MARKS: 100

NAME OF SCHOOL: .................................................................

This memorandum consists of 6 pages including this cover page

QUESTION 1

1.1. A ✓ ✓ (2)
1.2. A ✓ ✓ (2)
1.3. C ✓ ✓ (2)
1.4. C ✓ ✓ (2)
1.5. C ✓ ✓ (2) [10]

QUESTION 2

2.1. AN object moving /motion under the influence of weight/force of gravity only ✓ and there are no other forces such as friction. ✓ (2)
2.2. 12 m ✓ (2)
2.3.1.

<table>
<thead>
<tr>
<th>OPTION 1</th>
<th>OPTION 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upwards positive</td>
<td>Downwards positive</td>
</tr>
</tbody>
</table>
\[ v_f^2 = v_i^2 + 2a\Delta y \]
\[ 25^2 = v_f^2 + 2(-9.8)(-30) \]
\[ v_i = 6.08 \text{ m} \cdot \text{s}^{-1} \] (4)
\[ v_f^2 = v_i^2 + 2a\Delta y \]
\[ (-25)^2 = v_f^2 + 2(9.8)(30) \]
\[ v_i = 6.08 \text{ m} \cdot \text{s}^{-1} \]

\[ \text{OPTION 1} \]
Upwards is positive
\[ v_f = v_i + a\Delta t \]
\[ -25 = -6.08 + (-9.8)\Delta t \]
\[ \Delta t = 1.93 \text{ s} \] (3)

\[ \text{OPTION 3} \]
Upwards is positive
\[ \Delta y = v\Delta t^2 + \frac{1}{2} a t^2 \]
\[ -30 = -6.08 \Delta t + \frac{1}{2} (-9.8) t^2 \]
\[ \Delta t = 1.93 \text{ s} \]

\[ \text{OPTION 2} \]
Downwards is positive
\[ v_f = v_i + a\Delta t \]
\[ 25 = 6.08 + (9.8)\Delta t \]
\[ \Delta t = 1.93 \text{ s} \]

\[ \text{OPTION 4} \]
Downwards is positive
\[ \Delta y = v\Delta t^2 + \frac{1}{2} (-9.8) t^2 \]
\[ 30 = 6.08 \Delta t + \frac{1}{2} (9.8) t^2 \]
\[ \Delta t = 1.93 \text{ s} \]

\[ \text{2.3.3.} \]

\[ \text{OPTION 1} \]
Upwards positive
\[ v_f^2 = v_i^2 + 2a\Delta y \]
\[ 0 = v_f^2 + 2(-9.8)(12) \]
\[ v_i = 15.34 \text{ m} \cdot \text{s}^{-1} \]
\[ v_f = v_i + a\Delta t \]
\[ 0 = 15.34 + (-9.8)\Delta t \]
\[ \Delta t = 1.57 \text{ s} \]
Total time taken = (1,9 +1,57) =4,3 s (6)

\[ \text{OPTION 2} \]
Downwards positive
\[ v_f^2 = v_i^2 + 2a\Delta y \]
\[ 0 = v_f^2 + 2(9.8)(-12) \]
\[ v_i = 15.34 \text{ m} \cdot \text{s}^{-1} \]
\[ v_f = v_i + a\Delta t \]
\[ 0 = -15.34 + (9.8)\Delta t \]
\[ \Delta t = 1.57 \text{ s} \]
Total time taken = (1,9 +1,57) =4,3 s

\[ \text{2.4.} \]
Do **POSITIVE MARKING** from 2.3.1, 2.3.2 and 2.3.3

CONSIDER UPWARD AS POSITIVE

```
\begin{align*}
v_f & = v_i^2 + 2a\Delta y \\
25^2 & = v_f^2 + 2(-9.8)(-30) \checkmark \\
v_i & = 6.08 \text{ m} \cdot \text{s}^{-1} \checkmark \quad (4) \\
v_f & = v_i^2 + 2a\Delta y \\
(-25)^2 & = v_f^2 + 2(9.8)(30) \\
v_i & = 6.08 \text{ m} \cdot \text{s}^{-1}
\end{align*}
```
CONSIDER DOWNWARD POSITIVE

![Graph Image]

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graph starts at correct Initial velocity as shown</td>
<td>1</td>
</tr>
<tr>
<td>Time to reach the ground</td>
<td>1</td>
</tr>
<tr>
<td>Final velocity shown</td>
<td>1</td>
</tr>
<tr>
<td>Shape from ( t = 0 ) to ( t = 1,93s )</td>
<td>1</td>
</tr>
</tbody>
</table>

\[ (4) \]

