AP Calculus Name _____

Motion – Using an Equation

A particle moves up and down the y-axis with velocity given by the equation $v(t) = \frac{1}{3}t^3 - 3t^2 + 8t - \frac{16}{3}$ during the time interval $0 \le t \le 5$. At time t = 0, its position is y = 1.

1) Where is the particle at t = $\frac{3}{2}$?

2) Find the acceleration of the particle at t = 3.

3) At what time is the particle at rest?

4) Is the particle moving up or down the y-axis at time t = $\frac{1}{2}$? What is the speed of the particle at that time?

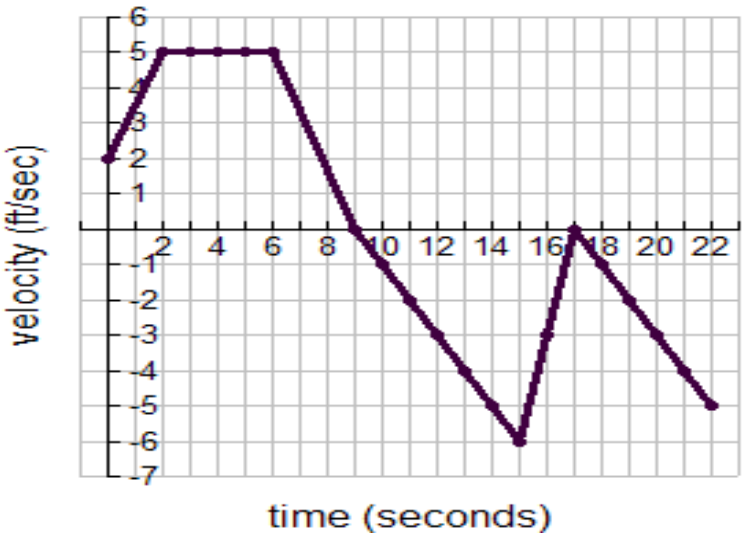
5) What is the average velocity from t = 0 to t = 5?

6) What is the maximum velocity of the particle? When does this happen?

7) When is the speed of the particle decreasing $0 \le t \le 5$?

AP Calculus

Motion – Using a Graph



A particle moves along the x-axis with velocity as shown in the graph above. Its position, x(t), at t = 0 is 5.

1) At t = 0, is the particle moving left or right?

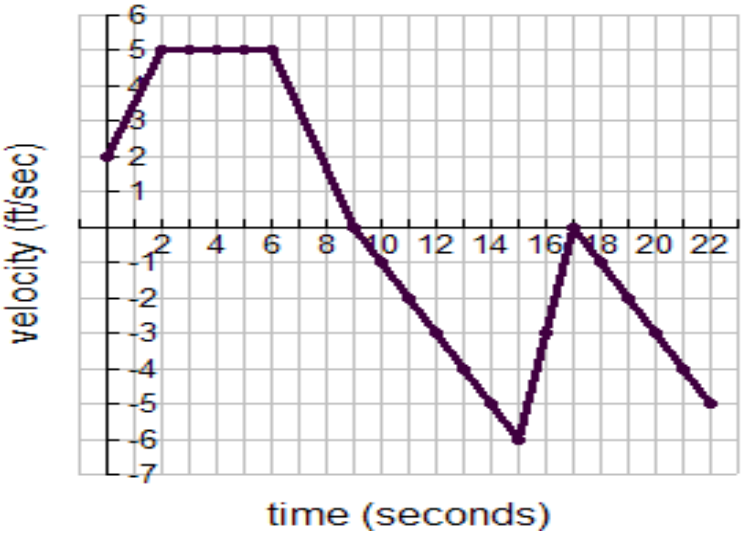
2) When is the particle at rest?

3) When does the particle change direction?

4) When is the particle's speed the greatest?

5) What is the acceleration of the particle at t = 1?

6) When is acceleration zero?



7) What is the total distance traveled from t = 0 to t = 15?

8) What is the particle's position at t = 15?

9) When is the particle farthest to the right?

10) When is the speed of the particle increasing from $0 \le t \le 22$?

AP Calculus

Motion – Using a Table

The velocity of a car is recorded at 10 second intervals. We can assume that the function and its derivative are continuous and differentiable over the entire interval. Position at t = 0 is 0 feet.

Time (seconds)	0	10	20	30	40	50	60
Velocity (ft/sec)	0	38	42	48	51	50	45

1) Approximately, how far did the car travel during the last 30 seconds using a left sum and 3 subintevals?

2) From the data in the chart and assuming that all critical numbers are represented, during what time interval is acceleration positive?

3) Approximate the average velocity from t = 10 to t = 40 using a right sum and n = 3.

4) Approximate the acceleration at time t = 50.

5) Using a midpoint sum and 3 equal partitions, approximate where the car is at the end of 60 seconds.

6) Using correct units, explain the meaning of $\frac{1}{60}\int_0^{60} v(t)dt$.