

Making Predictions with Experimental Probability

Q. How do you make predictions using experimental probability?

A. Write an _____ to find the likelihood of the event.
Use the _____ to make a prediction.

2 Methods

1. Proportion

Probability of making a bullseye.

$$\begin{matrix} \# \text{ Hits} & \rightarrow & \frac{2}{10} & = & \frac{X}{75} & \leftarrow & \begin{matrix} \text{unknown} \\ \text{How many hits} \end{matrix} \\ \text{Throws} & \rightarrow & & & & \leftarrow & \text{Throws} \end{matrix}$$

1. cross multiply $10 \text{ times } X = 10x$
 $2 \text{ times } 75 = 150$

So $\frac{10x}{10} = \frac{150}{10}$ \leftarrow these must be equal to be proportional
divide by 10 $1x = 15$

2. Percent

Percent of hitting bull 20% of 75 number of throws
 $.20 \times 75$

20% as a decimal is .20

\rightarrow of = if you take 2 out of every 10 or 1 out of 5

multiply

1 out of each 5 \rightarrow

| | | | | | | |
|-----|-----|-----|-----|-----|---|-----------|
| ### | ### | ### | ### | ### | } | 75 Throws |
| ### | ### | ### | ### | ### | | |
| ### | ### | ### | ### | ### | | |

$3 + 3 + 3 + 3 + 3 = 15$

Making Predictions with Experimental Probability

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← unknown
← How many hits
← Throws

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| ### | ### | ### | ### | ### | | |

$$3 + 3 + 3 + 3 + 3 = 15$$

LESSON
5-4

Making Predictions with Experimental Probability

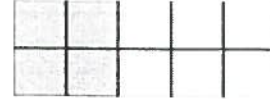
Reading Strategies: Use Models

Predicting is making an educated guess about a future result.

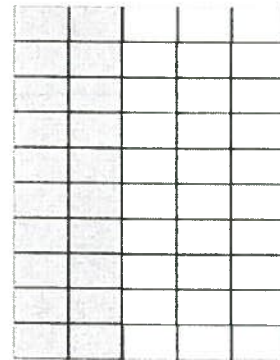
You can use **experimental probability** to make a prediction.

Pat is able to flip a game disk into a cup 4 times in 10 tries. Out of 50 tries, how many flips will Pat predict she can make?

Use a grid to model Pat's successful flips: $\frac{4}{10}$.



Then expand your grid to 50 squares to predict the number of Pat's successful flips out of 50.



$$\frac{4}{10} \times 50 = \frac{200}{10} = 20$$

Pat will predict she can make 20 flips out of 50.

Solve. On a separate sheet of paper, create grids to model the situation and make your prediction.

1. A tire manufacturer checks 5 tires and finds that 1 of them has a leak. If they produced 20 tires, how many of them would be likely to have a leak?



Solve. You may use a model if you like.

2. Will has calculated that he usually makes 60 percent of his attempted free throws. How many throws out of 15 should Will predict he can make?

$15 \times .6 = 9$

3. An ad for the elevated train line states that it is on time 96 percent of the time. The subway, which Bob has been taking, has been on time 75 times out of 83. Should Bob switch to the elevated train? Why or why not?

Yes The subway has been on time about 90% of the time
The train is on time about 96%

LESSON
5-4

Making Predictions with Experimental Probability
Success for English Learners

Problem

The Marino family plans a trip to Florida. They will go for 2 weeks. They hope to have *at least* 10 out of 14 days when it does not rain.

Weather Report for July through September

| JULY | | | | | | |
|------|----|----|----|----|----|----|
| Su | Mo | Tu | We | Th | Fr | Sa |
| | | | | | | 1 |
| 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 30 | 31 | | | | | |

| AUGUST | | | | | | |
|--------|----|----|----|----|----|----|
| Su | Mo | Tu | We | Th | Fr | Sa |
| | | 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 27 | 28 | 29 | 30 | 31 | | |

| SEPTEMBER | | | | | | |
|-----------|----|----|----|----|----|----|
| Su | Mo | Tu | We | Th | Fr | Sa |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |



All but 19 days are not rainy

92 days

19 days are rainy



Should the family go to Florida during those 3 months?

