

Lesson 6.3

TEKS
7.6H
7.6D
7.6E
7.1A

Making Predictions with Theoretical Probability

Q. How do you make predictions using theoretical probability?

A. Use the _____ to write an equation or use a _____ to make the prediction for a given experiment.

Quantitative

A proportion

Rolling a 1 or 2 on 6-sided dice
Roll 300 times

$$\frac{2}{6} = \frac{1}{3} \leftarrow \text{probability of 1 or 2}$$

How many you can predict

$$\frac{1}{3} = \frac{x}{300} \quad \frac{3x}{3} = \frac{300}{3} \quad 1x = 100$$

of rolls

B equation

← probability

$$\frac{1}{3} \times 300 = x \quad x = \frac{300}{3} = 100$$

of rolls

Quantitative

descriptive - yes or no it is likely

LESSON
6-3

Making Predictions with Theoretical Probability

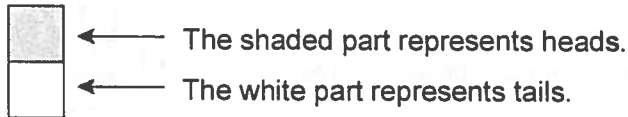
Reading Strategies: Use a Model

Predicting is making a thoughtful guess about a future result. You can use theoretical probability to make a prediction.

Al flips a coin 28 times. How many times can he expect to flip heads?

Make a bar model to help make a prediction.

Step 1 Find the theoretical probability of the coin landing on heads.



The probability of the coin landing on heads is $\frac{1}{2}$.

Step 2 Extend the model to show 28 tries.



$$\frac{1}{2} \times \frac{28}{1} = \frac{28}{2} = 14$$

Al can expect the coin to land on heads 14 times in 28 tries.

Use the probability to make a prediction.

- Li rolls a number cube labeled 1 to 6 a total of 24 times. How many times can she expect to roll a 1?

- The theoretical probability of rolling a 1 or 2 is $\frac{1}{3}$. Out of 15 rolls, how many can you expect to be a 1 or 2?

- The theoretical probability of spinning green on a spinner is $\frac{1}{4}$. How many spins in 32 tries can you expect to land on green?

- The theoretical probability of drawing a red marble is $\frac{1}{9}$. How many red marbles can you expect to get in 72 draws?

LESSON
6-3

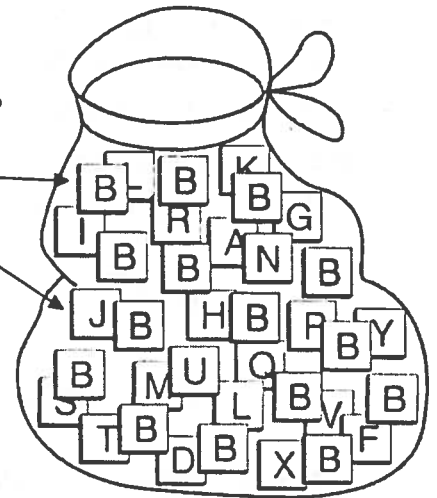
Making Predictions with Theoretical Probability
Success for English Learners

Problem 1

What is the theoretical probability of choosing a B from the bag?

$$\begin{aligned} \text{Theoretical probability} &= \frac{\text{number of desirable outcomes}}{\text{number of possible outcomes}} \\ &= \frac{15}{75} = \frac{1}{5} \end{aligned}$$

15 Bs
75 tiles in all



Problem 2

You pick a tile from the bag without looking.

You put it back. You pick again.

If you pick 30 times, how many times should you get a B?

Step 1 Write a proportion. $\frac{1}{5} = \frac{x}{30}$

Step 2 Cross-multiply. $5 \cdot x = 1 \cdot 30$
 $5x = 30$

Step 3 Divide each side by 5. $\frac{5x}{5} = \frac{30}{5}$
 $x = 6$

In 30 picks,
you can expect
to get 6 Bs.

1. Explain the difference between theoretical probability and experimental probability.

2. Explain how to use the theoretical probability to make a prediction.

3. Write your own word problem about using theoretical probability to make a prediction.

LESSON
6-3

Making Predictions with Theoretical Probability

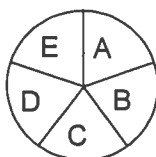
Practice and Problem Solving D

Find the probability of each event. The first one is done for you.

1. Arjan flips a quarter. What is the probability of the quarter landing tails up?

$$\frac{1}{2}$$

3. What is the probability of spinning this spinner and having it land on B?



2. Stephanie rolls a number cube that has sides numbered from 1 to 6. What is the probability of the cube landing on either 2 or 5?

4. Jonathan has a bag that has 2 red marbles and 3 blue marbles inside of it. If you were to pick one marble from the bag without looking, what is the probability of picking a red marble?