**QUESTION 3**

3.1. The total linear momentum in an isolated system is conserved. ✓ ✓ (2)

3.2.1. \( P = mv \) ✓

\[
\begin{align*}
P &= (0,15)(40) \checkmark \\
&= 6 \text{ kgm} \cdot \text{s}^{-1} \checkmark \text{To the right} \checkmark
\end{align*}
\]

3.2.2. \( P = mv \)

\[
\begin{align*}
P &= (0,15)(-25) \checkmark \\
&= -3,75 \text{ kgm} \cdot \text{s}^{-1} \\
&= 3,75 \text{ kgm} \cdot \text{s}^{-1} \checkmark \text{To the left} \checkmark
\end{align*}
\]

3.2.3.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>( F_{net} \Delta t = \Delta P ) ✓</td>
<td>( F_{net} \Delta t = m(v_f - v_i) )</td>
</tr>
<tr>
<td>( F_{net}0.4 = -3,75 - 6 \checkmark</td>
<td>( F_{net}0.4 = 0,15((-25) - 40) )</td>
</tr>
<tr>
<td>( F_{net} = -24,38 \text{ N} )</td>
<td>( F_{net} = -24,38 \text{ N} )</td>
</tr>
<tr>
<td>( F_{net} = 24,38 \text{ N} \checkmark \text{To the left} \checkmark (3)</td>
<td>( F_{net} = 24,38 \text{ N} \checkmark \text{To the left}</td>
</tr>
</tbody>
</table>

3.3. For the same momentum change ✓, a decrease in the contact time will lead to an increase in the net force. ✓ (2)

3.4. Some energy is converted to sound energy ✓. Total kinetic energy is not
conserved, thus collision is inelastic. ✓

QUESTION 4

4.1. Higher

4.2. Alcohols have hydrogen bonds that are stronger than van der Waals forces of
the alkanes. ✓ The hydrogen bonds need more energy to be broken ✓; therefore
the alcohols have higher boiling points than the corresponding alkanes. ✓ (3)

4.3. Methanol ✓

4.4. Is the smallest molecule/lower molecular mass.
Boiling points corresponds with molecular mass of the molecule. ✓
The intermolecular forces increase in strength if the mass/chain of the molecule
increases thus the surface area is increased. ✓
The stronger the intermolecular forces the more energy is needed to break the
bonds. ✓ (3)

QUESTION 5

5.1. Propyl ethanoate ✓

5.2.1. Sulphuric acid ✓ / H₂SO₄

5.2.2. Ethanoic acid ✓

5.2.3. Propan -1- ol ✓ / Propanol

5.2.4. Alcohols are flammable and should not be left near open flame ✓

5.2.5. Dehydrating ✓

5.2.6. H₂O ✓

QUESTION 6

6.1.1.

6.1.2. 4 – chloro, 1 – fluoro – ✓ 3 - methylpentane ✓

6.1.3. propene ✓

6.1.4. CₙC₂n₋₂ ✓ ✓

6.1.5. Methanol ✓ and butanoic acid ✓

6.1.6. haloalkanes/ halogenoalkane ✓ ✓
6.1.7. Alcohol ✓ ✓ (2)
6.2.1. Dehydration/ Elimination ✓
   Catalyst H₂SO₄ / H₃PO₄ ✓ (2)
6.2.2. Dehydrohalogenation / elimination ✓
   [Use hot alcoholic KOH/NaOH] ✓
   Use strong base in alcohol and heat ✓ ✓ (2)
6.2.3. Addition/hydrogenation (2)
6.3.1. Small organic molecules that can be covalently bonded
to each other in a repeating pattern. ✓ ✓ / A repeating unit in
   a polymer. (2)
6.3.2. A chemical reaction in which monomer molecules join
to form a polymer. ✓ ✓ (2)
6.3.3. Polythene/polyethene/polyethylene ✓ ✓ (5)

[28]

QUESTION 7
7.1.1 Functional group. ✓ (1)
7.1.2 Number of carbon atoms. ✓ (1)
7.2. Melting point increases from A-C ✓ ✓ (2)
7.3. Compound A has weak Van der Waal’s ✓ forces whilst B and C have strong
   hydrogen bonds between their molecules ✓ hence less energy is needed to
   break bonds in A than in B and C. Compound B has one side of hydrogen
   bonding while C has two sites of hydrogen bonding thus C has stronger
   intermolecular forces than B.
   More energy needed to break bonds in C than in B. ✓ (3)
7.4.1. Bromine water ✓

7.4.2. (1) Add few drops of bromine water into each test tube ✓.

(2) Let the test tube stand on the test rack for few minutes. ✓

(3) Observing THE RATE AT WHICH THE COLOUR FADES in each of the test tubes. ✓