

Unit 2 - Rate of Change

Grade: 11

Subject: Math 112B

Date: April

Untitled

Grade: «grade»
Subject: «subject»
Date: «date»

- 1** In 1977, there were 12,168,450 U.S. households with cable television. In 1997, there were 65,929,420 U.S. households with cable television.

Which represents the average rate of change per year in households with cable television during that time period?

A
B
C
D

- A. 2,688,048.5 households/year
- B. 5,376,097.0 households/year
- C. 53,760970. households/year
- D. 65,320,997.5 households/year

2 The table shows the relationship between x , the age of a girl and y , her average weight.

Which equation could represent a linear relationship of the data in the table between the age and average weight?

A $y = 5x + 20$

B $x = 5y + 20$

C $y = 7x + 35$

D $x = 7y + 35$

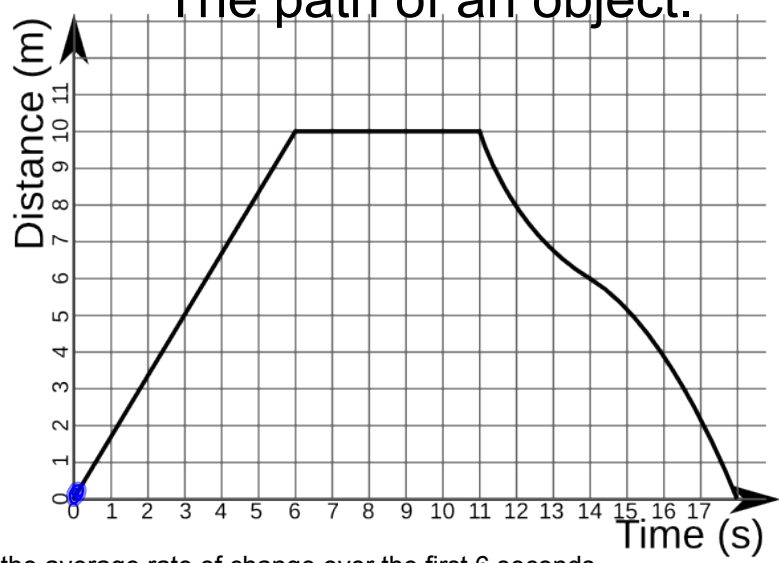
Age (x)	Weight in pounds (y)
3	35
10	70

$$m = \frac{70 - 35}{10 - 3} = \frac{35}{7} = 5$$

$$y = mx + b$$

3

The path of an object.



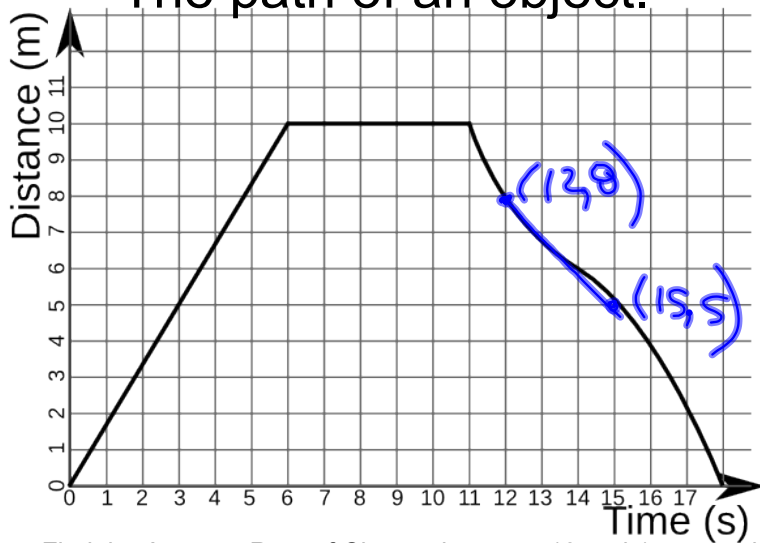
$(0,0)$ $(6,10)$
 $\frac{10}{6}$

Find the average rate of change over the first 6 seconds.

- A 10m
- B 1.67 m/s**
- C 0.6 s/m
- D 6 s

4

The path of an object.



$$\frac{3}{-3} = -1$$

Find the Average Rate of Change between 12 and 15 seconds?

