Scatter Plots
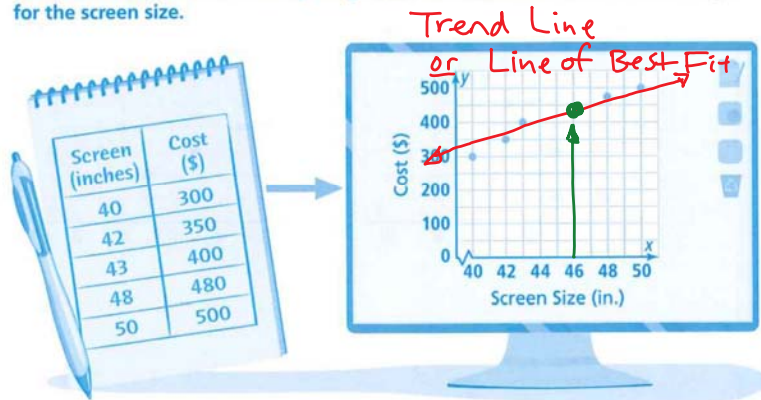- real world data

⟳ MODEL & DISCUSS

Nicholas plotted data points to represent the relationship between screen size and cost of television sets. Everything about the televisions is the same, except for the screen size.

Trend Line or Line of Best Fit

60

Screen (inches)	Cost ($)
40	300
42	350
43	400
48	480
50	500

Cost ($) — 0, 100, 200, 300, 400, 500
Screen Size (in.) — 40 42 44 46 48 50

A. Describe any patterns you see.

Screen Size ↑↓ ... Cost ↑↓

B. What does this set of points tell you about the relationship of screen size and cost of the television?

C. Reason Where do you think the point for a 46-inch television would be on the graph? How about for a 60-inch TV? Explain. © MP.2
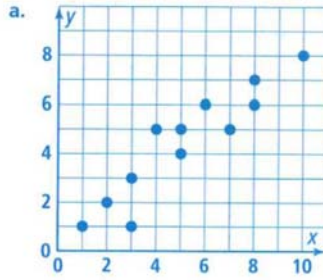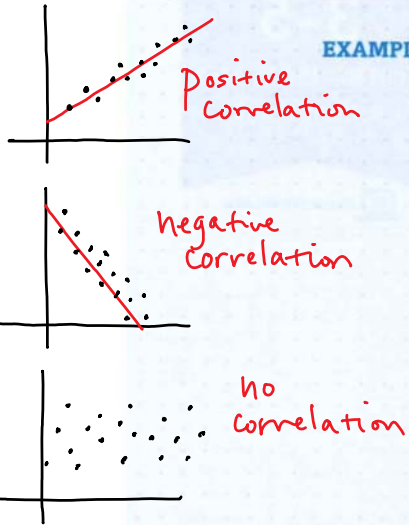
HABITS OF MIND

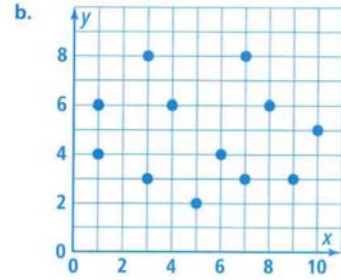**Use Appropriate Tools** How can a table of values help determine whether data can be modeled by a linear function? © MP.5

Slope: $\dfrac{\text{Change in Cost } \$\$}{\text{Change in Screen Size}}$

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(handwritten margin notes, left side)
- Positive correlation
- negative correlation
- no correlation

Assess

EXAMPLE 1 ✅ Try It! Understand Association

1. Describe the type of association each scatter plot shows.

a.

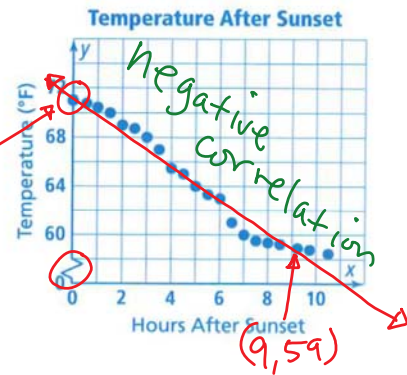*(handwritten)* Positive Correlation

b.

(handwritten) no correlation

HABITS OF MIND

Reason What features of two data sets can help you determine whether the data sets have a negative, positive, or no association? © MP.2

(handwritten) downhill   uphill   neither

(handwritten) Slope of Line of Best Fit...

EXAMPLE 2 ✅ Try It! Understand Correlation

2. How can the relationship between the hours after sunset *x* and the temperature *y* be modeled? If the relationship is modeled with a linear function, describe the correlation between the two data sets.

Temperature After Sunset

(handwritten) negative correlation

(handwritten) (0, 71)

(handwritten) (9, 59)

y-axis: Temperature (°F) — 60, 64, 68
x-axis: Hours After Sunset — 2, 4, 6, 8, 10

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EXAMPLE 3 ☑ **Try It!** **Write the Equation of a Trend Line**

3. a. What trend line, in slope-intercept form, models the data from the Example 2 Try It?

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

$x_1\ y_1 \quad x_2\ y_2$

$(0, 71), (9, 59)$

$y = mx + b$

b

$$= \frac{59 - 71}{9 - 0} = \frac{-12}{9} = \frac{-4}{3}$$

71

$$\boxed{y = \frac{-4}{3}x + 71}$$

b. Explain why there could be no data points on a trend line, yet the line models the data.

EXAMPLE 4 ☑ **Try It!** **Interpret Trend Lines**

4. What is the x-intercept of the trend line? Is that possible in a real-world situation? Explain.

• Set $y = 0$

ex) $y = \frac{-4}{3}x + 71$

$\left(0 = \frac{-4}{3}x + 71\right) \cdot 3$

$0 = -4x + 213$

$$\frac{-213}{-4} = \frac{-4x}{-4}$$
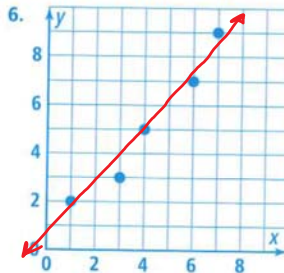
$\boxed{53.25 = x}$

HABITS OF MIND

Construct Arguments What argument can you construct to defend a prediction based on a trend line? Explain. Ⓖ **MP.3**

☑ Do You UNDERSTAND?

1. ESSENTIAL QUESTION How can you use a scatter plot to describe the relationship between two data sets?

2. Error Analysis A student claims that if *y*-values are not increasing as *x*-values increase, then the data must show a negative association. Explain the error the student made. © MP.3

3. Vocabulary In a scatter plot that shows *positive association*, describe how *y*-values change as *x*-values increase

4. Make Sense and Persevere Does a trend line need to pass through all the points in a scatter plot? Explain. © MP.1

5. Communicate Precisely Describe how the point-slope formula is useful when writing the equation for a trend line. © MP.6

Do You KNOW HOW?

Describe the type of association between *x* and *y* for each set of data. Explain.

6.

x ↑ *y* ↑
positive correlation

7.

x	4	6	7	9	10
y	9	7	5	3	3

x ↑
y ↓
negative correlation

8. The table shows the hours of studying *x* and a person's test score *y*. What is the equation of a trend line that models the data? What does the slope of your trend line represent?

Hours of Studying	0	1	1	2	3
Test Score	77	80	83	87	92