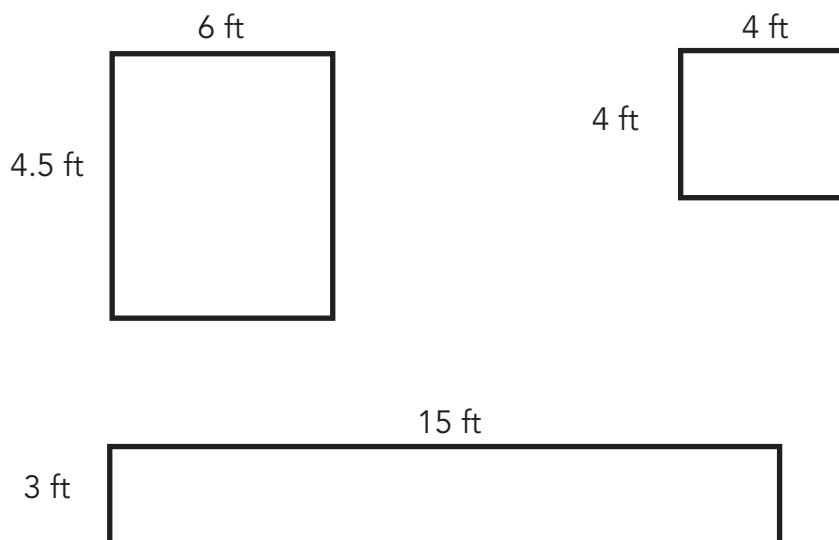


Objective Using Random Samples to Draw Inferences

Warm-Up



Mr. Mario has three bulletin boards in his classroom. What is the average amount of space per bulletin board?



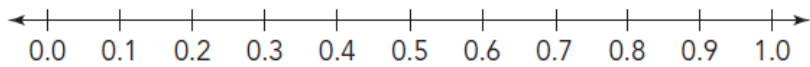


The student council holds regular fundraisers to raise money for community service projects. To raise money for Back-to-School Backpacks for the local homeless shelter, they hold a Gumball Guessing Competition. They place differently colored gumballs in a large, clear gumball machine. Students pay \$1.00 to predict the percent of blue gumballs in the machine. Any students who predict within 5% of the actual percent win a \$5.00 credit at the school store and a share of the gumballs.

To make their predictions, students take a sample of 25 gumballs (and then return the gumballs to the machine) and use the percent of blue gumballs in the sample to make their guess. The results from the first 100 students' samples are provided in the table.

1. Create a dot plot of the results. Be sure to label your dot plot.

Percent of Blue Gumballs in the Sample	Number of Samples
12%	5
16%	8
20%	13
24%	13
28%	16
32%	18
36%	13
40%	10
44%	3
48%	1



2. Use the results to predict the likely percent of gumballs that are blue. Explain your reasoning.

3. How many of the students obtained a sample that was less than 25% blue gumballs?

4. The gumball machine holds 10,000 gumballs and there are 2936 blue gumballs in the machine.

a. How many students will split the gumballs? How many gumballs will each student receive?

b. Is it reasonable that none of the estimates were equal to the actual percent of blue gumballs? Explain your reasoning.

c. Suppose a disgruntled student argued that there must be at least 40% blue gumballs. Use the analysis to explain why this is unlikely.

d. The principal did not take a random sample to create his estimate. Instead, he based his estimate on a visual inspection of the gumball machine. His guess was 35%. Calculate the percent error of the principal's guess from the true percent of blue gumballs.

