

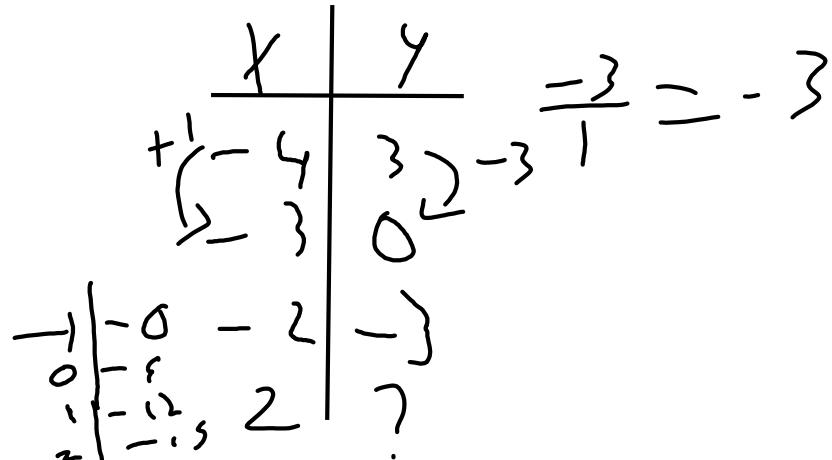
Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Lesson 4: Linear Regression****Do Now**

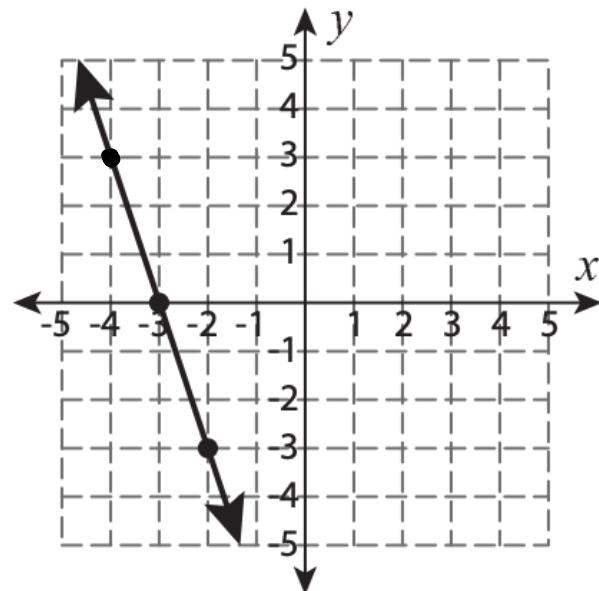
1. Write an equation from the graph above. What is the value of y when x is 2?

$$y = mx + b$$



Equation: $y = -3x - 9$ $y - 0 = -3(x + 3)$

When x is 2, y is -15



2. Round each number to the place value given:

- a. $\overset{1}{\cancel{5}}\overset{2}{\cancel{6}}\overset{8}{\cancel{2}}1$, round to nearest tenth
 $5.6 \text{ or } 5.6000$

if its 5 and above round up, + 1 and everything behind becomes 0
 if its 4 and below round down, the number and everything behind becomes 0 and
 the number behind the number rounded

- b. $3.\overset{2}{\cancel{5}}\overset{2}{\cancel{8}}2$, round to nearest hundredth
 3.52

- c. $10.62\overset{4}{\cancel{9}}$, round to nearest thousandth
 10.625

Name: _____

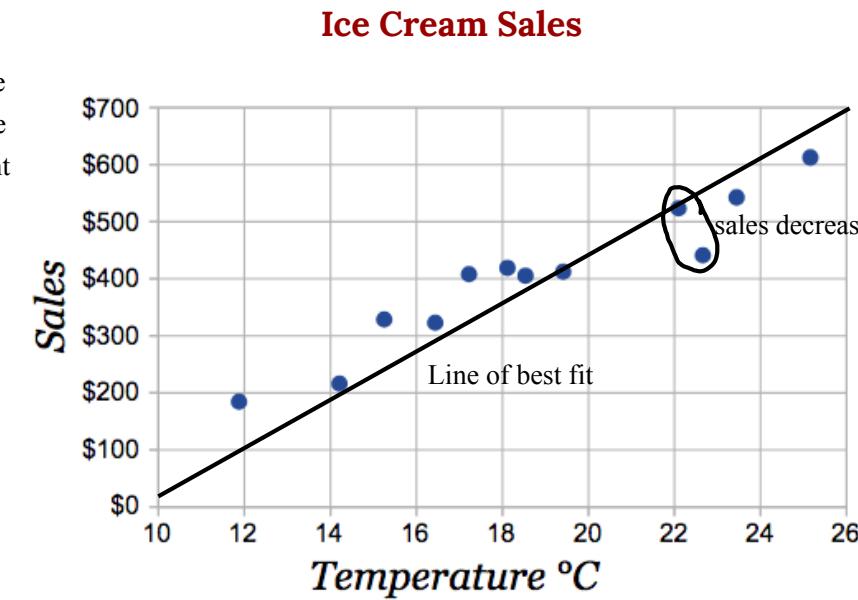
Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Explore**

