3.2 Linear Functions

Monday, September 23, 2019 7:46 AM

Warm Up

Find the linear equation for the following data tables.

x	1	2	3	4
y	13	16	19	22

x	1	2	3	4
y	4	9	14	19

Essential Question

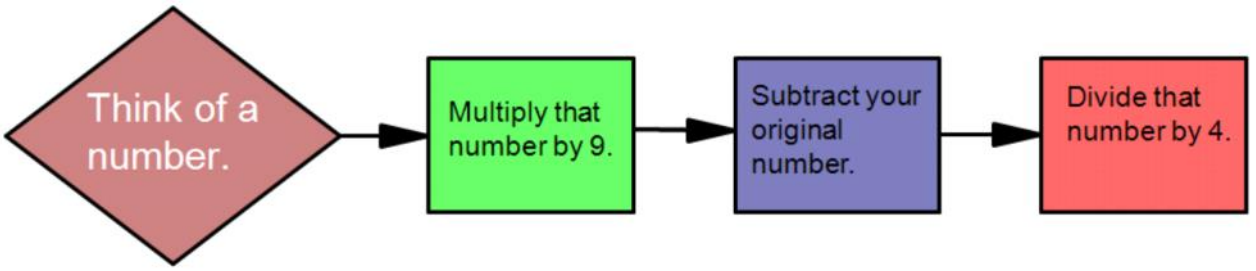
How can you identify a linear function?

Needed Vocab:

- **Function Notation**
- **Linear Function**

Goal: "I can. . .

Identify, evaluate, graph, and write linear functions."



Try this puzzle with 6 different integers.

Integer	13	2	6	5	7	8
Result	26	4	12	10	14	16

Do you recognize a patter from the puzzle we just did? If so, can you prove it will work for all numbers?

original # · 2.

If original # is x.

$$\frac{9x - x}{4}$$

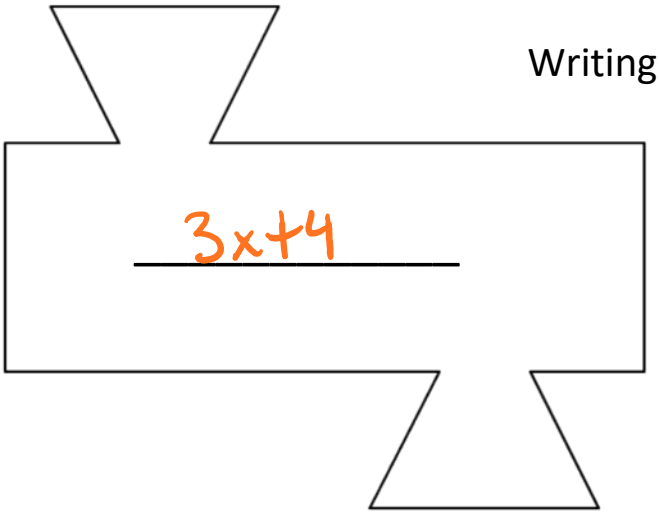
simplify

$$\frac{8x}{4}$$

$$2x$$

Example 1 **Evaluate Functions in Function Notation**

X How can you represent a function rule?



$f(x)$

Writing a function for $y=3x+4$?

normal outputs a y. but for a function it's f(x).

$f(x)=3x+4$

Function Notation is a method of writing variables as a function of other variables. The variable x is used to find the value of y. This helps distinguish between different functions and the relationships between the variables can be used to solve problems and make predictions.

Nothing else changes, it's still an equation it just looks different.

What is the value of $g(x) = 5x + 1, when\ x = 3$?

$g(3) = 5(3) + 1$

$g(3) = 15 + 1$

$g(3) = 16$

function notation allows us to see the point in the equation

3,16 its entirety

Evaluate each function for x=4

a) $g(x) = -2x - 3$

(b) $h(x) = 7x + 15$

Example 2 Write a Linear Function Rule

The cost to make 4 bracelets is shown in the table. How can you determine the cost to make any number of bracelets?

$\boxed{f(x) = 15x + 2}$

number of bracelets Ø	1	2	3	4
cost 2	17	32	47	62

+15 +15 +15 +15

6

coefficient of x

Write a linear function for the data in each table using function notation.

x	1	2	3	4	5
y	6.5	13	19.5	26	32.5

x	1	2	3	4	5
y	1	4	7	10	13

Example 3 **Analyze a Linear Function**

Tamika records the outside temperature at 6:00 a.m. The temperature increases by 2°F every hour for the next 6 hours. If the temperature continues to increase at the same rate, what will the temperature be at 2:00 p.m.? @ 6:00 am

initial temp. t=Ø

temperature be at 2:00 p.m.?

$+\frac{2^\circ}{1\,hr}$

@ 6:00 am

$t=0$

@ 2:00 pm

$t=8$

(8hrslater)

$f(t)=2t-3$

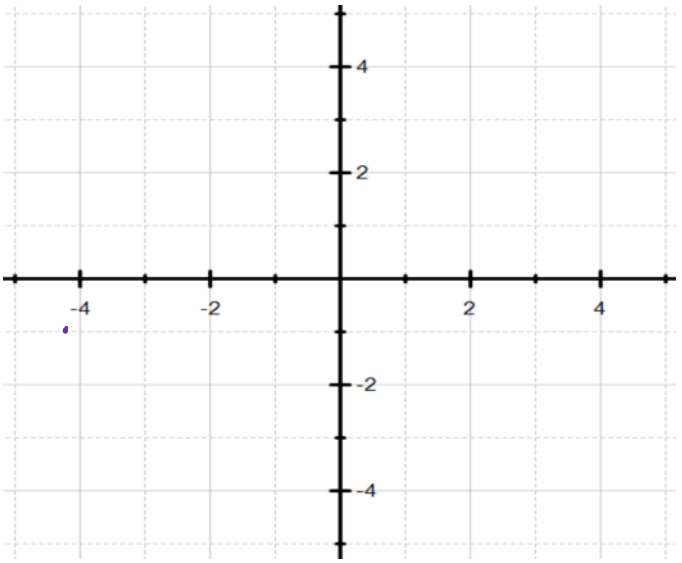
$f(8)=2(8)-3$

$f(8)=16-3$

$\boxed{f(8)=13^\circ}$

A LINEAR FUNCTIONS is a function whose graph is a line.

