

Average Rate of Change

- Recall that rate of change is another term for slope
- Slope mainly refers to linear functions since the rate of change is constant
- For other functions we find the average rate of change
- We calculate the average rate of change the same way we calculate slope

$$\text{slope} = \text{rate of change} = \frac{\text{rise}}{\text{run}} = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1}$$

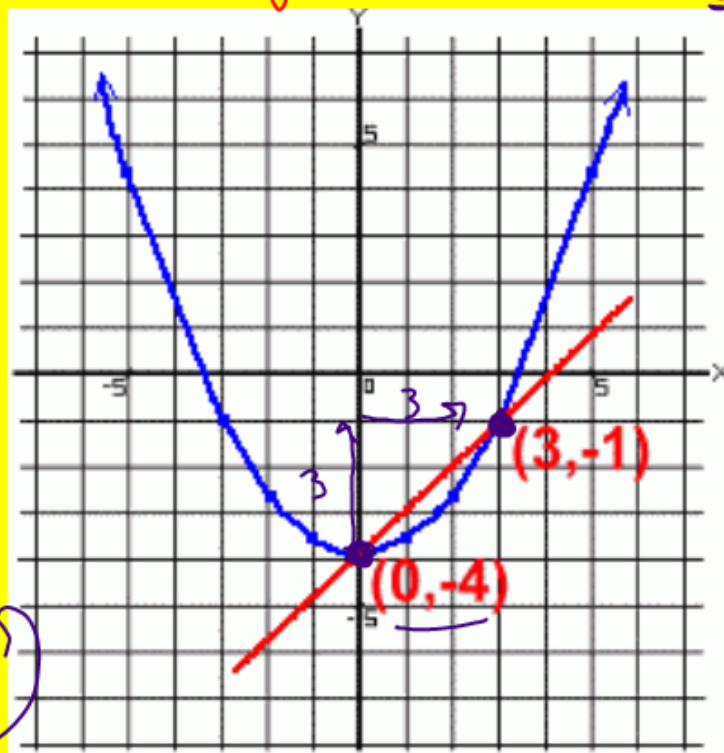
Average Rate of Change

Given $y = f(x)$ at the right,
find the average rate of
change between the points
 $(0, -4)$ and $(3, -1)$

avg. rate of change = 1

$$\frac{-1 - (-4)}{3 - 0} = \frac{-1 + 4}{3 - 0} = \frac{3}{3} = 1$$

rate of change from 0 to 3



Average Rate of Change

$G(t)$ represents the temperature measured in Celsius over a period of time measured in minutes.

· "Context"

Find the average rate of change between the following sets of points:

#1) (0,22) and (3,23)

$\frac{1}{3}$ or $\frac{2}{3}$

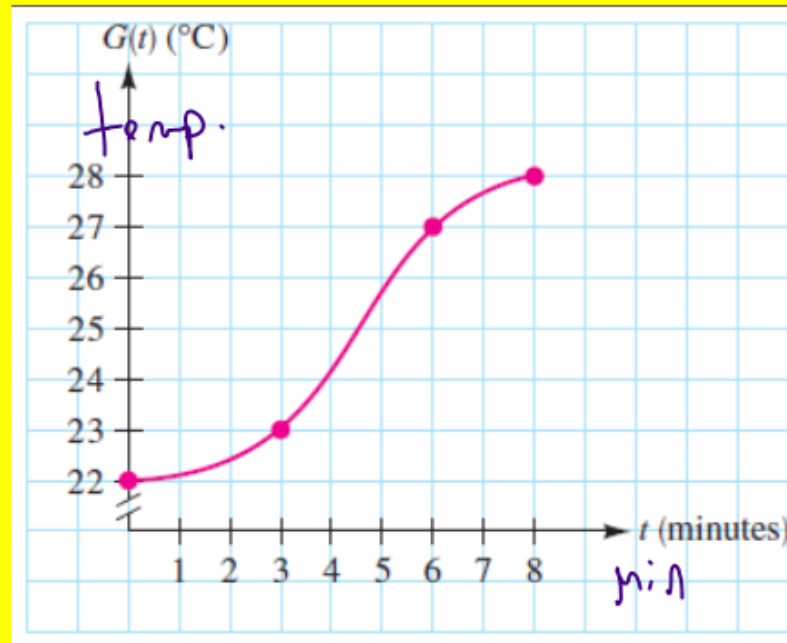
x	y
0	22
3	23

#2) (3,23) and (8,28)

1 °Celsius per min.

