Theoretical Probability

Lesson Objectives

Find the theoretical probability of an event

Vocabulary

theoretical probability (p. 640) _____

_____

Additional Examples

Example 1

Andy has 20 marbles in a bag. Of these, 9 are clear and 11 are blue. Find the probability of each event. Write your answer as a fraction, a decimal, and a percent.

$$P = \frac{\text{number of } \boxed{} \text{ outcomes}}{\text{total number of } \boxed{} \text{ outcomes}}$$

$$P(\text{clear}) = \frac{\text{number of } \boxed{} \text{ marbles}}{\text{total number of marbles}} \qquad \text{Write the ratio.}$$

$$= \boxed{} \qquad\qquad\qquad \text{Substitute.}$$

$$= \boxed{} = \boxed{}\% \qquad\qquad \text{Write as a decimal and write as a percent.}$$

The theoretical probability of drawing a clear marble is $\boxed{}$, $\boxed{}$,

or $\boxed{}$%.

The theoretical probability of drawing a blue marble is $1 - \boxed{}$, or

$\boxed{}$, $\boxed{}$, or $\boxed{}$%.

Example 2

There are 13 boys and 10 girls on the track team. The name of each team member is written on an index card. A card is drawn at random to choose a student to run a sprint and the card is replaced in the stack.

A. Find the theoretical probability of drawing a boy's name.

$$P(\text{boy}) = \frac{\text{number of } \boxed{} \text{ on the team}}{\text{number of } \boxed{} \text{ on the team}}$$ Find the theoretical probability.

$$= \boxed{}$$ Substitute.

Try This

1. Find the probability. Write your answer as a fraction, as a decimal, and as a percent. Jane has 20 marbles in a bag. Of these 8 are green. Find the probability of drawing a green marble from the bag.

2. There are 15 boys and 12 girls in the class. Find the theoretical probability of drawing a boy's name.

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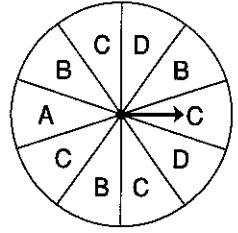
Name _____ Date _____ Class _____

The **theoretical probability** of an event is found by comparing the number of ways an event can occur to the total number of equally likely outcomes.

$$\text{theoretical probability} = \frac{\text{number of ways the event can occur}}{\text{total number of equally likely outcomes}}$$

One of the games at a carnival is the Wheel of Letters. Find the probability that the wheel will stop on each letter. Write your answer as a fraction, as a decimal, and as a percent.

1. The spinner has _____ equal sections.
   Each section is an equally likely outcome.

2. There is _____ section marked A.

3. There are _____ sections marked B.

4. There are _____ sections marked C.

5. There are _____ sections marked D.

6. $P(B) = \overline{\ \ } = 0.3 = $ _____ %

7. $P(A) = \overline{\ \ } = 0.1 = $ _____ %

8. $P(C) = \overline{\ \ } = \underline{\ \ } = 0.4 = $ _____ %

9. $P(D) = \underline{\ \ } = \underline{\ \ } = 0.2 = $ _____ %

There are 11 pennies and 9 dimes in a bag. Find the probability of each event. Write your answer as a fraction, as a decimal, and as a percent.

10. Find the probability that a dime will be drawn from the bag.

   $P(\text{dime}) = \overline{\ \ } = 0.45 = $ _____ %

11. $P(\text{penny}) = $ _____ $ = 0.55 = $ _____

There are 6 yellow cards, 4 blue cards, and 10 green cards in a bag. A card is chosen at random. Find the probability of each event.

12. yellow _____

13. blue _____

14. green _____

15. blue or green _____

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Name _____ Date _____ Class _____

LESSON **Practice A**
11-4 *Theoretical Probability*

Tina has 3 quarters, 1 dime, and 6 nickels in her pocket. Find the probability of randomly drawing each of the following coins. Write your answer as a fraction, as a decimal, and as a percent.

		Fraction	Decimal	Percent
1.	quarter			
2.	dime			
3.	nickel			

Find the probability of each event. Write your answer as a fraction, as a decimal, and as a percent. Round to the nearest tenth of a percent.

4. randomly choosing a red card in a game that has 10 red, 10 blue, 10 green, 10 yellow cards, and 10 orange cards

   _____

5. tossing two fair coins and having both land tails up

   _____

6. randomly drawing 1 of the 4 S's from a bag of 100 Scrabble tiles

   _____

7. rolling a number greater than 4 on a fair number cube

   _____

A game has 12 blue disks, 10 red disks, and 8 black disks. Find the probability of each event when a disk is chosen at random.

8. red _____

9. black _____

10. blue _____

11. not red or blue _____

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LESSON **Practice B**
11-4 *Theoretical Probability*

Find the probability of each event. Write your answer as a fraction, as a decimal, and as a percent. Round to the nearest tenth of a percent.

1. randomly choosing a white counter from a bag of 12 red counters, 12 white counters, 12 green counters, and 12 blue counters

   _____

2. tossing two fair coins and having one land on tails and one land on heads

   _____

3. rolling a number greater than 1 on a fair number cube

   _____

4. randomly drawing an orange disk from a bag of 14 black disks, 4 blue disks and 12 orange disks

   _____

5. randomly drawing 1 of the 6 R's from a bag of 100 Scrabble tiles

   _____

6. spinning a number less than 7 on a fair spinner with 8 equal sections labeled 1-8

   _____

A set of cards has 20 cards with stars, 10 cards with squares, and 15 cards with circles. Find the probability of each event when a card is chosen at random.

7. square _____   8. circle _____

9. star or circle _____   10. not circle or square _____

There are 14 girls and 18 boys in Ms. Wiley's class. Ms. Wiley randomly selects one student to solve a problem. Find the probability of each event.

11. selecting a boy _____   12. selecting a girl _____

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LESSON **Practice C**

11-4 *Theoretical Probability*

Find the probability of each event. Write your answer as a
fraction, as a decimal, and as a percent. Round to the nearest
tenth of a percent.

1. tossing three fair quarters and having all three of them land
   on heads

   _____

2. randomly choosing a classical CD from a collection of CDs
   consisting of 35 jazz CDs, 20 classical CDs, 25 rock CDs, and 5
   country music CDs

   _____

3. randomly choosing a card with an even number from a shuffled
   deck of 52 cards with four 13-card suits (diamonds, hearts,
   clubs and spades), each of which has 9 number cards labeled
   2-10 and 4 other cards

   _____

4. randomly drawing a vowel from a bag of 100 Scrabble® tiles
   that has 12 E's, 9 I's, 8 O's, 4 U's and 2 Y's.

   _____

There are 15 girls and 9 boys in Anne's yoga class. One of
them is randomly selected to demonstrate a yoga position. Find
the probability of each event.

5. selecting a boy _____   6. selecting a girl _____

Find the probability of each event when two 1-6 number cubes
are rolled.

7. P(total of 5) _____   8. P(total of 10) _____

9. P(total ≥ 7) _____   10. P(total < 2) _____

29 **Holt Mathematics**