Name: _____   Date: _____

Section 2.3 Compare Experimental and Theoretical Probabilities

1. A modified dart board has equally spaced sectors containing the numbers 1 through 20.
 a) What is the theoretical probability of hitting the numbers 18, 19, or 20?
 b) In 75 of her first 80 throws, a dart player hits the numbers 18, 19, or 20. Find the experimental probability.
 c) Would you expect the experimental probability to approach the theoretical probability if the number of throws increased? Explain.

2. Anton rolled a die 60 times. On 25 of these rolls, he got a 4.
 a) What is the experimental probability of rolling a 4?
 b) What is the theoretical probability of rolling a 4?
 c) If the number of trials increased, what would you expect would happen to the experimental probability of rolling a 4?

3. A bag contains 70 poker chips: 30 purple, 25 red, and 15 orange. Jessie draws a chip, records the colour, and returns it to the bag. The results are shown in the graph.
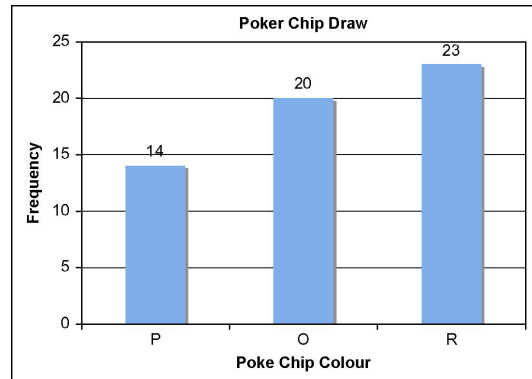
a) What is the experimental probability of drawing each colour?
 b) What is the theoretical probability of drawing each colour?
 c) Add the experimental probabilities from part a). Add the theoretical probabilities from part b). What do you notice? Explain.

4. A prize wheel has the numbers 0 through 36 on equally spaced sectors. The wheel is spun and contestants win a prize if the wheel stops at the number they choose. In 15 of the last 300 spins, the wheel stopped at the number 4.

a) Find the theoretical probability spinning a 4.
b) Use this theoretical probability to calculate how many times the wheel will stop at 4 in 300 spins and in 600 spins.
c) What is the experimental probability of spinning a 4?
d) Use your answers to parts b) and c) to predict how many times the wheel will stop at 4 in the next 300 spins.

5. The wheel from question 4 has 18 red numbers, 18 black numbers, and 1 green number (the zero). Some contestants choose either red or black since they think black will win half the time and red will win half the time.
a) Use theoretical probability to show why this is an incorrect assumption.
b) If the wheel is spun 740 times, how many spins will result in a black number?
c) If there was no zero, how would your answer to part b) change?

6. A coin is tossed 8 times, resulting in 2 heads and 6 tails.
a) Compare the experimental and theoretical probability of the experiment.
b) Why is this not a good example of a probability experiment?

7. a) Describe how a graphing calculator can be used to simulate 25 tosses of a coin.
b) Conduct this simulation, record your data, and make a bar graph of the results.

8. A "loaded" die has been weighted to cause certain numbers to come up more frequently than others. A die was rolled 100 times. The results are shown in the table.

Outcome	Frequency
1	3
2	22
3	6
4	36
5	16
6	17

a) Determine the experimental probability of each outcome.
b) What is the theoretical probability of each outcome?
c) Could the die be "loaded"? Explain
d) What could you do to verify your conclusion in part c)?

9. A 15 question multiple-choice quiz is given to a class. Each question has 5 choices.
a) What is the theoretical probability of randomly choosing a correct answer?
b) Manuel randomly chooses all the answers. How many questions can he expect to have answered correctly?