Using the Kinematic Equations to Solve Problems – Part 1

Lesson Notes

The BIG 4:

$$d = v_o \cdot t + \tfrac{1}{2} \cdot a \cdot t^2$$

$$v_f^2 = v_o^2 + 2 \cdot a \cdot d$$

$$d = (v_o + v_f) / 2 \cdot t$$

$$v_f = v_o + a \cdot t$$

d: displacement
a: acceleration
t: time
v_o: original velocity
v_f: final velocity

Problem-Solving Strategy

1. Read the problem carefully. Identify the known values of three of the five variables. Write down the known values. Relate the values to the symbols; e.g., v_o = 15 m/s.
2. Identify the unknown variable. Write in symbol form.
3. Now you have four variable symbols - 3 with known values and one of unknown value. Find the kinematic equation that contains these four variables. Write the equation down.
4. Substitute known values into this equation.
5. Perform algebra and calculations to solve for the unknown variable.

Example 1

Starting from rest, a car accelerates at 6.52 m/s^2 for 3.80 s. Determine the distance traveled by the car during this time.

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer:

Example 2

A bobsled, moving at 32 m/s, decelerates to 22 m/s at a rate of 4.8 m/s^2. Determine the distance traveled by the bobsled during this time.

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer:

Example 3

Inna Hurry is traveling at 6.8 m/s, when she realizes she is late for an appointment. She accelerates at 4.5 m/s^2 for 3.2 s. What is her final velocity?

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer: