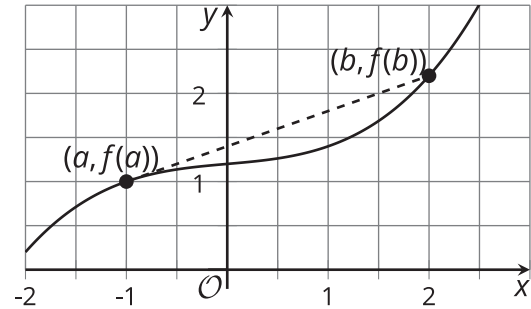


In general, we can calculate the average rate of change of a function f , between input values a and b , by dividing the difference in the outputs by the difference in the inputs.

$$\text{average rate of change} = \frac{f(b) - f(a)}{b - a}$$

If the two points on the graph of the function are $(a, f(a))$ and $(b, f(b))$, the average rate of change is the slope of the line that connects the two points.



Glossary

- average rate of change

Lesson 7 Practice Problems

Problem 1

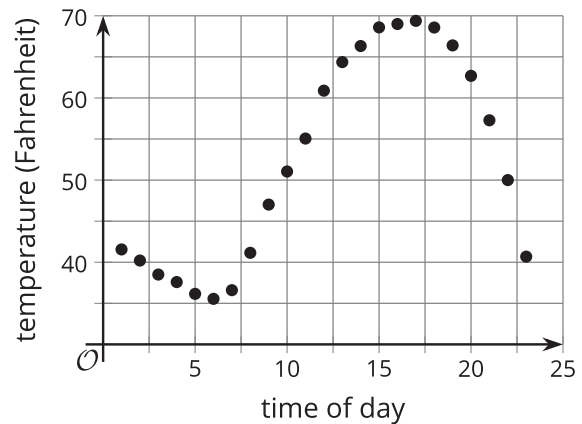
Statement

The temperature was recorded at several times during the day. Function T gives the temperature in degrees Fahrenheit, n hours since midnight.

Here is a graph for this function.

For each time interval, decide if the average rate of change is positive, negative, or zero:

- From $n = 1$ to $n = 5$
- From $n = 5$ to $n = 7$
- From $n = 10$ to $n = 20$
- From $n = 15$ to $n = 18$
- From $n = 20$ to $n = 24$



Solution

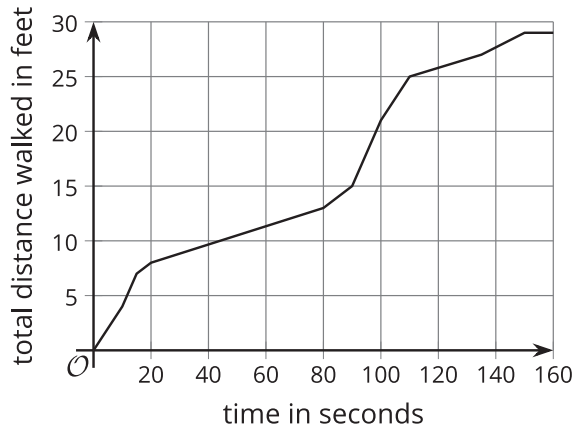
- Negative
- Positive
- Positive
- It appears to be zero

e. Negative

Problem 2

Statement

The graph shows the total distance, in feet, walked by a person as a function of time, in seconds.



- Was the person walking faster between 20 and 40 seconds or between 80 and 100 seconds?
- Was the person walking faster between 0 and 40 seconds or between 40 and 100 seconds?

Solution

- Between 80 and 100 seconds.
- Between 0 and 40 seconds.

Problem 3

Statement

The height, in feet, of a squirrel running up and down a tree is a function of time, in seconds.

Here are statements describing the squirrel's movement during four intervals of time. Match each description with a statement about the average rate of change of the function for that interval.

- | | |
|---|--|
| A. The squirrel runs up the tree very fast. | 1. The average rate of change is negative. |
| B. The squirrel starts and ends at the same height. | 2. The average rate of change is zero. |
| C. The squirrel runs down the tree. | 3. The average rate of change is small and positive. |
| D. The squirrel runs up the tree slowly. | 4. The average rate of change is large and positive. |

Solution

- A: 4
- B: 2
- C: 1
- D: 3

Problem 4

Statement

The percent of voters between the ages of 18 and 29 that participated in each United States presidential election between the years 1988 to 2016 are shown in the table.

year	1988	1992	1996	2000	2004	2008	2012	2016
percentage of voters ages 18-29	35.7	42.7	33.1	34.5	45.0	48.4	40.9	43.4

The function P gives the percent of voters between 18 and 29 years old that participated in the election in year t .

- a. Determine the average rate of change for P between 1992 and 2000.
- b. Pick two different values of t so that the function has a negative average rate of change between the two values. Determine the average rate of change.
- c. Pick two values of t so that the function has a positive average rate of change between the two values. Determine the average rate of change.

Solution

- a. $P(t)$ decreased 1.025% per year between 1992 and 2000.
- b. Sample response: $t = 2008$ and $t = 2012$ with average rate of change $\frac{40.9-48.4}{2012-2008} = -1.875$. The average rate of change is -1.875% per year.
- c. Sample response: $t = 1988$ and $t = 2016$ with average rate of change $\frac{43.4-35.7}{2016-1988} = 0.275$. The average rate of change is 0.275% per year.