Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education (9–1)

MATHEMATICS **0626/06**

Paper 6 **October/November 2017**

MARK SCHEME

Maximum Mark: 96

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.

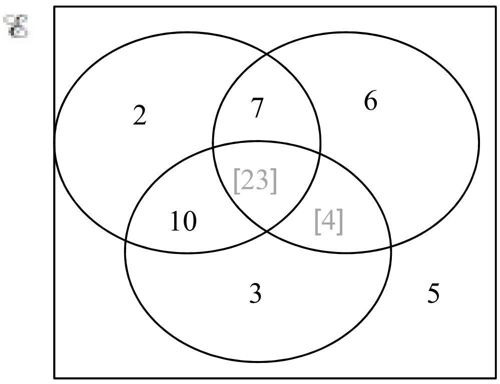
A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

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)	298	**2**	**M1** for diagram with 118 correctly marked together with the relative positions of Calais and Dover or 118 + 180 or 62 seen.
1(b)(i)	29 ml with three correct consistent values worked out.	**3**	**M2** for 3 correct consistent divisions soi or **M1** for one correct division
1(b)(ii)	30.22 or 30.21	**4**	**M1** for $\frac{1000}{1.358}$ or better **M1** for $1040 \times .679$ or better **M1** for a correct, or correct ft, difference in a consistent currency e.g. *their* $736 -$ *their* 706
1(c)(i)	204	**2**	**M1** for $\frac{340}{16-11}$
1(c)(ii)	9 : 1	**1**	
1(d)(i)	47 575 cao	**1**	
1(d)(ii)	4.76×10^4 cao	**1**	
2(a)(i)		**3**	**B2** for five numbers correct or for four numbers correct and a total of 60 or **B1** for three or four numbers correctly placed.
2(a)(ii)	44	**1**	**FT** 23 + 4 + *their* (7 + 10)
2(b)(i)	$A \cap B$ oe	**1**	
2(b)(ii)	$(A \cup B)'$ oe	**1**	
3(a)	$12x - 2$ or $2(6x - 1)$	**2**	**M1** for $2(4x-2)+2(2x+1)$ oe or $8x - 4$ or $4x + 2$ or **B1** for $12x + k$ or $kx - 2$

Question	Answer	Marks	Partial Marks
3(b)(i)	$(4x)^2 = (4x-2)^2 + (2x+1)^2$ oe	**M1**	
	$16x^2 - 8x - 8x + 4$ oe or $4x^2 + 2x + 2x + 1$ oe	**B1**	
	$16x^2 = 16x^2 - 16x + 4 + 4x^2 + 4x + 1$ leading to $4x^2 - 12x + 5 = 0$	**A1**	
3(b)(ii)	Correct working leading to answer of 10 only.	**4**	**M1** for $(2x+a)(2x+b)[=0]$ where $ab = 5$ or $a + b = -6$ or $(4x+c)(x+d)[=0]$ where $cd = 5$ or $c + 4d = -12$ **A1** for $(2x-1)(2x-5)[=0]$ **B1FT** for $x = their\,0.5$ and $x = their\,2.5$ dep on **M1** **B1** for 10 only
4(a)(i)	5529.6[0]	**2**	**M1** for $[6000\times](0.96)^2$ oe
4(a)(ii)	$6000\times(0.96)^k$	**1**	
4(b)	$3000\times(1.04)^k$	**1**	
4(c)(i)	$3000\times(1.04)^n = 6000\times(0.96)^n$	**M1**	**FT** *their* (a)(ii) provided of form $6000a^n$ $0 < a < 1$ and *their* (b)(i) provided of form $3000b^n$ $b > 1$
	$\dfrac{1.04^n}{0.96^n} = \dfrac{6000}{3000}$ leading to $\left(\dfrac{13}{12}\right)^n = 2$	**A1**	**A1** dep

Question	Answer	Marks	Partial Marks
4(c)(ii)	9	**2**	**M1** for $\left(\frac{13}{12}\right)^8 = 1.89[7\ldots]$ or $\left(\frac{13}{12}\right)^9 = 2.05[5\ldots]$ or for at least 2 other trials correctly evaluated. If zero scored **SC1** for answer of 8 or '8 to 9'
4(d)	Exponentially decreasing graph drawn from 6000	**2**	**M1** for exponentially decreasing graph from y-axis or for decreasing graph starting from 6000
5(a)(i)	Clear evidence with geometric reasons that $\angle BAE = \angle CDE$, $\angle ABE = \angle DCE$ and $\angle BEA = \angle CED$ therefore 3 equal angles, hence similar.	**3**	**M2** for two of: $\angle BAE = \angle CDE$, angles in same segment are equal. $\angle ABE = \angle DCE$ angles in same segment are equal $\angle BEA = \angle CED$ vertically opposite or **M1** for one of the above. or for 3 pairs of angles and no, or incorrect, reasons. **A1** for three of the above or two of the above and for clear statement that therefore that 3rd pair is equal **and** hence that ΔABE and ΔDCE have **3 equal angles and are therefore similar.**
5(a)(ii)	8	**2**	**M1** for $\frac{12}{7.2}$ oe or $\frac{4.8}{7.2}$ oe or $\frac{CE}{4.8} = \frac{12}{7.2}$ oe
5(b)	63 with at least 2 geometric reasons.	**4**	**B1** for ΔEFG is isosceles triangle or equal tangents $EF = EG$ **B1** for $\angle FGE$ (or $\angle GFE$) = 56 **B1** $\angle FHG = \angle EFG$ (or $\angle EGF$) alternate segment theorem **B1** for 63

