Name: _____ Date: _____

Learning Goal 9.1	I can calculate probabilities.

Experimental Probability	Theoretical Probability	Simulation
Probability based on experimental results	counting Outcomes.	model a real life situation using an experiment

Theoretical Probability Formula for Independent Events

$$P(C) = \frac{\text{the number of favourable outcomes}}{\text{the total number of possible outcomes.}}$$

$$P(C \text{ and } M) = P(C) \times P(M)$$

Examples

* 6-sided dice *

a. What is the probability of flipping heads and rolling a 4?

$$P(H,4) = P(H) \times P(4)$$
$$= \frac{1}{2} \times \frac{1}{6}$$
$$= \frac{1}{12}$$

b. What is the probability of flipping tails and rolling an odd number?

$$P(T, \text{odd}) = P(T) \times P(\text{odd})$$
$$= \frac{1}{2} \times \frac{3}{6}$$
$$= \frac{3}{12} = \frac{1}{4}$$

c. What is the probability of rolling a 6 twice in a row?

$$P(6,6) = \frac{1}{6} \times \frac{1}{6}$$
$$= \frac{1}{36}$$

d. What is the probability of rolling a 5 three times in a row?

$$P(5,5,5) = \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6}$$
$$= \frac{1}{216}$$

$$P(\text{yahtzee}) = \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} \times \frac{1}{6} = \frac{1}{7776}$$
$$= 0.012$$

1-75 ✓ 76-100 ×

Example Lebron plays basketball for the school team. His stats show he has an 75% chance of making his first foul shot and an 80% chance of making his second shot. What is the probability that Lebron will make both his shots?

1-80 ✓ 81-100 ×

a. Create a simulation to find the experimental probability. Repeat the simulation 10 times and record your results.

b. What is the experimental probability that he will make both shots?

$\frac{4}{10} = 40\%$

c. What is the theoretical probability that he will make both shots?

$\frac{3}{4} \times \frac{4}{5} = \frac{12}{20} = \frac{3}{5} = 60\%$

first shot: 1-75 ✓ 76-100 ×

second shot: 1-80 ✓ 81-100 ×

Trial	Experimental Results		
	First Shot	Second Shot	Both Good Shots
1	×	✓	×
2	✓	×	×
3	×	✓	×
4	✓	✓	✓
5	✓	✓	✓
6	✓	✓	✓
7	✓	✓	✓
8	✓	✓	✓
9	×	✓	×
10	✓	✓	✓

Example Andrew has a regular coin and a three coloured spinner. Andrew wants to calculate the probability that he will flip heads and spin blue. Model this situation and record the results for 10 trials.

T 1-50 H 51-100

B 1-33 34-66 67-99

Trial	Experimental Results		
	Flip Heads	Spin Blue	Both
1	✓	×	×
2	✓	×	×
3	×	×	×
4	✓	✓	✓
5	×	×	×
6	×	×	×
7	✓	×	×
8	×	×	×
9	×	×	×
10	×	×	×

a. What is the experimental probability of this outcome?

$\frac{1}{10} = 10\%$

b. What is the theoretical probability of this outcome?

$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6} = 17\%$

heads blue