- A 4.2 m/s
- B 1 m/s
- C -4.2 m/s
- D -1 m/s

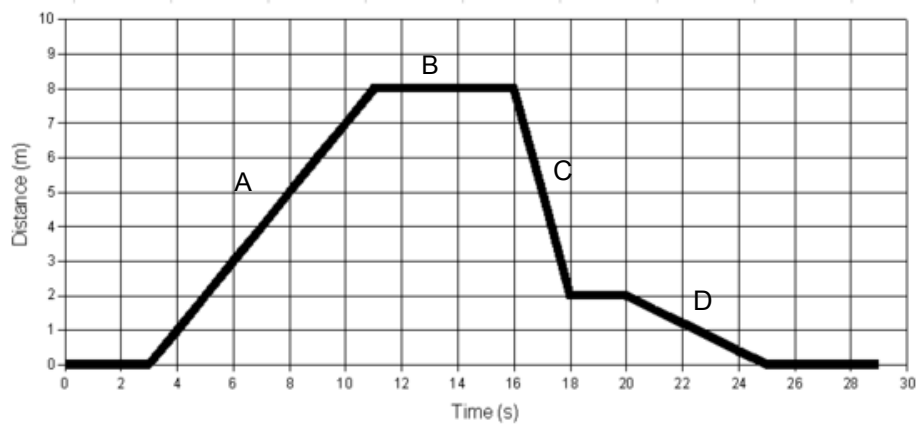
The path of an object.



What happens to the object after 11 seconds?

- A Stops
- B Speed Changes at a constant rate.
- C Slowing Down
- D Returns to starting position.

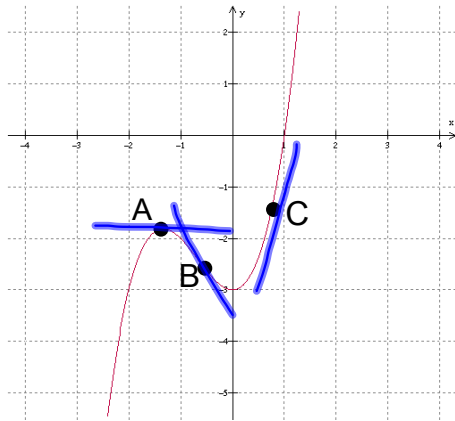
- 6 The motion of a particle is defined according to the following graph. At which point is the **Average** Rate of Change the Greatest.



Choose:

- A
- B
- C
- D

7



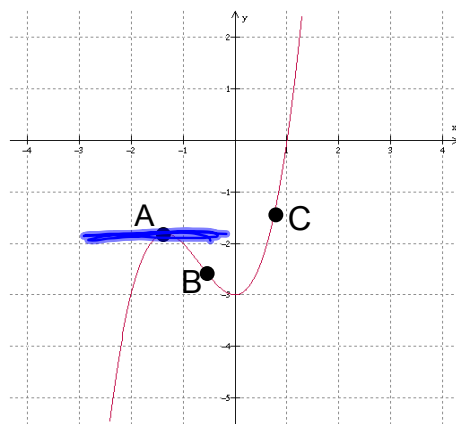
Which point would indicate a positive instantaneous rate of change?

A

B

C

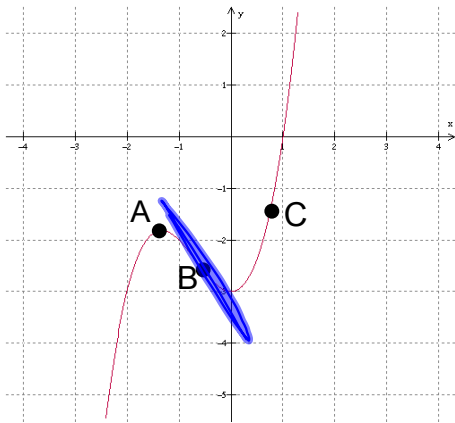
8



Which point would indicate a zero instantaneous rate of change?

- A
- B
- C

9



Which point would indicate a negative instantaneous rate of change?

