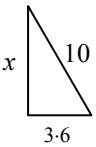


|   | Give one mark for each ●  | Illustrations for awarding each mark   |
|---|---|--|
| 1 | <b>ans : <math>3.67 \times 10^7</math> m or <math>3.67 \times 10^4</math> km</b> <b>3KU</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> knowing to multiply</li> <li>●<sup>2</sup> multiplying correctly</li> <li>●<sup>3</sup> answer in correct form (to 3 sig. fig)</li> </ul> | <ul style="list-style-type: none"> <li>●<sup>1</sup> <math>1.02 \times 10^4 \times 60 \times 60</math></li> <li>●<sup>2</sup> 36720000</li> <li>●<sup>3</sup> answer</li> </ul>  |
| 2 | <b>ans : £157809.62</b> <b>4RE</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> calculate rate of increase</li> <li>●<sup>2</sup> correct no. of increments</li> <li>●<sup>3</sup> repeated increase calculation</li> <li>●<sup>4</sup> correct answer</li> </ul>                  | <ul style="list-style-type: none"> <li>●<sup>1</sup> <math>\frac{7500}{125000} \times 100\% = 6\%</math></li> <li>●<sup>2</sup> M.F. = 1.06</li> <li>●<sup>3</sup> <math>£132500 \times 1.06^3</math></li> <li>●<sup>4</sup> answer</li> </ul>                               |
| 3 | <b>ans : <math>\frac{3}{5}</math></b> <b>2KU</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> identify non primes</li> <li>●<sup>2</sup> state probability</li> </ul>  | <ul style="list-style-type: none"> <li>●<sup>1</sup> not – 2, 3, 5, 7, 11, 13, 17, 19</li> <li>●<sup>2</sup> answer</li> </ul>   |
| 4 | <b>(a) ans: 39.3 seconds</b> <b>1KU</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> calculating mean</li> </ul>   | <ul style="list-style-type: none"> <li>●<sup>1</sup> <math>\bar{x} = \frac{314 \cdot 4}{8}</math></li> </ul>   |
| 4 | <b>(b) ans : 0.7 seconds</b> <b>3KU</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> knowing how to calculate sd</li> <li>●<sup>2</sup> correctly calculating sd</li> <li>●<sup>3</sup> rounding</li> </ul>  | <ul style="list-style-type: none"> <li>●<sup>1</sup> <math>\sum x = 314 \cdot 4</math>    <math>\sum x^2 = 12359 \cdot 70</math></li> <li>●<sup>2</sup> <math>sd = \sqrt{\frac{12359 \cdot 70 - \frac{314 \cdot 4^2}{8}}{7}}</math></li> <li>●<sup>3</sup> answer</li> </ul> |
| 4 | <b>(c) ans : B has faster mean but times are more spread out</b> <b>2RE</b><br><ul style="list-style-type: none"> <li>●<sup>1</sup> compare means</li> <li>●<sup>2</sup> interpret s.d. as the idea of spread</li> </ul>  | <ul style="list-style-type: none"> <li>●<sup>1</sup> mean is faster for B</li> <li>●<sup>2</sup> B's times more spread out</li> </ul>  |

|   | Give one mark for each •  | Illustrations for awarding each mark  |
|---|---|---|
| 5 | <b>ans: 0.6 &amp; -3.1</b> <b>4KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> identify <math>a, b, c</math></li> <li>•<sup>2</sup> substitute correctly into formula</li> <li>•<sup>3</sup> calculate one solution</li> <li>•<sup>4</sup> calculate second solution</li> </ul>   | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>a = 2, b = 5, c = -4</math></li> <li>•<sup>2</sup> <math>x = \frac{-5 \pm \sqrt{5^2 - 4 \times 2 \times (-4)}}{4}</math></li> <li>•<sup>3</sup> <math>x = 0.6</math></li> <li>•<sup>4</sup> <math>x = -3.1</math></li> </ul>   |
| 6 | <b>ans : 35.8cm</b> <b>5RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> knows to use cosine rule</li> <li>•<sup>2</sup> correct substitution</li> <li>•<sup>3</sup> calculate radius</li> <li>•<sup>4</sup> know how to calculate circumference</li> <li>•<sup>5</sup> correctly calculate circumference</li> </ul>         | <ul style="list-style-type: none"> <li>•<sup>1</sup> evidence</li> <li>•<sup>2</sup> <math>r^2 = 8 \cdot 6^2 + 8 \cdot 9^2 - 2 \times 8 \cdot 6 \times 8 \cdot 9 \times \cos 38^\circ</math></li> <li>•<sup>3</sup> <math>r = 5.7\text{cm}</math></li> <li>•<sup>4</sup> <math>C = \pi d = \pi (11.4)</math></li> <li>•<sup>5</sup> answer</li> </ul>   |
| 7 | <b>(a) ans: <math>a = 3, b = 2</math></b> <b>2KU</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> recognize max/min</li> <li>•<sup>2</sup> recognize period</li> </ul>  | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>a = 3</math></li> <li>•<sup>2</sup> <math>b = 2</math></li> </ul>  |
| 7 | <b>(b) ans: <math>20.9^\circ</math> &amp; <math>69.1^\circ</math></b> <b>4RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> forms a trigonometric equation</li> <li>•<sup>2</sup> rearrange to find <math>\sin 2x^\circ =</math></li> <li>•<sup>3</sup> identify quadrants</li> <li>•<sup>4</sup> calculate angles</li> </ul> | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3 \sin 2x^\circ = 2</math></li> <li>•<sup>2</sup> <math>\sin 2x^\circ = \frac{2}{3}</math></li> <li>•<sup>3</sup> <math>2x = 41.8^\circ</math> or <math>138.2^\circ</math></li> <li>•<sup>4</sup> answer</li> </ul>  |
| 8 | <b>ans : 14m</b> <b>5RE</b> <ul style="list-style-type: none"> <li>•<sup>1</sup> interpret information</li> <li>•<sup>2</sup> use suitable formula</li> <li>•<sup>3</sup> calculates bottom face diagonal</li> <li>•<sup>4</sup> calculates height to rope</li> <li>•<sup>5</sup> calculates height of pole</li> </ul>                  | <ul style="list-style-type: none"> <li>•<sup>1</sup> base rectangle <math>6\text{m} \times 4\text{m}</math></li> <li>•<sup>1</sup> <math>d = \sqrt{6^2 + 4^2} = 7.2</math></li> <li>•<sup>3</sup> </li> <li>•<sup>4</sup> <math>x = \sqrt{10^2 - 3.6^2} = 9.3</math></li> <li>•<sup>5</sup> <math>h = \frac{3}{2} \times 9.3</math></li> </ul> |

