

2.6 - Theoretical and Experimental Probability

Vocabulary:

the likelihood of an event occurring $0\% \rightarrow 100\%$

- Probability
- Outcome the result of 1 try
- Event any outcome that could occur
- Theoretical Probability
- Complement all of the outcomes not in the event \rightarrow $\frac{\# \text{ of favorable outcomes}}{\# \text{ of possible outcomes}}$
- Odds
- Experimental Probability

the likelihood of an event by comparing favorable & unfavorable outcomes

$1:1$

$0 \rightarrow 1$

1 EXAMPLE A bowl contains 12 slips of paper, each with a different name of a month on it. Find the theoretical probability that a slip selected at random from the bowl has the name of a month that ends with "ber."

$$P(\text{event}) = \frac{\text{number of favorable outcomes}}{\text{number of possible outcomes}}$$

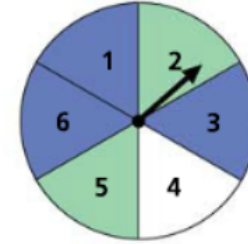
$$= \frac{4}{12} \div 4 = \frac{1}{3}$$

Sep. Oct Nov Dec

$$33\frac{1}{3}\%$$

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Find the theoretical probability of landing on the given sections of the spinner.



$$\#3. P(5) = \frac{1}{6} = 16.\bar{6}\%$$

$$\#7 P(\text{greater than 4}) = \frac{2}{6} = \frac{1}{3} = 33\frac{1}{3}\%$$

$$\#11 P(\text{not 2}) = \frac{5}{6} = 83.\bar{3}\%$$

2 EXAMPLE For a number cube, find the probability of not rolling a number divisible by 3.

$$P(\text{not } \# \div 3) = \frac{4}{6} = \frac{2}{3}$$

1 2 (3) 4 5 (6)

$$\begin{array}{l} 66\frac{2}{3}\% \\ \text{or} \\ 66.\bar{6}\% \end{array}$$

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#14. Suppose the probability that you will be picked for a committee at school is 20%. What is the probability that you will not be picked?

80%

3 EXAMPLE Find the odds, for the spinner below, in favor of the spinner landing on an even number.



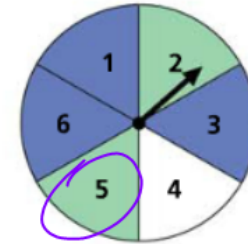
favorable : unfavorable

4 : 4

1 : 1

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Use the spinner to find each odds.



#15. odds in favor of green $2:4$
 $1:2$

#19. odds in favor of a multiple 5

$1:5$

* **4 EXAMPLE** Quality control inspected 500 belts at random. They found no defects in 485 belts. What is the probability that a belt selected at random will pass quality control?

$$\frac{485}{500} = 97\%$$

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The results of a survey of 100 randomly selected students at a 200-student high school are below. Find the experimental probability that a student selected at random makes the given response.

#21. $P(\text{community college}) = \frac{24}{100} = 24\%$

#25. $P(\text{trade school or community college})$

$$15 + 24 = \frac{39}{100}$$

Plans for After Graduation

Response	Number of Respondents
Go to community college	24
Go to 4-year college	43
Take a year off before college	12
Go to trade school	15
Do not plan to go to college	6

$$39\%$$

5 EXAMPLE If the belt manufacturer from Additional Example 4 has 6258 belts, predict how many belts are likely to have no defects.

$$\frac{485}{500} = 97\%$$

~~*~~ 97% of 6,258
 $0.97 \cdot 6,258$

$$\frac{485}{500} \times \frac{6258}{6258}$$

$$6,070.26$$

6,070 belts will pass

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#27. A forest contains about 500 trees. You randomly pick 67 trees and find that 27 of them are oaks.

a. What is the experimental probability that a tree in the forest is an oak?

$$\frac{27}{67} = 40\%$$

b. Predict how many oak trees there are in the forest.

40% of 500

$$0.4 \cdot 500 = 200 \text{ oak trees}$$

Homework Problems:

pg. 96-98 #28, 31, 45, 55, 71, 73