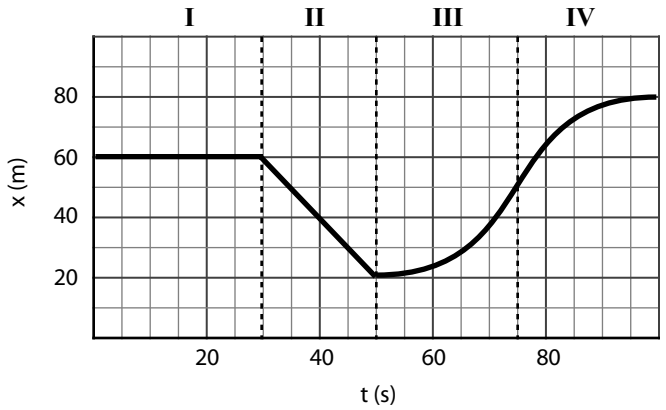
PhyzJob: Analytical Graphical Kinematics Exercises

Felix

I. Interpreting the Position *vs.* Time Graph



1.a. Write a qualitative description for the motion of the particle during section I.

Rest at 60 m.

b. Mathematically determine the velocity of the particle during that interval.

Velocity is the slope of the plot:
0 m / 30 s = 0 m/s

2.a. Write a qualitative description for the motion of the particle during section II.

Uniform Motion in the negative direction.

b. Mathematically determine the velocity of the particle during that interval.

−40 m / 20 s = −2 m/s

3.a. Write a qualitative description for the motion of the particle during the section III.

Moving in the positive direction; speeding up: Uniform Accelerated Motion.

b. Mathematically determine the average velocity of the particle during that interval.

30 m / 25 s = 1.2 m/s

c. What are the initial and final velocities in section III?

Initial: 0 Final: 2.4 m/s (double the average)

4.a. Write a qualitative description for the motion of the particle during section IV.

Moving in the positive direction; slowing up: Uniform Accelerated Motion.

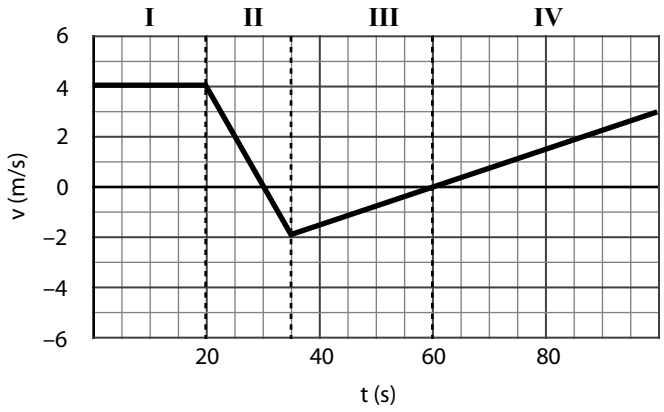
b. Mathematically determine the average velocity of the particle during that interval.

30 m / 25 s = 1.2 m/s

c. What are the initial and final velocities in section IV?

Initial: 2.4 m/s Final: 0

II. Interpreting the Velocity *vs.* Time Graph



1.a. Write a qualitative description for the motion of the particle during section I.

Uniform motion at +4 m/s

b. Mathematically determine the velocity of the particle during that interval.

4 m/s as read from the graph.

2.a. Write a qualitative description for the motion of the particle during section II.

Slowing down to rest, then speeding up in the negative direction.

b. Mathematically determine the acceleration of the particle during that interval.

Acceleration is the slope of the velocity vs. time graph:

$a = \Delta v/\Delta t = -6 \text{ m/s} / 15 \text{ s} = -0.4 \text{ m/s}^2$

3.a. Write a qualitative description for the motion of the particle during the section III.

Slowing down while moving in the negative direction.

b. Mathematically determine the change in position of the particle during that interval.

$\Delta x = (\text{area}) = 1/2 \Delta v \Delta t = 1/2 (-2\text{m/s})(25\text{s}) = -25 \text{ m}$

4.a. Write a qualitative description for the motion of the particle during section IV.

Speeding up while moving in the positive direction.

b. Mathematically determine the acceleration of the particle during that interval.

$a = \Delta v/\Delta t = 3 \text{ m/s} / 40 \text{ s} = 0.075 \text{ m/s}^2$

c. Mathematically determine the change in position of the particle during that interval.

$\Delta x = (\text{area}) = 1/2 \Delta v \Delta t = 1/2 (3\text{m/s})(40\text{s}) = 60 \text{ m}$