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MATHEMATICS **0580/42**

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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	Partial marks
1(a)(i)	4 : 5	**1**	
1(a)(ii)	4 : 5	**1**	
1(a)(iii)	3 : 4	**2**	**B1** for 12 : 16 or answer 4 : 3
1(b)(i)	26.8 or 26.79…	**3**	**M2** for $\frac{15600-11420}{15600}[\times 100]$ or $\frac{11420}{15600}\times 100$ or **M1** for $\frac{11420}{15600}$
1(b)(ii)	16 000 nfww	**3**	**M2** for $15600\times\frac{100}{100-2.5}$ oe or **M1** for 15600 associated with 97.5[%] seen
1(c)	1.6 or $\frac{8}{5}$	**2**	**M1** for $\frac{200\times x\times 15}{100}=48$ oe or **M1** for figs 16
1(d)	2.5 or $\frac{5}{2}$ cao nfww	**3**	**B2** for 2.49[9…] or 102.4[99…] or 1.024[99…] or 2.50 or 102.5 or 1.025 or **M2** for $\sqrt[10]{\frac{256}{200}}$ oe or **M1** for $256 = 200(x)^{10}$ seen

Question	Answer	Marks	Partial marks
2(a)(i)	1070 or 1072. ..	**3**	**M1** for $\pi \times 8^2 \times 2 \times 8$ **M1** for $\frac{4}{3} \times \pi \times 8^3$ or **M2** for $\frac{2}{3}\pi r^3$ or **M1** for $\pi r^2 2r - \frac{4}{3}\pi r^3$
2(a)(ii)	2.58 or 2.580 to 2.581	**3**	**B2** for $r^3 = \frac{36 \times 3}{2\pi}$ or better or **M1** for $\pi \times r^2 \times 2 \times r - \frac{4}{3} \times \pi \times r^3 = 36$ oe
2(b)(i)	4.24 or 4.241 to 4.242	**4**	**M3** for $(\pi \times 5^2 + \pi \times 5 \times \sqrt{5^2 + 12^2})$ or **M2** for $\pi \times 5 \times \sqrt{5^2 + 12^2}$ or **M1** for $5^2 + 12^2$ or $\pi \times 5^2$
2(b)(ii)	64 cao final answer	**3**	**M2** for $\frac{[k\pi] \times 5^2 \times 12}{[k\pi] \times 1.25^2 \times 3}$ or **M1** for $\frac{1}{3} \times \pi \times 5^2 \times 12$ or $\frac{1}{3} \times \pi \times 1.25^2 \times 3$ OR **M2** for 4^3 or $\left(\frac{1}{4}\right)^3$ seen or **M1** for factor 4 or $\frac{1}{4}$ soi
3(a)	7040 or 7035. …	**3**	**M1** for $\frac{1}{2} \times 100 \times 70$ oe **M1** for $\frac{1}{2} \times 100 \times 110 \times \sin 40$ oe
3(b)	374 or 375 or 374.4 to 374.5….	**5**	**M2** for $110^2 + 100^2 - 2 \times 110 \times 100 \times \cos 40$ oe or **M1** for implicit form **A1** for 5250 or 5247. … (or 72.4 or 72.43 to 72.44) **M1** for $70^2 + 100^2$
3(c)	64.3 or 64.27 to 64.28 nfww	**2**	**M1** for $\sin 40 = \frac{\text{distance}}{100}$ oe
3(d)	235	**3**	**B2** for [angle *ACB* =] 34.99 to 35 or [angle *ABC* =] 55[.0…] or **M1** for $\tan[ACB] = \frac{70}{100}$ or $\tan[ABC] = \frac{100}{70}$ or equivalent trig ratio

Question	Answer	Marks	Partial marks
4(a)(i)	Correct translation	**2**	**B1** for translation $\begin{pmatrix}6\\k\end{pmatrix}$ or $\begin{pmatrix}k\\-2\end{pmatrix}$
4(a)(ii)	Correct rotation	**2**	**B1** for rotation 180° but other centre
4(a)(iii)	Correct reflection	**2**	**B1** for reflection in $y = -x$
4(b)(i)	Enlargement [factor] $\frac{1}{2}$ or 0.5 [centre] (0, 0) oe	**3**	**B1** for each
4(b)(ii)	$\begin{pmatrix}\frac{1}{2} & 0\\0 & \frac{1}{2}\end{pmatrix}$ oe	**2**	**B1** for matrix of form $\begin{pmatrix}k & 0\\0 & k\end{pmatrix}$ oe, $k \neq 0$ or 1
4(c)	± 2.5	**3**	**B2** for $25u^2 = 156.25$ or $5u = [\pm]12.5$ or **M1** for $(4u)^2 + (3u)^2$
5(a)	3.2 or 3.15 or 3.152 to 3.153 5.2 or 5.19 or 5.20 or 5.196…	**2**	**B1** for each
5(b)	Correct graph for $0.5 \leqslant x \leqslant 3.5$	**4**	**B3FT** for 6 or 7 correct points or **B2FT** for 4 or 5 correct points or **B1FT** for 2 or 3 correct points
5(c)	1.7 to 1.8	**1FT**	**FT** *their* graph if one answer
5(d)(i)	Any integer $k \geqslant -1$	**1**	
5(d)(ii)	Any integer $k < -1$	**1**	
5(e)	Tangent ruled at $x = -3$	**B1**	
	2.5 to 4	**B2**	**dep** on tangent drawn at $x = -3$ or close attempt at tangent at $x = -3$ **M1** for rise/run also dep on tangent at $x = -3$ or close attempt at tangent at $x = -3$

