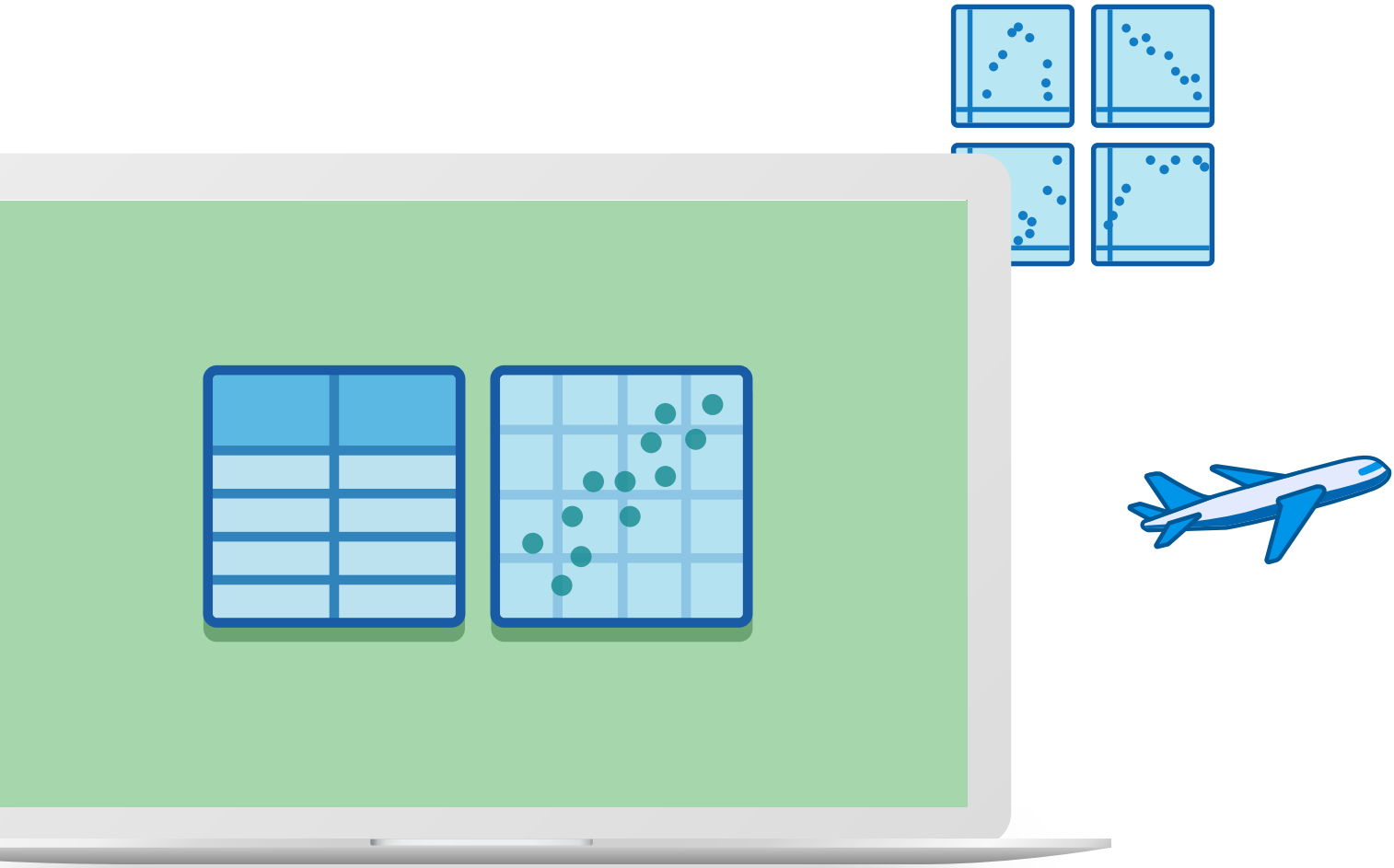
Amplify Desmos Math
CALIFORNIA

Grade 8

UNIT 6 | SUB-UNIT 1

Organizing Numerical Data



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Amplify Desmos Math
CALIFORNIA

Grade 8

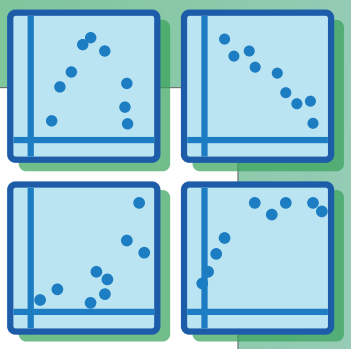
Unit 6: Associations in Data

Sub-Unit 1: Organizing Numerical Data

Student Edition

Unit 6

Associations in Data



Big Ideas in This Unit

CC1 Interpret Scatter Plots | Data, Graphs, and Tables | CC2 Slopes and Intercepts | Linear Equations | Multiple Representations of Functions

Questions for Investigation

- What is a scatter plot and what can it tell you?
- What are some ways you can describe trends in data?
- How can you analyze data with two variables that are categories instead of numbers?

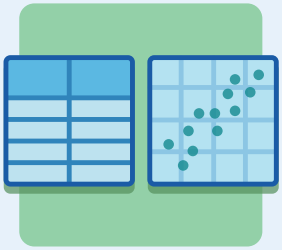
Explore: Changes in the Ozone Layer
How is the ozone layer changing?

