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MATHEMATICS **0580/22**

Paper 2 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 70

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	– 3	**1**	
2	[0].00517	**1**	
3	*BC* *AB* oe	**1**	
4(a)	2, 3, 4, 6	**1**	
4(b)	27, 36 cao	**1**	
5	[*x* =] 60 [*y* =] 40	**2**	**B1** for each or for two numbers that add to 100
6	2.5	**2**	**B1** for 2200 or 0.055 seen or **SC1** for answer figs 25
7	32	**2**	**M1** for $\frac{1}{2} \times 33 \times h = 528$ oe
8	16.5	**2**	**M1** for $\frac{55}{60}$ or speed × time (numerical)
9	1.32×10^{41}	**2**	**M1** for 0.12×10^{41} or 12×10^{40} or **SC1** for figs 132
10	20.75 final answer cao	**2**	**B1** for one of 5.15, 6.25 or 9.35 seen or **M1** for (5.2 – 0.05) + (6.3 – 0.05) + (9.4 – 0.05)
11	$48.\dot{4}\dot{8} \quad -0.\dot{4}\dot{8}$ oe	**M1**	**SC1** for $\frac{48}{99}$ or $\frac{16}{33}$ or equivalent fraction with no/insufficient working
	$\frac{48}{99}$ or $\frac{16}{33}$ or equivalent fraction	**A1**	
12	$15 + 2n - n^2$ final answer	**2**	**M1** for three terms of $15 + 5n - 3n - n^2$ correct

Question	Answer	Marks	Partial marks
13(a)	$3\frac{2}{3}$ cao	**1**	
13(b)	$\frac{3}{12}$[and $\frac{5}{12}$] oe	**M1**	For correct method to find common denominator e.g. $\frac{12}{48}$ and $\frac{20}{48}$
	$\frac{2}{3}$ cao	**A1**	
14	–1, 0, 1, 2, 3	**3**	**B2** for $-2 < n \leqslant 3$ or list with one error or omission or **M1** for $-5 + 1 < 2n$ or $2n \leqslant 5 + 1$ or a list with 3 correct and no more than 1 incorrect or if zero scored, **SC1** for 5, 3, 1, –1, –3
15	$\frac{y+x}{xy}$ final answer	**3**	**B1** for $y(x+1) - x(y-1)$ **B1** for common denominator xy or **SC2** for $\frac{y-x}{xy}$ final answer
16(a)	–1	**1**	
16(b)	$-6n + 29$ oe	**2**	**M1** for $-6n + k$ (any k) or $-kn + 29$ $(k \neq 0)$
17	60	**3**	**B2** for $x = 6$ or **M1** for $29x + x = 180$ oe and **M1** for $360 \div 6$ or $360 \div$ *their x* or $180(n - 2) =$ *their x* $\times 29n$
18	Correctly eliminating one variable	**M1**	
	[$x =$] $\frac{2}{3}$ or 0.667 or 0.6666…	**A1**	
	[$y =$] $\frac{1}{3}$ or 0.333 or 0.333…	**A1**	If zero scored, **SC1** for 2 values satisfying one of the original equations or if no working shown but 2 correct answers given
19	[±] $\sqrt{y^2 - 1}$ final answer	**3**	**M1** for correct squaring **M1** for correct rearranging for x or x^2 term **M1** for correct square root
20	132	**3**	**M2** for $\frac{1}{2}(7 + 15) \times 12$ or **M1** for any correct area

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Question	Answer	Marks	Partial marks
21	$\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe simplified	**3**	**B2** for correct unsimplified vector for $\overrightarrow{OK}$ in terms of **a** and **b** or **M1** for a correct route for $\overrightarrow{OK}$ or $\overrightarrow{AB} = -\mathbf{a} + \mathbf{b}$ or $\overrightarrow{BA} = -\mathbf{b} + \mathbf{a}$ or recognition of $\overrightarrow{OK}$ as a position vector
22	[w =] 54 [x =] 126 [y =] 60	**3**	**B1** for [w =] 54 **B1** for [x =] 126 If **B0 B0** for first two B marks then **B1** for *their w* + *their x* = 180 **B1** for [y =] 60 or for *their w* + *their x* + *their y* = 240
23	[k =] 3 [c =] 9	**3**	**M1** for $\frac{30}{360} \times \pi \times 6^2$ **M1** for $\frac{1}{2} \times 6 \times 6 \times \sin 30$
24(a)	$\frac{5}{14}$ or 0.357 or 0.357…	**2**	**M1** for $7 - 2 = 11n + 3n$ oe or better
24(b)	18	**2**	**M1** for $p - 3 = 3 \times 5$ or $\frac{p}{5} = 3 + \frac{3}{5}$
25(a)	$(x-12)(x+11)$ final answer	**2**	**B1** for $(x + a)(x + b)$ where $ab = -132$ or $a + b = -1$
25(b)	$x(x+2)(x-2)$ final answer	**2**	**B1** for $x(x^2 - 4)$ or $(x + 2)(x^2 - 2x)$ or $(x - 2)(x^2 + 2x)$
26	21.8 or 21.80…	**4**	**M3** for $\tan = \frac{2}{\sqrt{3^2 + 4^2}}$ oe or **M1** for $\sqrt{3^2 + 4^2}$ or $\sqrt{3^2 + 4^2 + 2^2}$ and **M1** for recognising angle *QAC*

Question	Answer	Marks	Partial marks
27(a)	27	**1**	
27(b)	x^2 final answer	**1**	
27(c)	$\frac{y^2}{2}$ or $0.5y^2$ final answer	**2**	**M1** for $\left(\frac{y^6}{8}\right)^{\frac{1}{3}}$ or $\left(\frac{2}{y^2}\right)^{-1}$ or better or **SC1** for answer $\frac{y^2}{c}$ or $\frac{y^k}{2}$ or $\frac{2}{y^2}$

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