

Determine a reasonable domain and range for the situation. Write your answer in set notation.

1. A professional basketball player earns \$150,000 for each game played, and there are 82 games in a season.
2. You eat up to 5 meals a day with an average of 844 milligrams of potassium at each meal.
3. The average amount of money spent on food per person at an amusement park that can accommodate 2500 people is \$5.25.

domain: Input values
x-coordinates

Range: output values
y-coordinates

* Students pair up to do these.

Warm Up

Find the mean of the data set. Round to the nearest tenth, if necessary.

1. 5, 2, 7, 4, 6, 6, 6
2. 11, 6, 8, 8, 11, 13, 9, 7, 11
3. 10, 9, 6, 10.1, 10.9, 9.6, 9.8, 16.9, 10.1
4. Salaries at a company: \$216,000 \$95,000 \$80,600

mean = average

Cumulative Warm Up

Essential Question

How can you use a linear function to model and analyze a real-life situation?

Correlation coefficient:

A number r from -1 to 1 that measures how well a line fits a set of data pairs (x, y)

- What you will learn:
- Write equations of linear functions using points and slopes
 - Find lines of best fit

line of fit: a line that models data in a scatter plot.

line of best fit: a line that lies as close as possible to all of the data points in a scatter plot.

Essential Question

Previous vocab: slope, slope-intercept form, point slope form, Scatter plot

Work with a partner. A company purchases a copier for \$12,000. The spreadsheet shows how the copier depreciates over an 8-year period.

	A	B
1	Year, t	Value, V
2	0	\$12,000
3	1	\$10,750
4	2	\$9,500
5	3	\$8,250
6	4	\$7,000
7	5	\$5,750
8	6	\$4,500
9	7	\$3,250
10	8	\$2,000

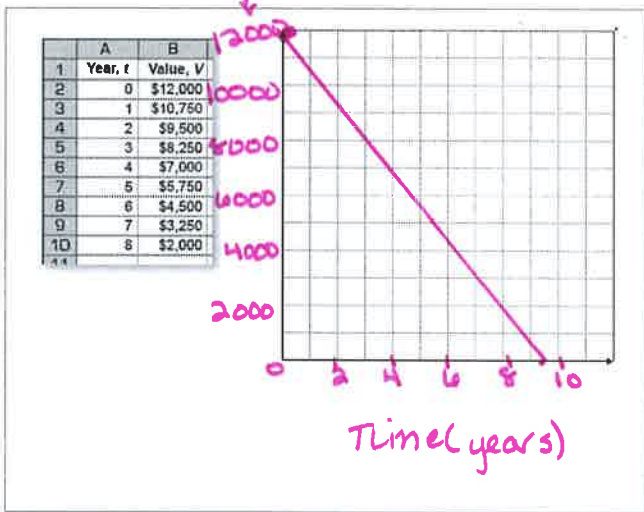
- Write a linear function to represent the value V of the copier as a function of the number t of years.
- Sketch a graph of the function. Explain why this type of depreciation is called *straight line depreciation*.
- Interpret the slope of the graph in the context of the problem.

a) $V(t) = 12,000 - 1250t$

b) have students graph (next slide)

The value decreases, or depreciates, at a constant rate.

Exploration 1

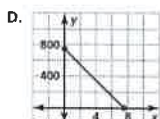
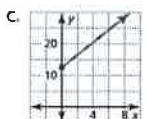
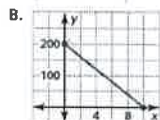
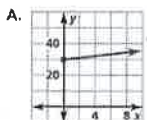


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c.) the value of the copier decreases \$1250 per year.

Work with a partner. Match each description of the situation with its corresponding graph. Explain your reasoning.

- A person gives \$20 per week to a friend to repay a \$200 loan.
- An employee receives \$12.50 per hour plus \$2 for each unit produced per hour.
- A sales representative receives \$30 per day for food plus \$0.565 for each mile driven.
- A computer that was purchased for \$750 depreciates \$100 per year.



Exploration 2

a) B ; y-intercept = 200
 $m = -20$

b) C : $b = 12.5$
 $m = 2$

c) A : $b = 30$
 $m = .565$

d) D. $b = 750$
 $m = -100$

Core Concept

Writing an Equation of a Line

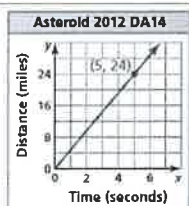
- Given slope m and y -intercept b Use slope-intercept form:
 $y = mx + b$
- Given slope m and a point (x_1, y_1) Use point-slope form:
 $y - y_1 = m(x - x_1)$
- Given points (x_1, y_1) and (x_2, y_2) First use the slope formula to find m . Then use point-slope form with either given point.

