

This is a 1-D problem involving constant acceleration.

A truck driving on a paved road is capable of decelerating at a constant value of 5 m/s^2 .

(a) If the truck is initially travelling at 27.4 m/s , how long does it take to come to a complete stop?

(b) How far does the truck travel in this time?

(c) Sketch a graph of distance vs. time and speed vs. time, when the brakes are applied.

Solution:

(b) Use the kinematic equation: $v_2^2 = v_1^2 + 2ad$

solve
(b) first

$$v_1 = 27.4 \text{ m/s} \text{ (initial speed)}$$

$$v_2 = 0 \text{ (truck comes to a stop)}$$

$$a = -5 \text{ m/s}^2 \text{ (truck is decelerating / slowing down)}$$

$$d = ? \text{ (displacement / stopping distance)}$$

Substitute:

$$(0)^2 = (27.4)^2 - 2(5)d$$

$$d = 75.1 \text{ m (answer)}$$

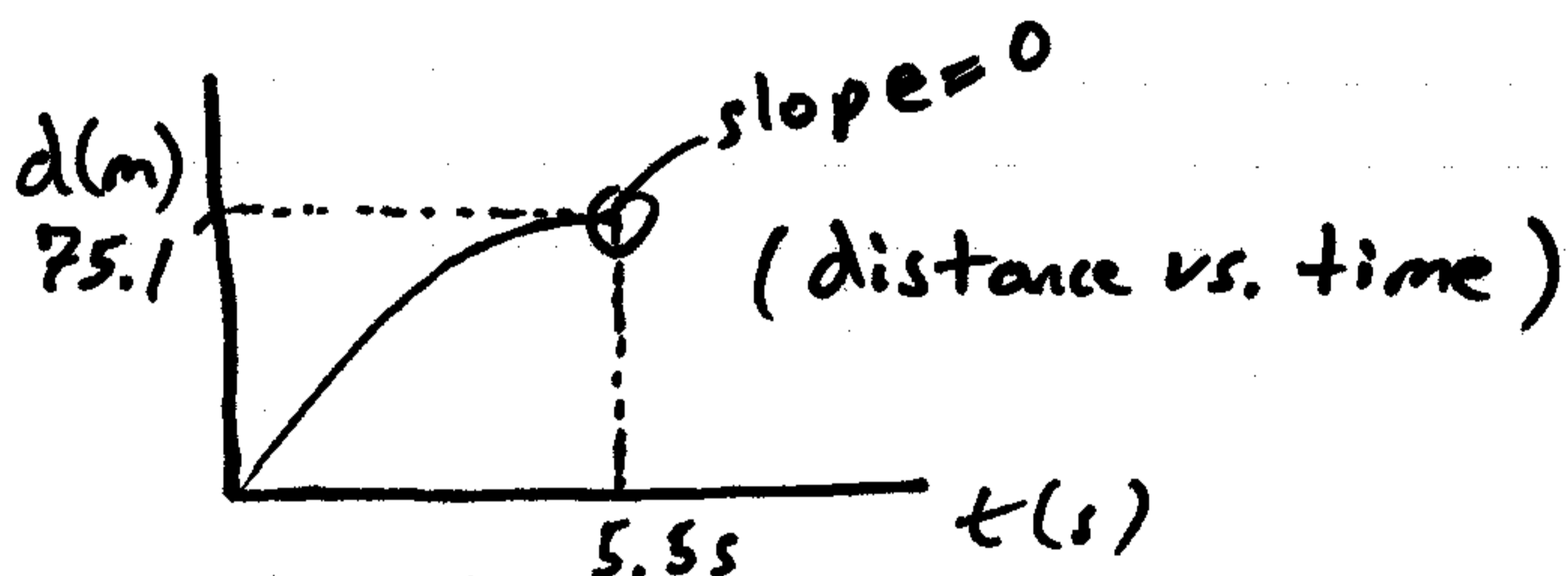
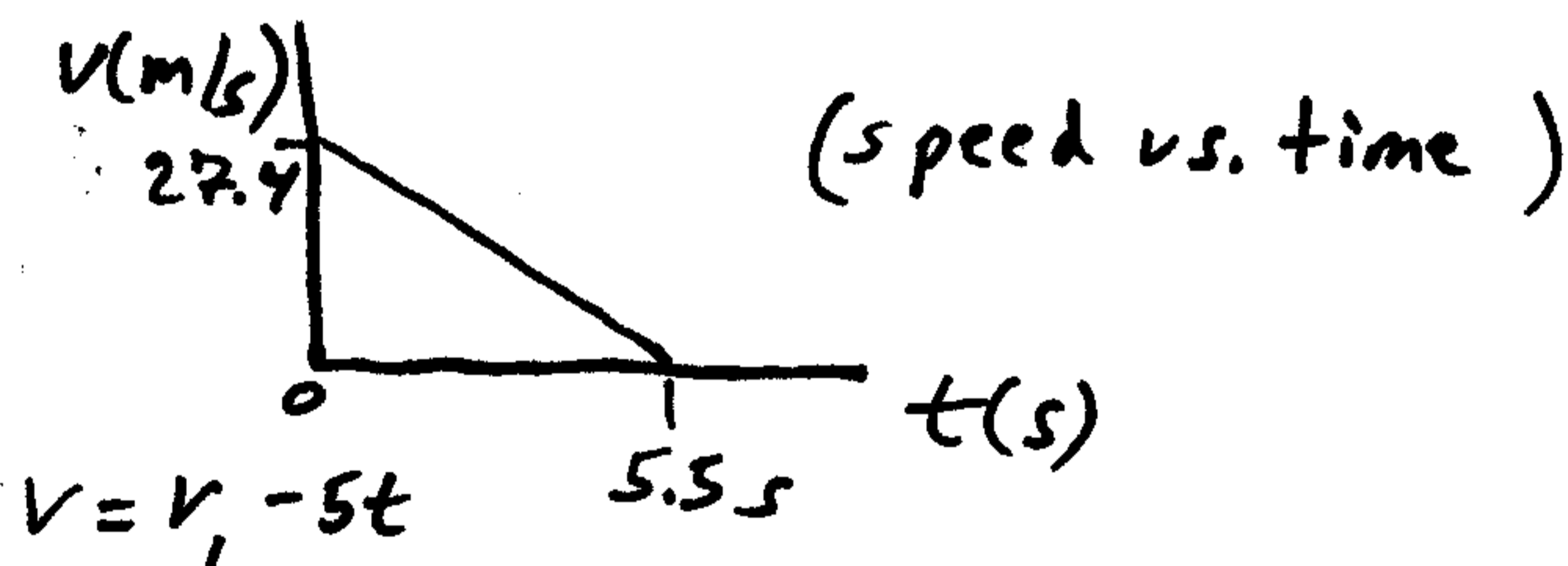
- (a) Use the kinematic equation: $v_2 = v_1 + at$ at $t = ?$ (stopping time)

Substitute:

$$0 = 27.4 - 5t$$

$$t = 5.5 \text{ s (answer)}$$

(c)



$$d = v_1 t - \frac{1}{2}(5)t^2$$