

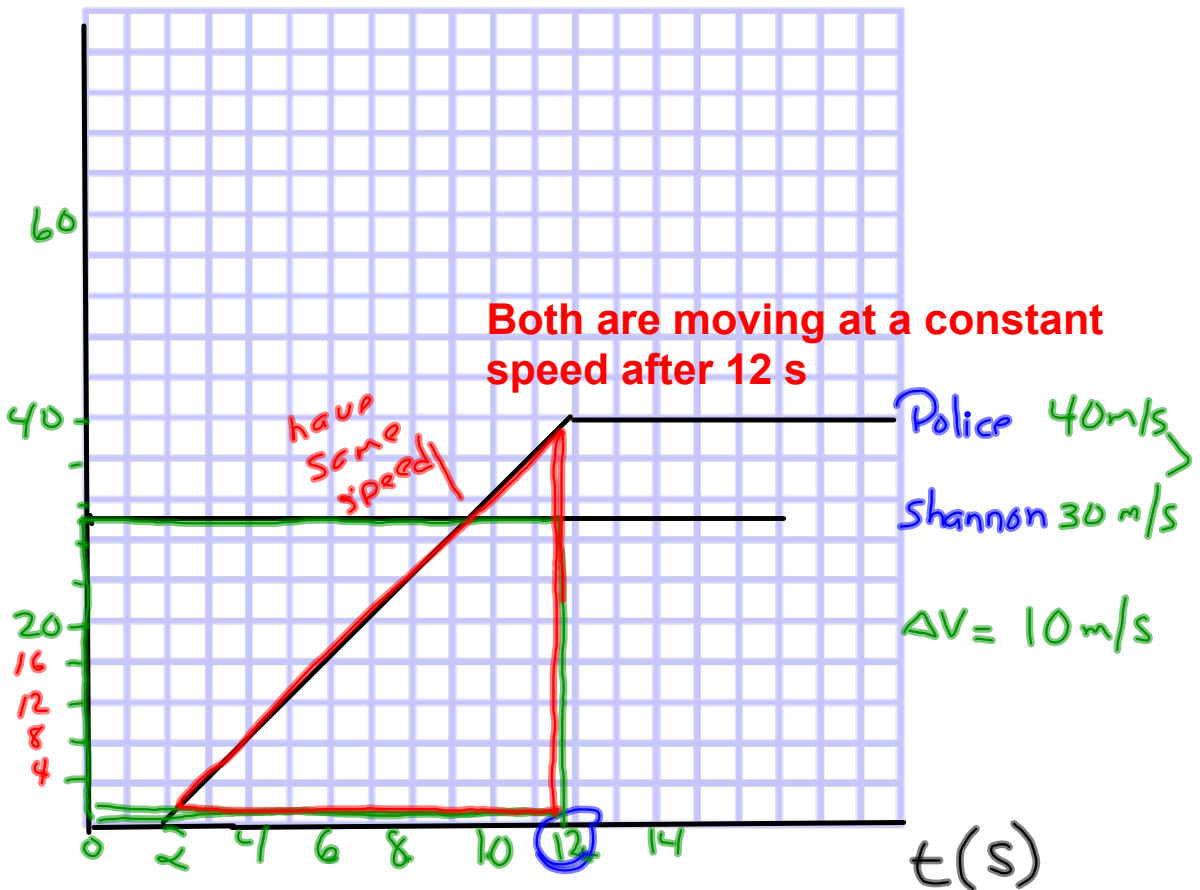
## Test Question

Shannon is speeding at 30.0 m/s and passes a stationary police car. Two seconds later, the police car accelerates at 4.0 m/s<sup>2</sup> until it reaches 40.0 m/s. He maintains this speed until he catches her.

→ slope (4m/s/s)

- Draw a v- t for each vehicle.
- When do the vehicles have the same velocity?
- When will the police car catch Shannon?

(a)



Shannon: 30 m/s

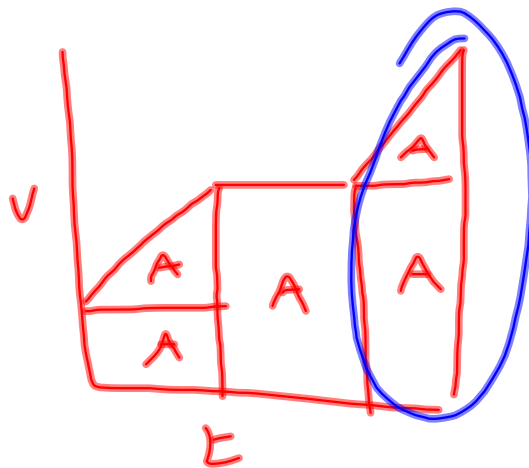
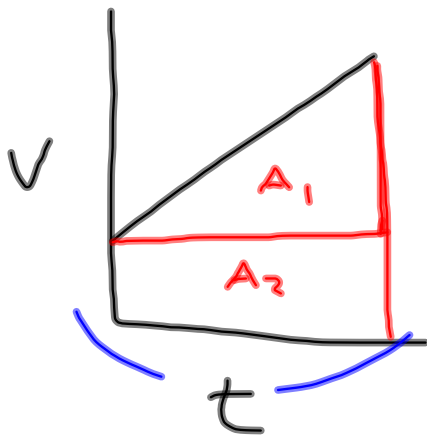
Police: 2 seconds later

$a = 4.0 \text{ m/s}^2$  until they reach 40.0 m/s

$\frac{4.0 \text{ m/s}}{1 \text{ s}}$  - Slope  
rise run

$$t = \frac{40 \text{ m/s}}{4.0 \text{ m/s}^2} = 10 \text{ s}$$

(b) 9.6 s



C) At 12 s, both are travelling at a constant speed. However, the police car is travelling 10.0 m/s faster than Shannon.

Step 1: Find the displacement of each vehicle for the first 12 s.

Shannon

$$d = A = lw = (12\text{ s})(30\text{ m/s}) = 360\text{ m}$$

Police

$$d = A = \frac{1}{2}bh = \frac{1}{2}(10\text{ s})(40\text{ m/s}) = 200\text{ m}$$

Note: Shannon is ahead of the police by 160m. This is the distance that the police must make up.

But the police are moving 10 m/s faster than Shannon.

$$t = \frac{d}{v} = \frac{160\text{ m}}{10\text{ m/s}} = 16\text{ s}$$

$$t_T = 16\text{ s} + 12\text{ s} = 28\text{ s.}$$

from when Shannon first passed the police car.