

Answer on Question #62616, Physics / Mechanics

A bus moving with constant acceleration covers the distance between two stops 82m apart in 6.3 sec. It's speed as it passes the second stop is 15.4 m/sec.

- A. What is its speed as it passes by the first stop?
- B. What is its acceleration?
- C. How much farther will it go if it travels 1.6 sec. more?

Solution:

(a)

Let the initial velocity of the bus at first stop is v_1 m/s

The kinematic equation is

$$d = \frac{v_1 + v_2}{2} t$$

The symbol d stands for the displacement of the object. The symbol t stands for the time for which the object moved.

$$v_1 = \frac{2d - v_2 t}{t}$$

where $v_2 = 15.4$ m/s.

$$v_1 = \frac{2 \cdot 82 - 15.4 \cdot 6.3}{6.3} = 10.63 \text{ m/s}$$

(b)

The kinematic equation for acceleration is

$$a = \frac{v_2 - v_1}{t} = \frac{15.4 - 10.63}{6.3} = 0.757 \frac{\text{m}}{\text{s}^2} \approx 0.76 \text{ m/s}^2$$

(c) The kinematic equation is

$$d_2 = v_2 t_2 + \frac{a t_2^2}{2}$$

Thus,

$$d_2 = 15.4 \cdot 1.6 + 0.757 \cdot \frac{1.6^2}{2} = 25.6 \text{ m}$$

Answer: A. 10.63 m/s;
B. 0.76 m/s²;
C. 25.6 m

