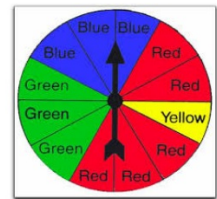




## 10.3 Experimental and Theoretical Probability



### Learning Targets



- Find an Experimental Probability
- Make a Prediction Using Experimental Probability
- Find a Theoretical Probability
- Use a Theoretical Probability to find an unknown
- Compare Experimental and Theoretical Probabilities



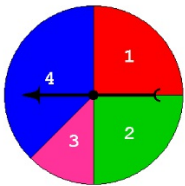
#1-6 unless specified  
Odd: 1,3,5 Even: 2,4,6



52 Cards in a deck  
4 suits (hearts, diamonds, clubs, spades)  
13 cards in each suit  
Face Cards: Jack, Queen, King, Ace



26 letters in the alphabet  
A E I O U are vowels























































































The size of section changes the probability

## 36 Outcomes When Rolling Two Dice

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Second Roll

						
First Roll 	 	 	 	 	 	 
	 	 	 	 	 	 
	 	 	 	 	 	 
	 	 	 	 	 	 
	 	 	 	 	 	 
	 	 	 	 	 	 

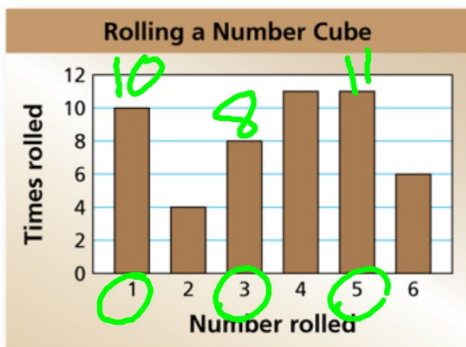
## Experimental Probability

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Conduct an Actual Experiment: Flip a coin, Roll a dice, Spin a spinner, etc. and keep track of the outcomes. Then use the data to find the probability of an outcome occurring again.

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

## Finding an Experimental Probability Write a probability based on Trials



The bar graph shows the results of rolling a number cube 50 times. What is the experimental probability of rolling an odd number?

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

$$P(\text{odd}) = \frac{10 + 8 + 11}{50} = \frac{29}{50}$$

$$58\%$$

## Using an Experimental Probability

## Write a probability based on Trials

A P R I L						
SUN	MON	TUE	WED	THU	FRI	SAT
				2	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

It rains 2 out of the last 12 days in March. If this trend continues, how many rainy days would you expect in April?

$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

$$P(\text{rain}) = \frac{2}{12} = \frac{1}{6}$$

Use the probability to predict rainfall in April if the trend continues.

5

$$\frac{1}{6} = \frac{x}{30}$$

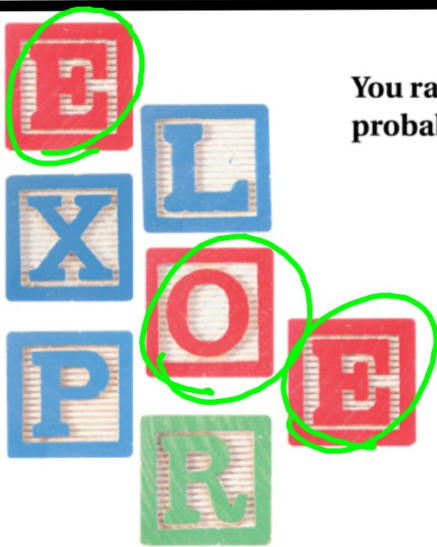
## Theoretical Probability

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The probability you would EXPECT if all possible outcomes are EQUALLY likely.

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

## Finding Theoretical Probability



You randomly choose one of the letters shown. What is the theoretical probability of choosing a vowel?

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

$P(\text{vowel}) =$

$$\frac{3}{7}$$



## Using Theoretical Probability

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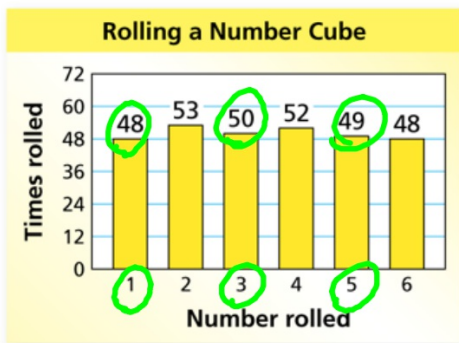
The theoretical probability of winning a bobblehead when spinning a prize wheel is  $\frac{1}{6}$ . The wheel has 3 bobblehead sections. How many sections are on the wheel?

$$P(\text{bobblehead}) = \frac{\text{number of bobblehead sections}}{\text{total number of sections}}$$

$$\frac{1}{6} = \frac{3}{x}$$

18 sections

# Comparing Experimental and Theoretical Probabilities



The bar graph shows the results of rolling a number cube 300 times.

a. What is the experimental probability of rolling an odd number?

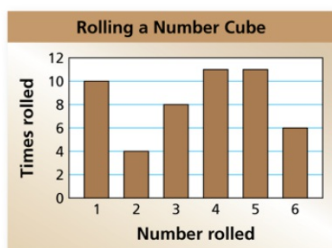
$$P(\text{event}) = \frac{\text{number of times the event occurs}}{\text{total number of trials}}$$

$$P(\text{odd}) = \frac{48 + 50 + 49}{300} = \frac{147}{300} = \frac{49}{100}, \text{ or } 49\%$$

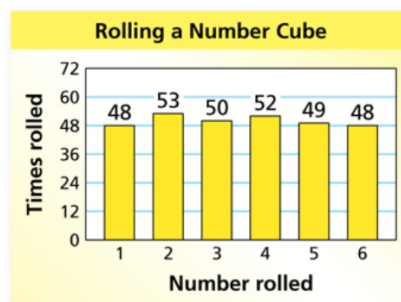
b. How does the experimental probability compare with the theoretical probability of rolling an odd number?

Because there were 300 trials,  
the exp. probability  
is very close to the theoretical one.

c. Compare the experimental probability in part (a) to the experimental probability in Example 1.



$$\frac{29}{50} \quad 58\%.$$



$$\frac{147}{300} \quad 49\%$$

As the number of trials increased from 50 to 300, the experimental probability decreased from 58% to 49%. So, it became closer to the theoretical probability of 50%.



**Homework**  
**pg 417**  
**#1-3,**  
**8-14 all,**  
**15-29 odd**  
**30 & 31**