**Math Learning Goals**

- Review the vocabulary for probability.
- Review Fractions, Percents, and favourable outcomes vs. all outcomes

**Minds On...****Whole Class → Guided Review**

Review the meaning of the vocabulary associated with probability situations . Discuss with the class (See BLM)

**Action!****Pairs → Investigation**

**Part 1** - Explain that a preference is considered to be a favourable outcome; and the probability of that event is the fraction (percent) of the number of favourable outcomes to the total number of possible outcomes.

$$P = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$

1. The faces of a cube are labelled 1, 2, 3, 4, 5, and 6. The cube is rolled once.

*List the favourable outcomes for each.*

- a) What is the probability that the number on the top of the cube will be odd?
- b) What is the probability that the number on the top of the cube will be greater than 5?
- c) What is the probability that the number on the top of the cube will be a multiple of 3?
- d) What is the probability that the number on the top of the cube will be less than 1?
- e) What is the probability that the number on the top of the cube will be a factor of 36?
- f) What is the probability that the number on the top of the cube will be a multiple of 2 and 3?

**Consolidate  
Debrief****Whole Class → Presentation**

One student from each pair presents their results.

*Reflection  
Concept  
Practice  
Skill Drill***Home Activity or Further Classroom Consolidation**

Complete a journal that focuses probability vocabulary and examples for each (use vocabulary introduced during the lesson – action part).

Probability is the mathematics of chance.

The probability of an event is a number between 0 and 1; an impossible event, 0; and an event that is certain, 1.

## (Review words) Talking Mathematically

Name:

Date:

### Part A

Read each statement carefully. Choose from the terms to describe each event and record your answer in the space provided:

- certain or sure
- impossible
- likely or probable
- unlikely or improbable
- maybe
- uncertain or unsure
- Favourable
- Not favourable
- Possible outcomes



## Probability – In class work (Answers)

1) The faces of a cube are labelled 1, 2, 3, 4, 5, and 6. The cube is rolled once.

*List the favourable outcomes for each.*

- a) What is the probability that the number on the top of the cube will be odd?
- b) What is the probability that the number on the top of the cube will be greater than 5?
- c) What is the probability that the number on the top of the cube will be a multiple of 3?
- d) What is the probability that the number on the top of the cube will be less than 1?
- e) What is the probability that the number on the top of the cube will be a factor of 36?
- f) What is the probability that the number on the top of the cube will be a multiple of 2 and 3?

### Question 1 – solutions (ANSWERS)

- a) There are 3 odd numbers, so the probability is  $\frac{3}{6}$  or  $\frac{1}{2}$ .
- b) There is only one number greater than 5, so the probability is  $\frac{1}{6}$ .
- c) There are two multiples of 3, i.e., 3 and 6, so the probability is  $\frac{2}{6}$  or  $\frac{1}{3}$ .
- d) There is no number less than one, so the probability is zero.
- e) There are 5 numbers that are factors of 36, i.e., 1, 2, 3, 4, and 6, so the probability is  $\frac{5}{6}$ .
- f) There is only one number that is a multiple of both 2 and 3, i.e., 6, so the probability is  $\frac{1}{6}$ .



**Math Learning Goals**

- Represent probability in multiple ways.
- Introduce concepts of theoretical and experimental probability.

**Materials**

- coins
- BLM 6.2.1, 6.2.2

**Minds On...**

**Whole Class → Guided Review**

Review the meaning of the vocabulary associated with probability situations (BLM 6.2.1). Students brainstorm, write, and share their own statements, using correct terminology. In discussion, focus on those events which students identify as “maybe” to decide whether these events are likely or unlikely to occur. Students explain their reasoning.

**Action!**

**Pairs → Investigation**

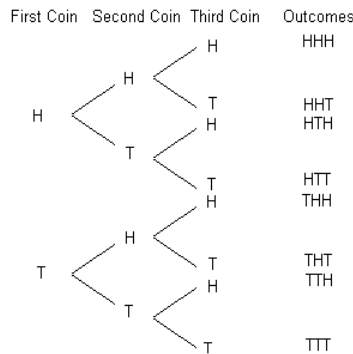
**Part 1 - (Theoretical)** Students toss one coin and state the number of possible outcomes. They toss two coins and suggest possible outcomes.

Demonstrate how a tree diagram can be used to organize the outcomes of their tosses. Point out that the branches represent their choices.