Mr. Saleh and Mr. Ierubino decide to sell ice cream during summer break. They want to find the relationship (if any) between ice cream sales and the temperature outside. Their data is recorded in a table and a **scatter plot**.

most of the time
approximately the
warmer it gets is
the more Ice cream
sales (sales go up
when temp goes
up)

sales decreased when it got hotter



Ice Cream Sales vs Temperature	
Temperature °C	Ice Cream Sales
14.2°	\$215
16.4°	\$325
11.9°	\$185
15.2°	\$332
18.5°	\$406
22.1°	\$522
19.4°	\$412
25.1°	\$614

Scatter Plot - points are all over the place so it wont work on a Linear function

What does the graph above show us? What can you infer from this data?

$$\text{LinReg}(ax+b) = \text{slope-intercept}$$

$$a = \text{slope} = 33.02322925$$

$$b = y\text{-intercept} = -213.089642$$

$$a = 33.02322925$$

$$33.023$$

$$b = -213.089642$$

$$-213.09$$

We will use our graphing calculator to generate a linear regression equation that models our ice cream sales based on the temperature. Round all values to the nearest **thousandth** place.

★ **Linear Regression Equation:** $y = 33.023x - 213.09$

- ★ Based on our equation, predict the amount of ice cream sales when the temperature is 20 degrees Celsius.
Round to the nearest whole number.

Linear Regression Equation: a line drawn on a scatter plot that is close to most of the data points (line of best fit)
a calculator generated equation used to model a linear relationship and make predictions

Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions

Unit 3: Graphing Calculator Tips

Linear Regression

- Once you have entered the data, press **STAT** then **CALC** [Use the right arrow].

Step 2. Go to CALC.

```
EDIT TESTS  
1:1-Var Stats  
2:2-Var Stats  
3:Med-Med  
4:LinReg(ax+b)  
5:QuadReg  
6:CubicReg  
7:QuartReg
```

- Highlight the fourth option, **LinReg (ax + b)**, and press Enter.



- Scroll down to calculate and press Enter.

```
LinReg(ax+b)  
Xlist:L1  
Ylist:L2  
FreqList:  
Store RegEQ:Y1  
Calculate
```

- For the linear regression, the *a*-value is the **slope** and the *b*-value is the **y-intercept**.

```
LinReg  
y=ax+b  
a=1.637931034  
b=1.103448276  
r2=.9634888438  
r=.9815746756
```

Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Practice**

1. The data table below shows water temperatures at various depths in an ocean.

Water Depth (x) (meters)	Temperature (y) (°C)
50	18
75	15
100	12
150	7
200	1

Part A: Write a linear regression equation that approximates the temperature. Round all values to the nearest **thousandth**.

$$\begin{aligned}y &= ax + b \\y &= -.1117241379x + 23.44827586 \\y &= -.112x + 23.448\end{aligned}$$

$$\begin{aligned}-.1117241379 \\-.112 \\23.44827586 \\23.448\end{aligned}$$

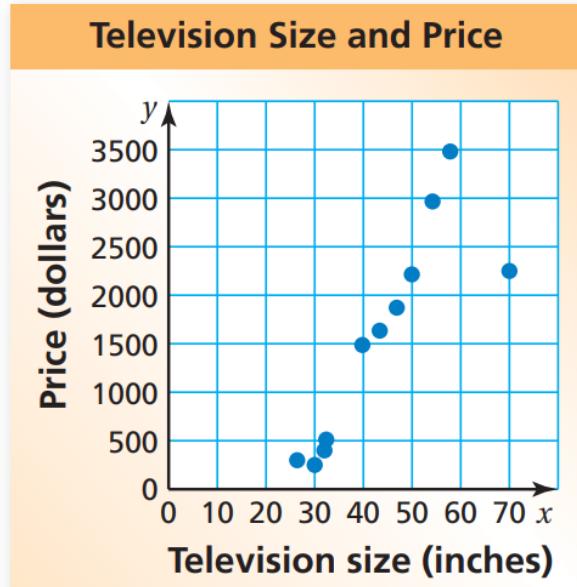
Linear Regression Equation: _____ $y = -.112x + 23.448$

Part B: Using this equation, predict the temperature (°C), to the nearest integer, at a water depth of 255 meters.

