

PHY115: Homework 2

Spring 2021

Deadline: February 11th

Exercise 1 (20 p)

A stone is thrown into the air at an angle above the horizontal and feels negligible air resistance. Which graph in Fig.1 best depicts the stone's speed as a function of time t while it is in the air?

Hint: remember that the speed is the magnitude of the velocity vector.

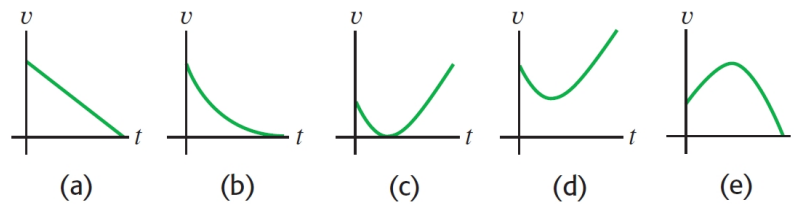


Figure 1: Variation of the speed with the time. © University Physics with Modern Physics, 13th Edition.

Exercise 2 (20 p)

A dragon-fly has a motion in one dimension towards the positive x -axis.

(a) Consider that the velocity is increasing and make sketches (similar to fig. 1) of the position, the velocity and the acceleration respect to the time.

(b) Repeat the point (a) considering that the velocity is decreasing.

Hint: What should be the sign of the acceleration in each one of the cases?

Exercise 3 (20 p)

Consider that the path shown in fig. 2 shows the motion of a skier along a ski-jump ramp. The skier speeds up as she moves downhill from point A to point B, where her speed is maximum. She slows down from points B to D. Draw the direction of the velocity and acceleration vectors at each one of the points A, B, C, and D.

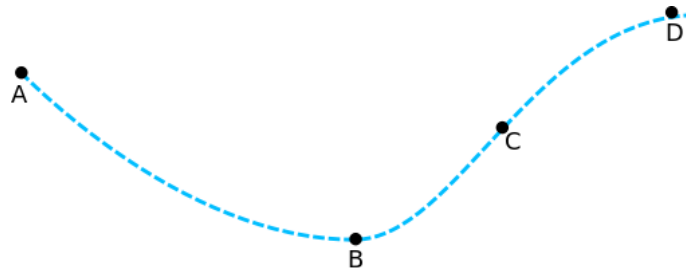


Figure 2: Motion Path.

Exercise 4 (40 p)

Watch the next video starting from minute 21:23

<https://www.youtube.com/watch?v=SvoycpSKCIw>,

- (a) Chose an origin for the coordinate system and draw it in the right panel of fig. 3
- (b) Estimate the height of the wall (see the figure).
- (c) Is the result you obtained plausible? Do you think the physics behind of this scene is realistic?

Hints:

- Don't try to make the estimation comparing the scale of the wall with the characters, you must use the formulation for a parabolic shot.
- Use a chronometer to measure the time interval since the character jumps until he reaches the initial height again. You also need the time he takes to reach the bottom roof.



Figure 3: Motion Path.