Sub-Unit

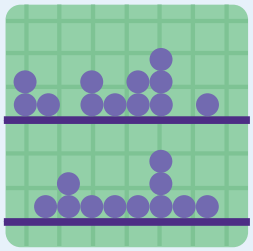
1

Organizing Numerical Data

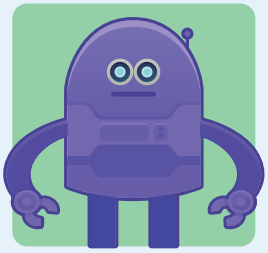
Explore
Changes in the Ozone Layer



Lesson 1
Click Battle



Lesson 2
Wingspan



Lesson 3
Robots

Name: ..... Date: ..... Period: .....

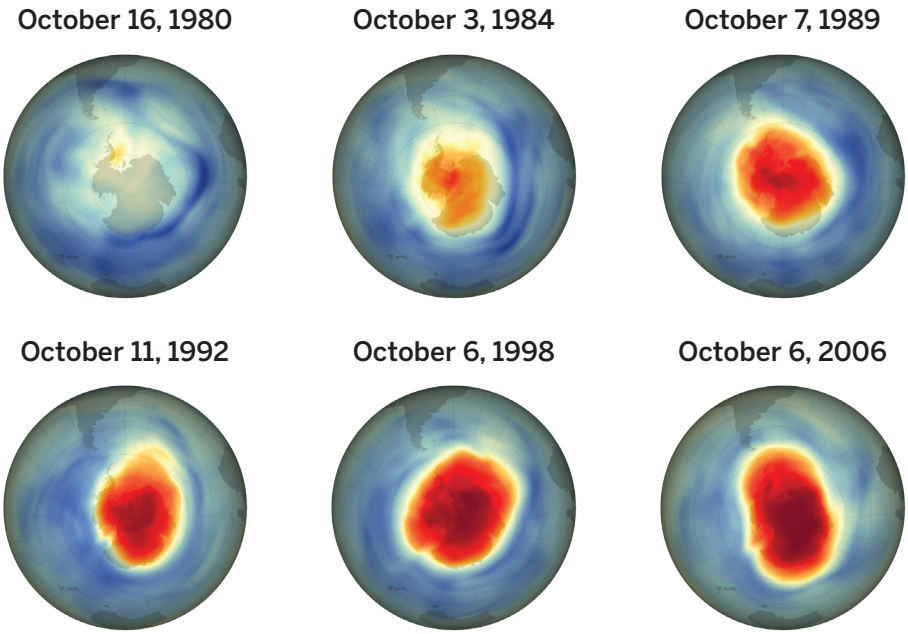
Interpret Scatter Plots | Building Toward 8.SP.1, SMP.2, SMP.4

Explore: Changes in the Ozone Layer

How is the ozone layer changing?

Warm-Up

1. The images show the hole in the ozone layer over Antarctica. The size and shape of the hole are monitored yearly.



"World of Change: Ozone Hole." NASA Earth Observatory

Discuss: What do you notice? What do you wonder?

Name: ..... Date: ..... Period: .....

The Ozone Layer

2. The darker red shows a "hole" in the ozone layer. This is not a hole you can see with your eyes. Instead, it is the thinning of the ozone layer.

After examining the images from the Warm-Up, which statement do you agree with?

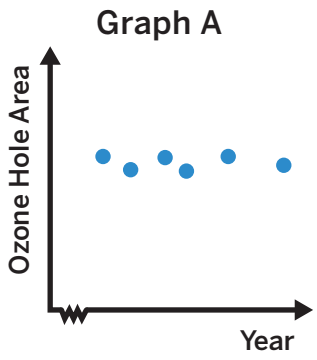
A. The size of the hole in the ozone layer seems to be decreasing.

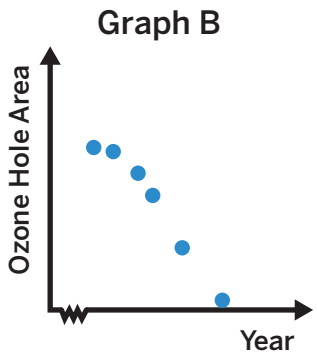
B. The size of the hole in the ozone layer seems to be increasing.

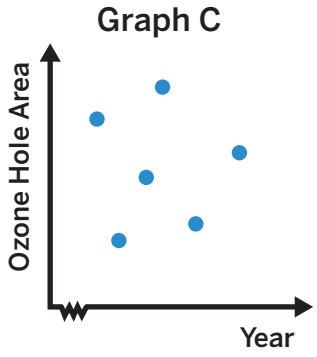
C. The size of the hole in the ozone layer seems to remain the same each year.

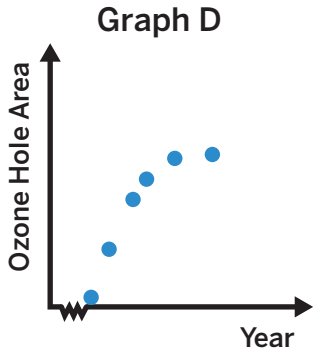
D. The size of the hole in the ozone layer does not seem to change in any pattern.

3. **Data Talk!** Which graph do you think could represent the changing size of the ozone hole from 1980 to 2006? Circle one.









Explain your thinking.

Name: ..... Date: ..... Period: .....

The Ozone Layer (continued)

The ozone layer acts like an invisible shield and protects Earth by filtering out most of the Sun's ultraviolet (UV) radiation. If the size of the ozone hole increases, we have less protection from ultraviolet radiation.

4. Which do you think could have damaged the ozone layer?

people	refrigerators	water pollution
bicycles	electric cars	air conditioners

Could damage the ozone layer	Could not damage the ozone layer	I'm unsure

5. Which do you think could be affected by the damaged ozone layer?

a person's lungs	marine life	a person's health
plants	a person's skin	air quality

Could be affected by damaged ozone layer	Could not be affected by the damaged ozone layer	I'm unsure

6. There are changes to the ozone layer even until this day and data shows that our actions matter.

Discuss: What information could you collect to help determine whether your responses are correct?

