Hi Grade 6!

In keeping with our work on Probability, we will explore this week data collection and conducting experiments.

By definition, data is facts or information such as measurements or statistics, collected from a survey or experiment for reference or analysis. Most often when we think of data, we think of a table of values. Before we can make any conclusions about any data, we need to consider the type of data we are looking at and how it was collected.

There are 2 types of data we use:

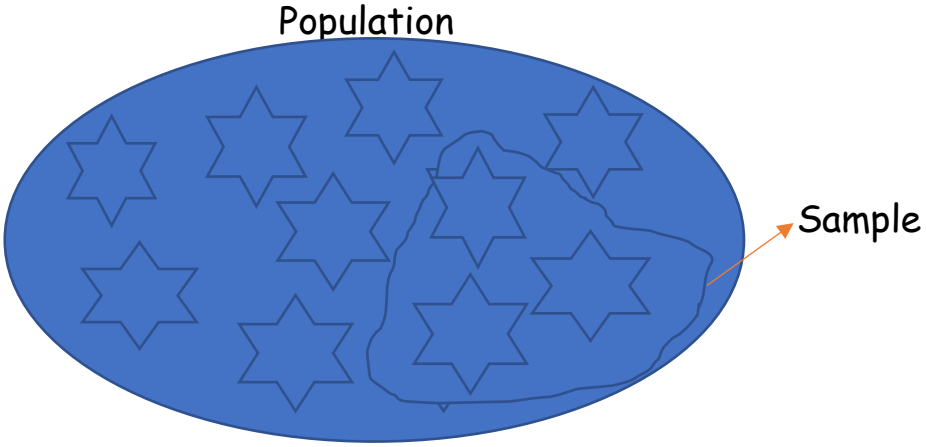
1. First hand data - data collected by carrying out interviews or observations by yourself. For example: Questionnaires (conducted in person, by phone, by e-mail)
   If your question was "What are the favourite pets of our Grade 6 class?", you would ask each person directly yourself.

2. Second hand data – data that is collected from outside sources by someone else. For example: getting information from newspapers, magazines or computer searches.
   If your question was "How big is the water park at Magic Mountain in Moncton, compared to other water parks in Canada?", you would probably do a computer search to get the data. In this, you would be using someone else's data.

   When collecting data we usually look for information about a specific group of people or things. If we were collecting information about our classroom's favourite pets, we would ask everyone in the class. We call this the **population** being studied.

A population is the set of all people or things of interest for a question, meaning the **whole** group.

If instead, you choose to survey a small group of the whole class to base your findings on, this would be called a sample of the population.



There are different methods of data collection we can use. Some of these include observations, measurements, experiments and surveys. We will consider:

1. Surveys: When doing a survey, most often, some type of questionnaire is used.
   A questionnaire is a collection of survey questions on the same topic. Some guidelines for creating good questionnaires include:

   a. It is important that the questions should be understood in the same way by everyone.
      For example: "Do you talk on the phone a lot?"
      This question is not clear as "a lot" could mean different things to different people. To make the question better, try:
      "How many hours do you spend on the phone each week?"
      This question is more specific and easily understood.

b. Each person should find an answer he/she would choose.
   For example: "What is your favourite ice cream?"

   __ Chocolate __ Vanilla

There are not many choices here. To make the question better try:

"What is your favourite ice cream?"

__ Chocolate __ Vanilla __ Strawberry __ Other __ None

This question provides more options so everyone can respond.

Note too, the use of "other" and/or "none" as choices makes it not only a better question to be able to make a choice, but also makes it a fair question.

