**Cambridge International Examinations**
Cambridge International General Certificate of Secondary Education

**MATHEMATICS** **0580/42**

Paper 42 (Extended) **March 2017**

MARK SCHEME

Maximum Mark: 130

**Published**

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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 |
| nfww | not from wrong working |
| soi | seen or implied |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 1 (a) | 22.9 or 22.85 to 22.86 | 2 | **M1** for $\frac{8}{10+17+8}$ [× 100] oe |
| (b) | $5635 \times \frac{17}{10+17+8}$ or better [= 2737] | 2 | **M1** for $\frac{5635}{(10+17+8)}$ |
| (c) | 5000 | 3 | **M2** for $5635 = k\left(1+\frac{2.42}{100}\right)^5$ oe<br>or **B1** for $\left(1+\frac{2.42}{100}\right)$ |
| (d) | 9950 | 2 | **M1** for 2 × 2500 or 3 × 1650 |
| (e) | 1.98 final answer | 2 | **B1** for 1.976 or 1.98 not final answer<br>or **M1** for 130 × 0.0152 |
| 2 (a) (i) | Rotation | 1 | |
| | 90° [anticlockwise] oe | 1 | |
| | (9, 5) | 1 | |
| (ii) | Translation | 1 | |
| | $\begin{pmatrix}-8\\-14\end{pmatrix}$ oe | 1 | |
| (iii) | Enlargement | 1 | |
| | [sf] $\frac{1}{3}$ | 1 | |
| | (– 8, – 2) | 1 | |
| (b) (i) | Image at (1, – 3) (2, – 3) (2, – 5) | 2 | **M1** for triangle correct size and orientation, wrong position<br>or **SC1** for correct reflection in $y = -x$ |
| (ii) | $\begin{pmatrix}0 & 1\\1 & 0\end{pmatrix}$ | 2 | **B1** for 1 correct column or row |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 3 (a) | 0 0.5 oe 1.25 oe | 1, 1, 1 | |
| (b) | Fully correct smooth curve | 4 | **B3 FT** for 7 or 8 points<br>or **B2 FT** for 5 or 6 points<br>or **B1 FT** for 3 or 4 points |
| (c) | 3.6 to 3.8 | 2 | **M1** for $y = 3.5$ soi |
| (d) | line $y = x + 1$ ruled | M1 | |
| | $-1.55$ to $-1.40$ 4.55 to 4.8 | A1 A1 | If 0 scored **SC1** for $y = x + 1$ stated or implied<br>or for 2 correct values given |
| (e) (i) | Point plotted at (5, 5) | 1 | |
| (ii) | Tangent ruled from $A$ | 1 | |
| (iii) | 1.2 to 1.4 | B2 | B2 and M1 dep on reasonable attempt at tangent from (5, 5)<br>**M1** for change in $y$/ change in $x$ of *their* ruled line |
| 4 (a) | $\frac{1}{8}$ oe | 3 | **M2** for $\frac{1}{2}\left(1-\frac{1}{6}-\frac{1}{4}-\frac{1}{3}\right)$ oe<br>or **M1** for $\frac{1}{6}+\frac{1}{4}+\frac{1}{3}$ seen oe or idea that all sum to 1 |
| (b) | $\frac{7}{12}$ oe | 2 | **M1** for $\frac{1}{3}+\frac{1}{4}$ oe |
| (c) (i) | $\frac{1}{16}$ oe | 2 | **M1** for $\frac{1}{4}\times\frac{1}{4}$ oe |
| (ii) | $\frac{2}{24}$ oe | 3 | **M2** for $2\times\frac{1}{6}\times\frac{1}{4}$ oe<br>or **M1** for $\frac{1}{6}\times\frac{1}{4}$ oe |
