

Essential Question: How do we describe relationships using function notation?

Do Now: Read the problem below and complete parts a - c.

A pot of boiling water at 212 degrees Fahrenheit is left in a room that is 65 degrees Fahrenheit. As the water begins to cool, temperature readings are taken each hour and are presented in the table below. In this scenario, the temperature, T , is a function of the number of hours, h .

h hours	0	1	2	3	4	5	6	7
$T(h)$ $^{\circ}\text{F}$	212	141	104	85	76	70	68	66

- a) Find $T(2)$. What does this value represent in the context of the problem?

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At 2 hours, the temperature of the water is 104°F

- b) For what value of h is $T(h) = 76$? What does this value represent in the context of the problem?

$h = 4$

The temperature of the water is 76°F in 4 hours.

- c) Examine the table carefully. Do you think the relationship between time and temperature is linear? Be ready to justify your response.

This relationship is not linear because the ROC (rate of change) is not constant.

Describing Relationships Using Function Notation

1. Neal has a \$5 gift card for music downloads. Each song costs \$1 to download. The amount of money left on the card, M , is a function of the number songs downloaded, x .

- a) Complete the table below that describes the relationship presented above.

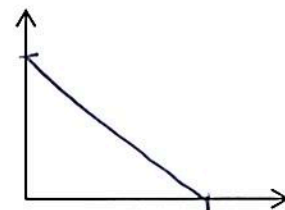
x	0	1	2	3	4	5
$M(x)$	5	4	3	2	1	0

- b) Is the relationship linear? *yes*

- c) Sketch a graph of the relationship.

- d) Can we write an equation in function notation to represent this scenario?

ROC = -1 $M(x) = -x + 5$
 $y\text{-int} = 5$



- e) Would 1.5 represent an appropriate value for the domain of this function? Explain.

No. You can't purchase half a song. (download)

2. Jenna knits scarves and then sells them on Etsy, an online market place. Let $C(x) = 4x + 20$ represent the cost, C , in dollars to produce 0 to 6 scarves.

a) Create a table that describes the relationship between x and $C(x)$.

# of scarves x	0	1	2	3	4	5	6
\$ cost $C(x)$	20	24	28	32	36	40	44

b) What is the meaning of $C(3)$? $= 32$

$(3, 32)$
 ↑ ↑
 scarves \$ cost

It costs \$32 to produce 3 scarves.

c) What is the meaning of the solution to the equation $C(x) = 40$? $x = 5$

$(5, 40)$
 ↑ ↑
 scarves \$ cost

It costs \$40 to produce 5 scarves.

3. Next weekend Marnie wants to attend either carnival A or carnival B. Carnival A charges \$6 for admission and an additional \$1.50 per ride. Carnival B charges \$2.50 for admission and an additional \$2 per ride.

a) In function notation, write a cost equation $A(x)$ which represents the total cost of attending carnival A and going on x rides. In function notation, write a cost equation $B(x)$ which represents the total cost of attending carnival B and going on x rides.

$x = \# \text{ of rides}$

$$A(x) = 6 + 1.5x$$

$$B(x) = 2.50 + 2x$$

b) Determine the number of rides Marnie can go on such that the total cost of attending each carnival is the same.

$$6 + 1.5x = 2.50 + 2x$$

$$3.50 + 1.5x = 2x$$

$$\frac{3.50}{.5} = \frac{.5x}{.5}$$

$$x = 7$$

c) Marnie wants to go on five rides. Which carnival should she attend? Justify your response.

carnival A

$$A(x) = 6 + 1.5x$$

$$A(5) = 6 + 1.5(5)$$

$$= 6 + 7.5$$

$$= 13.5$$

carnival A costs \$13.50 for 5 rides

carnival B

$$B(x) = 2.50 + 2x$$

$$B(5) = 2.50 + 2(5)$$

$$= 12.50$$

It costs \$12.50 to go on 5 rides at carnival B.

should attend carnival B because $12.50 < 13.50$