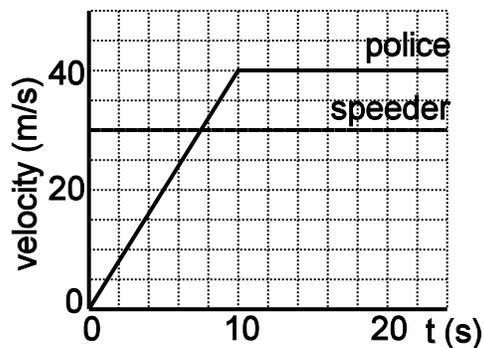


Where necessary use  $g = 10.0 \text{ m/s}^2$  for the following problems. Watch your precision & accuracy & be sure to show all your work!

ANSWERS

1. A ball rolls down a slope with an acceleration of  $5.0 \text{ m/s}^2$ .
  - (a) If it starts from rest what is its velocity after 10.0 s? 1.(a) 50 m/s[d]
  - (b) How long must the ball roll before it reaches a final velocity of 30 m/s? 1.(b) 6.0 s
  
2. A ball starts to roll up a slope with a velocity of 5.0 m/s and comes to a stop after rolling 5.0 m up the slope. Assume the acceleration was uniform.
  - (a) What was the rate of acceleration of the ball on the slope? 2.(a)  $2.5 \text{ m/s}^2$ [d]
  - (b) How long did the ball roll up the slope? 2.(b) 2.0 s
  
3. A stone is dropped down a well and strikes the bottom of the well 4.0 s later.
  - (a) How deep is the well? 3.(a) 80 m[d]
  - (b) What was the velocity of the stone when it hit the bottom? 3.(b) 40 m/s[d]
  - (c) How far did the stone fall in the last second? 3.(c) 35 m[d]
  
4. A ball is thrown straight upwards on earth at 40 m/s.
  - (a) What was the velocity of the ball 6.0 seconds later? 4.(a) 20 m/s[d]
  - (b) What is the displacement of the ball at  $t = 6.0 \text{ s}$ ? 4.(b) 60 m[u]
  - (c) What was the maximum height of the ball in flight? 4.(c) 80 m[u]
  
5. A man runs 200 m at 10 m/s and then runs at 5.0 m/s for 10.0 seconds. What is his average velocity? 5. 8.3 m/s[f]
  
6. At the Los Alamos National Laboratory in New Mexico protons are accelerated from rest to a velocity of  $2.5 \times 10^8 \text{ m/s}$  in an accelerator that is 0.80 km long.
  - (a) What is the protons' average acceleration? 6.(a)  $3.9 \times 10^{13} \text{ m/s}^2$ [f]
  - (b) How long do the protons take to travel the length of the accelerator? 6.(b)  $6.4 \times 10^{-6} \text{ s}$

7. A speeder passes a stationary police cruiser. The police officer spots the speeder and pursues him. The graph shows the velocity of the two vehicles as a function of time. Assume that at time  $t = 0 \text{ s}$  the speeder passes the stationary cruiser.



- (a) What is the police cruiser's acceleration? 7.(a)  $4.0 \text{ m/s}^2$ [f]
- (b) What is the displacement for each of the vehicles at 10 s? 7.(b) 300 m[f], 200 m[f]
- (c) How far apart are the two vehicles at 10 s? 7.(c) 100 m[f]
- (d) At what time will the police cruiser pass the speeder? 7.(d) 20 s