

### Answer on Question #70524, Physics / Mechanics | Relativity

A truck traveling north at 18 m/s and a car 500 m north traveling south at 24 m/s applies breaks with an acceleration of  $3.5\text{ m/s}^2$ . Where will they meet

#### Solution:

Kinematic equation for truck:

$$d_1 = v_1 t$$

where  $v_1 = 18\text{ m/s}$ .

Kinematic equation for car:

$$d_2 = v_0 t + \frac{at^2}{2}$$

where  $v_0 = 24\text{ m/s}$ ,  $a = -3.5\text{ m/s}^2$ .

The car to travels distance

$$d_2 = \frac{v^2 - v_0^2}{2a} = \frac{0 - 24^2}{2 \times (-3.5)} = 83.8\text{ m}$$

The time to stop is

$$t_2 = \frac{v - v_0}{a} = \frac{0 - 24}{-3.5} = 6.86\text{ s}$$

For this time truck will travel only

$$d_1 = v_1 t_2 = 18 \times 6.86 = 123.4\text{ m}$$

So, truck will move to stopped car

$$d = 500 - d_2 = 500 - 83.8 = 416.2\text{ m}$$

**Answer:** The cars will meet at 416.2 m to north from trucks start point.

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