What is Motion?

I. Frames of Reference

Whenever you describe something that is moving, you are comparing it with something that is assumed to be stationary, or not moving.

Frame of Reference:

II. Measuring Motion

1. Motion – a change in position in a certain amount of time

2. Speed

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} \qquad \text{Units} = \text{m/sec} \text{ or } \text{km/hr}$$

Speed –

Constant Speed –

A. Steps for solving Speed Problems

1. Identify the unknown

2. Write formula

3. Substitute the given numbers and units

4. Solve for the unknown

5. Show all work and circle the final answer and be sure to include the proper units

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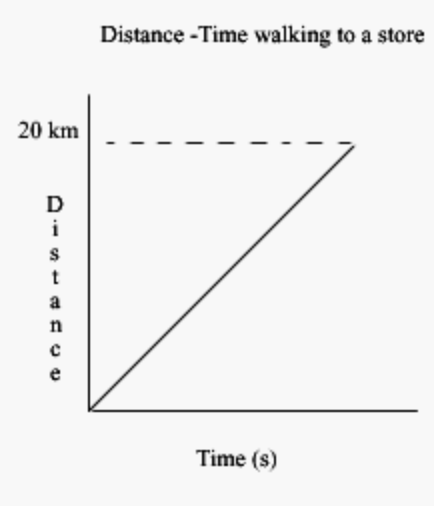
Solve the following problems using the above steps

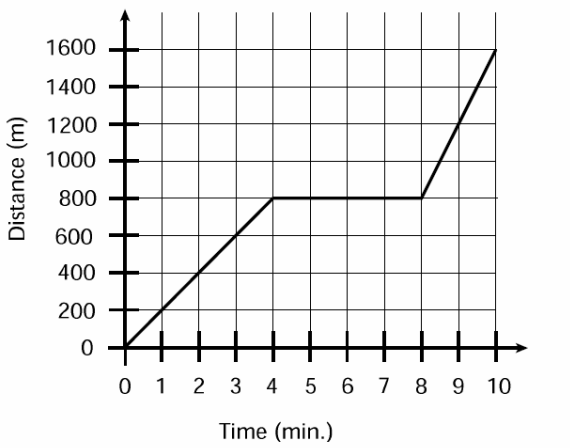
1. **At what speed did a plane fly if it traveled 1760 meters in 8 seconds?**

2. **A car travels 240 kilometers in 3 hours. What is the speed of the car during that time?**

3. **The speed of a cruise ship is 50 km/hr. How far will the ship travel in 14 hours?**

B. Compare the two graphs below





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Average Speed –

Velocity –

3. Changes in Velocity

The rate of change in velocity is known as acceleration

$$\text{Acceleration} = \frac{\text{Final Velocity} - \text{Original Velocity}}{\text{Time}}$$

Units = m/sec/sec or m/sec^2

Solve the following Acceleration problems

1. A roller coaster's velocity at the top of a hill is 10 meters/second. Two seconds later it reaches the bottom of the hill with a velocity of 26 meters/second. What is the acceleration of the roller coaster?

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2. A roller coaster is moving at 25 m/sec at the bottom of a hill. Three seconds later it reaches the top of the next hill, moving at 10 m/sec. What is the deceleration of the roller coaster?

3. A car is traveling at 60 km/hr. It accelerates to 85 km/hr in 5 seconds. What is the acceleration of the car?

4. Momentum

Momentum depends on the mass of the object and the velocity with which it is traveling.

Momentum = Mass x Velocity

Conservation of Momentum – the total momentum of any group of objects remains the same unless outside forces act on the objects.

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