Name: ..... Date: ..... Period: .....

Building Math Habits of Mind

Discuss:

- Which of these habits of mind did you strengthen during this activity?
- How did you use the one(s) you selected?

I can slow down and first make sense of a challenging problem before trying to solve it.

Not yet Almost I got it!

I can represent real-world problems and interpret their solutions within the context of the problem.

Not yet Almost I got it!

I can justify my thinking and ask questions to help me understand the thinking of others.

Not yet Almost I got it!

I can apply the math that I know to solve real-world problems, making assumptions and revising my thinking as needed.

Not yet Almost I got it!

I can select an appropriate tool to help me solve problems.

Not yet Almost I got it!

I can communicate my thinking and solutions clearly to others.

Not yet Almost I got it!

I can look for structure or patterns to help me solve problems.

Not yet Almost I got it!

I can look for repeated calculations and other repeated steps to make generalizations.

Not yet Almost I got it!

Unit 6
Lesson
1

Name: ..... Date: ..... Period: .....

Interpret Scatter Plots | Slopes and Intercepts | 8.SP.1, SMP.7

Click Battle

Let's find ways to show patterns in data.

Warm-Up

1. Tap your pencil on your desk as many times as you can for 2 seconds. Record your number of taps.

2. Tap your pencil on your desk as many times as you can for 6 seconds. Record your number of taps.

Activity 1

Name: Date: Period:

Organizing Data

3 **Data Talk!** Let's look at some class data about button clicks, which are similar to pencil taps.

a. Organize the data in a way that makes sense to you.

b. **Discuss:** What patterns do you see in the data?

4 Let's look at one way to represent the data. What do you notice?

5 **Data Talk!** Let's look at another way to represent the data.

Discuss the connections do you see between the table and graph.

Activity 2

Name: ..... Date: ..... Period: .....

Make a Prediction

Data Talk! Here is click data organized as a list, table, and scatter plot.

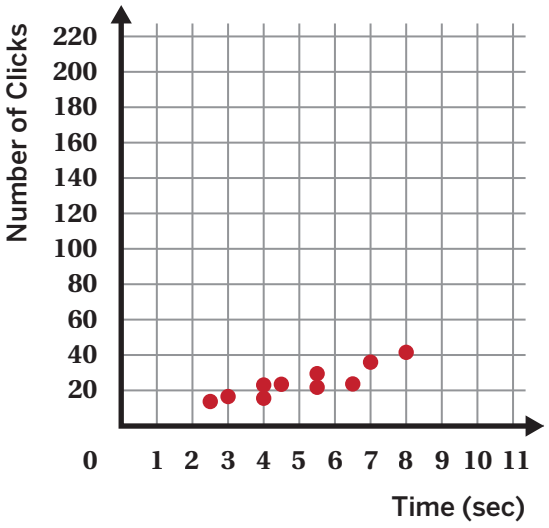
List

14 clicks in 2.5 seconds	24 clicks in 6.5 seconds
17 clicks in 3 seconds	30 clicks in 5.5 seconds
16 clicks in 4 seconds	24 clicks in 4.5 seconds
42 clicks in 8 seconds	36 clicks in 7 seconds
22 clicks in 5.5 seconds	23 clicks in 4 seconds

Table

Time (sec)	Number of Clicks
2.5	14
3	17
4	16
4	23
4.5	24
5.5	22
5.5	30
6.5	24
7	36
8	42

Scatter Plot



6 Select a representation and use it to answer this question:
How many clicks do you think a typical student in your class would make in 10 seconds?

Explain your thinking.

7 Test your prediction by counting the number of pencil taps you can make in 10 seconds.

8 Synthesis

Data Talk! Discuss some advantages of using a list, a table, or a scatter plot to organize data.

11 Summary 6.01

You can organize and display data that includes numbers in different ways, including in a table and in a **scatter plot**.

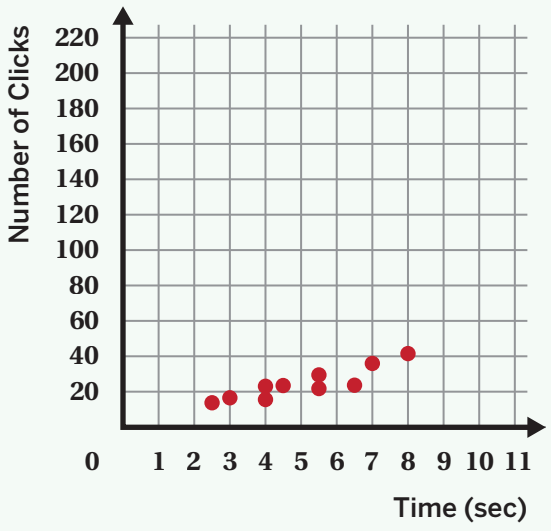
A table and a scatter plot both display the same data, but can be helpful in different ways. For example, you can use a scatter plot to investigate connections between two variables, while a table is helpful for looking for the exact values of specific data points.

Here is data showing the amount of time in seconds and the number of clicks of the button.

Table

Time (sec)	Number of Clicks
2.5	14
3	17
4	16
4	23
4.5	24
5.5	22
5.5	30
6.5	24
7	36
8	42

Scatter Plot



scatter plot A set of disconnected data points plotted on a coordinate plane. It allows us to investigate connections between two variables.

Practice
6.01

Name: ..... Date: ..... Period: .....

Problems 1–3: Here is data on the number of cases of whooping cough from 1944 to 1955.

