
MATHEMATICS (US)

0444/23

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.

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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	2 h 32 min	1	
2	3	1	
3	5	1	
4	kite	1	
5	$9(2x + 3y)$ final answer	1	
6	$\frac{2}{3}$ oe	1	
7	235	2	M1 for $180 + 55$ or diagram with a correct angle seen other than the 55° bearing or diagram with the angle to be worked out clearly indicated.
8	5.76×10^9	2	M1 for figs 576 or 0.36×10^9 or 54×10^8
9	$x \leq -1.2$ oe final answer	2	B1 for -1.2 oe or M1 for correct step to collect x 's and numbers
10	540	3	M2 for $6000 \times 30^2 \div 100^2$ oe M1 for 30^2 or 0.3^2 (implied by figs 540) or $\div 100^2$
11	150	3	M2 for $(12 - 2) \times 180 \div 12$ or $180 - 360 \div 12$ or M1 for $(12 - 2) \times 180$ or $360 \div 12$ soi 30
12	$[x =] 3$ $[y =] -2$	3	M1 for correctly eliminating one variable A1 for $x = 3$ A1 for $y = -2$ If zero scored, SC1 for two values satisfying one of the original equations

Question	Answer	Marks	Partial marks
13	$\frac{22}{7}$ or $\frac{5}{4}$	$2\frac{1}{7} - \frac{1}{4}$	B1 Allow $\frac{22k}{7k}$ or $\frac{5k}{4k}$. Correct step for dealing with mixed numbers
	$\frac{88}{28}$ or $\frac{35}{28}$	$2\frac{4}{28}$ or $\frac{7}{28}$	M1 Correct method to find common denominator e.g. $3\frac{4}{28}$ or $1\frac{7}{28}$
	$1\frac{25}{28}$	$1\frac{25}{28}$	A1
14	$(3x + 5)(x - 4) [= 0]$	M2	M1 for $(3x + b)(x + a)$ where $ab = -20$ or $3a + b = -7$
	4 and $-\frac{5}{3}$ oe	A1	If zero scored, SC1 for 2 correct answers from no working or other methods
15	$14 + 8\sqrt{5}$	3	B1 for $9 + 3\sqrt{5} + 3\sqrt{5} + 5$ oe B1 for $2\sqrt{5}$
16	8	3	M2 for $\frac{5 \times 0.8}{\sin 30}$ oe or M1 for $\frac{\sin 30}{5} = \frac{\sin A}{BC}$ oe
17	$\frac{12m}{p-4y}$ or $\frac{-12m}{4y-p}$ final answer	4	M1 for $12m + 4xy = xp$ or $3m = \frac{xp}{4} - xy$ M1 for $12m = xp - 4xy$ or $3m = x(\frac{p}{4} - y)$ M1 for $12m = x(p - 4y)$ or $\frac{3m}{\frac{p}{4} - y} = x$ M1 for $\frac{12m}{p-4y}$ To a maximum of 3 marks for an incorrect answer
18(a)	1, -4 and -9	1	
18(b)	Yes because 11 is an integer oe	3	B2 for $[n =] 11$ or M2 for $\sqrt{((608 - 3) \div 5)}$ or $5 \times 11^2 + 3 [= 608]$ or M1 for $5n^2 + 3 = 608$ oe
19	$[k =] 18$ $[c =] 144$	4	B3 for $k = 18$ B1 for $c = 144$ OR M3 for $12^2 + \frac{1}{2}\pi 6^2$ or M2 for $\frac{1}{2}\pi 6^2$ or M1 for radius = 6 or for 12^2

Question	Answer	Marks	Partial marks
20(a)(i)	$-\mathbf{a} + \mathbf{b}$ oe	1	
20(a)(ii)	$-\frac{1}{4}\mathbf{a} + \frac{1}{4}\mathbf{b}$	1	FT <i>their</i> (a)(i)
20(a)(iii)	$\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ oe	2	M1 for correct unsimplified answer or for a correct route
20(b)	$-\frac{1}{2}\mathbf{a} + \frac{3}{2}\mathbf{b}$ oe	2	M1 for correct unsimplified answer or for a correct route
21(a)	3.4	3	M1 for $2 + 5 + 4 + 2 + 1 + 3 + 2 + 7 + 6 + 2$ [34] M1 for <i>their</i> $34 \div 10$
21(b)	5	2	M1 for 5, 5 identified
21(c)	[Day] 10	1	
22(a)	19	1	
22(b)	138	3	M2 for $180 - (19 + 23)$ or M1 for angle $AEB = 23$ or angle $AEC = 42$
22(c)	90	2	M1 for angle $EBC = 71$ or angle $EAB = 90$
23(a)	125 or 216 or 343 or 512 or 729	1	
23(b)	97	1	
23(c)	$7\% < \frac{7}{10} < 0.71 < \sqrt{49}$	3	B2 for two of 0.07, 0.7, 7 soi or M1 for converting at least two values oe
23(d)	$\frac{4}{9}$	2	M1 for numerator 4 or denominator 9 or for final answer $\frac{9}{4}$