ALGEBRA 2 Name:_____ Date:_____

10.6 Introduction to Probability and Odds

Theoretical Probability:

- The likelihood of an event occurring when all outcomes are equally likely.
- Number between 0 and 1
  - Probability of 1: the event will always occur
  - Probability of 0: the event can never occur
- $\mathbf{P(success)} = \frac{\mathbf{\#\ of\ successful outcomes}}{\mathbf{\#\ of\ total outcomes}}$ $\mathbf{P(failure)} = \frac{\mathbf{\#\ of\ unsuccessful outcomes}}{\mathbf{\#\ of\ total outcomes}}$

  success: desired outcome **failure:** undesired outcome
- LEAVE YOUR ANSWERS AS REDUCED FRACTIONS!!!!

Experimental Probability:

- Probability that is based off of the trials of an experiment.
- Will not always be exactly the same as the theoretical probability.
- Examples of experiments: flipping a coin, taking a survey, picking cards from a deck of cards, etc.

Examples:

1. A box contains 2 baseballs, 7 softballs, and 11 tennis balls. What is the probability that a ball selected at random will be…
   (a) tennis ball? (b) baseball? (c) softball? (d) not a softball? (e) not a tennis ball?

2. Two dice are thrown. List all of the possible sums of the two dice by completing the chart.

+	1	2	3	4	5	6
1						
2						
3						
4						
5						
6						

3. Find the probability that one roll of the two dice will give…
   (a) a sum of 7 (b) two 6's (c) a sum of 8

   (d) a sum less than 6 (e) a sum of 17 (f) a sum greater than 0

4. A card is drawn at random from a standard deck of 52 cards. What is the probability it is a…
   (a) heart? (b) four? (c) face card? (d) pink?

5. If you randomly selected a letter from the word "MATHEMATICS", what is the probability the letter is a…
   (a) "M"? (b) vowel? (c) a consonant?

6. Powerball contains the numbers 1-46. What is the probability the first number selected is…
(a) 21? (b) an even number? (c) 20, 21, or 22? (d) 0?

7. If you flip a quarter, what is the probability you get… (a) "heads"? (b) "tails"?

8. If you roll a die, what is the probability you get…
(a) 5? (b) an even number? (c) a 1 or 2? (d) not an 8?

9. A bowl contains 6 green, 4 blue, 3 red, and 7 yellow marbles. What is the probability you pick…
(a) a green marble? (b) not a blue marble? (c) a red or yellow marble?

Odds:

- the ratio of successes to failures
- $\textbf{Odds (success)} = \frac{\textbf{\# of successes}}{\textbf{\# of failures}}$ $\textbf{Odds (failure)} = \frac{\textbf{\# of failures}}{\textbf{\# of successes}}$
- If the odds are greater than 1, then the event is more likely to occur.
- If the odds are less than 1, then the event is less likely to occur.
- The total does not go on the bottom like probability!!
- LEAVE YOUR ANSWERS AS REDUCED FRACTIONS!!!!

Examples:

10. Glenn Schwartz announced that the probability of snow tomorrow is 3/10. Find the odds that it…
(a) will snow tomorrow. (b) will not snow tomorrow.

11. The probability that Patriots will win next year's Super Bowl is 2/5. Find the odds that the Patriots…
(a) will win the Super Bowl. (b) will not win the Super Bowl.

12. The odds of a horse winning the Kentucky Derby are 1:12. What is the probability the horse…
(a) will win the race? (b) will not win the race?

13. The odds of getting an "A or B" in social students are 5/3. What is the probability of…
(a) getting an "A or B"? (b) not getting an "A" or "B"?

14. If you select one letter from the word "SCHOOL", what are the odds it will be…
(a) an "O"? (b) a vowel? (c) a consonant?

15. A card is randomly drawn from a deck. What are the odds the card will be a…
(a) club? (b) "number" card? (c) a face card?