| (d) | 12 | 1 | |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 5 (a) (i) | $(3x-1)(x+4)$ | 2 | **M1** for $(3x+b)(x+c)$ with $bc=-4$ or $3c+b=11$ or for $3x(x+4)-1(x+4)$ or for $x(3x-1)+4(3x-1)$ |
| (ii) | $\frac{1}{3}$ oe and $-4$ | 1 | |
| (b) (i) | $2\times2(x-4)-2(2x+11)=(2x+11)(x-4)$ or better | M2 | **M1** for common denom $2(2x+11)(x-4)$ seen or attempt to multiply through by denoms or for $\frac{2(x-4)-(2x+11)}{(2x+11)(x-4)}\left[=\frac{1}{2}\right]$ |
| | $2x^2+11x-8x-44$ or better | B1 | or for other correct relevant 2 bracket expansion if alt method used |
| | $4x-16-4x-22=2x^2-8x+11x-44$<br>$2x^2+3x-6=0$ | A1 | correct solution reached with all brackets expanded and no errors or omissions seen |
| (ii) | $\frac{-3\pm\sqrt{(3)^2-4(2)(-6)}}{2\times2}$ | 2 | **B1** for $\sqrt{(3)^2-4(2)(-6)}$ or better or $\left(x+\frac{3}{4}\right)^2$ oe and **B1** for $\frac{-3+\sqrt{q}}{2(2)}$ or $\frac{-3-\sqrt{q}}{2(2)}$ or better or $-\frac{3}{4}+\sqrt{\frac{57}{16}}$ oe or $-\frac{3}{4}-\sqrt{\frac{57}{16}}$ oe |
| | –2.64 and 1.14 final ans cao | B1B1 | **SC1** for –2.6 or –2.637... **and** 1.1 or 1.137... or –2.64 and 1.14 seen in working or 2.64 and –1.14 as final answers |
| 6 (a) (i) | 27 | 1 | |
| (ii) | 3.89 or 3.888 to 3.889 | 2 | **M1** for $\frac{7}{EZ}=\frac{9}{5}$ oe |
| (b) | 76 cao | 3 | **B2** for $ABC = 104$ or $AOC = 152$ or $COD = 28$ or $OBA = 52$ **and** $OBC = 52$ or $BCD = 128$ **and** $OCB = 52$ or **B1** for any one of $OBA, OBC,$ $OCB = 52$ or $BCD = 128$ |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| (c) (i) | 90 | 1 | |
| | angle in semicircle | 1 | |
| (ii) | 27 | 1 | |
| | tangent [perpendicular to] radius | 1 | |
| (iii) | rectangle | 1 | |
| 7 (a) | 72.7 or 72.70 to 72.71 nfww | 4 | **M1** for midpoints **soi** (condone 1 error or omission)<br>(47.5, 55, 65, 80, 95, 110)<br><br>**M1** for use of $\sum fx$ with $x$ in correct interval including both boundaries (condone 1 further error or omission)<br>(1092.5, 3520, 7930, 10880, 2470, 3190)<br><br>**M1** (dep on 2nd M1) for $\sum fx \div 400$ |
| (b) (i) | [23] 87 209 345 371 [400] | 2 | **B1** for 2 or 3 correct |
| (ii) | Correct graph | 3 | **B1FT** *their* **(b)(i)** for 6 correct heights<br>**B1** for 6 points at upper ends of intervals on correct vertical line<br>**B1FT** (dep on at least B1) for increasing curve or polygon through 6 points<br><br>After 0 scored, **SC1FT** *their* **(b)(i)** for 5 correct points plotted |
| (iii) (a) | 69 to 70 | 1 | |
| (b) | 20 to 23 | 2FT | **FT** *their* cumulative freq curve<br>**M1** for correct UQ or LQ for *their* cumulative freq curve |
| (c) | 72 to 75 | 2 | **M1** for 240 soi |
