Name _____   Date_____

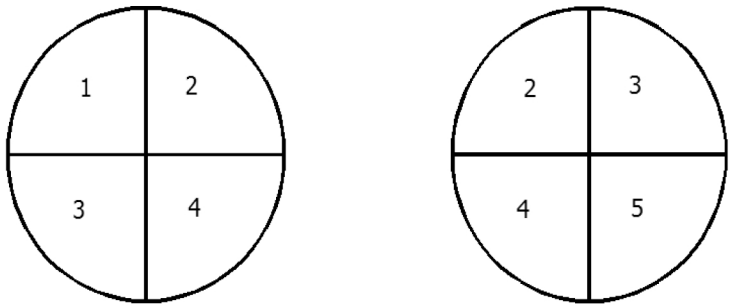# Estimating Probabilities by Collecting Data

In the following problems, round all of your decimal answers to 3 decimal places. Round all of your percents to the nearest tenth of a percent.

A student randomly selected crayons from a large bag of crayons. The table below shows the number of each color crayon in a bag. Now, suppose the student were to randomly select one crayon from the bag.

Color	Number
Brown	10
Blue	5
Yellow	3
Green	3
Orange	3
Red	6

1. What is the estimate for the probability of selecting a blue crayon from the bag? Express your answer as a fraction, decimal, or percent.

2. What is the estimate for the probability of selecting a brown crayon from the bag?

3. What is the estimate for the probability of selecting a red crayon or a yellow crayon from the bag?

4. What is the estimate for the probability of selecting a pink crayon from the bag?

5. Which color is most likely to be selected?

6. If there are 300 crayons in the bag, how many will be red? Justify your answer.

1. Play a game using the two spinners below. Spin each spinner once, and then multiply the outcomes together. If the result is less than or equal to 8, you win the game. Play the game 15 times, and record your results in the table below. Then, answer the questions that follow.

Turn	1st Spin Results	2nd Spin Results	Product
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

a. What is your estimate for the probability of getting a product of 8 or less?

b. What is your estimate for the probability of getting a product of more than 8?

c. What is your estimate for the probability of getting a product of exactly 8?

d. What is the most likely product for this game?

e. If you play this game another 15 times, will you get the exact same results? Explain.

2. A seventh-grade student surveyed students at her school. She asked them to name their favorite pet. Below is a bar graph showing the results of the survey.
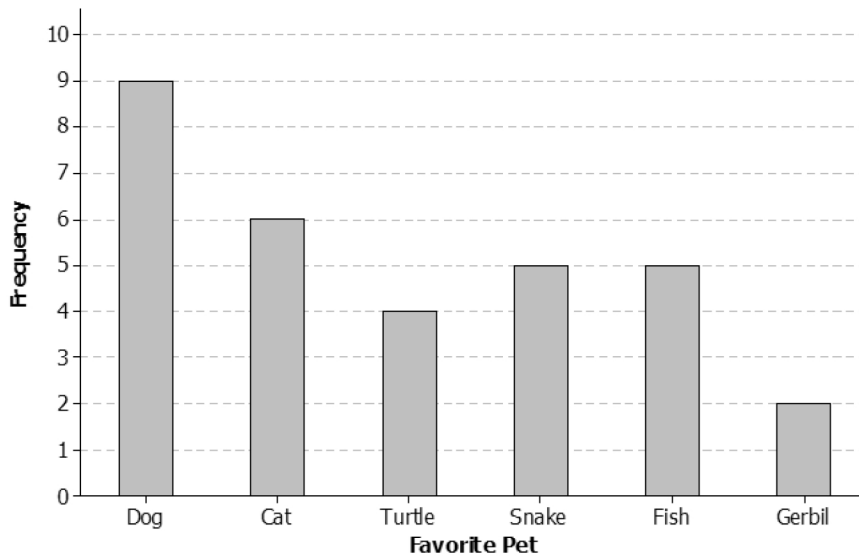
Use the results from the survey to answer the following questions.

a. How many students answered the survey question?

b. How many students said that a snake was their favorite pet?

Now suppose a student will be randomly selected and asked what his favorite pet is.

c. What is your estimate for the probability of that student saying that a dog is his favorite pet?

d. What is your estimate for the probability of that student saying that a gerbil is his favorite pet?

e. What is your estimate for the probability of that student saying that a frog is his favorite pet?

3. A seventh-grade student surveyed 25 students at her school. She asked them how many hours a week they spend playing a sport or game outdoors. The results are listed in the table below.