Year	Number of Cases
1944	109,873
1945	133,792
1946	109,860
1947	156,517
1948	74,715
1949	64,479
1950	120,718
1951	68,687
1952	45,030
1953	37,129
1954	60,866
1955	62,786

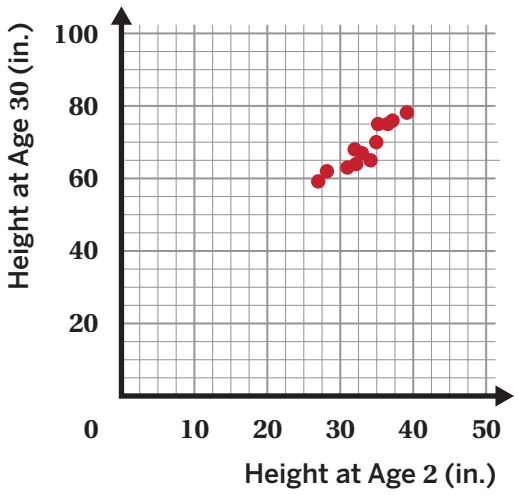
1. Describe another way to sort this table. What is a question that can be answered when the table is sorted this way?

2. Which years in this period of time had more than 100,000 cases of whooping cough?

3. Based on this data, would you expect 1956 to have closer to 50,000 cases or 100,000 cases? Explain your thinking.

Problems 4–5: A research study measured the heights of twelve people on their birthday at age 2 and at age 30.

4. What patterns do you notice in the data?



5. A two-year-old has a height of 38 inches. Based on this data, predict their height at age 30.

Name: ..... Date: ..... Period: .....

6. Here is data a teacher collected after asking her students how many hours of sleep they had the night before a test.

How might you organize or display this data? Explain your thinking.

	Hours of Sleep	Test Score
Ayaan	7	74
Emika	6	76
Inola	8	88
Kwasi	5	63
Zoe	7	90

Spiral Review

7. A cylinder has a height of 6 feet and a diameter of 2 feet. Which measurement is closest to the volume of the cylinder in cubic feet?

A. 226.2 cubic feet

B. 75.4 cubic feet

C. 18.8 cubic feet

D. 113.1 cubic feet

Problems 8–11: This cylinder has a radius of 4 centimeters and a height of 5 centimeters.

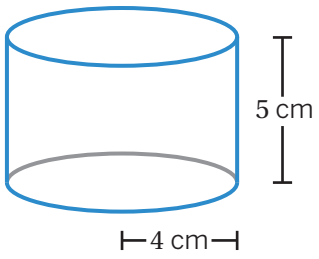


Figure may not be drawn to scale.

8. What is the volume of the cylinder?

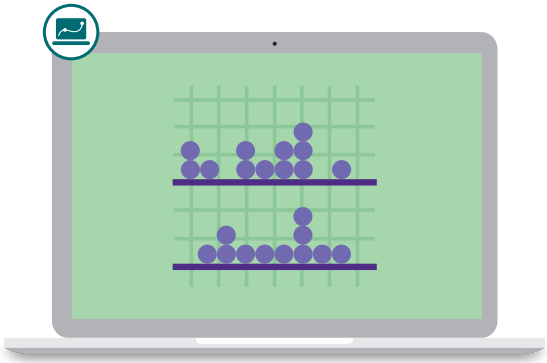
9. What is the volume of the cylinder when its radius is tripled?

10. What is the volume of the cylinder when its radius is halved?

11. A cylinder has a volume of 120 cubic units. What is the volume of a cone with the same radius and height? Explain your thinking.

Name: ..... Date: ..... Period: .....

Interpret Scatter Plots 8.SP.1, SMP.6, SMP.7



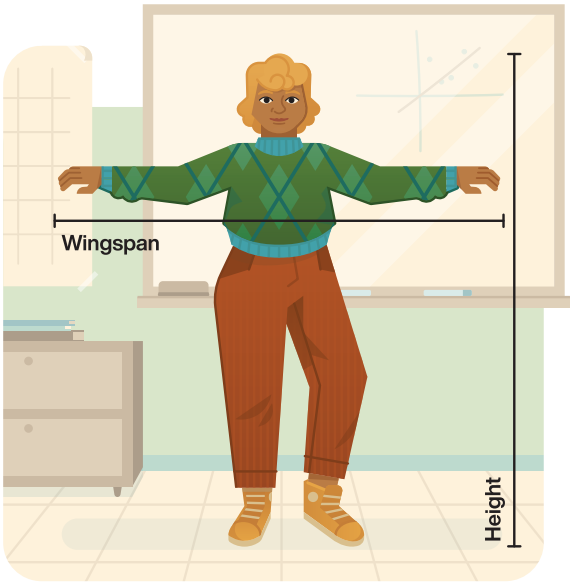
Wingspan

Let's compare dot plots and scatter plots.

Warm-Up

1 With a partner, measure your height and wingspan to the nearest inch.

Height (in.)	Wingspan (in.)



2 **Data Talk!** Let's look at a table of height and wingspan data.

Discuss the following:

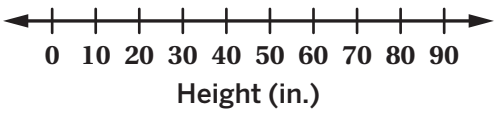
- How could we reorganize the data to make it more useful for analyzing?
- What are some questions this data could help answer?

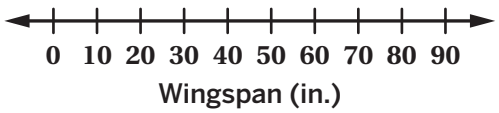
Activity 1

Name: ..... Date: ..... Period: .....

Visualizing Data

3 Plot points on the *dot plots* to represent your height and wingspan.





4 **Data Talk!** Let's look at dot plots of height and wingspan data.