Write a proportion.

$$\frac{\text{rainy days}}{\text{total days}} = \frac{\text{predicted rainy days}}{\text{total vacation days}}$$

$$\frac{19}{92} = \frac{x}{14}$$

$x \approx 2.89$, or about 3 rainy days

14 vacation days – 3 rainy days
= 11 days that are not rainy
The family should go!

Use the information above to answer the questions.

1. What if there were 32 rainy days? Would the family go to Florida?

Explain.

No $\frac{32}{92} = \frac{x}{14}$ $\frac{92x}{92} = \frac{448}{92}$ $x = 4.9$ about 5 days

2. What if there were 10 rainy days in July and August? Would the family go to Florida? Explain.

$\frac{10}{62} = \frac{x}{14}$ $62x = 140$ $x = 2.3$ about 2 days
 $14 - 2 = 12$ days

LESSON
5-4

Making Predictions with Experimental Probability

Practice and Problem Solving: D

Solve each problem. The first one is done for you.

1. In 1951, Odessa, Texas had high temperatures of at least 95°F for 11 percent of the year. During that year, how many days could residents predict would have highs of at least 95°F? Show your work.

Use the proportion to solve. Round to the nearest whole number.

$$\frac{11}{100} = \frac{x}{365} \quad x = \underline{40}$$

The residents of Odessa could predict highs of at least 95°F on 40 days of the year.

2. A survey shows that 67 percent of peanut-butter lovers prefer chunky-style. Out of 850 people surveyed, how many can be predicted to say they prefer chunky-style peanut butter?

Use the proportion to solve. Round to the nearest whole number.

$$\frac{67}{100} = \frac{x}{850} \quad x = \underline{\hspace{2cm}}$$

 people can be expected to say they prefer chunky-style peanut butter.

3. A football player forces at least 1 turnover in 27.5 percent of the games he plays. If the player plays in 57 games, in how many games can he predict he will force a turnover? Show your work.

Use the proportion to solve. Round to the nearest whole number.

$$\frac{27.5}{100} = \frac{x}{57} \quad x = \underline{\hspace{2cm}}$$

He can expect to force a turnover in games.

4. Sandy says she splits her time on her homework as follows: 45 percent on math, 20 percent on science, 18 percent on social studies, and 17 percent on language arts.
- a. If Sandy spends 100 hours on homework over a month, predict how much time she spend on each subject.
- Math: _____ Science: _____
- Social Studies: _____ Language Arts: _____
- b. If Sandy only spends 75 hours on homework over a month, predict how much time she spends on each subject to the nearest tenth of an hour.

Math: _____ Science: _____

Social Studies: _____ Language Arts: _____

LESSON
5-4

Making Predictions with Experimental Probability

Practice and Problem Solving: A/B

Make a prediction based on experimental probability.

1. A bowler knocks down at least 6 pins 70 percent of the time. Out of 200 rolls, how many times can you predict the bowler will knock down at least 6 pins?

2. A tennis player hits a serve that cannot be returned 45 percent of the time. Out of 300 serves, how many can you predict will not be returned?

3. West Palm Beach, Florida, gets rain about 16 percent of the time. On how many days out of 400 can residents of West Palm Beach predict they will get rain?

4. Rob notices that 55 percent of the people leaving the supermarket choose plastic bags instead of paper bags. Out of 600 people, how many can Rob predict will carry plastic bags?

5. A baseball player reaches base 35 percent of the time. How many times can he expect to reach base in 850 at-bats?

6. Fredericka can make 65 percent of her shots from the free-throw line. If she shoots 75 times, how many shots can she expect to make?

7. In a current-events class, a professor predicted that at least 78 percent of students prefer getting their news from a digital source rather than from a print source. He polled 3 classes. The results are shown in the table below.

| | Class 1 | Class 2 | Class 3 |
|---------|---------|---------|---------|
| Digital | 20 | 14 | 30 |
| Print | 5 | 10 | 7 |

In which class(es) did his prediction hold true? Explain.
