



MATHEMATICS

0580/21

Paper 2 (Extended)

October/November 2018

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.

Cambridge International will not enter into discussions about these mark schemes.

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Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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	8[h] 55[min]	1	
2	Congruent	1	
3	Negative	1	
4	7.36×10^7	2	B1 for figs 736
5	$6x^2 + 13x - 63$ final answer	2	M1 for 3 correct terms of $6x^2 - 14x + 27x - 63$
6	[0]47	2	B1 for 133 or 47 seen or M1 for $227 - 180$ oe
7	$\frac{4}{x^3}$ oe final answer	2	M1 for $y = \frac{k}{x^3}$ oe
8	121 nfw	2	M1 for $(6000 + 50) \div 50$ or B1 for 6050 seen
9	896	3	M2 for $800 + \frac{800 \times 4 \times 3}{100}$ oe or M1 for $\frac{800 \times 4 \times 3}{100}$ oe
10	900	3	M2 for $\frac{150 \times 100 \times 60}{1000}$ oe or M1 for $150 \times 100 \times 60$ or $1.5[\times 1] \times 0.6$ or B1 for figs 9
11(a)	23	1	
11(b)	$3n + 5$ oe	2	B1 for $3n + j$ or $kn + 5$, $k \neq 0$
12	4, 5, 6	3	B2 for 1 error or 1 omission or M2 for $3.75 \leq n < 7$ oe or M1 for $3.75 \leq n$ or $n < 7$ or better

Question	Answer	Marks	Partial Marks
13(a)	Correct angle bisector at B with two pairs of correct arcs reaching AC	2	B1 for accurate with no/wrong arcs or for two pairs of correct arcs with no or wrong line or short line
13(b)	Correct region shaded	1	
14	$\frac{3}{8} \times \frac{4}{9}$ oe or $\frac{3}{8} \div \frac{18}{8}$ oe with common denominator	M2	B1 for $\frac{9}{4}$ oe seen or M1 for $\frac{3}{8} \times$ <i>their</i> $\frac{4}{9}$
	$\frac{1}{6}$ cao	A1	
15	$\frac{x^2 - 3x + 8}{3(x+2)}$ or $\frac{x^2 - 3x + 8}{3x+6}$ final answer	3	B1 for common denominator $3(x+2)$ M1 for $(x-5)(x+2) + 3 \times 6$
16	$[x =] 62$	2	B1 for 56 identified as angle A or M1 for $\frac{(180-56)}{2}$
	$[y =] 118$	2	FT for 2 marks <i>their</i> acute $x +$ <i>their</i> $y = 180$ or $56 +$ <i>their</i> acute $x =$ <i>their</i> y or B1 for any of ACB, BCM or $LCN = 62$ or <i>their</i> acute x or M1 for $180 - 62$ or $180 -$ <i>their</i> acute x or $56 + 62$ or $56 +$ <i>their</i> acute x
17(a)	8	1	
17(b)(i)	$\frac{x^2}{16}$ final answer	1	
17(b)(ii)	$a^{-3}b^5$ or $\frac{b^5}{a^3}$ final answer	2	B1 for $a^{-3}b^k$ or $a^k b^5$
18	for correctly equating one set of coefficients	M1	
	for correct method to eliminate one variable	M1	
	$[x =] 6$ $[y =] -8$	A2	A1 for each If M0 scored, SC1 for 2 values satisfying one of the original equations or if no working shown, but 2 correct answers given

Question	Answer	Marks	Partial Marks
19	$\frac{-7 \pm \sqrt{(7)^2 - 4(3)(-11)}}{2 \times 3}$	B2	B1 for $\sqrt{(7)^2 - 4(3)(-11)}$ or better and B1 for $\frac{-7 + \sqrt{q}}{2(3)}$ or $\frac{-7 - \sqrt{q}}{2(3)}$
	-3.41 and 1.08 cao	B2	B1 for each If B0 , SC1 for -3.4 and 1.1 or -3.409 and 1.076 or -3.4089... and 1.0756.... or 3.41 and -1.08 or -3.41 and 1.08 seen in working
20(a)	$\begin{pmatrix} 26 & 2 \\ 19 & 8 \end{pmatrix}$	2	B1 for 2 or 3 correct elements
20(b)	$\frac{1}{10} \begin{pmatrix} 3 & -2 \\ -7 & 8 \end{pmatrix}$ oe isw	2	B1 for $k \begin{pmatrix} 3 & -2 \\ -7 & 8 \end{pmatrix}$ soi or det = 10 soi
21(a)(i)	20	1	
21(a)(ii)	14	1	FT part (i) providing $20 < \text{part (i)} \leq 40$
21(a)(iii)	280	1	
21(b)	$2[\times 20] = [20] \left(1 + \frac{r}{100}\right)^{14}$ oe isw	2	FT 2 marks for $2[\text{their (a)(i)}] = [\text{their (a)(i)}] \left(1 + \frac{r}{100}\right)^{\text{their(a)(ii)}}$ M1 for $n(x)^{14}$ or $n(x)^{\text{their(a)(ii)}}$ oe seen isw
22(a)	$\frac{94}{200}$ oe	2	M1 for $\frac{46}{200} + \frac{48}{200}$ oe
22(b)	14.1 or 14.07...	3	M2 for $2 \left(\frac{50}{200} \times \frac{56}{199}\right)$ oe or M1 for $\frac{50}{200} \times \frac{56}{199}$ oe
23(a)	27	2	M1 for 3^{3x} seen
23(b)	3	2	M1 for $7 + 3x = 2^4$
23(c)	$\frac{x-7}{3}$ oe final answer	2	M1 for $x = 7 + 3y$ or $y - 7 = 3x$ or $-3x = 7 - y$ or $\frac{y}{3} = \frac{7}{3} + x$