



MATHEMATICS

0580/22

Paper 2 (Extended)

October/November 2017

MARK SCHEME

Maximum Mark: 70

Published

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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
nfw	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 $\times$ 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	$48.\dot{4}\dot{8} \ -0.\dot{4}\dot{8} \ oe$	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 $-2 < n \leq 3$ or list with one error or omission or M1 for $-5 + 1 < 2n$ or $2n \leq 5 + 1$ 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 $360 \div \text{their } x$ or $180(n-2) = \text{their } x \times 29n$
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	$[\pm] \sqrt{y^2 - 1}$ 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

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 $\mathbf{a}$ and $\mathbf{b}$ 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 <i>their</i> $w + \text{their } x = 180$ B1 for $[y =] 60$ or for <i>their</i> $w + \text{their } x + \text{their } y = 240$
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 $\frac{2}{y^2}$