| 8 (a) (i) | 5.14 or 5.135 to 5.142 nfww | 4 | **M2** for<br>$[XY^2 =] 12.5^2 + 9.9^2 - 2 \times 12.5 \times 9.9 \times \cos 23$<br>or **M1** for implicit version<br>**A1** for 26.4 to 26.5<br>OR<br>**B1** for $[XYT =]$ 108 or $[TXY =]$ 49<br>**M2** for $\frac{12.5 \sin 23}{\sin(180-72)}$ oe<br>or **M1** for $\frac{\sin(180-72)}{12.5} = \frac{\sin 23}{XY}$ oe |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| (ii) | 15.6 or 15.7 or 15.64 to 15.68 | 3 | **M2** for $[TZ=]\frac{9.9}{\sin 37}\times\sin(72)$ oe<br>or **M1** for $\frac{9.9}{\sin 37}=\frac{TZ}{\sin 72}$ oe<br>OR<br>**M2** for $\frac{12.5\times\sin(180-23-108)}{\sin 37}$ oe<br>or **M1** for $\frac{\sin 37}{12.5}=\frac{\sin(180-23-108)}{TZ}$ oe |
| (b) | 3.79 or 3.793 to 3.794 | 4 | **M3** for $r=20.5\div\left(2+\frac{3\times65\times2\pi}{360}\right)$ oe<br>or **M2** for $20.5=2r+\frac{3\times65}{360}\times2\pi r$ oe<br>or **M1** for $[3\times]\frac{65}{360}\times2\pi r$ oe<br>or 20.5 = 2*r* + expression involving π |
| **9** (a) | $x<10$ oe | 1 | Accept $x\leqslant 9$ |
| | $y\geqslant 2$ oe | 1 | Accept $y>1$ |
| (b) | $x+3y\leqslant 21$ oe | 1 | Mark answer line isw |
| (c) | ruled broken line $x=10$ | B1 | or ruled line $x=9$ |
| | ruled line $y=2$ | B1 | or ruled broken line $y=1$ |
| | ruled line from (0, 7) to (21, 0) | B2 | **SC1** for line with negative gradient correct only at (0, 7) or (21, 0) |
| | correct region indicated cao | 1 | |
| (d) (i) | 4 | 1 | |
| (ii) | 20 | 1 | |
| **10** (a) (i) | (6 – 2) × 180 or (2 × 6 – 4) × 90<br>or (360 ÷ 6) | M1 | |
| | (6 – 2) × 180 ÷ 6 or (2 × 6 – 4) × 90 ÷ 6<br>or 180 – (360 ÷ 6) | M1dep | dep on previous M1 |
| (ii) | 1.73*x* or $x\sqrt{3}$ oe | 3 | **M2** for $2x\sin 60$ or $2x\cos 30$ oe<br>or for $\sqrt{x^2+x^2-2\times x\times x\times\cos 120}$<br>or **M1** for $x\sin 60$ or $x\cos 30$ oe<br>or for $x^2+x^2-2\times x\times x\times\cos 120$ |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| **(iii)** | $(10-x)\sin 30$ seen oe | **M1** | |
| | $10+2\left((10-x)\sin 30\right)$ oe | **M1dep** | dep on previous **M1** |
| | $10+10-x$ or $10+2\times\frac{1}{2}\times(10-x)$ | **A1** | with no errors or omissions seen |
| **(b)** | 12.7 or 12.67 to 12.68.... nfww | **4** | **B3** for 7.32 to 7.33<br>or **M2** for $x=20\div(1+1.73)$ oe<br>or **M1** for $20-x$ = *their* **(a)(ii)** oe |
| **11 (a)** | 4 5 6 7<br>8 16 32 64 128 | **1**<br>**3** | **B2** for 3 or 4 correct<br>or **B1** for first 2 correct<br>If 0 scored, **SC1** for 4 values correctly doubled **FT** one error |
| **(b)** | $2^n$ oe | **1** | |
| **(c) (i)** | $2+4+8=14$ | **1** | |
| | $16-2=14$ | **1** | or for $14+2=16=2^4$ |
| **(ii)** | 62<br>and<br>6 | **2** | **B1** for each |
| **(iii)** | $2^{n+1}-2$ oe | **1** | |
| **(iv)** | 9 | **1** | |