#3) (0,22) and (6,27)

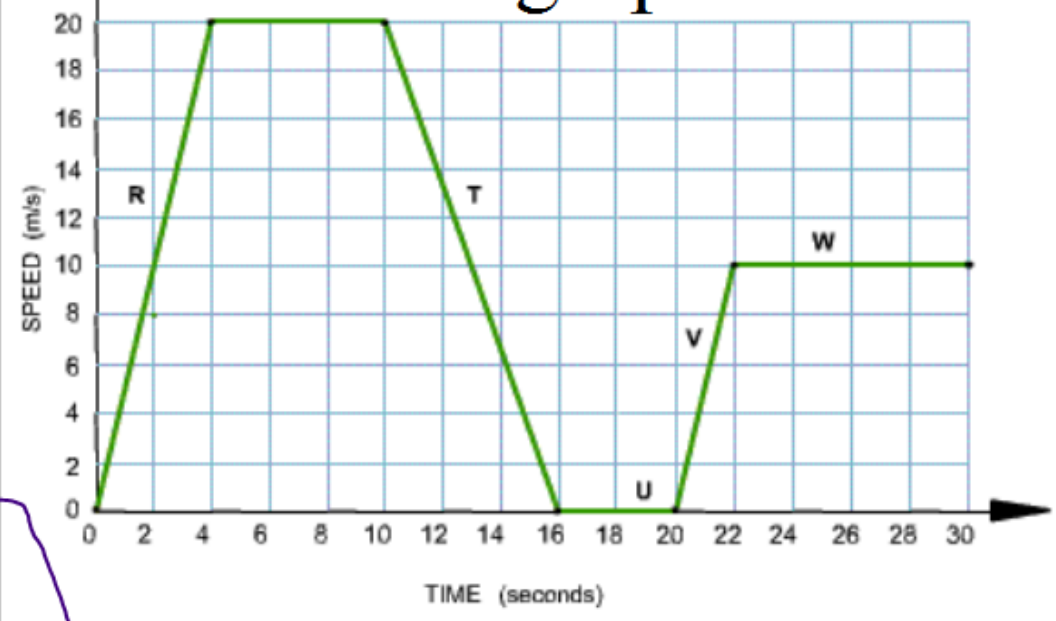
$\frac{5}{6} = .8\bar{3}$ or .83



#1) 0.3 °Celsius/min

Warmup:

Identify all of the key features of this graph below



x - intercept \emptyset $[16, 20]$

y - intercept \emptyset

increasing $(0, 4)^R$ & $(20, 22)^V$

decreasing $(10, 16)^T$

positive $(0, 16)$ $(20, 30)$

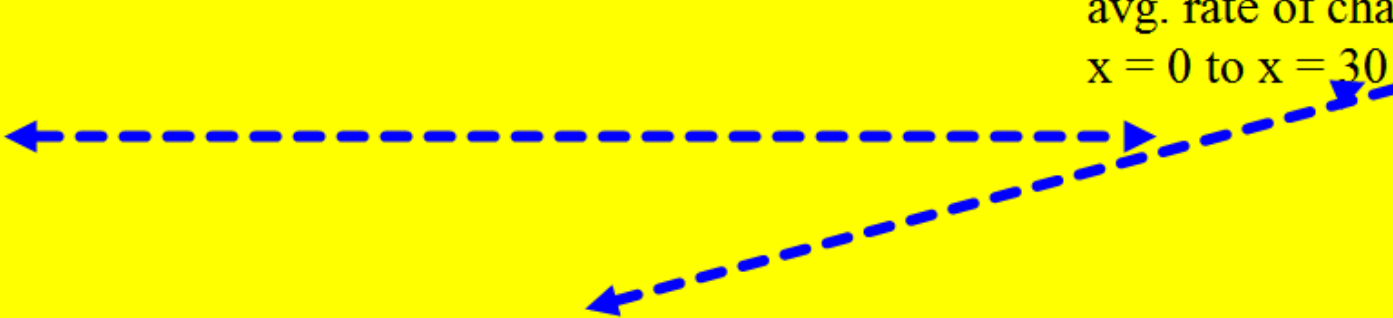
negative N/A

maximum abs: 20
rel: 10

minimum abs: 0
rel: N/A

avg. rate of change from
 $x = 0$ to $x = 30$

$\frac{17}{3}$



Identify the following characteristics:

