

Chapter 2: Extended Kinematics Problems Practice

1. A car accelerates from rest at a constant rate of -4m/s^2 . After accelerating at this rate for a distance of 500m, the car turns off its engine and begins to coast. The car coasts for 22 seconds with constant deceleration before finally coming to rest. *Sketch a helpful diagram and then answer the questions below.*
- a. What was the car's maximum speed during this event?
 - b. What was the car's velocity when it reached its maximum speed?
 - c. At what time did the car reach that velocity?
 - d. What was the car's acceleration during its coasting period?
 - e. How far did the car travel after its motor turned off?
 - f. What was the car's total displacement?

a. 63.2m/s b. -63.2m/s c. 15.8s d. 2.87m/s² e. 695m f. -1195m

2. A plastic action figure is launched vertically upward from a point 10m above the ground [At $t_0 = 0s$, the height of the action figure is 10m above the ground]. From $t=0s$ to $t=6s$, the action figure travels solely under the influence of gravity. Air resistance can be ignored for this time period. At $t=6s$, the action figure's height is 40m. Between $t=6s$ and $t=7s$, a parachute pops out of the figure and deploys, causing the figure's speed to decrease at a constant rate for that 6s to 7s time period. At $t=7s$, the figure's speed is 3m/s. From $t=7s$ onward, the action figure floats the rest of the way to the Earth (height = 0m) at a constant speed of 3m/s. *Sketch a helpful diagram and then answer the questions below – Some of you may have to change your diagram after part b.*

- a. What was the action figure's initial velocity?

- b. What was the action figure's velocity at $t=6s$?

- c. What was the figure's average acceleration between $t=6s$ and $t=7s$?

- d. What was the figure's displacement between $t=6s$ and $t=7s$?

- e. What was the figure's elevation at $t=7s$?

- f. How long did the entire trip last?

- g. What was the figure's average speed for the entire trip?

a. 34.3m/s b. -24.5m/s c. 21.5m/s² d. -13.8m e. 26.3m f. 15.75s g. 8.25m/s