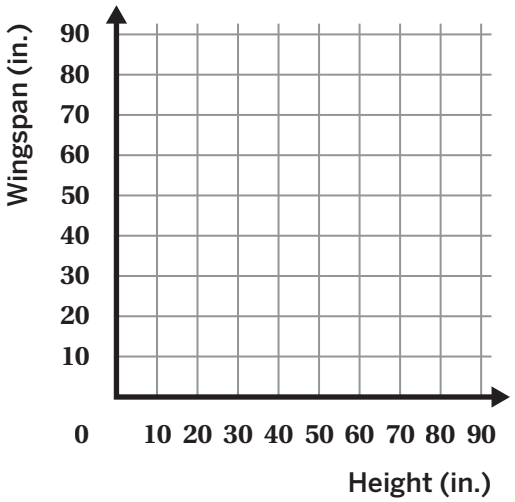
a What is a question you *can* answer based on the dot plots?

b What is a question you *cannot* answer based on the dot plots?

Name: ..... Date: ..... Period: .....

Visualizing Data (continued)

5 Let's look at a table of some student's heights and wingspans. Plot the data shown in the table.



6 **Data Talk!** Let's look at a scatter plot that represents height and wingspan data.

a What is a question you *can* answer based on the scatter plot?

b What is a question you *cannot* answer based on the scatter plot?

You're invited to explore more.

7 Use the Activity 1 Sheet to examine the heights, weights, wingspans, and hand lengths of professional basketball players.

What do you notice? What do you wonder?

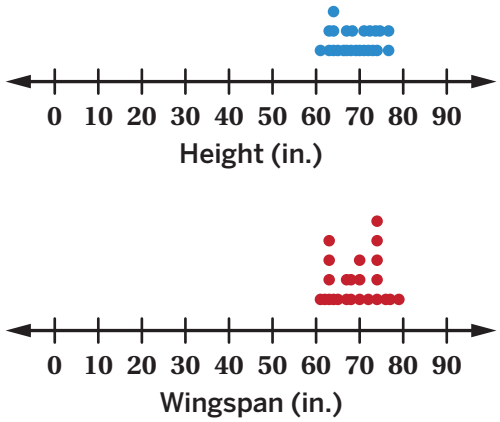
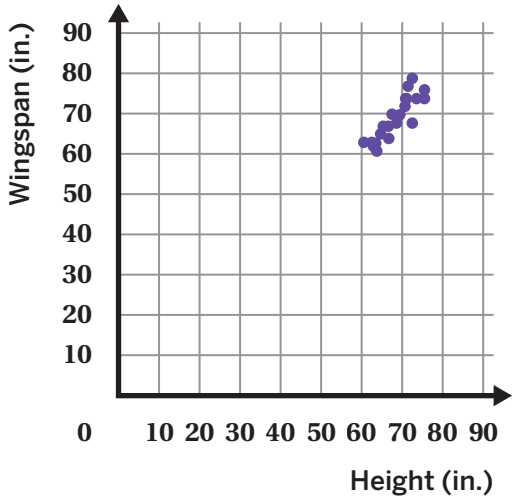
8 Synthesis

Data Talk! Discuss some advantages of using a dot plot or a scatter plot to represent data. Use the examples from the Summary if they help with your thinking.

11 Summary 6.02

Data presented as numbers, quantities, or measurements that can be compared in a meaningful way is called *numerical data*, or *quantitative data*. You can investigate *univariate data*, which involves one variable, and *bivariate data*, which involves two variables.

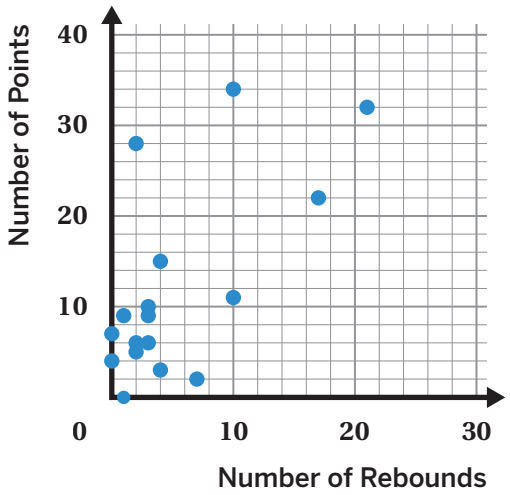
There are different ways to represent numerical data. A *dot plot* shows data for one variable and a scatter plot shows data for two variables at the same time. Seeing two numerical variables at the same time allows us to notice trends and connections.

Dot Plot	Scatter Plot
	

Practice
6.02

Name: ..... Date: ..... Period: .....

Problems 1–5: This scatter plot shows the number of rebounds and points for each player in a recent professional basketball game.



1. Circle the point on the graph that represents the player with the most rebounds. How many rebounds did that player have?

2. How many players had 0 rebounds?

3. What is another question you *can* answer based on this scatter plot?

4. What is a question you *cannot* answer based on this scatter plot?

5. The table shows the data for another basketball player. Plot the point for the player on the graph.

Number of Rebounds	Number of Points
20	15

6. Which representation(s) are appropriate for comparing the heights of students on a volleyball team to the heights of students on a soccer team?

A. Scatter plot

B. Dot plots

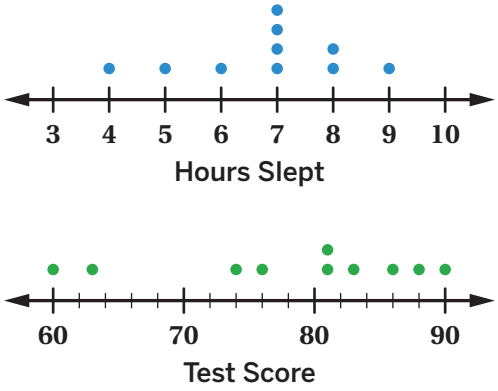
C. Both

Explain your thinking.