✓ Domain: $(-\infty, \infty)$

✓ Range: $(-\infty, \infty)$

✓ x-int: $\{-3, 0, 2\}$
 $(-3, 0) (0, 0) (2, 0)$

✓ y-int: 0

Maximums: ~~∞~~ ^{Abs} N/A
 ✓ Rel: 8

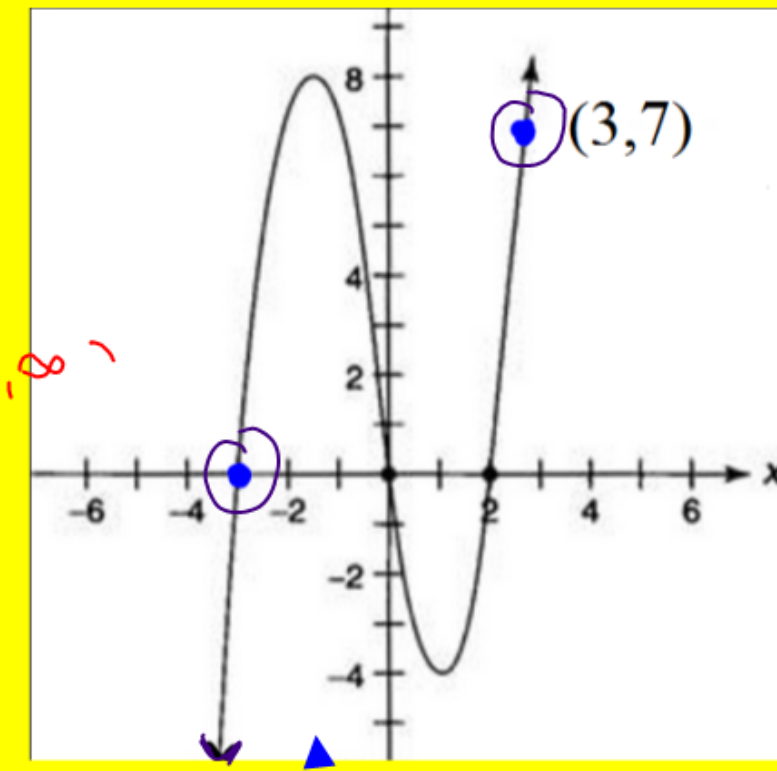
Minimums:
 ✓ Abs: N/A
 ✓ Rel: -4

Intervals of Increase:
 $\sqrt{(-\infty, -1.5)}$ $\sqrt{(1, \infty)}$

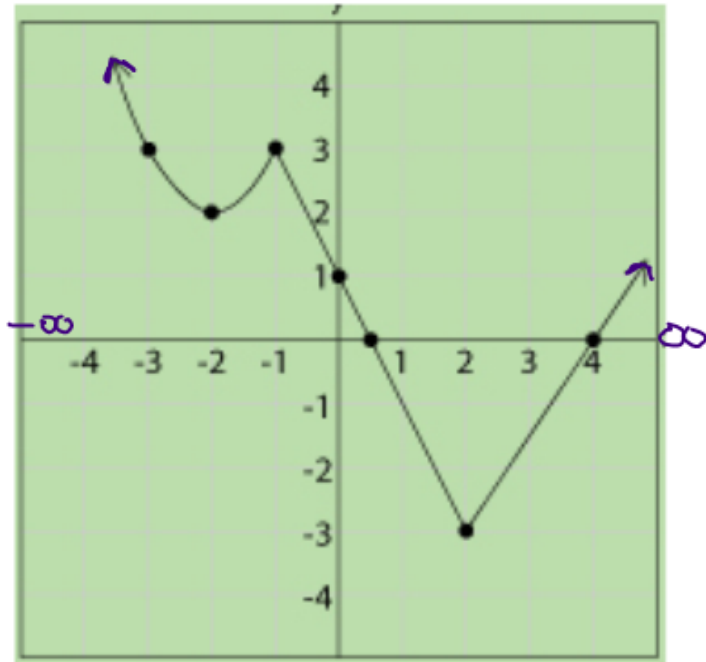
Intervals of Decrease:
 $(-1.5, 1)$

Positive Intervals:
 $\sqrt{(-3, 0)}$ $(2, \infty)$

Negative Intervals:
 $\sqrt{(0, 2)}$ $\sqrt{(-\infty, -3)}$



Average rate of change from -3 to 3:
 $\frac{7}{6}$
 $(-3, 0)$
 $(3, 7)$



$$D: (-\infty, \infty)$$

$$R: [-3, \infty)$$

$$x\text{-int: } 0.5 \text{ \& } 4$$

$$y\text{-int: } 1$$

$$\text{increase: } (-2, -1) \text{ \& } (2, \infty)$$

$$\text{decrease: } (-\infty, -2) \text{ \& } (-1, 2)$$

$$\text{positive: } (-\infty, 0.5) \text{ \& } (4, \infty)$$

$$\text{negative: } (0.5, 4)$$

$$\text{rate of change from } -1 \text{ to } 4:$$

$$-\frac{3}{5}$$

HW #10

Key Features of Graphs