Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS (US) **0444/21**

Paper 2 (Extended) **May/June 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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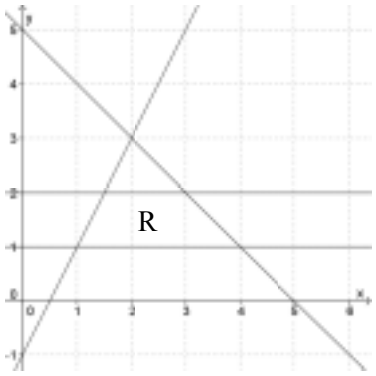
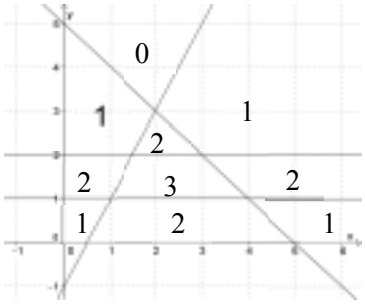
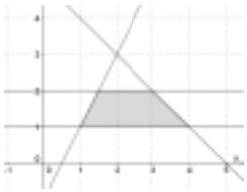
Abbreviations

cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

Question	Answer	Marks	Part marks
1	x^{10}	**1**	
2	4	**1**	
3(a)	23.46 cao	**1**	
3(b)	20 cao	**1**	
4(a)	Chicago	**1**	
4(b)	−3	**1**	
5	$4n(3n - m)$ final answer	**2**	**B1** for $4(3n^2 - mn)$ or $n(12n - 4m)$ or $2n(6n - 2m)$ or $2(6n^2 - 2mn)$
6(a)	−4	**1**	
6(b)	$\frac{1}{5}$ or 0.2	**1**	
7	$2\frac{8}{21}$ cao	**3**	**M2** for $\frac{50}{21}$ or $1\frac{8}{21}$ or $\frac{29}{21}$ or $1\frac{29}{21}$ or **M1** for $\frac{14k\,(\text{or}35k)}{21k} + \frac{15k}{21k}$
8	rt $(1 - t)\,r$ $(1 - r)t$ oe $(1 - r)(1 - t)$ oe	**3**	**B1** for each
9	1.5 oe	**3**	**M1** for $h = k\sqrt{p}$ oe **M1** for $h = \text{their } k\sqrt{p}$ or **M2** for $\frac{6}{\sqrt{4}} = \frac{h}{\sqrt{\frac{1}{4}}}$ oe

Question	Answer	Marks	Part marks
10	Correct region identified 	**3**	 **SC1** for 
11	60	**3**	**M2** for $75 \div \sqrt[3]{\frac{125}{64}}$ or $75 \times \sqrt[3]{\frac{64}{125}}$ or **M1** for $\sqrt[3]{\frac{125}{64}}$ soi or $\sqrt[3]{\frac{64}{125}}$ soi or $\left(\frac{h}{75}\right)^3 = \frac{64}{125}$ oe
12	$k-3$ or $-3+k$	**3**	**M1** for $5 = \frac{23-8}{k-x}$ oe **M1** for $5(k-x) = 23-8$ or better e.g. $[x =]k - \frac{23-8}{5}$
13	3.75 or $3\frac{3}{4}$ or $\frac{15}{4}$	**3**	**M2** for $5 \times \frac{3}{4}$ or **M1** for $\frac{4}{3} = \frac{5}{BC}$ oe
14	165	**3**	**M2** for $\frac{360}{8} + \frac{360}{3}$ oe or **M1** for [exterior angle of octagon =] $\frac{360}{8}$ or [exterior angle of triangle =] $\frac{360}{3}$ oe
15(a)	$7\sqrt{5}$	**2**	**B1** for $2\sqrt{5}$ or $5\sqrt{5}$
15(b)	$14 + 4\sqrt{6}$ oe final answer	**2**	**B1** for 3 correct from $\left(\sqrt{2}\right)^2 + \sqrt{2} \times 2\sqrt{3} + \sqrt{2} \times 2\sqrt{3} + \left(2\sqrt{3}\right)^2$ or better

Question	Answer	Marks	Part marks
16(a)	Points plotted at (4.5, 33) and (6.5, 35)	**1**	
16(b)	Positive	**1**	
16(c)	Correct ruled line	**1**	
16(d)	33.5 to 37.5	**1FT**	**FT** from *their* line provided positive gradient
17(a)	[amplitude =] $\frac{1}{2}$ [period =] 1080	**2**	**B1** for each or **SC1** for answers reversed
17(b)	[u =] -3 [v =] 5	**2**	**M1** for $(x-2)^2+(x-2)+3$ or better If zero scored, **SC1** for $u = 5$ and $v = 9$
18(a)	$2\mathbf{a} + \mathbf{b}$	**1**	
18(b)	D	**1**	
18(c)	$\overrightarrow{CF}$ and $\overrightarrow{BG}$	**2**	**B1** for each
19	[p =] $\frac{100}{3}$ oe [q =] -50	**4**	**M3** for $2\times\left\{\left(\frac{60}{360}\times\pi\times10^2\right)-\left(\frac{1}{2}\times10^2\times\sin 60\right)\right\}$ or **M2** for $\left[\frac{1}{2}\times\right]10^2\times\sin 60$ and $\left[2\times\right]\frac{60}{360}\times\pi\times10^2$ or **M1** for $\left[\frac{1}{2}\times\right]10^2\times\sin 60$ or $\left[2\times\right]\frac{60}{360}\times\pi\times10^2$ or $\sin 60=\frac{\sqrt{3}}{2}$
20(a)	5 7 7 8 10 7 9 9 10 12	**1**	
20(b)	7	**1**	
20(c)(i)	$\frac{7}{25}$ or 0.28 or 28%	**2FT**	**FT** $\frac{\textit{their}\,7}{25}$ **B1** for $\frac{k}{25}$ If zero scored, **SC1** for $\frac{2}{5}$ or $\frac{6}{15}$ if no values in the bottom two rows of the table
20(c)(ii)	0	**1FT**	**FT** $\frac{\textit{their}\,0}{25}$

Question	Answer	Marks	Part marks
21(a)	[u =] 35	**1**	
	[v =] 110	**2**	**B1** for ACB or ADB = 35
21(b)	75	**2**	**B1** for 150 or **M1** for $\frac{360-210}{2}$
22(a)	$\frac{x}{x+3}$ final answer	**3**	**B1** for $x(x-3)$ **B1** for $(x-3)(x+3)$
22(b)	$\frac{8x+7}{(x-4)(2x+5)}$ final answer	**3**	**B1** for common denominator of $(x-4)(2x+5)$ **M1** for $3(2x+5)+2(x-4)$ oe with an attempt to expand the brackets