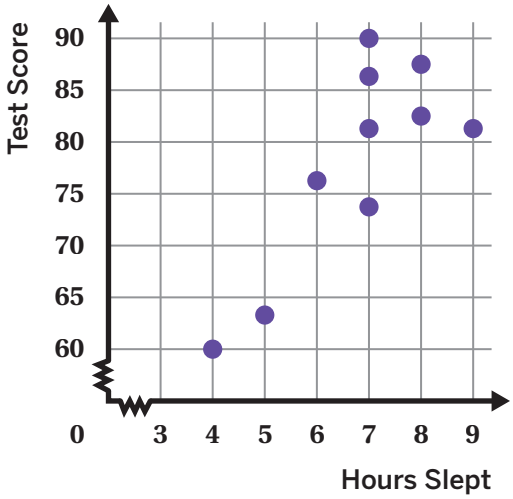
Name: ..... Date: ..... Period: .....

7. A teacher collected data about her students' test scores and how many hours they slept the night before a test. She represented the data with dot plots and a scatter plot.

Dot Plots



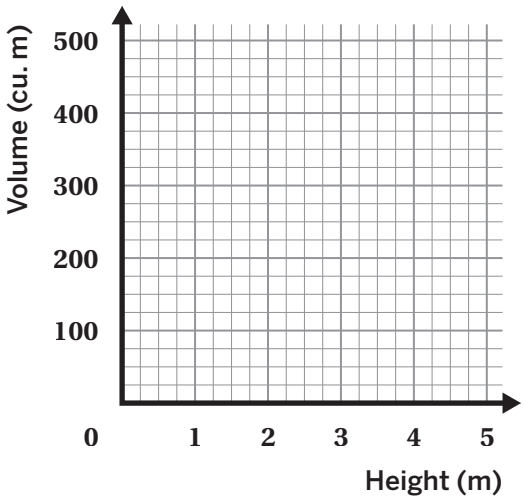
Scatter Plot



What is different about the two ways of representing the data?

Spiral Review

Problems 8–11: There are many cylinders with a radius of 6 meters. Let h represent the height in meters and V represent the volume in cubic meters.



8. Write an equation that represents the volume, V, as a function of the height, h.

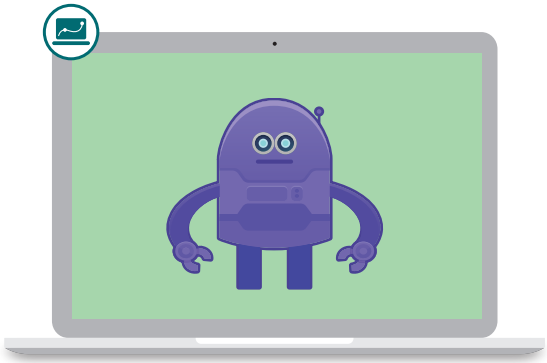
9. Sketch the graph of the equation, using 3.14 as an approximation for π.

10. If you double the height of a cylinder, what happens to the volume? Use the equation to help you explain your thinking.

11. A cone has a radius of 4 feet and of height of 11 feet. What is the volume, in cubic feet, of the cone? Use 3.14 as an approximation for π. Round your answer to the nearest hundredth.

Name: _____ Date: _____ Period: _____

Interpret Scatter Plots 8.SP.1, SMP.1, SMP.2, SMP.6



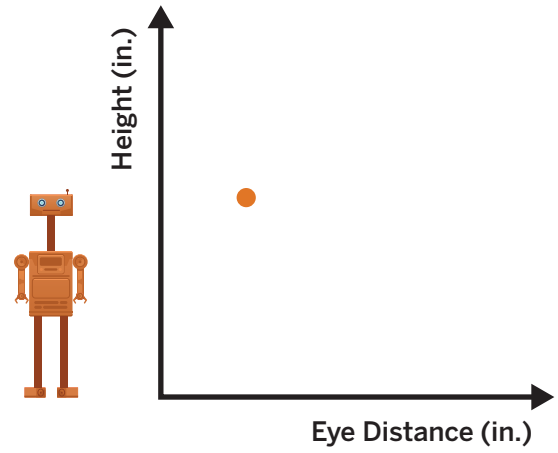
Robots

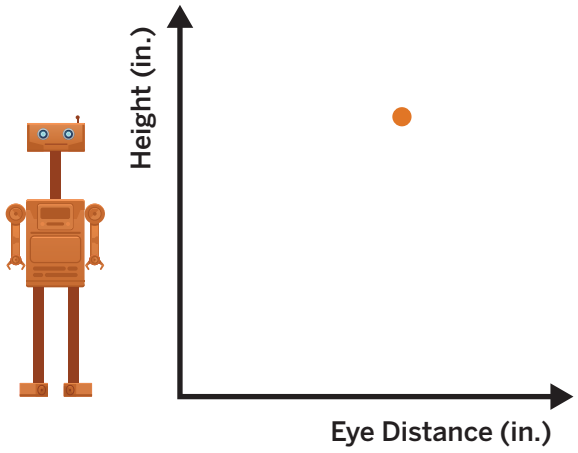
Let's investigate points on a scatter plot.

Warm-Up

1 Here are two graphs and images of a robot.

Discuss: What do you notice?

