Cambridge Assessment International Education
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MATHEMATICS **0626/04**

Paper 4 **October/November 2017**

MARK SCHEME

Maximum Mark: 84

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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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

M Method marks, awarded for a valid method applied to the problem.

A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation '**dep**' is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	4	**2**	**M1** for $\frac{11-3}{2-0}$ oe soi
1(b)	[y =] $4x + 3$ oe	**1**	**FT** from *their* gradient
2	35, 70, 75	**4**	**M1** for sum of angles in a triangle = 180 soi or for 3 angles that fit two of the conditions **M1** for $2x$ and $x + 40$ oe **M1** for $x + 2x + x + 40 = 180$ soi
3	Correct angle bisector with correct arcs shown	**2**	**B1** for angle bisector or correct arcs
4(a)	7	**1**	
4(b)	3, 7, 31 (with no extras)	**2**	**B1** for two correct (with no extras) or for answer [n =] 2, 3, 5 only or **M1** for 3, 7, 15, 31 seen
4(c)	Valid reason	**1**	e.g. Because 63 is divisible by 3 or 7 or 9 or 21 e.g. because 63 has more than 2 factors
5(a)	$\frac{2}{5}, \frac{4}{7}, \frac{3}{7}, \frac{4}{7}, \frac{3}{7}$ correctly placed	**2**	**B1** for $\frac{2}{5}$ or $\frac{3}{7}$ on a 'does not stop' branch
5(b)	$\frac{6}{35}$ oe	**2**	**M1** for *their* $\frac{2}{5} \times$ *their* $\frac{3}{7}$
6(a)	$(x+3)(x-6)$	**2**	**M1** for $x(x-6) + 3(x-6)$ or $x(x+3) - 6(x+3)$ or for $(x+a)(x+b)$ where $a + b = -3$ or $ab = -18$
6(b)	$x = -3$, $x = 6$	**1**	**FT** *their* factors
7	60	**4**	**M1** for time for A to B = 125 ÷ 50 soi **M1** for time for B to C = 4 – *their* 2.5 **M1** for 90 ÷ *their* 1.5
8	$x^2 + 7x - 4x - 28$	**M1**	Must have at least 3 terms correct or $x^2 + 3x - 28$, must have at least 2 terms correct
	$3x^2 - 3x$	**B1**	
	$x^2 + 7x - 4x - 28 + 3x^2 - 3x$ $= 4x^2 - 28 = 4(x^2 - 7)$	**A1**	

Question	Answer	Marks	Partial Marks
9(a)(i)	18	**1**	
9(a)(ii)	14	**2**	**B1** for 26 or 12 or **M1** for attempt at difference of quartiles
9(b)	15	**3**	**B2** for answer 85 OR **M1** for $[t < 30] = 102$ or $[t > 30] = 18$ seen **M1** for $\frac{120 - \textit{their } 102}{120}$ soi
10(a)	$3k^7$	**1**	
10(b)	$\frac{5}{2}$ oe	**2**	**M1** for $\frac{2}{5}$ seen or $\left(\frac{25}{4}\right)^{\frac{1}{2}}$
10(c)	$\frac{1}{3}$	**1**	
11	$12x^3$	**4**	**M1** for $2x \times 2x \times 2x$ **M1** for $\frac{1}{3} \times 2x \times 2x \times (5x - 2x)$ **M1** for *their* $8x^3$ − *their* $4x^3$
12	270	**3**	**B2** for $\left(\frac{9}{6}\right)^3$ or $\left(\frac{6}{9}\right)^3$ oe soi or **B1** for $\frac{9}{6}$ or $\frac{6}{9}$ oe soi
13	$\frac{26}{33}$	**3**	**M2** for $x = \frac{78}{99}$ or **M1** for $x = 0.\dot{7}\dot{8}$ and $100x = 78.\dot{7}\dot{8}$ soi
14(a)	5	**1**	
14(b)	36 700	**1**	
14(c)	6	**1**	
15(a)	$\begin{pmatrix} 12 & 9 \\ 18 & 21 \end{pmatrix}$	**1**	
15(b)	10	**1**	
15(c)	$\frac{1}{10}\begin{pmatrix} 7 & -3 \\ -6 & 4 \end{pmatrix}$ oe	**1**	**FT** from *their* determinant.