- A
- B
- C

✓

10 Find the average rate of change of $h(t) = \sqrt{2t}$ for $2 \leq t \leq 8$

A 2 $h(2) = \sqrt{2(2)}$
 $= 2$

C $\frac{1}{3}$ $h(8) = \sqrt{2(8)}$

B $\frac{-3}{10}$ $(2, 2)$

D 7 $(8, 4)$

$$\frac{4 - 2}{8 - 2} = \frac{2}{6} = \frac{1}{3}$$

- 11 Pedro throws a ball upward at a rate of 20 meters per second from an initial height of 2 meters. The height of the ball above the ground can be approximated by the equation , $h = -5t^2 + 20t + 2$ where t represents the amount of time, in seconds, since the ball has been released.

Which is the maximum height that the ball reaches?

- A 5 meters
B 6 meters
C 20 meters
D 22 meters

$$\begin{aligned}h &= -5(t^2 - 4t + 4) + 2 + 20 \\ &= -5(t-2)^2 + 22\end{aligned}$$

12

The braking distance of Samir's car can be described by the equation $y = \frac{x^2 + 5x}{200}$

where x is the car's speed in kilometers per hour and y is the braking distance in meters.

Which represents how fast a car is traveling when the braking distance is 75 meters?

- A 30 kilometers per hour
- B 50 kilometers per hour
- C 55 kilometers per hour
- D 120 kilometers per hour

$$(200)75 = \frac{x^2 + 5x(200)}{200}$$

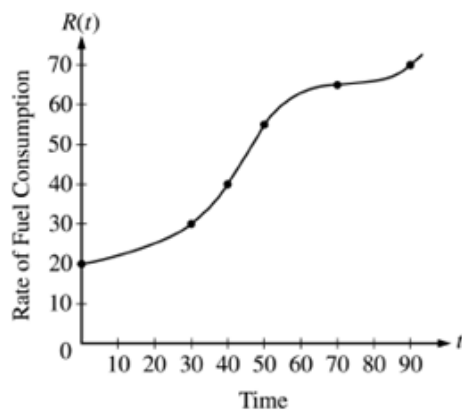
$$15000 = x^2 + 5x$$

$$x^2 + 5x - 15000 = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

13

The rate of fuel consumption, in gallons per minute, recorded during an airplane flight is given by a function R of time t .



t (minutes)	$R(t)$ (gallons per minute)
0	20
30	30
40	40
50	55
70	65
90	70

Use data from the table to find the Average Rate of Change from 30 minutes to 70 minutes.

- A $\frac{8}{7}$ gallons per minute/minute
 B $\frac{7}{8}$ gallons per minute/minute
 C $-\frac{8}{7}$ gallons per minute/minute
 D $-\frac{7}{8}$ gallons per minute/minute

$$(30, 30) \quad (70, 65)$$

$$AR = \frac{65 - 30}{70 - 30} = \frac{35}{40} = \frac{7}{8}$$

14 Find the instantaneous rate of change of the function $y = x^2$ when $x = 3$

$$3.1 \overline{) 9.61} \quad 2.9 \overline{) 8.41}$$

- A 9
- B 6
- C 3
- D 1

15 Find the slope of the tangent of $f(x) = 2x^3 - 4x$ at $x = -1$

A 10

B 2

C 0

D -10

$$\begin{array}{r|l} -0.9 & 1.730 \\ \hline -1.1 & 2.142 \end{array}$$

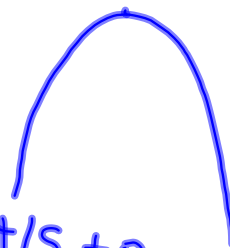
16 An arrow is fired and follows the path defined by $h(t) = -5t^2 + 40t + 15$

When does the arrow start to fall?

- A 0 seconds
- B 2 seconds
- C 4 seconds**
- D 8 seconds

$$h(t) = -5(t^2 - 8t + 16) + 15 + 80$$
$$= -5(t - 4)^2 + 95$$

4 sec



17 An arrow is fired and follows the path defined by $h(t) = -5t^2 + 40t + 15$

When does the arrow hit the ground?

- A -0.35 seconds
- B 8.35 seconds
- C 4 seconds
- D 8 seconds

Quad. Formula

18 An arrow is fired and follows the path defined by $h(t) = -5t^2 + 40t + 15$

With what speed does the arrow hit the ground?

- A -43.5m/s
- B 0 m/s
- C -36.7 m/s
- D -27.6 m/s

$$\begin{array}{r|l} 0.36 & 0.822 \\ \hline 0.37 & 0.048 \\ \hline & \end{array}$$