Number of hours	Tally	Frequency
0	| | |	3
1	| | | |	4
2	++++	5
3	++++ | |	7
4	| | |	3
5		0
6	| |	2
7		0
8	|	1

a. Draw a dot plot of the results

```
     0    1    2    3    4    5    6    7    8
              Number of Hours
```
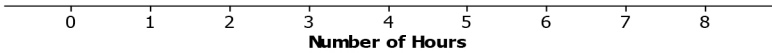
Suppose a student will be randomly selected.

b. What is your estimate for the probability of that student answering 3 hours?

c. What is your estimate for the probability of that student answering 8 hours?

d. What is your estimate for the probability of that student answering 6 or more hours?

e. What is your estimate for the probability of that student answering 3 or fewer hours?

f. If another 25 students were surveyed do you think they would give the exact same results? Explain your answer.

g. If there are 200 students at the school, what is your estimate for the number of students who would say they play a sport or game outdoors 3 hours per week? Explain your answer.

4. A student played a game using one of the spinners below. The table shows the results of 15 spins. Which spinner did the student use? Give a reason for your answer.

Spin	Results
1	1
2	1
3	2
4	3
5	1
6	2
7	3
8	2
9	2
10	1
11	2
12	2
13	1
14	3
15	1
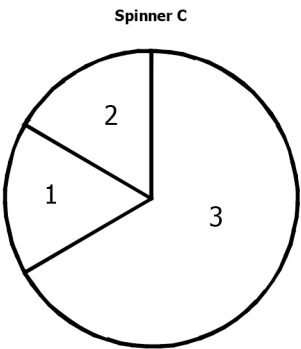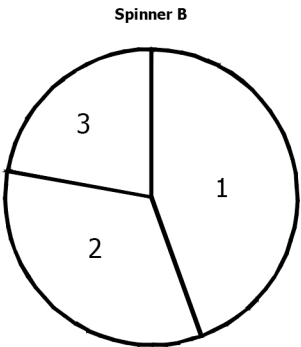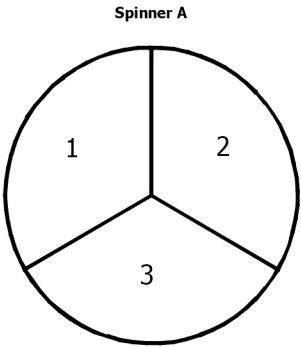
Spinner A

Spinner B

Spinner C

In the following problems, round all of your decimal answers to 3 decimal places. Round all of your percents to the nearest tenth of a percent.

A student randomly selected crayons from a large bag of crayons. The table below shows the number of each color crayon in a bag. Now, suppose the student were to randomly select one crayon from the bag.

Color	Number
Brown	10
Blue	5
Yellow	3
Green	3
Orange	3
Red	6

1. What is the estimate for the probability of selecting a blue crayon from the bag? Express your answer as a fraction, decimal, or percent.

$$\frac{5}{30} = \frac{1}{6} = 0.167 \; or \; 16.7\%$$

2. What is the estimate for the probability of selecting a brown crayon from the bag?

$$\frac{10}{30} = \frac{1}{3} = 0.333 = 33.3\%$$

3. What is the estimate for the probability of selecting a red crayon *or* a yellow crayon from the bag?

$$\frac{9}{30} = \frac{3}{10} = 0.3 = 30\%$$

4. What is the estimate for the probability of selecting a pink crayon from the bag?
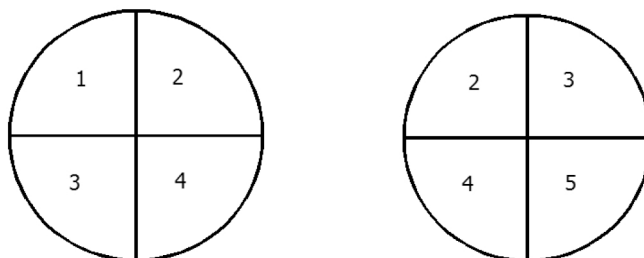
$$\frac{0}{30} = 0\%$$

5. Which color is most likely to be selected?

Brown

6. If there are 300 crayons in the bag, how many will be red? Justify your answer.

There are 6 out of 30, or $\frac{1}{5}$ or 0.2, crayons that are red. Anticipate $\frac{1}{5}$ of 300 crayons are red, or approximately 60 crayons.

1. Play a game using the two spinners below. Spin each spinner once, and then multiply the outcomes together. If the result is less than or equal to 8, you win the game. Play the game 15 times, and record your results in the table below. Then, answer the questions that follow.

Turn	1st Spin Results	2nd Spin Results	Product
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

a. What is your estimate for the probability of getting a product of 8 or less?

   Answers should be approximately 7, 8, or 9 divided by 15.

b. What is your estimate for the probability of getting a product of more than 8?

