

Phys 201A

Quiz 3 - 10/20/09

Points: 10

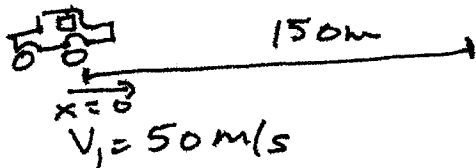
Name _____

- 1) Bob is driving the getaway car after the big bank robbery. He is going 50m/s when his headlights suddenly reveal a nail strip that the cops have placed across the road 150m in front of him. If Bob can stop in time, he can throw the car into reverse and escape. But if he crosses the nail strip all his tires will go flat and he will be caught. Bob's reaction time before he can hit the brakes is 0.60s, and his car's maximum acceleration is 10.0m/s². Is Bob in jail?

(4 points)

- 2) Draw a position vs. time graph, a velocity vs. time graph and an acceleration vs. time graph to represent the motion of Bob's car. The graphs should indicate the appropriate times and distances.

(6 points)



$$a = -10 \text{ m/s}^2$$

$$v_2^2 = v_1^2 + 2a(x_2 - x_1)$$

$$v_2^2 = \left(50 \frac{\text{m}}{\text{s}}\right)^2 - 2\left(10 \frac{\text{m}}{\text{s}^2}\right)(150 \text{m})$$

$$= 2500 \frac{\text{m}^2}{\text{s}^2} - 2400 \frac{\text{m}^2}{\text{s}^2}$$

Reaction time = 0.60s

So hits brakes at

$$x_2 = \left(50 \frac{\text{m}}{\text{s}} \times 0.60 \text{s}\right)$$

$$= 30 \text{m}$$

$$v_2 = \pm 10 \text{ m/s}$$

Choose +m/s
→

Bob hits the nail strip and goes to jail.

$$10 \text{ m/s} = 50 \text{ m/s} - \left(10 \frac{\text{m}}{\text{s}^2}\right) t_2$$

$$t_2 = 4 \text{ s}$$