Core Concept

slope formula

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The graph shows the distance Asteroid 2012 DA14 travels in x seconds. Write an equation of the line and interpret the slope. The asteroid came within 17,200 miles of Earth in February, 2013. About how long does it take the asteroid to travel that distance?



$$17,200 = 4.8x$$

$$3583.33x$$

3600 seconds in 1 hour \rightarrow
takes about an hour to
travel 17,200 miles.

Example 1

$$\begin{matrix} (0,0) & (5,24) & \frac{24-0}{5-0} \\ x_1, y_1 & x_2, y_2 & \end{matrix}$$

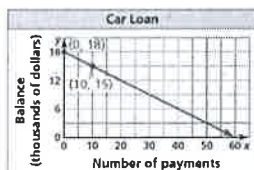
$$m = \frac{24}{5}$$

$$y = mx + b$$

$$y = \frac{24}{5}x \quad \text{or} \quad y = 4.8x$$

don't need to add the
y-intercept when it equals
zero.

1. The graph shows the remaining balance y on a car loan after making x monthly payments. Write an equation of the line and interpret the slope and y -intercept. What is the remaining balance after 36 payments?



$$y = -0.3x + 18$$

the balance decreases
\$300 per payment and
the initial amount is
\$18,000 ; \$7200

Monitoring Progress 1

* Student practice

Two prom venues charge a rental fee plus a fee per student. The table shows the total costs for different numbers of students at Lakeside Inn. The total cost y (in dollars) for x students at Sunview Resort is represented by the equation $y = 10x + 600$.

Which venue charges less per student? How many students must attend for the total costs to be the same?

Number of students, x	Total cost, y
100	\$1,500
125	\$1,800
150	\$2,100
175	\$2,400
200	\$2,700

Example 2

Find slope: $m = \frac{1800 - 1500}{125 - 100}$

$m = \frac{300}{25} = 12$

$y - y_1 = m(x - x_1)$

$y - 1500 = 12(x - 100)$

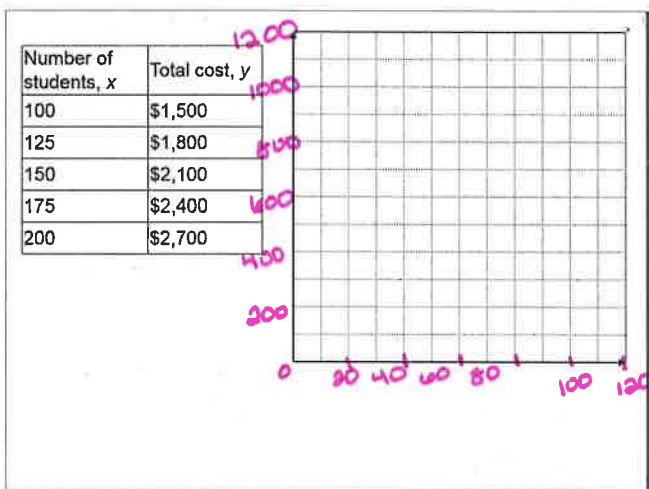
$y - 1500 = 12x - 1200$

$y = 12x + 300$

$10x + 600 = 12x + 300$

$300 = 2x$

$150 = x$



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Graph.

2. WHAT IF? Maple Ridge charges a rental fee plus a \$10 fee per student. The total cost is \$1900 for 140 students. Describe the number of students that must attend for the total cost at Maple Ridge to be less than the total costs at the other two venues. Use a graph to justify your answer.

• add another line to the graph and interpret.

Core Concept

Finding a Line of Fit

- Step 1** Create a scatter plot of the data.
- Step 2** Sketch the line that most closely appears to follow the trend given by the data points. There should be about as many points above the line as below it.
- Step 3** Choose two points on the line and estimate the coordinates of each point. These points do not have to be original data points.
- Step 4** Write an equation of the line that passes through the two points from Step 3. This equation is a model for the data.

Core Concept

line of fit: a line that models data in a scatter plot.

The table shows the femur lengths (in centimeters) and heights (in centimeters) of several people. Do the data show a linear relationship? If so, write an equation of a line of fit and use it to estimate the height of a person whose femur is 35 centimeters long.

Femur length, x	Height, y
40	170
45	183
32	151
50	195
37	162
41	174
30	141
34	151
47	185
45	182

(Insert slide w/ graph)

Example 3

graph points

- What type of correlation?
 - Positive
 - Negative
 - No correlation

Use the linear regression feature on a graphing calculator to find an equation of the line of best fit for the data in Example 3. Estimate the height of a person whose femur is 35 centimeters long. Compare this height to your estimate in Example 3.

Example 4

Can use desmos to do - but also calculate by hand.