   Subtract the answer to part (a) from 1, or 1 − the answer from part (a). Approximately 8, 7, or 6 divided by 15.

c. What is your estimate for the probability of getting a product of exactly 8?

   Approximately 1 or 2 divided by 15.

d. What is the most likely product for this game?

   Possibilities are 4, 6, 8, and 12.

e. If you play this game another 15 times, will you get the exact same results? Explain.

   No, since this is a chance experiment, results could change for each time the game is played.

2. A seventh-grade student surveyed students at her school. She asked them to name their favorite pet. Below is a bar graph showing the results of the survey.
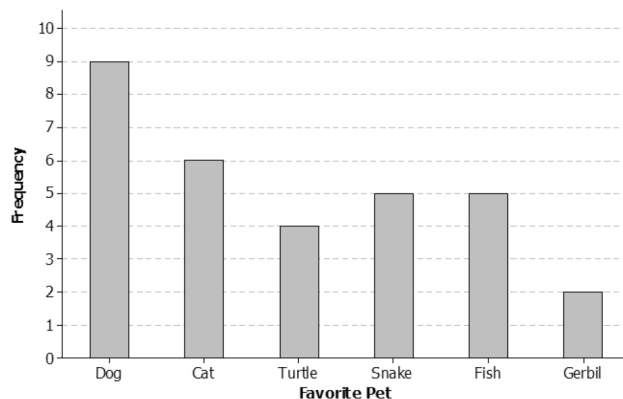
Use the results from the survey to answer the following questions.

a. How many students answered the survey question?

31

b. How many students said that a snake was their favorite pet?

5

Now, suppose a student is randomly selected and asked what his favorite pet is.

c. What is your estimate for the probability of that student saying that a dog is his favorite pet?

(Allow any form.) $\frac{9}{31}$ *or approximately* 0.29 *or approximately* 29%

d. What is your estimate for the probability of that student saying that a gerbil is his favorite pet?

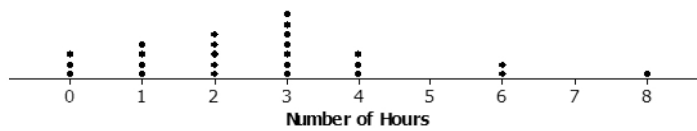*(Allow any form.)* $\frac{2}{31}$ *or approximately* 0.06 *or approximately* 6%

e. What is your estimate for the probability of that student saying that a frog is his favorite pet?

$\frac{0}{31}$ *or 0 or* 0%

3. A seventh grade student surveyed 25 students at her school. She asked them how many hours a week they spend playing a sport or game outdoors. The results are listed in the table below.

Number of Hours	Tally	Frequency
0	| | |	3
1	| | | |	4
2	┼┼┼	5
3	┼┼┼ | |	7
4	| | |	3
5		0
6	| |	2
7		0
8	|	1

a. Draw a dot plot of the results.

Suppose a student will be randomly selected.

b. What is your estimate for the probability of that student answering 3 hours?

$$\frac{7}{25} = 0.28 = 28\%$$

c. What is your estimate for the probability of that student answering 8 hours?

$$\frac{1}{25} = 0.04 = 4\%$$

d. What is your estimate for the probability of that student answering 6 or more hours?

$$\frac{3}{25} = 0.12 = 12\%$$

e. What is your estimate for the probability of that student answering 3 or fewer hours?

$$\frac{19}{25} = 0.76 = 76\%$$

f. If another 25 students were surveyed, do you think they would give the exact same results? Explain your answer.

No, each group of 25 students could answer the question differently.

g. If there are 200 students at the school, what is your estimate for the number of students who would say they play a sport or game outdoors 3 hours per week? Explain your answer.

$200 \cdot \left(\frac{7}{25}\right) = 56$ students. This is based on estimating that of the 200 students, $\frac{7}{25}$ would play a sport or game outdoors 3 hours per week as $\frac{7}{25}$ represented the probability of playing a sport or game outdoors 3 hours per week from the seventh-grade class surveyed.

4. A student played a game using one of the spinners below. The table shows the results of 15 spins. Which spinner did the student use? Give a reason for your answer.

Spinner B. Tallying the results: 1 occurred 6 times, 2 occurred 6 times, and 3 occurred 3 times. In Spinner B, the sections labeled 1 and 2 are equal and larger than section 3.

Spin	Results
1	1
2	1
3	2
4	3
5	1
6	2
7	3
8	2
9	2
10	1
11	2
12	2
13	1
14	3
15	1

Spinner A

1 2

3

Spinner B

3

1

2

Spinner C

2

1

3