## Show You KNOW

### Pumpkin Patch

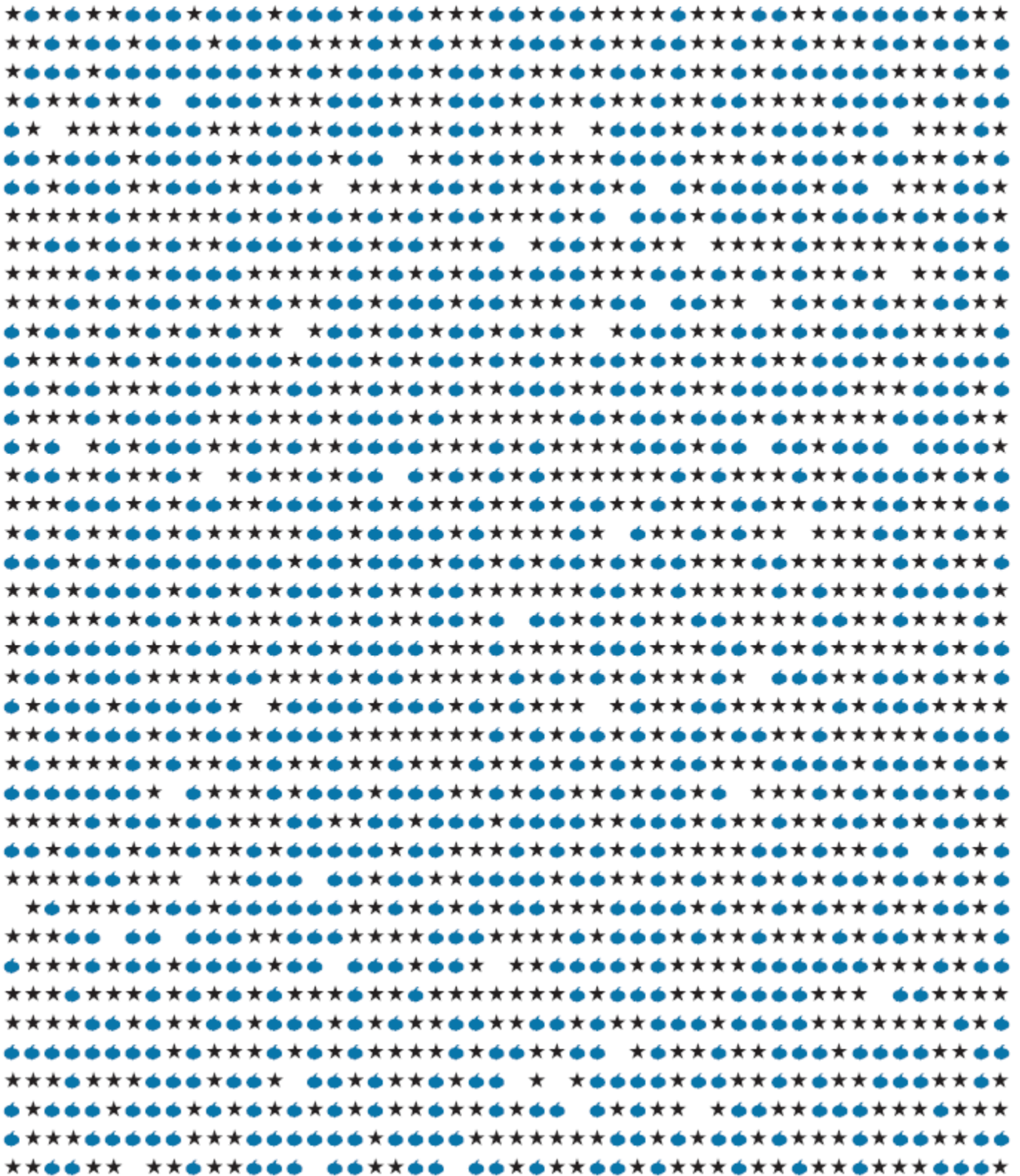
Right before pumpkin picking season, you are hired by Paula's Pumpkin Patch. Your first task is to determine the number of pumpkins available for picking. In addition to growing pumpkins in the pick-your-own field, Paula also grows gourds.

The diagram on the next page shows the field that contains the pumpkins and the gourds. The stars represent the gourds. Notice that there are also gaps in the field.

You and Paula agree that it would take too long to count all the pumpkins in the field.

1. Design and carry out a method to estimate the total number of pumpkins in the field without counting all the shapes. Then prepare a presentation for your classmates that includes an explanation of your method, your results, and justification of your estimate.

# Pumpkins and Gourds





## LESSON 12.2b Tiles, Gumballs, and Pumpkins



### Objective USING Random Samples to Draw Inferences

#### Practice

The table at the right shows the names and ages at inauguration of 45 presidents of the United States.

Presidents of the United States			
President	Age at Inauguration	President	Age at Inauguration
George Washington	57	Franklin Pierce	48
John Adams	61	James Buchanan	65
Thomas Jefferson	57	Abraham Lincoln	52
James Madison	57	Andrew Johnson	56
James Monroe	58	Ulysses S. Grant	46
John Quincy Adams	57	Rutherford B. Hayes	54
Andrew Jackson	61	James A. Garfield	49
Martin Van Buren	54	Chester A. Arthur	51
William Henry Harrison	68	Grover Cleveland	47
John Tyler	51	Benjamin Harrison	55
James K. Polk	49	Grover Cleveland	55
Zachary Taylor	64	John F. Kennedy	43
William McKinley	54	Lyndon B. Johnson	55
Theodore Roosevelt	42	Richard Nixon	56
William Howard Taft	51	Gerald Ford	61
Woodrow Wilson	56	Jimmy Carter	52
Warren G. Harding	55	Ronald Reagan	69
Calvin Coolidge	51	George H.W. Bush	64
Herbert Hoover	54	Bill Clinton	46
Franklin D. Roosevelt	51	George W. Bush	54
Harry S. Truman	60	Barack Obama	47
Dwight D. Eisenhower	62	Donald Trump	70
Millard Fillmore	50		

1. You want to determine the mean age of the U.S. presidents at their inaugurations. Instead of calculating the mean using all 45 presidents' ages, you will take a sample.

a. What is the population for this situation?

b. Select 10 presidents whose ages best represent the **mean** age of a U.S. president at inauguration.

c. Record the ages of these presidents.

d. Explain why you chose these presidents.

e. Is this a random sample? Explain your reasoning.

f. Calculate the **mean** age of the presidents you selected. Round to the nearest year.