Each pair of students creates a tree diagram for tossing three coins. As an example, when tossing three coins, we wish to see 1 head and 2 tails. What is the probability of this occurring?

Explain that a preference is considered to be a favourable outcome; and the probability of that event is the fraction (percent) of the number of favourable outcomes to the total number of possible outcomes.

$$P = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$



Probability is the mathematics of chance.

The probability of an event is a number between 0 and 1; an impossible event, 0; and an event that is certain, 1.

**Theoretical probability** applies only to situations that can be modelled by mathematically fair objects.

The coin toss provides experimental results.

**Consolidate Debrief**

**Whole Class → Presentation**

One student from each pair presents their results for tossing two coins twenty times. Combine whole class data to share results with the larger sample size.

Discuss the effect of sample size on experimental outcomes. Discuss what a probability of 0 and a probability of 1 would mean in the context of coin tosses.



*Reflection  
Concept  
Practice  
Skill Drill*

**Home Activity or Further Classroom Consolidation**

Complete worksheet 6.2.2.

Devise your own simulations using spinners, or a combination of coins and spinners, etc.

## 6.2.1: Talking Mathematically

Name:

Date:

### Part B

Consider pairs of statements and determine which of them would be:

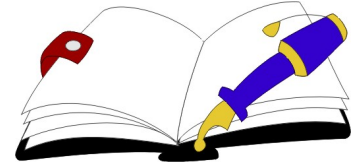
- equally likely
- equally unlikely

1. A flipped coin will show tails.	
2. I will be in school tomorrow.	
3. It will not get dark tonight.	
4. I will have pizza for dinner tonight.	
5. I roll a 3 using a number cube.	
6. It will snow in July.	
7. The teacher will write on the board today.	
8. January will be cold in Ontario.	
9. My dog will bark.	
10. I will get Level 4 on my science fair project.	

## 6.2.2: Investigating Probability

Name:

Date:



Solve the following problems in your notebook:

1. Keisha's basketball team must decide on a new uniform. The team has a choice of black shorts or gold shorts and a black, white, or gold shirt.  
*Use a tree diagram to show the team's uniform choices.*

- a) What is the probability the uniform will have black shorts?
- b) What is the probability the shirt will not be gold?
- c) What is the probability the uniform will have the same-coloured shorts and shirt?
- d) What is the probability the uniform will have different-coloured shorts and shirt?

## 6.2.2: Investigating Probability - (Answers)

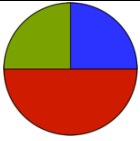
Keisha's basketball team must decide on a new uniform. The team has a choice of black shorts or gold shorts and a black, white, or gold shirt.

(SEE TREE DIAGRAM – IMAGE)

### Question 1 - ANSWERS

- a) The probability the uniform will have black shorts is  $\frac{3}{6}$  or  $\frac{1}{2}$ .
- b) The probability the shirt will not be gold is  $\frac{4}{6}$  or  $\frac{2}{3}$ .
- c) The probability the uniform will have the same-coloured shorts and shirt is  $\frac{2}{6}$  or  $\frac{1}{3}$ .
- d) The probability the uniform will have different-coloured shorts and shirt is  $\frac{4}{6}$  or  $\frac{2}{3}$ .

## Day 2 - Theoretical Probability



### Math Learning Goals

- Represent probability in multiple ways (tree diagram)
- Introduce concepts of theoretical probability.

### Minds On...

#### Whole Class → Guided Review

Review homework of tree diagram from previous day (Keisha's soccer outfit). Discuss different outcomes and how students created their tree diagrams.

### Action!

#### Pairs → Investigation

**Part 1 - (Theoretical)** Introduce dice activity with tree diagram.

The faces of a cube are labelled 1, 2, 3, 4, 5, and 6. If two cubes are rolled (create a tree diagram):

- What is the probability that the both numbers on the top of the cube will be odd?
- What is the probability that both numbers on the top of the cube will be greater than 5?
- What is the probability that one number on the top of one cube will be a multiple of 3?
- What is the probability that the numbers on the top of the cubes will be less than 1?
- What is the probability that the numbers on the top of the cubes will both be factors of 36?

