14.1 HW Pg. 496-497 1-8, 10-14

For Exercises 1–6, a tile is randomly drawn from a bag containing twenty tiles numbered 1 through 20. Find the probability of the given event.

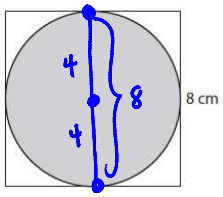
1. A 12 is drawn. $\frac{1}{20}$
2. An even number is drawn. $\frac{10}{20} = \frac{1}{2}$
3. A number that is a perfect square is drawn. $1, 4, 9, 16$ so $\frac{4}{20} = \frac{1}{5}$
4. A prime number is drawn. $2, 3, 5, 7, 11, 13, 17, 19$ so $\frac{8}{20} = \frac{2}{5}$
5. A number greater than 15 is drawn. $\frac{5}{20} = \frac{1}{4}$
6. A single-digit number is drawn. $\frac{9}{20}$

7. A number cube, with faces labeled 1–6, is rolled 25 times.
   a. If a 3 were rolled 4 times, what is the experimental probability of rolling a 3? $\frac{4}{25}$
   b. How does your answer to Part (a) compare to the theoretical probability of rolling a 3? $\frac{1}{6}$

   The experimental probability is slightly less than the theoretical probability.

8. A probability that involves a geometric measure such as a length or an area is sometimes referred to as a *geometric probability*. Assuming that a dart is equally likely to hit any point on the target, find the probability that the dart thrown at the target will land in the shaded region. Write your answers in terms of π.

   a.

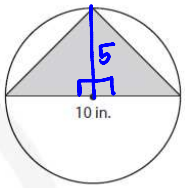


$A_{\odot} = \pi r^2 = \pi(4)^2 = 16\pi$

$A_{\square} = s^2 = 8^2 = 64$

$\frac{16\pi}{64} = \frac{\pi}{4}$

   b.



$A_{\triangle} = \frac{b \cdot h}{2} = \frac{10 \cdot 5}{2} = 25$

$A_{\odot} = \pi r^2 = \pi(5)^2 = 25\pi$

$\frac{25}{25\pi} = \frac{1}{\pi}$

9. Design and conduct an experiment to determine the experimental probability that an ordinary thumbtack will land with its point facing up when dropped on a horizontal surface. Write an explanation of what you did and what conclusions you can draw from your experiment.

   Omit

10. Of the 366 birthdates, what is the probability that a March date will be randomly chosen in a lottery? $\frac{31}{366} \approx 0.085$ or 8.5%
11. In a large data set, what is the approximate probability of randomly choosing a value that is below the median? $\frac{1}{2}$ or .5 or 50% since half the #'s are below the median
12. According to a NASA space scientist, a city could be destroyed once every 30,000 years by an asteroid hitting the Earth. If he is correct, what is the probability of a city being destroyed by an asteroid in any year? $\frac{1}{30,000} \approx 0.00003$
13. When the euro coin was issued, a German newspaper reported that a coin-flipping experiment with the Belgian one-euro coin showed that heads came up 140 times out of 250. Because of this, a ban on using euros at the start of soccer matches was considered. According to the experiment, what is the probability that a flipped euro results in heads? $\frac{140}{250} = \frac{14}{25}$ or 56%

14. The term *odds* is used to describe a ratio that is often used in connection with the chance of winning (or losing) a game or competition. When all outcomes are equally likely, the odds *in favor* of an event A are

$$\text{Odds in favor of } A = \frac{\text{number of outcomes in } A}{\text{number of outcomes not in } A}$$

The odds *against* event A are

$$\text{Odds against event } A = \frac{\text{number of outcomes not in } A}{\text{number of outcomes in } A}$$

Winning → not winning

a. If the odds in favor of a runner winning a gold medal in a race are 1 to 3, what are the odds against the runner winning a gold medal? What is the probability that the runner will win a gold medal?

odds against the runner = $\frac{3}{1}$

$P(W) = \frac{1}{4}$ probability of winning

b. A company has bid on a contract to write a new probability book. The company estimates that it has a 0.4 probability of winning the contract. What are the odds in favor of winning the contract?

$\frac{4}{10} = P(W)$ so Odds of winning = $\frac{4}{6}$ or $\frac{2}{3}$

c. What are the odds in favor of drawing a 2 from a standard deck of 52 cards?

2 of ♥ ♦ (Red) ♠ ♣ (Black) $\frac{4}{48} = \frac{1}{12}$