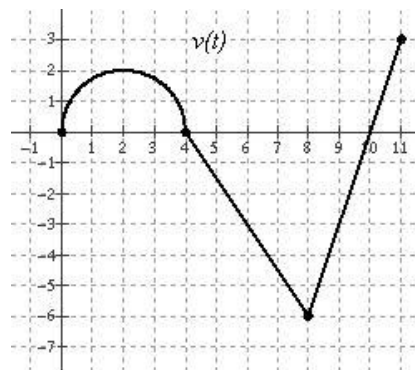


Classwork #1 - Motion

1. The graph to the right shows the velocity,  $v(t)$ , of a particle moving along the x-axis for  $0 \leq t \leq 11$ . It consists of a semicircle and two line segments. Use the graph and your knowledge of motion to answer the following questions.



- At what time  $t$ ,  $0 \leq t \leq 11$ , is the speed of the particle the greatest?
- At which of the times,  $t = 2$ ,  $t = 6$ ,  $t = 9$ , is the acceleration of the particle greatest? Explain your answer.
- Over what time intervals is the particle moving to the left? Explain your answer.
- Over what time intervals is the speed of the particle decreasing? Explain your answer.
- Find the total distance traveled by the particle over the time interval  $0 \leq t \leq 11$ .
- Find the value of  $\int_0^{11} v(t) dt$  and explain the meaning of this integral in the context of the problem.
- If the initial position of the particle is  $x(0) = 2$ , find the position of the particle at time  $t = 11$ .

2. The table below gives values for the velocity and acceleration of a particle moving along the x-axis for selected values of time  $t$ . Both velocity and acceleration are differentiable functions of time  $t$ . The velocity is decreasing for all values of  $t$ ,  $0 \leq t \leq 10$ . Use the table to answer questions that follow.

Time, $t$	0	2	6	10
Velocity, $v(t)$	5	3	-1	-8
Acceleration, $a(t)$	0	-1	-3	-5

- Is there a time  $t$  when the particle is at rest? Explain your answer.
- What is the speed of the particle at  $t = 6$ ?
- At what time indicated in the table is the speed of the particle decreasing? Explain your answer.
- Determine the value of  $\int_0^{10} a(t) dt$ . Explain the meaning of the definite integral in the context of the problem.