

1. The  $s-t$  graph of a train is shown in Figure 1. From the data, please construct the  $v-t$  and  $a-t$  graphs for motion. (30%)

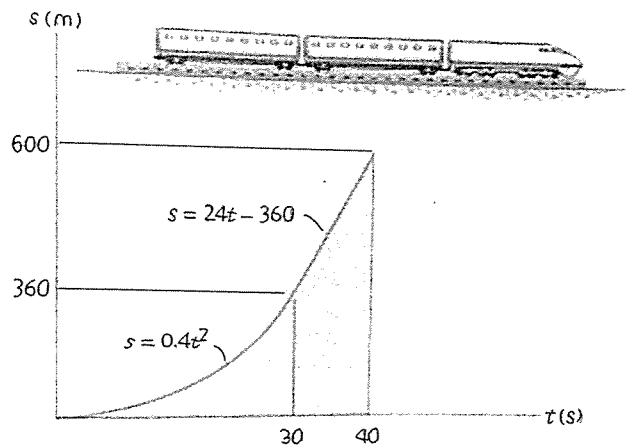


Figure 1

2. In Figure 2 is a vehicle passing through a curved road segment. When reaching point A, the vehicle has a speed of 4 m/s. The vehicle is accelerating with a constant rate of  $2 \text{ m/s}^2$ . Please determine the time required for the vehicle to reach point B, and the velocity and acceleration of the vehicle at point B. (30%)

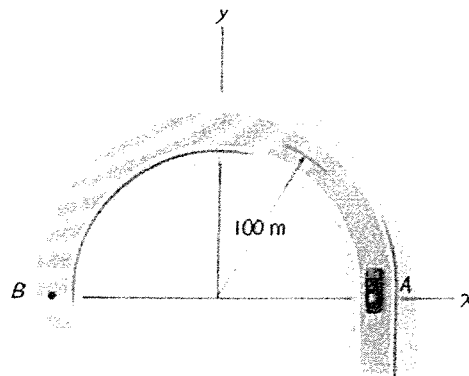


Figure 2

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3. In Figure 3, there are two vehicles approaching the intersection. The vehicles have weight 4000 lb each. At the intersection, they have collided. The movement of the vehicles after the collision is illustrated in Figure 3 where O is the point of collision. Vehicle A was traveling with a speed of 44 ft/s right before the collision, and the driver applied the breaks right after the collision, resulting to the sliding of the vehicle of 10 ft. Please determine the speed of vehicle B before the collision. Note that the kinetic friction between the tires and the pavement is 0.15. (40%)

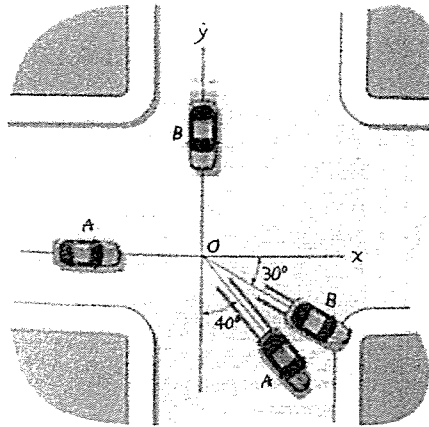


Figure 3

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