2. Does the graph show a positive, negative or no association?

Explain your answer.

Predict how much a 35 inch tv would cost



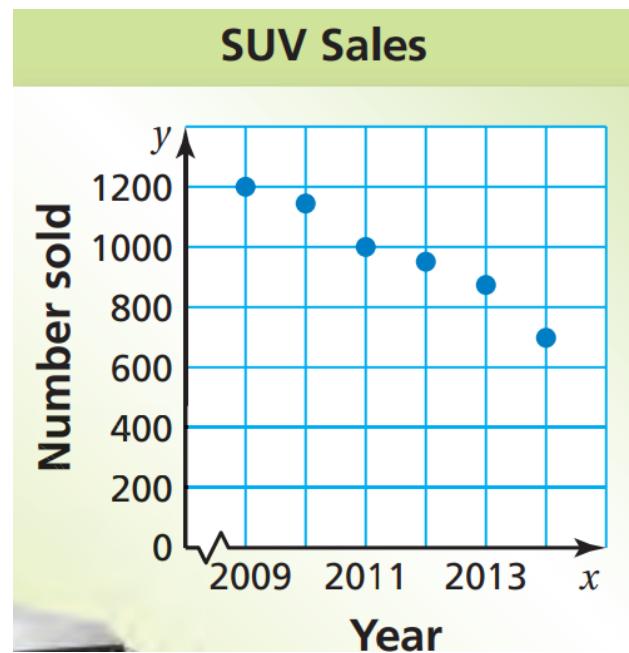
Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Practice**

3. The scatter plot shows the numbers of sport utility vehicles sold in a city from 2009 to 2014.

Describe the relationship shown by the data



In what year were 1000 SUVs sold?

About how many SUVs were sold in 2012?

4. The table shows the numbers y of visitors to a particular beach and the average daily temperatures x .

Part A: Write a linear regression equation that approximates the temperature. Round all values to the nearest ***hundredth***.

Average Daily Temperature (°F)	Number of Beach Visitors
80	100
82	150
83	145
85	190
86	215
88	263
89	300
90	350

Linear Regression Equation: _____

Part B: Interpret the slope and y-intercept of the linear regression (include units).

Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Practice**

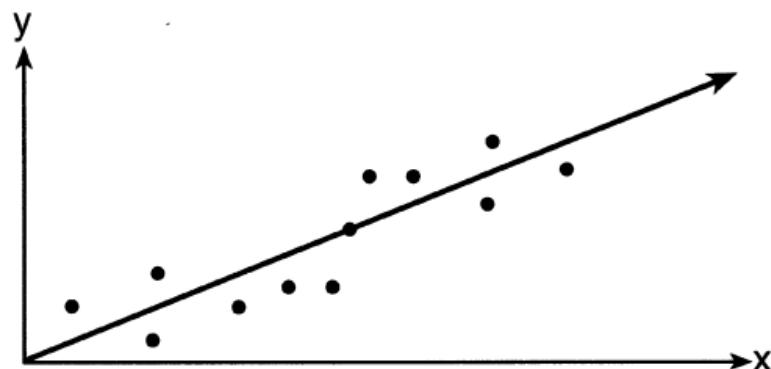
5. The table shows the average number of minutes y per kilometer for runners and the total distance of a running race, x (in kilometers).

x	3.1	6.2	9.3	12.4	15.5	18.6	21.7	24.8	27.9
y	5.4	5.6	5.7	5.9	6.0	6.1	6.3	6.5	6.9

Use a graphing calculator to find an equation of the line of best fit. Round all values to the nearest **tenth**.

Predict the average number of minutes per kilometer when the distance of a race is 31 kilometers.

6. A line of best fit has been drawn on the scatter plot below.



The relationship between these variables can be described as having

- 1) a negative correlation
- 2) no correlation
- 3) a positive correlation
- 4) zero correlation

Name: _____

Date: _____

Grade 8 Math - Unit 3: Applications of Linear Functions**Practice**

7. The table shows the total number y of rolls of wrapping paper sold by a student after x weeks.

x	1	2	3	4	5	6
y	3	5	9	12	17	24

Write a linear equation that models the number of rolls of wrapping paper as a function of the number of weeks.

Interpret the slope and y -intercept of the line of fit.