **(a)** | 71 | **2** | **M1** for $7\times8-3\times-5$ or **B1** 56 and –15 |
| | **(b)** | $3v\,(u+3w)$ final answer | **2** | **B1** for $3(uv+3vw)$ or $v\,(3u+9w)$<br>As final answer |
| **14** | **(a)** | $64p^3q^6$ | **2** | **B1** $64p^uq^v$ or $kp^3q^6$ |
| | **(b)** | $0.5x^{-2}$ or $\frac{1}{2x^2}$ oe | **2** | **B1** $\frac{1}{2x^u}$ oe or $\frac{1}{kx^2}$ oe |
| **15** | | –3.44, 0.44<br>correct working must be shown | **4** | **B1** for $\sqrt{(6)^2-4(2)(-3)}$ or better seen<br>**B1** if in form $\frac{p+(or-)q}{r}$, for $p=-6$ **and** $r=2\times2$ oe<br>**B1**, **B1** (**SC1** –3.4 or –3.436… **and** 0.4 or 0.436...) |
| **16** | | 359 www | **4** | **M1** $\pi\times4^2$ or $\frac{1}{2}\pi\times4^2$<br>**M1** for $0.5\times\pi\times8\times15$ oe<br>**M1** for $8\times15$ + their 2 ends + their curved surface area |
| **17** | **(a)** | (4 10) | **2** | **B1** each element or correct without brackets |
| | **(b)** | $\frac{1}{2}\begin{pmatrix}3&-4\\-1&2\end{pmatrix}$ oe | **2** | **B1** for $\frac{1}{2}\begin{pmatrix}a&c\\b&d\end{pmatrix}$ or $k\begin{pmatrix}3&-4\\-1&2\end{pmatrix}$ seen |
| **18** | **(a)** | $\mathbf{p}-\frac{1}{3}\mathbf{q}$ oe | **2** | **M1** $\overrightarrow{QR}+\overrightarrow{RX}$ oe or $-\mathbf{q}+\mathbf{p}+(\frac{2}{3})\mathbf{q}$ oe |
| | **(b)** | $\frac{1}{2}\mathbf{p}+\frac{5}{6}\mathbf{q}$ oe | **2 ft** | ft $\mathbf{q}+\frac{1}{2}$ their (a) but must be vectors<br>or **M1** for $\overrightarrow{OQ}+\overrightarrow{QM}$ oe |
| **19** | | 6(.00) **www** | **4** | **M1** use of area = distance<br>**M1** complete, correct set of area statements, ignoring units<br>**M1** changing min to hours or km/h to km/min |

| | | | |
|---|---|---|---|
| **20** | $\frac{x+4}{x(x-5)}$ oe cao | **5** | **B2** $(x-5)(x+4)$ seen<br>or **SC1** $(x+a)(x+b)$ where $ab = -20$ or $a+b=$<br><br>**B2** $x(x-5)(x-5)$<br>or **B1** one of $x(x^2-10x+25)$, $(x-5)(x-5)$, $(x-5)(x^2-5x)$ seen |
| **21 (a)** | 7.55 www | **3** | **M2** $(\frac{1}{2}\sqrt{(8^2+8^2)})^2+5^2$ or $4^2+5^2+4^2$ seen<br>**or M1** $8^2+8^2$ or $5^2+4^2$ or $4^2+4^2$ or $5^2+$(their $MB$)$^2$ seen |
| **(b)** | 41.5 www | **3** | **M2** $\sin(B) = \frac{5}{(a)}$ or $\tan(B) = \frac{5}{\text{their } MB}$ or $\cos(B) = \frac{\text{their } MB}{(a)}$<br>or **M1** recognition of angle $PBM$ |