Practice:

1) You roll a six-sided die whose sides are numbered 1 through 6. Find:
   a) P(number greater than 7)
   b) P(4)
   c) P(1 or 6)
   d) P(prime number)
   e) P(a multiple of 2 or 5)
   f) P(odd or even number)

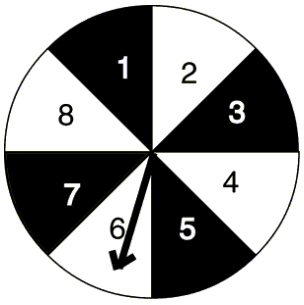
2) There are 4 blue marbles, 5 red marbles, 1 green marble, and 2 black marbles in a bag. Suppose you select one at random. Find each **probability**.
   a) P(black)
   b) P(not blue)
   c) P(red or green)
   d) P(pink)
   e) P(neither red nor black)
   f) P(not purple)

3) A card is drawn randomly from a standard deck of cards. Find the **probability** of drawing:
   a) P(a 7)
   b) P(a 10 or a J)
   c) P(a red)
   d) P(a 1)
   e) P(not a face card)
   f) P(an A, a 2, or a 3)
   g) P(an even number)
   h) P(not a number card)
   i) P(a club)

4) A jar contains 10 blue marbles, 6 red marbles, and 9 white marbles. What are the **odds** of drawing a blue marble from the bag?

5) If there are 60 golden tickets and your name is on 3 tickets,
   a) What is the **probability** of you getting picked?
   b) What are the **odds** of you getting picked?

Use the spinner for questions #6–9:



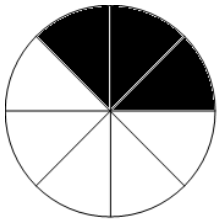
6) What is the **probability** of landing on a black space?
7) What is the **probability** of landing on a multiple of 3?
8) What are the **odds** of landing on a white space?
9) What are the **odds** of landing on a multiple of 4?

10) A bag of M&M's contains 12 yellow, 15 brown, 3 blue, 7 red, 8 green, and 5 orange. What are the **odds** of picking a white?

11) Suppose you randomly choose one letter from A through J. Find the **odds** of choosing a consonant.

12) A spinner has five equal portions colored orange, red, blue, yellow, and green. What are the **odds** of spinning a yellow or an orange?

13) If a randomly thrown dart hits the target, what are the **odds** of hitting the non-shaded region?



14) What is the **probability** of choosing an "A" or a "G" in the word "ALGEBRA"?

Homework: Text page 559-560

A jar contains 3 red marbles, 2 blue marbles, and 2 green marbles. Find the probability of drawing the given type of marble at random.

3. a red marble

4. a blue marble

5. a red or a green marble

6. a blue or a green marble

Choosing Cards **A card is drawn at random from a standard 52-card deck (see page 547). Find the probability of drawing the given card.**

21. the jack of hearts

22. a 7

23. a black card

24. a heart

25. a 2 or a 3

26. a card other than an ace

Surveys **In Exercises 34–37, use the following information.**

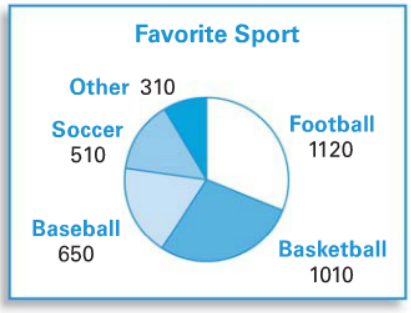
The graph shows the results of a survey asking high school students to name their favorite sport. For a high school student chosen at random, find the experimental probability of the event.

34. The student's favorite sport is football.

35. The student's favorite sport is baseball.

36. The student's favorite sport is football or basketball.

37. The student's favorite sport is *not* soccer.



38. Writing You ask 3 friends to each flip a penny 25 times, then report the probability the penny shows tails. Your friends report probabilities of 0.44, 0.48, and 0.60. You say the probability is 0.5. Can everyone be right? Explain.