Answer on Question #46151, Physics, Mechanics | Kinematics | Dynamics

An automobile starts from rest and accelerates to a final velocity in two stages along a straight road. Each stage occupies the same amount of time. In stage 1, the magnitude of the car's acceleration is 3.01 m/s2. The magnitude of the car's velocity at the end of stage 2 is 1.90 times greater than it is at the end of stage 1. Calculate the magnitude of the acceleration in stage 2.

Car's velocity at the end of stage 1:

$$v_{end1} = a_1 t$$

Car's velocity at the end of stage 2:

$$v_{end2} = a_2 t + v_{end1} = a_2 t + a_1 t = (a_2 + a_1)t$$

From the task we know that:

$$v_{end2} = 1.90 v_{end1}$$

From these equations we can find acceleration in stage 2:

$$(a_2 + a_1)t = 1.90 a_1 t$$
$$a_2 + a_1 = 1.90 a_1$$
$$a_2 = 1.90 a_1 - a_1 = 0.90 a_1$$
$$a_2 = 0.90 \cdot 3.01 \frac{m}{s^2} \approx 2.71 \frac{m}{s^2}$$

Answer: the magnitude of the acceleration in stage 2 is $a_2 \approx 2.71 \frac{m}{s^2}$