### Consolidate Debrief

#### Whole Class → Presentation

Review that a preference is considered to be a favourable outcome; and the probability of that event is the fraction (percent) of the number of favourable outcomes to the total number of possible outcomes.

$$P = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$



Reflection  
Concept  
Practice  
Skill Drill

#### Home Activity or Further Classroom Consolidation

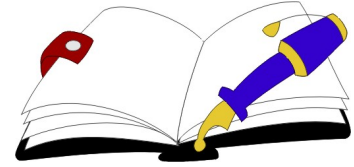
Creating a sandwich question for practice (use of tree diagram)



## (day 2 – HMWRK) Investigating Probability

Name:

Date:



Solve the following problems in your notebook:

2. Brit goes out for lunch to the local submarine sandwich shop. He can choose white or whole wheat bread, and a filling of turkey, ham, veggies, roast beef, or salami.

*Use a tree diagram to show all Brit's possible sandwich choices.*

- a) How many sub choices are there?
- b) He may also choose a single topping of tomatoes, cheese, or lettuce. Now, how many possible sub choices does he have?
- c) If each possibility has an equal chance of selection, what is the probability that Brit will choose a whole wheat turkey sub topped with tomatoes?
- d) What is the probability of choosing a veggie sub topped with cheese?
- e) What is the probability of choosing a meat sub topped with lettuce on white bread?
- f) What is the probability of choosing a meat sub topped with lettuce?

## (day 2 – HMWRK) - Investigating Probability - (Answers)

### Question:

Brit goes out for lunch to the local submarine sandwich shop. He can choose white or whole wheat bread, and a filling of turkey, ham, veggies, roast beef, or salami.

*Use a tree diagram to show all Brit's possible sandwich choices.*

(SEE TREE DIAGRAM – IMAGE)

### Question 1 - ANSWERS

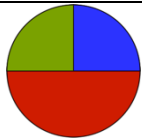
a) Brit has the choice of 2 breads and 5 fillings. So, he has the choice of  $2 \times 5 = 10$  sandwiches. This can be shown using a tree diagram that first has 2 branches (one for each of the bread types) and then 5 branches at the end of the first branches (one for each of the fillings). This will give 10 ends to the tree.

b) You can add 3 branches at the end of each branch to indicate each of 3 topping choices. This gives 30 possible outcomes.

c) Only one of these outcomes is a whole-wheat turkey sandwich topped with tomatoes. So the probability that he chooses this sandwich is  $\frac{1}{30}$ . It is only one of 30 possible sandwiches.

d) The probability of choosing any veggie sub topped with cheese is  $\frac{2}{30}$  or  $\frac{1}{15}$ . The student must remember to use both the whole wheat and white bread possibility in this answer.

e) The probability of choosing a meat sub topped with lettuce on white bread is  $\frac{4}{30}$  or  $\frac{2}{15}$ . The student must remember to use all possible meat selections for this answer.



**Math Learning Goals**

- Review the vocabulary for probability.
- Review Fractions, Percents, and favourable outcomes vs. all outcomes

**Minds On...**

**Whole Class → Guided Review**

Review the meaning of the vocabulary associated with probability situations . Discuss with the class (See BLM)

**Action!**

**Pairs → Investigation**

**Part 1** - Explain that a preference is considered to be a favourable outcome; and the probability of that event is the fraction (percent) of the number of favourable outcomes to the total number of possible outcomes.

$$P = \frac{\text{Number of favourable outcomes}}{\text{Number of possible outcomes}}$$

**Part 2 (Experimental)** Each pair tosses two coins twenty times (20 is the sample size) and records each outcome. Students will decide on a way to record their results (e.g., chart, list, etc.). A favourable outcome will be ones that have a combination of heads/tails or tails/heads.

Experimental results:  $\frac{\#TT}{20}$   $\frac{\#HH}{20}$   $\frac{\#TH \text{ or } HT}{20}$

Have students complete the experiment.

Discuss how changing sample size (to more or fewer than 20) would affect experimental results.

(Theoretical)

$P(TT) = \frac{1}{4}$        $P(\text{one of each}) = \frac{2}{4}$        $P(HH) = \frac{1}{4}$

**Consolidate Debrief**

**Whole Class → Presentation**

One student from each pair presents their results.

**Home Activity or Further Classroom Consolidation**

Create a spinner with 5 sections. Label/colour the sections so they have a theoretical probability of Green – 2/5 Red 1/5 Blue 1/5 Yellow 1/5

Complete an experiment (20 spins on the spinner) and determine outcomes. How many were favourable outcomes (green section)? In a paragraph, compare your results to the theoretical results.

*Reflection  
Concept  
Practice  
Skill Drill*



Probability is the mathematics of chance.

The probability of an event is a number between 0 and 1; an impossible event, 0; and an event that is certain, 1.