Make a prediction based on a theoretical probability. Show your work. The first one is done for you.

5. The probability of flipping a coin and having it land on heads is $\frac{1}{2}$. If a coin is tossed 4 times, how many times can you expect it to land on heads?

$$\frac{1}{2} \times 4 = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2$$

7. The probability of a number cube landing on 4 is $\frac{1}{6}$. If a number cube is tossed 12 times, how many times can it be expected to land on 4?

6. A spinner is divided into 4 equal sections. The probability of landing on A is $\frac{1}{4}$. Norma spins the spinner 16 times. How many times can she expect the spinner to land on A?

8. The probability of picking a blue pen from a cup of pens is $\frac{1}{3}$. Tim picks one pen from the cup without looking, records the color, and puts the pen back. He does this 15 times. How many times can he expect to pick a blue pen?

LESSON
6-3

Making Predictions with Theoretical Probability

Practice and Problem Solving: A/B

In each odd-numbered question, find the theoretical probability. Then use that probability to make a prediction in the even-numbered question that follows it.

- | | |
|---|--|
| <p>1. Martin flips a fair coin. What is the probability that the coin will land on heads?</p> <p>_____</p> | <p>2. Martin flips the coin 64 times. How many times can Martin expect the coin to land on heads?</p> <p>_____</p> |
| <p>3. A spinner is divided into five equal sections labeled 1 to 5. What is the probability that the spinner will land on 3?</p> <p>_____</p> | <p>4. If the spinner is spun 60 times, how many times can you expect the spinner to land on 3?</p> <p>_____</p> |
| <p>5. Harriet rolls a number cube. What is the probability that the number cube will land on 3 or 4?</p> <p>_____</p> | <p>6. If Harriet rolls the number cube 39 times, how many times can she expect to roll a 3 or 4?</p> <p>_____</p> |
| <p>7. A bag contains 6 red and 10 black marbles. If you pick a marble from the bag, what is the probability that the marble will be black?</p> <p>_____</p> | <p>8. If you pick a marble, record its color, and return it to the bag 200 times, how many times can you expect to pick a black marble?</p> <p>_____</p> |

Make a prediction based on the theoretical probability.

- | | |
|--|---|
| <p>9. Gill rolls a number cube 78 times. How many times can he expect to roll an odd number greater than 1?</p> <p>_____</p> | <p>10. Jenna flips two pennies 105 times. How many times can she expect both coins to come up heads?</p> <p>_____</p> |
| <p>11. A shoebox holds a number of disks of the same size. There are 5 red, 6 white, and 7 blue disks. You pick out a disk, record its color, and return it to the box. If you repeat this process 250 times, how many times can you expect to pick either a red or white disk?</p> <p>_____</p> | <p>12. Ron draws 16 cards from a deck of 52 cards. The deck is made up of cards of four different colors—red, blue, yellow, and green. How many of the cards drawn can Ron expect to be green?</p> <p>_____</p> |

Lesson 6.3

TEKS
7.6H
7.6D
7.6E
7.1A

Making Predictions with Theoretical Probability

Q. How do you make predictions using theoretical probability?

A. Use the theoretical probability to write an equation or use a proportion to make the prediction for a given experiment.

Quantitative

A proportion

Rolling a 1 or 2 on 6-sided dice
Roll 300 times

$$\frac{2}{6} = \frac{1}{3} \leftarrow \text{probability of 1 or 2}$$

How many you can predict

$$\frac{1}{3} = \frac{x}{300} \quad \frac{3x}{3} = \frac{300}{3} \quad 1x = 100$$

of rolls

B equation

$$\frac{1}{3} \times 300 = x \quad x = \frac{300}{3} = 100$$

← probability

of rolls

Quantitative

discriptive - yes or no it is likely

LESSON
6-3

Making Predictions with Theoretical Probability

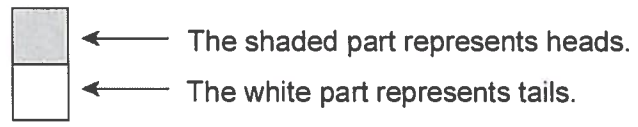
Reading Strategies: Use a Model

Predicting is making a thoughtful guess about a future result. You can use theoretical probability to make a prediction.

Al flips a coin 28 times. How many times can he expect to flip heads?

Make a bar model to help make a prediction.

Step 1 Find the theoretical probability of the coin landing on heads.



The probability of the coin landing on heads is $\frac{1}{2}$.

Step 2 Extend the model to show 28 tries.



$$\frac{1}{2} \times \frac{28}{1} = \frac{28}{2} = 14$$

Al can expect the coin to land on heads 14 times in 28 tries.

Use the probability to make a prediction.