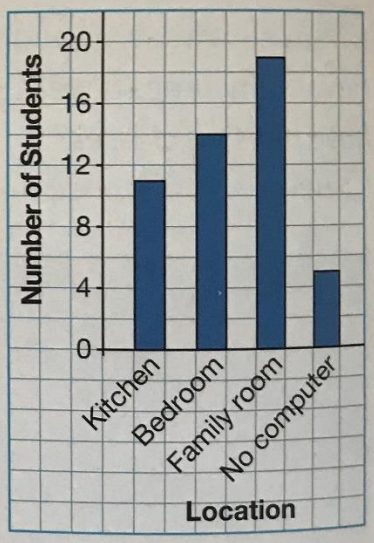
c. The question should be an **unbiased** (fair) question. It should not influence a person's response. If a question is not fair, we say it is **biased**.
   For example: If I said my absolute favourite ice cream was chocolate, then asked people theirs, this would be a biased survey as my big statement about my favourite may influence others to agree with me. To make it unbiased (fair), it would be important for me to leave out my own preferences.

Let's practice making our own questionnaires by trying the circled questions on the text page that follows. *Remember the above guidelines for creating good questions – clear, choices for all, and unbiased.

Practice

1. Design a questionnaire for collecting data to answer each question.
Give at least 4 possible answers for your question each time.
   a) What is the favourite food of Grade 6 students?
   b) What is the favourite pet of students in your school?
   c) Who is the favourite athlete of people in your province or territory?

2. This graph shows the results of a questionnaire.



   a) Write what the question might have been.
   b) Can you tell how many students were given the questionnaire? Explain.
   c) Write 2 things you know from this questionnaire.

3. Think of a questionnaire you could hand out in your school.
   a) Write a question you could ask.
   b) How do you know if your question is a fair question?

4. Each question (written in italics) can be improved.
Write a better question for each. Explain why you think it is better.
   a) To discover how much time each person spends doing homework each day:
   Do you spend a lot of time each day doing homework?
   b) To find out how students get to school:
   Do you usually walk to school or ride your bike?
   c) To find out the favourite type of TV programs:
   Do you prefer to watch mindless comedies or exciting dramas?

5. Ariel wanted to find out what the Grade 6 students in her school wanted to be when they left school. She wrote this question.

What do you want to be when you leave school? Check one.

Astronaut ☐ Designer ☐ Mechanic ☐ Nurse ☐

Ariel gave this question to the 76 students in Grade 6. Forty-five people answered the question. Here are the results.

Ariel concluded that most students will become astronauts or designers when they leave school.

a) Is Ariel's conclusion valid? Explain.

b) What might Ariel have done to improve her question?

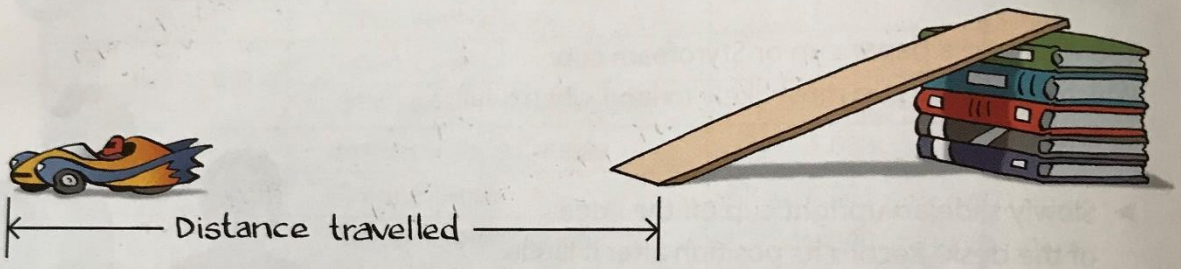
Occupation	Boys	Girls
Astronaut	𝍸 𝍸	𝍸 III
Designer	𝍸	𝍸 𝍸 I
Mechanic	III	I
Nurse	II	𝍸

2. Experiments: Here, instead of asking survey questions, you conduct your **own experiment** to gather data and answer questions. When carrying out experiments, it is good to do a few trials (runs). This will help by first, minimizing the impact of errors by taking the average of the trials. Second, it helps to minimize random effects and the effects of uncontrollable variables when we average the trials.
   Consider the following experiment from your text. Note, three trials were conducted to provide the best data possible to answer the question. Once you have read through the experiment and seen how it is set up, try some of your own! (circled questions)

Connect

Jasbir and Summer wanted to answer this question:
Does doubling the height of the ramp double the distance a toy car travels?

