<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>15(a)(i)</td><td>States $T = 0.16$ s (1)

Use of $\omega = 2\pi / T$ (1)

$\omega = 39$ (radian s^{-1}) (1)

<u>Example of calculation</u>
$T = 0.16$ s
$\omega = 2\pi / 0.16$ s
$\omega = 39.3$ radian s^{-1}</td><td>3</td></tr>
<tr><td>15(a)(ii)</td><td>Maximum force read from graph ($F = 0.63$ N) (accept 0.62 N to 0.64 N) (1)

Use of $F = m \omega^2 r$ (1)

$r = 0.044$ (m) (e.c.f from (a)(i)) (1)

86 mm is 2×0.043 m, so 0.086 m was the diameter in mm (1)

<u>Example of calculation</u>
$0.63 \text{ N} = 0.0095 \text{ g} \times (39 \text{ radian s}^{-1})^2 \times r$
$r = 0.044$ m (Show that value gives 0.041)</td><td>4</td></tr>
<tr><td>15(b)*</td><td>This question assesses a student's ability to show a coherent and logically structured answer with linkages and fully-sustained reasoning.

Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning.

The following table shows how the marks should be awarded for indicative content.
<table>
<tr><th>Number of indicative marking points seen in answer</th><th>Number of marks awarded for indicative marking points</th><th>Max linkage mark available</th><th>Max final mark</th></tr>
<tr><td>6</td><td>4</td><td>2</td><td>6</td></tr>
<tr><td>5</td><td>3</td><td>2</td><td>5</td></tr>
<tr><td>4</td><td>3</td><td>1</td><td>4</td></tr>
<tr><td>3</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>2</td><td>2</td><td>0</td><td>2</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>1</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td></tr>
</table>
The following table shows how the marks should be awarded for structure and lines of reasoning.
<table>
<tr><th></th><th>Number of marks awarded for structure of answer and sustained line of reasoning</th></tr>
<tr><td>Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout</td><td>2</td></tr>
<tr><td>Answer is partially structured with some linkages and lines of reasoning</td><td>1</td></tr>
<tr><td>Answer has no linkages between points and is unstructured</td><td>0</td></tr>
</table>
Guidance on how the mark scheme should be applied: The mark for indicative content should be added to the mark for lines of reasoning. For example, an answer with five indicative marking points which is partially structured with some linkages and lines of reasoning scores 4 marks (3 marks for indicative content and 1 mark for partial structure and some linkages and lines of reasoning). If there are no linkages between points, the same five indicative marking points would yield an overall score of 3 marks (3 marks for indicative content and no marks for linkages).</td><td></td></tr>
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	Indicative content: IC1: Magnitude of centripetal force is constant since speed is constant IC2: Centripetal force on car at bottom is normal contact force minus weight ($F = N - W$ **or** $N = F + W$) IC3: When car is at bottom force is maximum IC4: Centripetal force on car at top is normal contact force plus weight ($F = N + W$ **or** $N = F - W$) IC5: When car is at top force is minimum IC6: At 0.04 s it is at the bottom and at 0.12 s it's at the top	**6**
	Total for question 15	**13**