Cambridge Assessment International Education<br>Cambridge International General Certificate of Secondary Education (9-1)

MATHEMATICS
0626/02
Paper 2
October/November 2017
MARK SCHEME
Maximum Mark: 60

## 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 | 141 or 141.3 to 141.4 | 2 | M1 for $\pi \times 3^{2} \times 5$ soi |
| 2(a) | $x \leqslant 3$ final answer | 2 | M1 for $7 x \leqslant 9+2$ <br> M1 for $x \leqslant \frac{b}{a}$ after $a x \leqslant b$ seen max 1 mark if answer incorrect If 0 scored, SC1 for answer 3 or $x 3$ with any incorrect equality or inequality symbol or answer $7 \times 3-2 \leqslant 19$ |
| 2(b) |  | 1 | FT their inequality in (a) |
| 3 | 1.5 oe | 3 | M1 for $8-2 x=5$ or $56-14 x=35$ M1 for collecting their like terms M1 for $x=\frac{b}{a}$ after $a x=b$ seen max 2 marks if answer incorrect |
| 4 | Number (order) each student from 1 to 360 Choose every 18 th student | 2 | B1 for incomplete explanation or 18 seen If 0 scored, SC1 for details of how to select a random sample |
| 5 | 58.4 to 58.5 | 4 | M1 for $\pi \times 4.9^{2}[\div 2]$ <br> M1 for $2 \times 10.1 \times 15.2$ or $3 \times 10.1 \times 15.2$ <br> M1 for their shaded area $\div$ their total area |
| 6 | $14 x^{7} y^{4}$ final answer | 2 | B1 for $x^{7}$ or $y^{4}$ seen in answer |
| 7 | $c=\frac{S-3 d h}{d}$ final answer or $c=\frac{S}{d}-3 h$ final answer | 2 | M1 for $S-3 d h=c d$ or $\frac{S}{d}=c+3 h$ or for $\frac{S-3 d h}{d}$ or $\frac{S}{d}-3 h$ |
| 8 | Correct comparison of the correct values with 3.14159[...] $\frac{22}{7}-\pi=0.00126[\ldots] \text { or } 0.00127$ <br> and $\frac{7}{3}\left(1+\frac{\sqrt{3}}{5}\right)-\pi=0.00003[\ldots]$ | 3 | B2 for 0.00003 [...] and $0.00126[\ldots]$ oe seen or $\mathbf{B 1}$ for one of the values 0.00003 [...] or $0.00126[\ldots]$ oe or for $\frac{22}{7}=3.14285[\ldots]$ or 3.14286 and $\frac{7}{3}\left(1+\frac{\sqrt{3}}{5}\right)=3.14162[\ldots]$ seen |
| 9 | $\begin{aligned} & x=13 \\ & y=7 \\ & z=5 \end{aligned}$ | 3 | B2 for correct figures in wrong order or two correct answers or $5 \times 7 \times 13$ seen or $\mathbf{B 1}$ for 5, 7 or 13 seen on answer line or $x y z[=455]$ seen or M1 for attempt to divide 455 by an integer $n>2$ |


| Question | Answer | Marks | Partial Marks |
| :---: | :---: | :---: | :---: |
| 10 | 16500 | 3 | M2 for $14520 \div(1-0.12)$ or 165 (is $1 \%$ ) oe seen or B1 for 88 [\%] oe seen |
| 11 | 15.7 or 15.66 to 15.67 | 3 | M2 for $\pi \times 12 \times \frac{35}{360}+6+6$ oe or M1 for $\pi \times 12 \times \frac{35}{360}$ oe |
| 12(a) | Correct Box Plot | 2 | M1 for median and quartiles plotted correctly with an appropriate vertical line or box with 2 values correct |
| 12(b)(i) | 22000 | 1 |  |
| 12(b)(ii) | 24000 | 1 |  |
| 13(a) | $\frac{x+3}{4}$ final answer oe | 2 | M1 for $y+3=4 x$ or $\frac{y}{4}=x-\frac{3}{4}$ or $x=4 y-3$ If 0 scored, $\mathbf{S C 1}$ for $\frac{y+3}{4}$ |
| 13(b)(i) | Valid explanation | 1 | e.g. He has found $\operatorname{gf}(x)$ |
| 13(b)(ii) | $4 x^{2}-3$ | 1 |  |
| 14 | $y=-\frac{1}{2} x+7 \text { oe }$ | 3 | B1 for gradient $=-\frac{1}{2}$ oe <br> M1 for substituting $x=4$ and $y=5$ in their linear equation oe |
| 15(a) | 8.66 or $8.660[\ldots]$ | 4 | M3 for $\sqrt{5^{2}+5^{2}-2 \times 5 \times 5 \times \cos 120}$ or $\frac{5 \times \sin 120}{\sin 30}$ or M2 for $5^{2}+5^{2}-2 \times 5 \times 5 \times \cos 120$ or $\frac{B C}{\sin 120}=\frac{5}{\sin 30}$ oe or M1 for identifying angle $O B C=30$ or angle $B O C=120$ oe <br> Alternative Method <br> If $X$ is such that $O X$ is perpendicular to $B C$ <br> M3 for $2 \times 5 \cos 30$ or $2 \times 5 \sin 60$ <br> or M2 for $[B X]=5 \cos 30$ or $5 \sin 60$ <br> or M1 for identifying angle $O B C=30$ or angle $B O X=60$ oe |
| 15(b) | 32.5 or 32.47 to 32.48 | 2 | M1 for $0.5 \times$ their $B C \times$ their $B C \times \sin 60$ or $0.5 \times 5 \times 5 \times \sin 120 \times 3$ or $0.5 \times$ their $B C \times(5+5 \sin 30)$ or $0.5 \times$ their $B C \times 2.5 \times 3$ |


| Question | Answer | Marks | Partial Marks |
| :---: | :---: | :---: | :---: |
| 16(a) | Correct completion to $x=5-\frac{x}{3}$ (Answer Given) | 2 | M1 for correct first step $x^{2}=5 x-3 \text { or } \frac{x^{2}-5 x+3}{x}=0 \mathrm{oe}$ |
| 16(b) | Iteration leading to 4.30 | 3 | B1 for $x_{2}=4.25$ <br> M1 for $x_{3}=4.294[\ldots]$ and $x_{4}=4.301[\ldots]$ using their $x_{2}$ and $x_{3}$ |
| 17(a) | $\begin{aligned} & x^{2}-4 x+4+3 \\ & \text { or } \\ & (x-2)^{2}-4+7 \end{aligned}$ | 1 | Answer Given |
| 17(b) | Valid Explanation | 1 | e.g. As $(x-2)^{2} \geqslant 0,(x-2)^{2}+3>0$ so $(x-2)^{2}+3$ cannot equal 0 . oe e.g. $b^{2}-4 a c=16-28=-12<0$ |
| 17(c) | $(2,3)$ | 1 |  |
| 17(d) | Correct sketch of quadratic with minimum at $(2,3)$ indicated | 2 | FT from their (c), if $y$ co-ordinate $>0$ B1 for any symmetrical U-shaped quadratic |
| 18 | $\frac{2}{7}$ | 3 | M1 for $(1-p)^{3}=\frac{125}{343}$ soi M1 for $\left(\frac{125}{343}\right)^{\frac{1}{3}}$ soi |

