UNIT III: Uniform Acceleration - TEST v2

1. Consider the position vs time graph for objects A and B below.

   a. Draw qualitative motions maps for objects A and B.

      \[ A \]

      \[ B \]

   b. How does the motion of object A differ from that of object B?

   c. In the chart below, you will compare **qualitatively** objects A and B (use statements like \( A > B \), \( A < B \), or \( A = B \), etc.), then provide a brief explanation for your answer.

      \[
      \begin{array}{|c|c|}
      \hline
      \text{Comparison} & \text{How do you know?} \\
      \hline
      \text{Displacement at } t = 5s: & \text{} \\
      \text{Ave. velocity from } t = 0 \text{ s to } t = 5s: & \text{} \\
      \text{Instantaneous velocity at } t = 5s: & \text{} \\
      \hline
      \end{array}
      \]
2. Consider the velocity vs time graph for objects A and B below.

![Graph of velocity vs time for objects A and B]

a. Draw qualitative motion maps for objects A and B:

\[ A \quad \text{x (m)} \]

\[ B \quad \text{x (m)} \]

b. In the chart below, you will compare qualitatively objects A and B (use statements like A > B, A < B, or A = B, etc.), then provide a brief explanation for your answer.

<table>
<thead>
<tr>
<th>Comparison</th>
<th>How do you know?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ave. velocity from ( t = 0 )s to ( t = 5 )s:</td>
<td></td>
</tr>
<tr>
<td>Instantaneous velocity at ( t = 5 )s:</td>
<td></td>
</tr>
<tr>
<td>Acceleration at ( t = 5 )s:</td>
<td></td>
</tr>
</tbody>
</table>

3. From the given graph in each of the sets below, sketch the shape of the corresponding graphs.

![Graphs showing x vs t, y vs t, and a vs t]
4. Tommy’s red Corvette can go from rest to 25 m/s (=60mph) in 10. seconds. The car’s velocity changes at a constant rate.

a. Draw a motion map to represent the motion of the Corvette during the 10 s.

   ![Motion Map]

b. Construct a **quantitative** velocity vs time graph to represent the motion of the car.

   ![Quantitative Graph]

c. What is the acceleration of the car? Show work; use labels.

d. How far will the car travel in these 10. seconds?

e. How fast will the car be going 3.0 seconds after it starts?
5. The drawing below shows a moving object which has been photographed using a strobe flash. The object starts at rest and moves to the left. The dots show the location of the object each second.

![Graph showing position vs time](image)

a. Plot the position vs time for the object on the graph below. **Label the axes clearly!**

b. **Explain** how you could determine the instantaneous velocity at \( t = 5 \) s. (You may sketch on the graph above to aid your explanation.)

c. Using an appropriate mathematical expression, calculate the average acceleration from 0 to 5 seconds.

d. How fast is the object moving at \( t = 6.0 \) s? Explain how you obtained your answer.