1. Li rolls a number cube labeled 1 to 6 a total of 24 times. How many times can she expect to roll a 1?

$$\frac{1}{6} \times 24 = \frac{24}{6} = 4$$

2. The theoretical probability of rolling a 1 or 2 is $\frac{1}{3}$. Out of 15 rolls, how many can you expect to be a 1 or 2?

$$\frac{1}{3} \times 15 = \frac{15}{3} = 5$$

3. The theoretical probability of spinning green on a spinner is $\frac{1}{4}$. How many spins in 32 tries can you expect to land on green?

$$\frac{1}{4} \times 32 = 8$$

4. The theoretical probability of drawing a red marble is $\frac{1}{9}$. How many red marbles can you expect to get in 72 draws?

$$\frac{1}{9} \times 72 = 8$$

LESSON
6-3

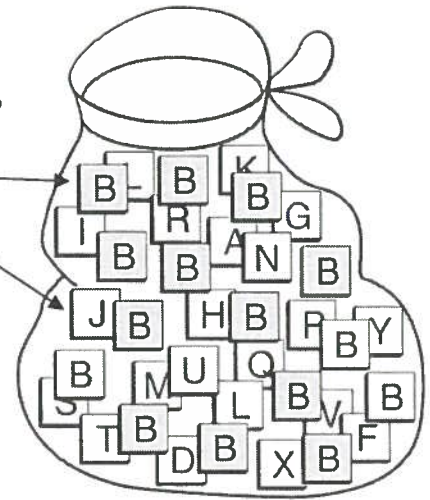
Making Predictions with Theoretical Probability

Success for English Learners

Problem 1

What is the theoretical probability of choosing a B from the bag?

15 Bs
75 tiles in all



$$\begin{aligned} \text{Theoretical probability} &= \frac{\text{number of desirable outcomes}}{\text{number of possible outcomes}} \\ &= \frac{15}{75} = \frac{1}{5} \end{aligned}$$

Problem 2

You pick a tile from the bag without looking.

You put it back. You pick again.

If you pick 30 times, how many times should you get a B?

Step 1 Write a proportion. $\frac{1}{5} = \frac{x}{30}$

Step 2 Cross-multiply. $5 \cdot x = 1 \cdot 30$
 $5x = 30$

Step 3 Divide each side by 5. $\frac{5x}{5} = \frac{30}{5}$
 $x = 6$

In 30 picks, you can expect to get 6 Bs.

1. Explain the difference between theoretical probability and experimental probability.

TP - is what should happen
EP - is base on what has already happened

2. Explain how to use the theoretical probability to make a prediction.

Multiply the TP by the # of trials

3. Write your own word problem about using theoretical probability to make a prediction.

Max rolls a cube labeled 1-6 a total of 60 times.
How many times could he expect to roll a 3? (10) $\frac{60}{6}$

LESSON
6-3

Making Predictions with Theoretical Probability

Practice and Problem Solving D

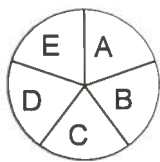
Find the probability of each event. The first one is done for you.

1. Arjan flips a quarter. What is the probability of the quarter landing tails up?

$$\frac{1}{2}$$

3. What is the probability of spinning this spinner and having it land on B?

$$\frac{1}{5}$$



2. Stephanie rolls a number cube that has sides numbered from 1 to 6. What is the probability of the cube landing on either 2 or 5?

$$\frac{1}{6} \times 2 = \frac{1}{3}$$

4. Jonathan has a bag that has 2 red marbles and 3 blue marbles inside of it. If you were to pick one marble from the bag without looking, what is the probability of picking a red marble?

$$\frac{2}{5}$$

Make a prediction based on a theoretical probability. Show your work. The first one is done for you.

5. The probability of flipping a coin and having it land on heads is $\frac{1}{2}$. If a coin is tossed 4 times, how many times can you expect it to land on heads?

$$\frac{1}{2} \times 4 = \frac{1}{2} \times \frac{4}{1} = \frac{4}{2} = 2$$

6. A spinner is divided into 4 equal sections.

The probability of landing on A is $\frac{1}{4}$.

Norma spins the spinner 16 times. How many times can she expect the spinner to land on A?

$$\frac{1}{4} \times 16 = 4$$

7. The probability of a number cube landing on 4 is $\frac{1}{6}$. If a number cube is tossed 12 times, how many times can it be expected to land on 4?

$$\frac{1}{6} \times 12 = 2$$

8. The probability of picking a blue pen from a cup of pens is $\frac{1}{3}$. Tim picks one pen

from the cup without looking, records the color, and puts the pen back. He does this 15 times. How many times can he expect to pick a blue pen?

$$\frac{1}{3} \times 15 = 5$$