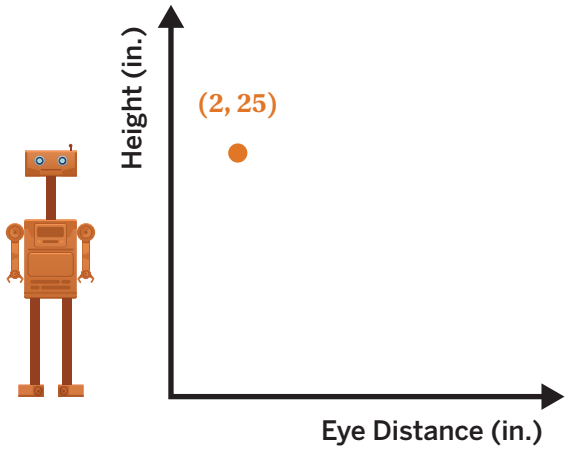




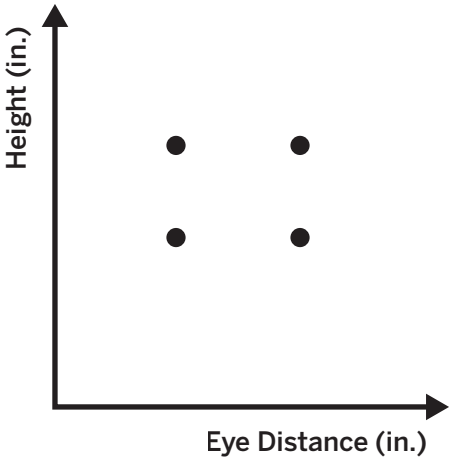
Name: ..... Date: ..... Period: .....

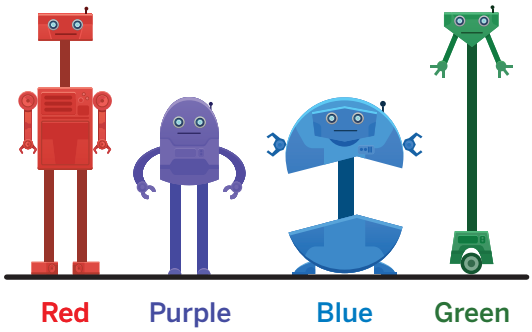
Robots

2 Describe something you know about the robot based on the graph.



3 Here are four different robots. Label each point on the graph with the color robot it represents.



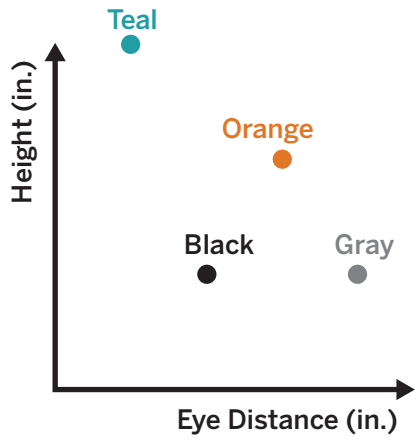


Name: ..... Date: ..... Period: .....

Robots (continued)

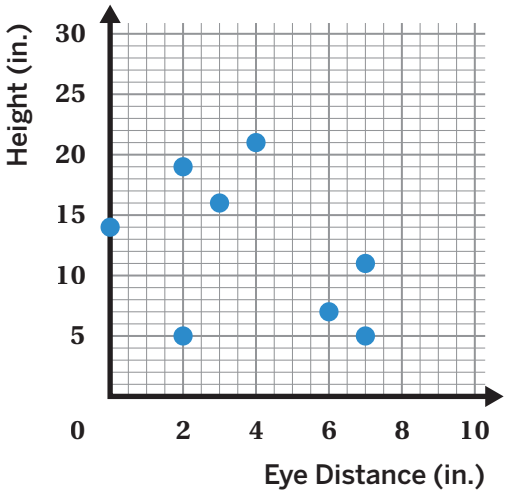
4 The table shows the heights and eye distances for five different robots. Plot a point to represent the pink robot.

Robot Color	Eye Distance (in.)	Height (in.)
Teal	2	30
Black	4	10
Gray	8	10
Orange	6	20
Pink	8	20



5 The graph shows the heights and eye distances for eight blue robots.

Plot a point for a red robot to make this statement true: *The red robot is taller than all the blue robots, and its eye distance is 5 inches.*



Activity 2

Name: ..... Date: ..... Period: .....

Challenge Creator

6 You will use a set of cards with scatter plots to create your own challenge.

a Choose one card that interests you and plot a point somewhere you think is interesting.

b On this page, write the point as an ordered pair. Then tell a story about this point.

My Point	My Story

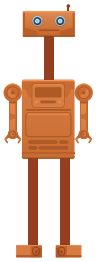
c Swap your challenge with one or more partners. Write the point they plotted as an ordered pair and tell a story about it.

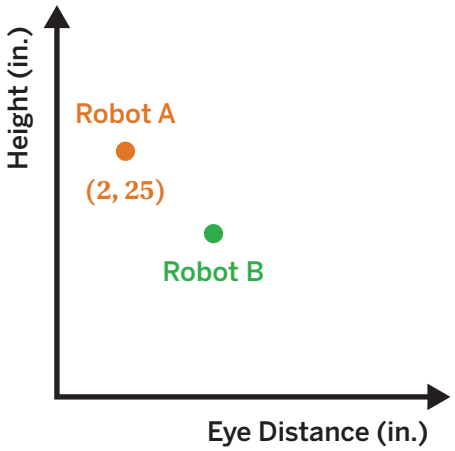
	Point	Story
Partner 1		
Partner 2		
Partner 3		

7 Synthesis

This graph shows the height and eye distance for two robots.

Describe some things you know about Robot B given the information about Robot A.

