Using the Kinematic Equations to Solve Problems – Part 2

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

Lisa Ford accelerates from 12 m/s to 26 m/s at a rate of 4.2 m/s^2. Over what distance does this acceleration occur?

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer:

Example 2

Ed Foot is traveling at 38.2 m/s when he spots the state police. He decelerates at 8.6 m/s^2 for 2.1 s. What distance does he travel during this time?

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer:

Example 3

What is the acceleration of a car that brakes from 24.2 m/s to 11.9 m/s in 2.85 seconds?

Known Variables: _____

Unknown Variable: _____

Equation: _____

Solution and Answer: