Multiple Choice Section

Q1 A
Q2 B
Q3 B
Q4 B
Q5 B
Q6 C
Q7 B
Q8 B
Q9 C
Q10 D
Q11 D
Q12 A
Q13 B
Q14 E
Q15 C
Q16 E
Q17 A
Q18 C
Q19 E
Q20 B
Longer Written Answers

B1

(a) (i) \( \frac{128}{1.4} \) (1 mark) = 320 (1 mark) \( m/s^2 \) (1 mark)

(ii) Area under graph used/identified as distance (1 mark) \( \frac{1}{2} \times 28 \times 1.4 \) (1 mark) 19.6m (1 mark)

(iii) 0.06 s (1 mark)

(b) (i) \( F=ma \) (or any correctly rearranged version) (1 mark)

(ii) \( m=F/a \) quoted or used (1 mark) 1250 kg (1 mark)

B2

(a) Energy required to fracture specimen = Initial gravitational potential energy of mass – final gravitational potential energy of mass (1 mark)

(b) (i) states or uses \( GPE=mg \cdot h \) (1 mark) \( 60 \times 10 \times 0.5 = 300 \) (1 mark)

(ii) 300J (1 mark)

(iii) correctly rearranges \( \frac{1}{2}mv^2 \) to find \( v \) \( v^2=600/60 \) (1 mark) \( v=3.3m/s \) (1 mark)

(iv) energy lost to surroundings/air resistance/friction (1 mark)

(v) 300-70 = 130 J (1 mark)

(vi) energy can not be gained or lost only transferred (1 mark)
(a) Any eight points which must include the two marked *.
   • Put water in kettle
   • *Heat water (priority mark)
   • Boil water
   • Use measuring cylinder
   • Water into cup
   • Check no water left in measuring cylinder
   • Put thermometer in cup of water
   • Note (initial) temperature of water
   • Start stopwatch
   • Note temperature at a later time (or note temperature after a certain time)
   • Stir (before taking readings)
   • *Repeat for other cups (priority mark)
   • A valid conclusion comment

(b) Any two (1 mark each)
   • amount/volume of water (in cup) {accept mass/weight of water (in cup)}
   • initial/start temperature
   • external/room temperature
   • surface on which the cup stands (as it cools)
   • position of cup
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Extra Information</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 (a)</td>
<td>any two (1) + (1) each examples difficult to ensure different samples of sand are equally damp (1) whereas sand can easily be made dry (1) to make a fair comparison (1) damp and dry sand have different (crater forming) characteristics (1) there is no water on the Moon (1) so the sand/surface there is dry (1) wet sand (might) stick to ball boaring (1) alters its mass (1)</td>
<td>credit any appropriate suggestion credit any appropriate explanation/amplification</td>
<td>(4)</td>
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<tr>
<td>3 (b)</td>
<td>any two (1) each (otherwise) you would not know (exactly) what had caused the crater same starting condition(s) to be able to compare different experiments</td>
<td></td>
<td>(2)</td>
</tr>
<tr>
<td>3 (c)</td>
<td>any two (1) each to check his results to identify/remove anomalous results to get average results to arrive at reliable results</td>
<td>do not accept ‘to get accurate results’</td>
<td>(2)</td>
</tr>
<tr>
<td>3 (d)</td>
<td>14 (mm)</td>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>3 (e)</td>
<td>the greater the height (the ball dropped from) the greater the radius (of the crater) (1)</td>
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