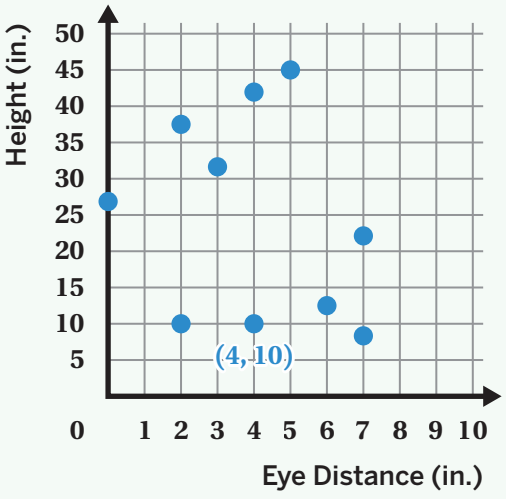




10 Summary 6.03

A point on a scatter plot represents two pieces of information. The axis labels tell you how to interpret the coordinates of each point.

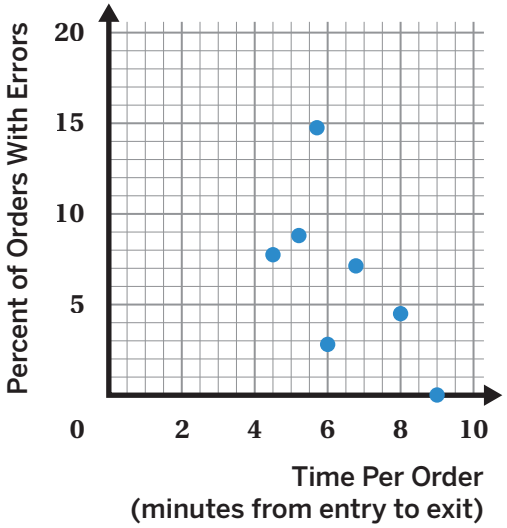
In this example, the point $(4, 10)$ represents a robot with an eye distance of 4 inches and a height of 10 inches.



Name: ..... Date: ..... Period: .....

Problems 1–3: A study gathered data about different drive-thru restaurants. The table and scatter plot show the average time per order and the percent of orders with errors for each restaurant.

Restaurant	Time Per Order (min)	Percent of Orders With Errors
CraveBite	8	4.5
Taco Tango	6	2.8
Bite Master	9	0
Noodle Nest	4.5	7.7
Burger Whiz	5.2	8.8
Pajaro	6.8	7.1
NachoLoco	5.7	14.7

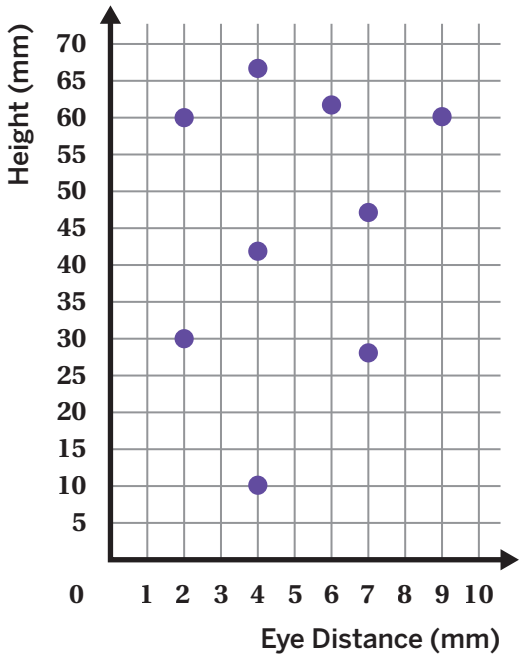


1. Circle the point on the scatter plot that represents the data for NachoLoco.

2. What does the point $(6, 2.8)$ represent?

3. In the same study, the data showed that Dumpling Delight takes 4.5 minutes per order and 13% of their orders had errors. Add a point to the scatter plot to represent Dumpling Delight.

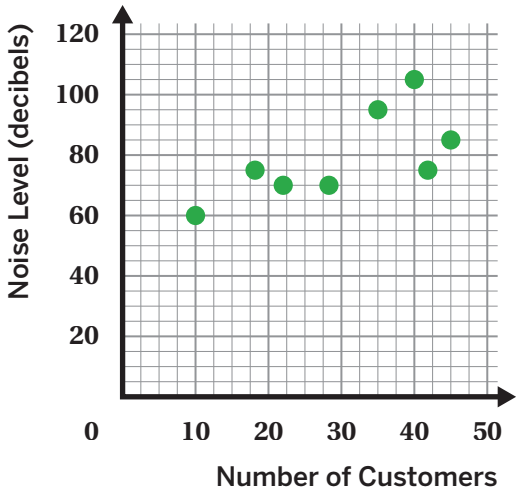
4. Circle the point(s) for the robot(s) with the shortest eye distance. Write the height and eye distance of each point you circled.



Practice
6.03

Name: ..... Date: ..... Period: .....

Problems 5–8: This scatter plot shows the noise level and the number of customers for eight restaurants.



5. What is the noise level at the loudest restaurant?

6. What is the noise level at the restaurant with the most customers?

7. What does the point $(10, 60)$ tell you about the noise level and number of customers at that restaurant?

8. The noise level at a restaurant with 35 customers is 80 decibels. Plot a point on the graph that represents this restaurant.

Spiral Review

9. Select *all* the representations that are appropriate for comparing exam score to hours of sleep the night before an exam.

- ☐ **A.** Histogram
- ☐ **B.** Scatter plot
- ☐ **C.** Dot plot
- ☐ **D.** Table
- ☐ **E.** Box plot

Problems 10–13: Evaluate each expression.

10. $-2 \cdot (-4)$ **11.** $-7 \cdot 2$ **12.** $9 \cdot (-10)$ **13.** $-2 \cdot (-6) \cdot (5)$

Notes

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