Student Worksheet: Probability

Teacher Introduction

In the Target Moon mission NASA will need to determine the likelihood of a comet hitting three lunar settlements. NASA must find the probability that the settlements will be hit by the comet to decide whether the astronauts and resources at each site should be evacuated. Probability is the likelihood that a certain outcome will take place. Probability is calculated by creating a ratio of the number of ways an event can happen to the total number of possible outcomes and can be shown as a fraction, decimal, or percentage.

Duration

30 - 45 minutes

Vocabulary

outcomes: possible results in a situation.

event: the particular outcome that you are looking for.

probability: a ratio of the number of ways an event can happen to the total number of possible outcomes.

Pi (π): for any circle the ratio of the circumference to the diameter; π equals 3.14.

Formulas to Review

Area of a Circle = $\pi \times r^2$

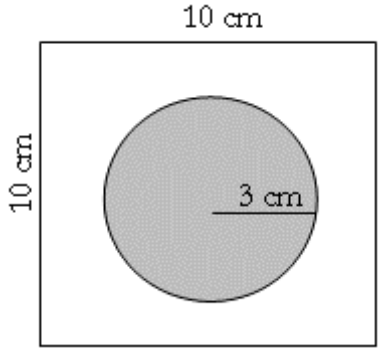
Area of a Square or Rectangle = length $\times$ width

Procedure

1. Review the vocabulary section. Make sure you understand each term before going to the example problem.
2. Read the example problem. Work through it step by step. Make sure your answer matches the answer given.
3. Complete the remaining probability problems. Then answer the analysis questions that follow.

Example Problem

If you flip a token onto this game board, what is the probability that your token will land on the circle?



To find the probability that the token will fall within the circle on the game board, you need to find the area of the circle and the total area of the game board. Once you have both areas, you should divide the area of the circle by the total area of the game board to find the probability. Use the following formula:

$$\text{Probability (of landing in the circle)} = \frac{\text{area of circle}}{\text{total area of the game board}}$$

In this problem the game board is a square shape, so the formula for the area of a square is used to find the total area of the game board.

$$= \frac{\pi \times r^2}{\text{length} \times \text{width}}$$

$$= \frac{3.14 \times 3\text{cm} \times 3\text{cm}}{10\text{cm} \times 10\text{cm}}$$

$$= \frac{28.26\ \text{cm}^2}{100\text{cm}^2}$$

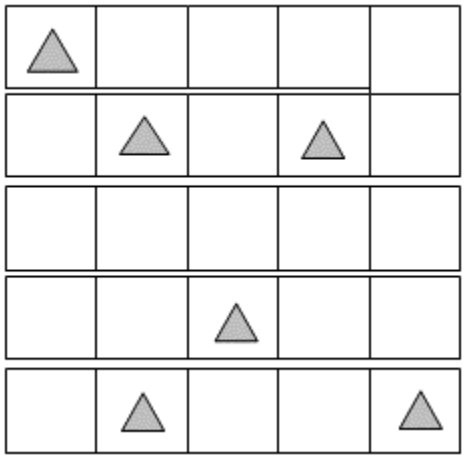
≈ 0.28, or 28%

The probability that the coin will land in the circle is approximately 28 percent.

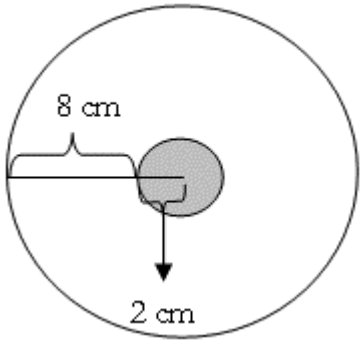
Probability Practice

Complete the following probability problems using the example problem to guide you. Write your answer as a percentage.

1. Look at the following game board. If you toss a coin onto the game board, what is the probability that you will land on a square that contains a triangle?

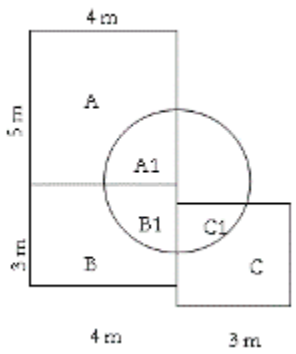


2. Geoff likes to play darts. If he throws a dart at the board, what is the probability that he will hit a bull's-eye?



3. A resort is planning to dig a well to aid in the watering of its prize flower garden. Here is a diagram of the garden.

Area of section A1 = 3 m²
Area of section B1 = 2 m²
Area of section C1= 2 m²



Garden A is a rose garden, garden B contains tulips, and garden C contains lilies. The well will be placed somewhere within the circle. What is the probability that the well will be dug in the rose garden? In the tulip garden? In the lily garden?

Analysis Questions

Answer the following questions based on the probability problems you have solved.

1. Can you give an example of where probability is used in your daily life?

2. How can probability help you to make decisions? Give an example?