Question	Answer	Marks	Partial Marks
6(a)(i)	130	**5**	**B1** for at least 3 correct midpoints seen 25, 35, 50, 70 **B1** for 50×61.2 or 3060 seen **M1FT** for $25 \times 5 + 35 \times 7 + 50 \times 16 + 70 \times 12 +$ 'x' $\times 10 = 50 \times 61.2$ **A1** 'x' = 105
6(a)(ii)	3 correct bars drawn and frequency density axis correctly labelled	**4**	**FT** *their k* **M1FT** for at least 3 correct frequency densities soi 0.5, 0.7, 0.8, 0.6, *their* 0.2 **A1** for a correct bar drawn. **A1** for 3 bars correct. **B1** for vertical axis labelled 'frequency density' and correct scale plotted.
6(b)	$\frac{5}{18}$ oe	**6**	**M1** for $\frac{4}{n}$ and $\frac{3}{n-1}$ or $\frac{4}{n}$ and $\frac{3}{n}$ seen **M1FT** dep for $\frac{4}{n} \times \frac{3}{n-1}$ or $\frac{4}{n} \times \frac{3}{n}$ **A1** for $\frac{4}{n} \times \frac{3}{n-1} = \frac{1}{6}$ oe or $n(n-1) = 72$ **A1** for $n = 9$ **M1FT** for $\frac{(their\,n)-4}{their\,n} \times \frac{(their\,n)-5}{(their\,n)-1}$,
7(a)	$\sqrt{40}$ or $2\sqrt{10}$	**2**	**M1** for $6^2 + 2^2$
7(b)	$x^2 + y^2 = 40$	**2**	**FT** *their* $\sqrt{40}$ **B1** for $x^2 + y^2 = k$, where $k > 0$
7(c)	gradient $OP = \frac{2}{6}$ oe	**M1**	
	perpendicular gradient $= -3$	**M1**	Dependent on first **M1**
	$2 = -3 \times 6 + c$ and $c = 20$	**A1**	

Question	Answer	Marks	Partial Marks
7(d)	141 or 140.9 to 141.0…	**6**	**M1** for $\pi \times$ *their* $\left(\sqrt{40}\right)^2$ **B1** for 20 and $\frac{20}{3}$ oe seen **M1** for $k \times 20 \times \frac{20}{3}$ where k = 0.5, 1 or 2 **A1** for $\frac{800}{3}$ **M1** for *their* $\frac{800}{3}$ − *their* 40π
8(a)(i)	Enlargement [Scale factor] −2 Centre O oe	**3**	**B1** for each
8(a)(ii)	$\begin{pmatrix} -2 & 0 \\ 0 & -2 \end{pmatrix}$	**2**	**M1** for $\begin{pmatrix} -k & 0 \\ 0 & -k \end{pmatrix}$ or $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$
8(b)(i)	Reflection y-axis or $x = 0$	**2**	**B1** for each
8(b)(ii)	$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	**1**	
8(b)(iii)	Two reflections in y-axis are equivalent to the identity transformation. oe	**1**	
9(a)	$3x^2 - 12x + 9$	**2**	**M1** for one correct term
9(b)	−3	**2**	**M1** for $x = 2$ substituted into *their* $\frac{dy}{dx}$
9(c)(i)	(3,0) , (1,4)	**4**	**M1** for *their* $\left(3x^2 - 12x + 9\right) = 0$ **M1FTdep** for $[3](x+a)(x+b)[=0]$ where $ab = 3$ or $a + b = -4$ or for $(3x+c)(x+d)[=0]$ where $cd = 9$ or $c + 3d = -12$ or for correct use of quadratic formula, allow one error **A1** for $x = 3$ and $x = 1$ **A1** (3, 0) and (1, 4)

Question	Answer	Marks	Partial Marks
9(c)(ii)	(1,4) is a max correctly justified and $(3,0)$ is a min correctly justified	**3**	**M1FT** for $\frac{d^2y}{dx^2} = 6x - 12$ **A1** for $x = 1$, $\frac{d^2y}{dx^2} = -6 < 0$ max **A1** for $x = 3$, $\frac{d^2y}{dx^2} = 6 > 0$ min Alternative method **M1FT** for considering $\frac{dy}{dx}$ both sides of $x = 1$ or $x = 3$ **A1** for $x = 1$ is a max with valid points tested correctly **A1** for $x = 3$ is a min with valid points tested correctly