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This document consists of **6** printed pages.

## 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 | Part Marks |
|---|---|---|---|
| 1(a) | 0.15 oe | **2** | **M1** for $0.35 + 0.4 + k + 0.1 = 1$ or better or **B1** for 0.85 seen |
| 1(b) | 48 | **1** | |
| 2(a) | $m^3$ | **1** | |
| 2(b) | $y^{-8}$ | **1** | |
| 2(c) | $\dfrac{x^5 y^4}{7}$ | **2** | **M1** for 2 correct parts and both $x$ and $y$ present ie : $\dfrac{x^k y^4}{7}$ or $\dfrac{x^5 y^k}{7}$ or $kx^5 y^4$ $(k \neq 0)$ |
| 3 | Any irrational number between 6 and 7 | **1** | |
| 4 | 8.553 | **2** | **M1** for 8.55[…] <br><br> If 0 scored, **SC1** for *their* answer seen and rounded correctly to 3dp |
| 5(a) | 13.15, 13.25 | **2** | **B1** for each <br><br> or **SC1** for both answers correct but reversed. |
| 5(b) | $2\pi \times 2.1$ | **M1** | |
| | 13.19… | **A1** | |
| | *their* 13.19 > 13.15 oe | **B1** | Showing *their* circumference > 13.15 |
| 6(a) | 16.8 | **4** | **M1** for $8.4 \times 150\,000$ soi <br><br> and **M1** for division by $10^5$ oe soi <br><br> and **M1** for $\dfrac{their\ distance}{45} \times [60]$ oe |
| 6(b) | A valid comment | **1** | **FT** from *their* final speed answer in part (a) |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 7 | 1936 and 81 or $44^2$ and $9^2$ | 2 | **M1** for 2 correct trials evaluated of form: $a^2 + b^2$ where $a < 10$ and $b > 10$ and $a$ and $b$ are integers<br><br>or $2017 - a^2 = b^2$ where $a$ is a positive integer with $b^2$ being tested to see if it is square<br><br>If 0 scored, **SC1** for 44 and 9 seen as a pair |
| 8(a) | 95.4 or 95.39 to 95.40 | 3 | **M2** for $[LN =] \dfrac{85}{\cos 27}$ oe<br><br>or **M1** for $\cos 27 = \dfrac{85}{LN}$ oe |
| 8(b) | 38.6 or 38.58 to 38.59 | 3 | **M2** for $85 \times \sin 27$ oe<br><br>or **M1** for $\sin 27 = \dfrac{x}{85}$ oe<br>or **M1** for correct line indicated on a diagram |
| 9 | 40 | 3 | **M2** for $\dfrac{34}{1 - 0.15}$ oe<br>or **B1** for 85[%] oe seen |
| 10 | 16.5 | 3 | **M2** for $\sqrt[3]{\dfrac{2592}{1500}}$ or $\sqrt[3]{\dfrac{1500}{2592}}$ soi<br><br>or **M1** for $\dfrac{2592}{1500}$ or $\dfrac{1500}{2592}$ oe |
| 11 | 9 nfww | 2 | **M1** for $\dfrac{54}{308}$ oe |
| 12(a) | 3.2 | 3 | **M2** for $w = \dfrac{400}{t^3}$ oe or $50 \times 2^3 = w \times 5^3$<br><br>or **M1** for $w = \dfrac{k}{t^3}$ oe or $50 \times 2^3$ seen |
| 12(b) | 10 | 1 | |
| 13(a) | Complete correct graph drawn | 1 | |
| 13(b) | $x = 0$<br>$y = 0$ | 2 | **B1** for each |

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 14(a) | 37 | 2 | **M1** for $3(3\times5-2)-2$<br>or $3(3x-2)-2$<br>or f(5)=13<br>or f(13) |
| 14(b) | $\dfrac{x+2}{3}$ final answer | 2 | **M1** for $[x=]\dfrac{y+2}{3}$ or $y+2=3x$ or<br>$\dfrac{y}{3}=x-\dfrac{2}{3}$ or $x=3y-2$<br><br>If 0 scored, **SC1** for transposing $x$ and $y$ in *their* equation for $x$ in terms of $y$ |
| 14(c) | $x$    final answer | 1 | |
| 15 | $[y=]3x$ | 1 | |
| 16 | 22.8 or 22.79 to 22.80 | 3 | **M1** for $\dfrac{1}{2}x^2\sin60=25$ or better<br><br>or $\dfrac{1}{2}x\times\sqrt{x^2-\left(\dfrac{x}{2}\right)^2}=25$<br><br>**M1** for $x=\sqrt{\dfrac{25\times2}{\sin60}}$ or $x=\sqrt{\dfrac{25\times4}{\sqrt{3}}}$ |
| 17 | $-\dfrac{1}{2}\mathbf{a}+\dfrac{1}{6}\mathbf{b}+\dfrac{1}{3}\mathbf{c}$ or $\dfrac{(-3\mathbf{a}+\mathbf{b}+2\mathbf{c})}{6}$ | 4 | **M1** for $\overrightarrow{AB}=-\mathbf{a}+\mathbf{b}$ or $\overrightarrow{BC}=-\mathbf{b}+\mathbf{c}$<br>or $\overrightarrow{MN}=\overrightarrow{MB}+\overrightarrow{BN}$<br>or any other correct vector expression for $\overrightarrow{MN}$<br><br>**M1FT** for $\overrightarrow{MB}=\dfrac{1}{2}their(-\mathbf{a}+\mathbf{b})$<br>or $\overrightarrow{BN}=\dfrac{1}{3}their(-\mathbf{b}+\mathbf{c})$<br><br>**M1FT** for $\overrightarrow{MN}=\dfrac{1}{2}their(-\mathbf{a}+\mathbf{b})+$<br>$\dfrac{1}{3}their(-\mathbf{b}+\mathbf{c})$ |

         

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| 18 | $x = k \pm \sqrt{k^2 - kt}$ final answer | 4 | **M1** for $(2x - t)k = x^2$ or $2xk - tk = x^2$ or better <br><br> **M1** for $x^2 - 2kx + kt = 0$ <br> or $x^2 - 2kx = -kt$ <br><br> **M1FT** for $\dfrac{2k \pm \sqrt{4k^2 - 4kt}}{2}$ <br> or $(x - k)^2 - k^2 = -kt$ |

        