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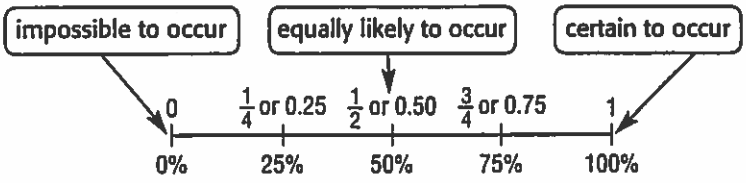
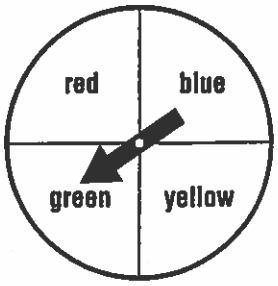
Study Guide and Intervention

Theoretical Probability

When tossing a coin, there are two possible **outcomes**, heads and tails. Suppose you are looking for heads. If the coin lands on heads, this would be a favorable outcome or **event**. The chance that some event will happen (in this case, getting heads) is called **theoretical probability**. You can use a ratio to find probability. The probability of an event is a number from 0 to 1, including 0 and 1. The closer a probability is to 1, the more likely it is to happen.



EXAMPLE 1 **There are four equally likely outcomes on the spinner. Find the probability of spinning green or blue.**



$$P(\text{green or blue}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

$$= \frac{2}{4} \text{ or } \frac{1}{2}$$

The probability of landing on green or blue is $\frac{1}{2}$, 0.50, or 50%.

Complementary events are two events in which either one or the other must happen, but both cannot happen at the same time. The sum of the probabilities of complementary events is 1.

EXAMPLE 2 **There is a 25% chance that Sam will win a prize. What is the probability that Sam will not win a prize?**

$P(\text{win}) + P(\text{not win}) = 1$

$0.25 + P(\text{not win}) = 1$ Replace $P(\text{win})$ with 0.25.

$-0.25 \quad = -0.25$ Subtract 0.25 from each side.

$P(\text{not win}) = 0.75$

So, the probability that Sam won't win a prize is 0.75, 75%, or $\frac{3}{4}$.

EXERCISES

1. There is a 90% chance that it will rain. What is the probability that it will not rain?

One pen is chosen without looking from a bag that has 3 blue pens, 6 red, and 3 green. Find the probability of each event. Write each answer as a fraction, a decimal, and a percent.

2. $P(\text{green})$
3. $P(\text{blue or red})$
4. $P(\text{yellow})$

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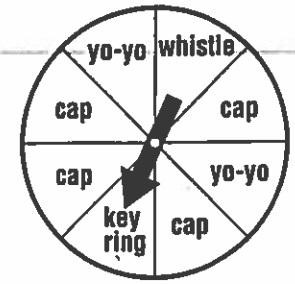
Practice: Word Problems

Theoretical Probability

Write each answer as a fraction, a decimal, and a percent.

PARTY For Exercises 1 and 2, the spinner shown is spun once. The spinner shows the prizes a person can win at a party.



1. What is the probability that a person will spin a cap? a whistle? a cap or yo-yo?	2. What is the probability that a person will spin a stuffed animal? Explain. What is the probability that a person will win a prize?
3. **WEATHER** The weather report says there is an 85% chance it will be very hot tomorrow. Should you get ready to use the air conditioner? Explain.	4. **EATING HABITS** 7% of Americans are vegetarians. If you ask a random person whether he or she is a vegetarian, what is the probability that the person is *not* a vegetarian? Explain.
5. **SCHOOL** Theresa is taking a multiple-choice test and does not know an answer. She can guess answer A, B, C, D, or E. What is the probability that Theresa will guess correctly? incorrectly?	6. **NUMBER CUBE** You roll a number cube. How likely is it that you will roll a number less than 1? less than 7? Explain.
7. **FOOD** Mrs. Phillips has 10 identical cans without labels. She knows that she had 1 can of peas, 5 cans of corn, 1 can of carrots, and 3 cans of beets. She opens one can. What is the probability it is carrots? corn or beets?	8. In Exercise 7, how likely is it Mrs. Phillips will open a can of corn? a can of peas? Explain.

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