Question	Answer	Marks	Partial Marks
16	$(-1\frac{1}{2}, 1\frac{1}{2}), (2, 5)$	**5**	**M1** for $2x^2 - 3 = x + 3$ **M1** for $2x^2 - x - 6 = 0$ **M1** for $(2x+3)(x-2) = 0$ **A1 FT** from *their* factorised quadratic, for $x = -1\frac{1}{2}$ or 2 After A0, **SC1** for *their* x co-ordinates being +3 more than *their* y co-ordinates
17(a)	Total of flour in grams is $250x + 375y$	**M1**	
	$250x + 375 \leqslant 6000$ $\rightarrow 2x + 3y \leqslant 48$	**A1**	
17(b)	$x + y \leqslant 20$ oe $y \geqslant 3$ oe	**2**	**B1** for each or **SC1** for $x + y * 20$ **and** $y*3$ where * can be an equals or any inequality sign.
17(c)	Correct region clearly identified	**4**	**B3** for three correct boundaries $2x + 3y = 48$, $x + y = 20$, $y = 3$ or **B2** for two correct boundaries or **B1** for one correct boundary
17(d)	116	**2**	**M1** for $x = 12$ and $y = 8$ identified or for $5x + 7y$ for integer (x, y) in their region
18	$g = 3$ $h = -5$	**4**	**B3** for one correct OR **M1** for $2x^3 - 2gx^2 + x^2 - gx - 15x + 15g$ or $(x - g)(2x - 5)(x + 3)$ **M1** for $2x^3 + hx^2 - 18x - 9h$ or $(x - 3)(x + 3)(2x + h)$
19(a)	$2\mathbf{q} - 2\mathbf{p}$ oe	**3**	**M1** for $\overrightarrow{DA} = -2\mathbf{p}$ or $\overrightarrow{AX} = 2\mathbf{q}$ or $\overrightarrow{BX} = -\mathbf{q}$ **M1** for $\overrightarrow{DX} = \overrightarrow{DA} + \overrightarrow{AX}$ oe soi
19(b)	$\overrightarrow{DY} = 3\mathbf{q} - 3\mathbf{p}$ $[= 3(\mathbf{q} - \mathbf{p})]$ or $\overrightarrow{XY} = \mathbf{q} - \mathbf{p}$	**M1**	
	which is a multiple of $\overrightarrow{DX}$ **and** X is on DX and on DY oe	**A1**	

Question	Answer	Marks	Partial Marks
20	243 and 297	**3**	**B2** for one correct or **M1** for 180 + 63 or 360 – 63 oe or **M1** for sketch of sine curve for $0° \leqslant x \leqslant 360°$ seen
21	$\frac{2}{\sqrt{27}} = \frac{2}{3\sqrt{3}}$	**M1**	$\frac{2\sqrt{3}+\sqrt{27}}{\sqrt{27}\times\sqrt{3}}$
	$\frac{5}{3\sqrt{3}}$	**M1**	$\frac{2\sqrt{3}+\sqrt{27}}{\sqrt{81}}$ or numerator $2\sqrt{3}+\sqrt{27}$ or better
	$\frac{5}{3\sqrt{3}} = \frac{5\times\sqrt{3}}{3\sqrt{3}\times\sqrt{3}}$	**M1**	$\frac{2\sqrt{3}+3\sqrt{3}}{9}$
	$\frac{5\sqrt{3}}{9}$	**A1**	$\frac{5\sqrt{3}}{9}$