

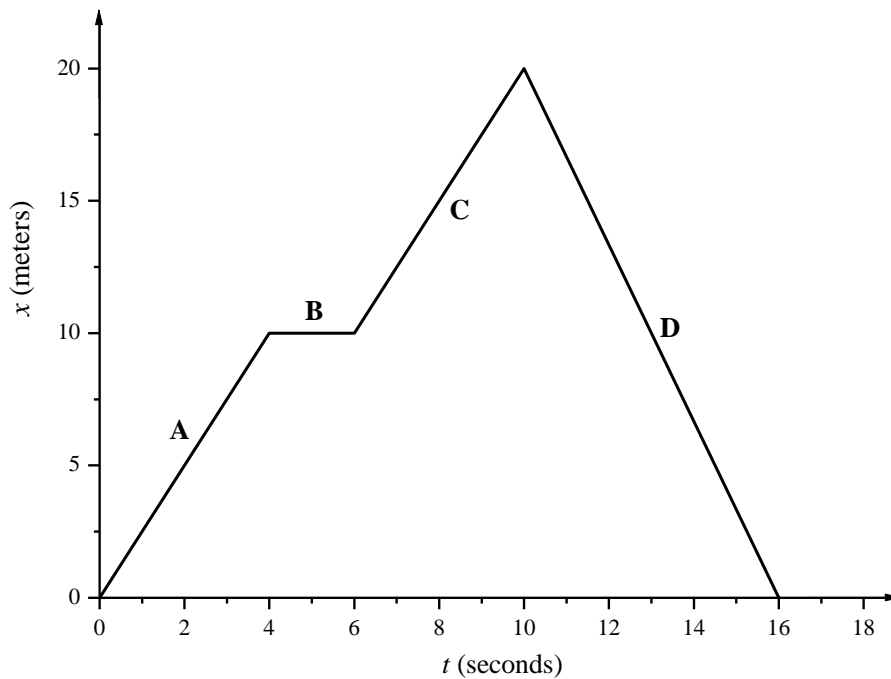
## Physics-145 Summer 2019

### Homework No. 1

**Q1)** A particle moves in a straight line according to the equation  $x = 50t^2 - 10t^3$  where  $x$  is in meters and  $t$  in seconds.

- (a) Calculate the average velocity of the particle in the time interval  $t = 0$  s and  $t = 3$  s.
- (b) Calculate the acceleration of the particle at  $t = 2$  s.

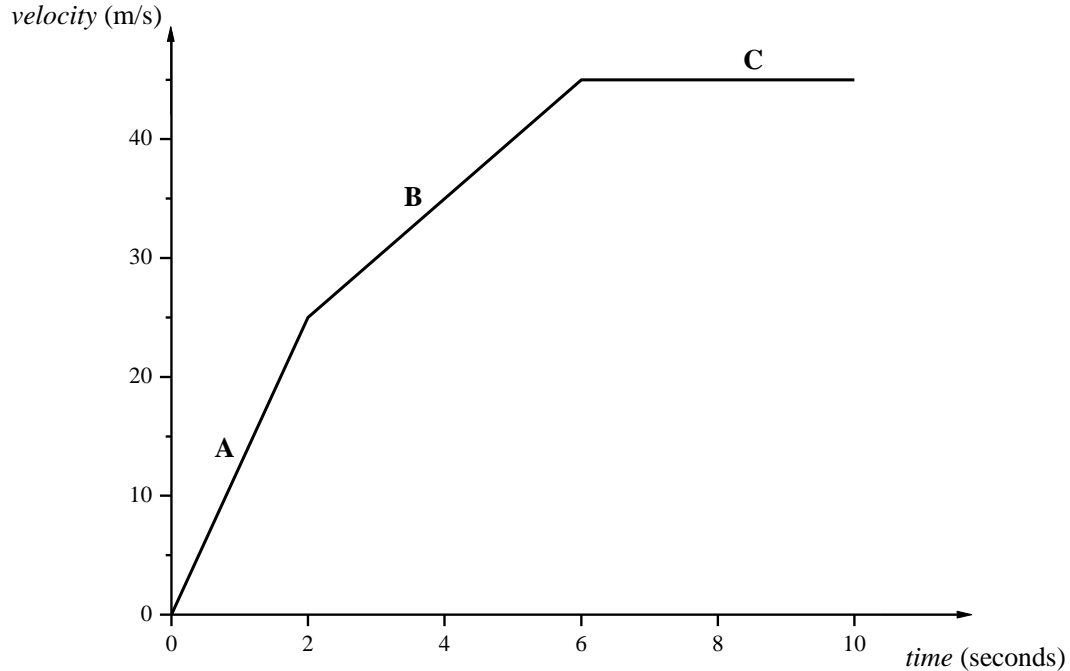
**Q2)** The graph below shows the position-time graph of a particle.



From the graph, find the following:

- (a) The distance moved in the time interval **C** (between  $t = 6$  s to  $t = 10$  s).
- (b) The displacement moved in the time interval **C**.
- (c) The average velocity in the time interval **C**.
- (d) The *total* distance moved by the particle.
- (e) The average velocity for the whole journey.

**Q3)** The graph below shows the first 10 seconds velocity-time graph of a Tesla car journey.



From the graph, find the following:

- The car's acceleration in the first two seconds.
- The car's acceleration in the time interval between  $t = 0$  s to  $t = 6$  s.
- How far did the car move before reaching the speed of 45 m/s?

**Q4)** A particle accelerates from rest with a constant acceleration of  $15 \text{ m/s}^2$ . How far the particle moves before it reaches a speed of 60 m/s?

**Q5)** A car starts from rest until it reaches a speed of 25 m/s with an acceleration of  $2 \text{ m/s}^2$ . After that, the car decelerates (slows down) with deceleration of  $1 \text{ m/s}^2$  until it stops. How much time elapsed from start to stop?

**Q6)** Consider the following three vectors:  $\mathbf{A} = 2\mathbf{i} - 4\mathbf{j}$ ,  $\mathbf{B} = 5\mathbf{j}$ ,  $\mathbf{C} = 3\mathbf{i} + 3\mathbf{j}$ .

- Calculate  $\mathbf{R} = 2\mathbf{A} - \mathbf{C} + 10\mathbf{B}$ .
- What the angle  $\mathbf{R}$  makes with the positive  $x$ -axis?
- What is the length of  $\mathbf{R}$ ?