Complex Assessment Activity

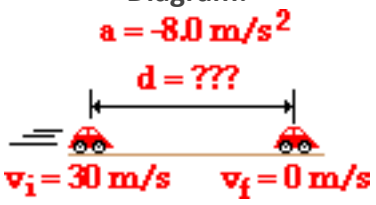
Create a multi-dimensional scoring rubric, each dimension having descriptors for four levels of performance (3 accomplished, 2 fair, 1 poor, 0 unacceptable). The rubric should be used to assess the performance of solving a typical, free-response word problem. Dimensions should include such things as correct answer; use of units; proper use of algebra; drawing, diagram, or graph; selection of appropriate equation, appropriate use of vector directions, etc. Consider the following problem as an example as you develop the rubric.

PROBLEM:

Imina Hurry is approaching a stoplight moving with a velocity of +30.0 m/s. The light turns yellow, and Imina applies the brakes and skids to a stop. If Imina's acceleration is -8.00 m/s^2, then determine the distance the car travels during the skidding process. Prepare v-t and d-t graphs. (Note that the direction of the velocity and the acceleration vectors are denoted by a + and a – sign.)

SOLUTION:

Diagram:



Given:

v_i = +30.0 m/s
v_f = 0 m/s

a = - 8.00 m/s^2

Find:

d = ??

The next step of the strategy involves identifying a kinematic equation that would allow you to determine the unknown quantity. There are four kinematic equations to choose from. In general, you will always choose the equation that contains the three known and the one unknown variable. In this specific case, the three known variables and the one unknown variable are v_f, v_i, a, and d. Thus, you will look for an equation that has these four variables listed in it. An inspection of the four traditional kinematics equations reveals that the following equation contains all four variables.

$$v_f^2 = v_i^2 + 2 \bullet a \bullet d$$

Once the equation is identified and written down, the next step of the strategy involves substituting known values into the equation and using proper algebraic steps to solve for the unknown information. This step is shown below. (It might be best to solve for the unknown before inserting values and units.)

$$(0\ m/s)^2 = (30.0\ m/s)^2 + 2 \bullet (-8.00\ m/s^2) \bullet d$$

$$0\ m^2/s^2 = 900\ m^2/s^2 + (-16.0\ m/s^2) \bullet d$$

$$(16.0\ m/s^2) \bullet d = 900\ m^2/s^2 - 0\ m^2/s^2$$

$$(16.0\ m/s^2)*d = 900\ m^2/s^2$$

$$d = (900\ m^2/s^2)/\ (16.0\ m/s^2)$$

$$\mathbf{d = 56.3\ m}$$

The solution above reveals that the car will skid a distance of 56.3 meters. (Note that this value is rounded to the third digit.)