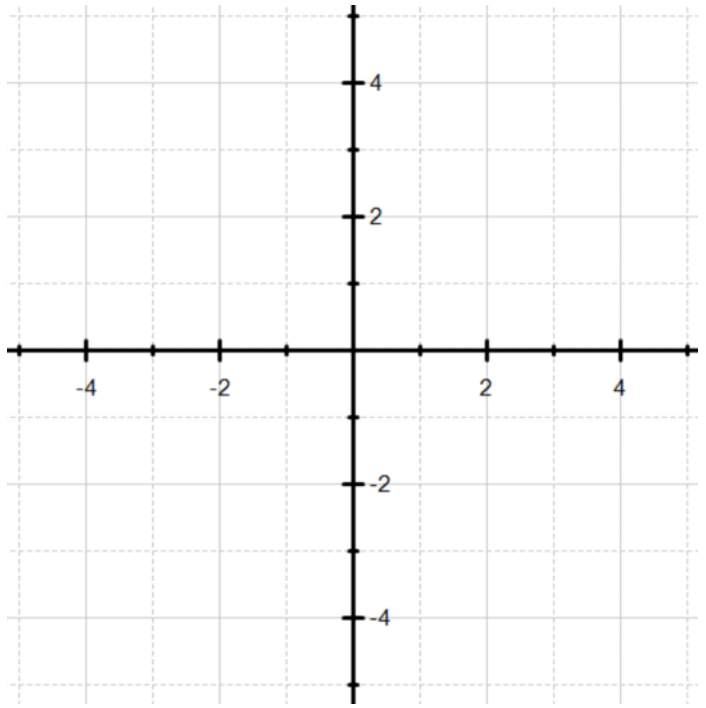
Does using a linear function realistically represent the temperature for the domain of 0<x<24? Explain.



Sketch the graph of the following functions.

A) $f(x) = -x + 1$

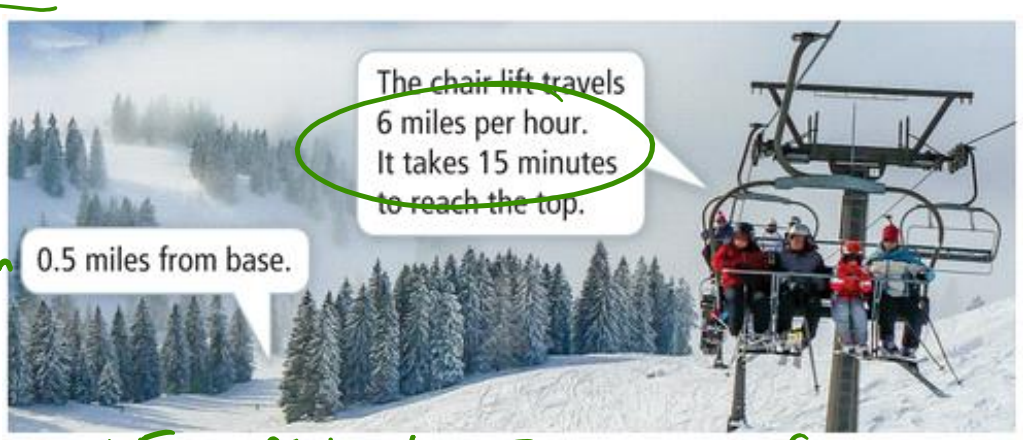
B) $g(x) = 3x + 1$



Example 4

Use Linear Functions to Solve Problems

A chairlift starts 0.5 mi above the base of a mountain and travels up the mountain at a constant speed. How far from the base of the mountain is the chairlift after 10 minutes?



$\frac{6\text{mi}}{1\text{hr}} \cdot \frac{1\text{hr}}{60\text{min}}$

$\frac{.1\text{mi}}{\text{min.}}$

$y = .1x + .5 \therefore f(x) = .1x + .5$

$f(10) = .1(10) + .5$

$f(10) = 1 + .5 = \boxed{1.5}$

max for $x = 15$

D: $0 \le x \le 15$

A chairlift starts 0.5 mi above the base of a mountain and travels up the mountain at a constant speed of 6 mph. How would the function, graph, and equation change if the speed is 4mph? What is the effect on the domain?

Linear Function Representations

WORDS Linear functions are represented by words, rules, tables, or graphs. Function notation tells us the name of a function and the input variable.

ALGEBRA $f(x) = -2x + 1$

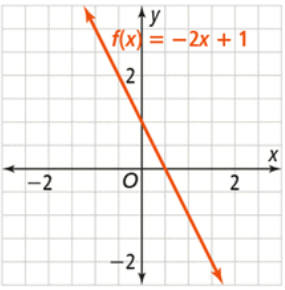
"f of x"

TABLE

x	-2	-1	0	1	2
$f(x)$	5	3	1	-1	-3

The table shows the domain and range of the function.

GRAPH The graph of the function $f(x) = -2x + 1$ is the graph of the linear equation $y = -2x + 1$.



Homework

Pg. 100
9, 12-19, 21, 22, 24, 29, 32, 33