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Question	Answer	Marks	Partial marks
5(f)(i)	$y = 6 - x$ ruled accurately	**M2**	**M1** for correct line but freehand or ruled line gradient –1.1 to –0.9, or through (0, 6) but not $y = 6$
	$2.85 \leqslant x \leqslant 3$	**A1**	
5(f)(ii)	[a =] 8 [b =] –48 [c =] –16	**4**	**B3** for 2 correct or $x^5 + 8x^3 - 48x^2 - 16 = 0$ seen or $-x^5 - 8x^3 + 48x^2 + 16 = 0$ seen or **M2** for correct multiplication by $8x^2$ or **B1** for answers ± 8, ± 48, ± 16 or **M1** for $\frac{x^2 \times x^3 - 8 \times 2}{x^2 \times 8} = 6 - x$ or **M1** for correct multiplication by 8 or **M1** for correct multiplication by x^2
6(a)(i)	280	**1**	
6(a)(ii)	320	**1**	
6(a)(iii)	90	**1**	
6(a)(iv)	10	**2**	**M1** for 90 written
6(b)(i)	250.2 nfww cao	**4**	**M1** for at least 4 correct mid-values **M1** for Σfx **M1 dep on second M1** for $\Sigma fx \div 100$
6(b)(ii)	Correct completion of histogram	**4**	**B1** for each correct block If zero scored, then **SC1** for correct frequency densities seen
6(c)	[22 m] further oe	**1**	
7(a)	$\frac{5}{6}$	**1**	
7(b)	$\frac{4}{36}$ oe	**2**	**M1** for $\frac{2}{6} \times \frac{2}{6}$
7(c)	20	**1**	

Question	Answer	Marks	Partial marks
7(d)(i)	Diagram completed correctly x x 3 3 3 9 x x 2 2 2 6 x x 2 2 2 6 x x 2 2 2 6 x x 1 1 1 3	**2**	**B1** for 3 correct columns or for 4 correct rows
7(d)(ii)(a)	$\frac{9}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(d)(ii)(b)	$\frac{4}{36}$ oe	**1FT**	**FT** *their* **(d)(i)**
7(e)	$\frac{512}{7776}$ oe	**2**	**M1** for $\left(\frac{4}{6}\right)^k \times \frac{2}{6}$ oe k = 3, 4 or 5 only
8(a)(i)	$7a + 9p = 354$ oe final answer	**1**	
8(a)(ii)	[a =] 21 [p =] 23	**3**	**M1** for correctly eliminating one variable **A1** for $a = 21$ **A1** for $p = 23$
8(b)(i)	$\frac{2}{x}$	**1**	
8(b)(ii)(a)	$\frac{2}{x} + \frac{3}{x-1} = 2$	**M1**	
	$2(x-1) + 3x = 2x(x-1)$ oe	**M1dep**	Both sides of the equation could be over $x(x-1)$ at this stage Dep on **M1** or 3 term equation with fractions but one sign error
	$2x - 2 + 3x = 2x^2 - 2x$ oe $2x^2 - 7x + 2 = 0$	**A1**	Answer reached with one correctly expanded line seen and no errors seen
8(b)(ii)(b)	$\sqrt{(-7)^2 - 4(2)(2)}$	**B1**	or for $\left(x - \frac{7}{4}\right)^2$
	$\frac{--7 + \sqrt{q}}{2 \times 2}$ or $\frac{--7 - \sqrt{q}}{2 \times 2}$	**B1**	or for $\frac{7}{4} + \text{or} - \sqrt{-1 + \left(\frac{7}{4}\right)^2}$
	3.19 only	**B2**	**B1** for 3.19 with other root or for 3.2 or 3.186… isw other root or for 0.31 or 0.314 or 0.3138 to 0.3139

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Question	Answer	Marks	Partial marks
9(a)	3	**1**	
9(b)	$-\frac{2}{5}$ oe	**2**	**M1** for $2(1-2x) = x + 4$
9(c)	$-2x - 7$ final answer	**2**	**M1** for $1 - 2(x + 4)$
9(d)	26	**2**	**B1** for h(5) soi or **M1** for $\left(x^2+1\right)^2+1$
9(e)	$\frac{1-x}{2}$ oe final answer	**2**	**M1** for $x = 1 - 2y$ or $2x = 1 - y$ or $\frac{y}{2} = \frac{1}{2} - x$ or $y - 1 = -2x$
9(f)	$[p =] -20$ $[q =] 26$	**4**	**B3** for $[\text{hgf}(x)] = 4x^2 - 20x + 26$ seen and not spoilt by further working or **M1** for $(1 - 2x) + 4$ **M1 dep** for $\left(\textit{their } (5-2x)\right)^2+1$ **B1FT dep** for $25 - 10x - 10x + 4x^2$
10(a)	5.68 or 5.684 to 5.685	**5**	**M2** for $2x\sqrt{x^2+x^2}$ oe or $2\times\sqrt{2}\times x^2$ or **M1** for $x\sqrt{2}$ or $\sqrt{x^2+x^2}$ oe soi **M1** for $\frac{270}{360}\times\pi\times x^2$ oe **M1** for $0.5\ x^2$ oe
10(b)	4.4[0] or 4.398 to 4.401	**2**	**dep** on a correct value for k in **(a)** **M1** for $\left[x^2\right] = \frac{110}{\textit{their } k}$