|    | Give 1 mark for each •   | Illustration(s) for awarding each mark   |
|----|--|--|
| 9  | <b>ans: 13m</b><br>5RE<br><ul style="list-style-type: none"> <li>•<sup>1</sup> identify R.A. triangle</li> <li>•<sup>2</sup> uses correct trig ratio</li> <li>•<sup>3</sup> calculates angle at centre</li> <li>•<sup>4</sup> know how to calculate arc</li> <li>•<sup>5</sup> correctly calculates arc</li> </ul> | <ul style="list-style-type: none"> <li>•<sup>1</sup> Triangle sides 6(hyp), 3,</li> <li>•<sup>2</sup> <math>\cos x^\circ = \frac{3}{6} \Rightarrow x = 60^\circ</math></li> <li>•<sup>3</sup> angle at centre = <math>120^\circ</math></li> <li>•<sup>4</sup> <math>\frac{120}{360} \times \pi \times 12</math></li> <li>•<sup>5</sup> answer</li> </ul> |
| 10 | <b>(a) ans: <math>V = 2x(3x - 1)(x + 1)</math></b><br>1KU  | <ul style="list-style-type: none"> <li>•<sup>1</sup> answer</li> </ul>   |
| 10 | <b>(b) ans: <math>V = 6x^3 + 4x^2 - 2x</math></b><br>3KU<br><ul style="list-style-type: none"> <li>•<sup>1</sup> multiply two factors correctly</li> <li>•<sup>2</sup> starts to multiply by third factor</li> <li>•<sup>3</sup> completes multiplication</li> </ul>   | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>2x(3x^2 + 2x - 1)</math></li> <li>•<sup>2</sup> <math>6x^3 + 4x^2 \dots\dots\dots</math></li> <li>•<sup>3</sup> <math>\dots\dots\dots - 2x</math></li> </ul>  |
| 10 | <b>(c) ans: <math>192\text{cm}^3</math></b><br>3RE<br><ul style="list-style-type: none"> <li>•<sup>1</sup> creates linear equation</li> <li>•<sup>2</sup> solves equation</li> <li>•<sup>3</sup> calculates volume</li> </ul>  | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>3x - 1 = 2(x + 1)</math></li> <li>•<sup>2</sup> <math>x = 3</math></li> <li>•<sup>3</sup> <math>V = 6(3)^3 + 4(3)^2 - 2(3)</math></li> </ul>  |
| 11 | <b>(a) ans: <math>F = \frac{3v^2}{5r}</math> or <math>F = \frac{0 \cdot 6v^2}{r}</math></b><br>3KU<br><ul style="list-style-type: none"> <li>•<sup>1</sup> interpret variation statement</li> <li>•<sup>2</sup> calculate constant of variation</li> <li>•<sup>3</sup> state formula</li> </ul>                    | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>F = \frac{kv^2}{r}</math></li> <li>•<sup>2</sup> <math>10 = \frac{k \times 5^2}{1 \cdot 5} \Rightarrow k = \frac{3}{5}</math></li> <li>•<sup>3</sup> answer</li> </ul>  |
| 11 | <b>(b) ans: 80N</b><br>2KU<br><ul style="list-style-type: none"> <li>•<sup>1</sup> substitute correct values</li> <li>•<sup>2</sup> evaluate formula</li> </ul>  | <ul style="list-style-type: none"> <li>•<sup>1</sup> <math>v = 10, r = 0.75</math> or <math>F = \frac{3(2v)^2}{5(\frac{R}{2})} = 8(\frac{3v^2}{5R})</math></li> <li>•<sup>2</sup> answer</li> </ul>  |

|         |    |    |    |    |
|---------|----|----|----|----|
| Total : | KU | 24 | RE | 28 |
|---------|----|----|----|----|

|                         |                 |           |           |           |           |
|-------------------------|-----------------|-----------|-----------|-----------|-----------|
| <b>For PI &amp; PII</b> | <b>Totals :</b> | <b>KU</b> | <b>45</b> | <b>RE</b> | <b>45</b> |
|-------------------------|-----------------|-----------|-----------|-----------|-----------|