To find out, they let a toy car roll down a ramp of height 10 cm, then measured the distance the car travelled from the end of the ramp.
Then, the students doubled the height of the ramp to 20 cm, and then to 40 cm.
They did 3 trials for each height of the ramp, and recorded the results.



Here are the data the students collected.

	Distance Travelled		
Ramp Height	**Trial 1**	**Trial 2**	**Trial 3**
10 cm	60 cm	58 cm	61 cm
20 cm	118 cm	120 cm	121 cm
40 cm	235 cm	241 cm	238 cm

The car travelled about 60 cm when the height of the ramp was 10 cm.
When the height of the ramp was doubled to 20 cm, the distance travelled also doubled: $60 \text{ cm} \times 2 = 120 \text{ cm}$

When the height of the ramp was doubled to 40 cm, the distance travelled also doubled: $120 \text{ cm} \times 2 = 240 \text{ cm}$

From the data, Jasbir and Summer concluded that doubling the height of the ramp doubles the distance a toy car travels.

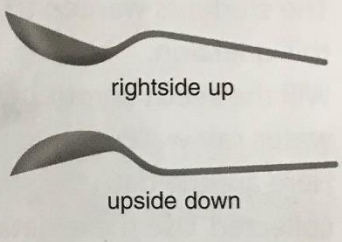
Practice

1. Work with a partner to answer this question:
Which sum occurs most often when you roll 2 dice labelled 1 to 6?
You will need two dice labelled 1 to 6.
Take turns to roll the dice.
Find the sum of the numbers on the dice.
Each student rolls the dice 25 times.

Sum	Tally	Total
2		
3		
4		

a) Record the results.
b) Which sum occurred most often?
c) How do your results compare with those of another pair of students?
d) What other questions could you answer using these data? Explain.

2. Work with a partner to answer this question:
Which way is a spoon more likely to land:
rightside up or upside down?
You will need a bag and 10 plastic spoons.
Place the spoons in a bag, shake them up,
then drop them on the floor.
Count how many spoons land rightside up and
how many land upside down. Record your results.
Repeat the experiment 9 more times. Make sure you drop the spoons
from the same height each time. Add the results.
Which way is a spoon more likely to land? Why do you think so?



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4. Morgan experimented with 3 different paper airplanes to answer this question: Which airplane travels the greatest distance? Morgan flew each plane 4 times and measured the length of each flight. Here are the data Morgan collected.

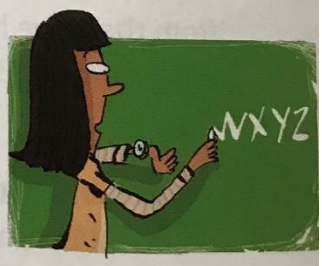
Airplane Design	Trial 1	Trial 2	Trial 3	Trial 4
The Dart	6.3 m	18.4 m	12.2 m	4.1 m
Flying Squirrel	11.3 m	10.5 m	9.8 m	11.2 m
Speed-o-matic	3.1 m	2.5 m	2.1 m	3.6 m

What answer would you give to the question above? Explain your choice.

5. A Grade 6 class experimented with radish seeds and bean seeds. The students wanted to answer this question:
Will the seeds sprout best in tap water, salt water, or sugar water?
Here are the data the students collected. Use these data.
What conclusion can you make?
Why do you think this might be?

Type of Seed	Percent of Seeds That Sprouted After One Week		
	Tap water	Sugar water	Salt water
Radish	60%	30%	10%
Bean	50%	18%	7%

6. How long does it take a Grade 6 student to write the alphabet backward: 30–44 s, 45–60 s, or more than 60 s?
   a) Predict the answer to the question above. Explain your prediction.
   b) Design an experiment you can use to check your prediction.
   c) Conduct the experiment. Record the results.
   d) Use the data you collected to answer the question above. What other conclusions can you make from your data?



7. Which method would you use to collect data to answer this question: How many times can you blink in 5 s?
Explain your choice of method.
Collect the data. Answer the question. Show your work.

Have a great week!

Don't forget our Team meeting on Thursday at 2pm, if you can make it 😊