

Section 1

Understanding Life Systems

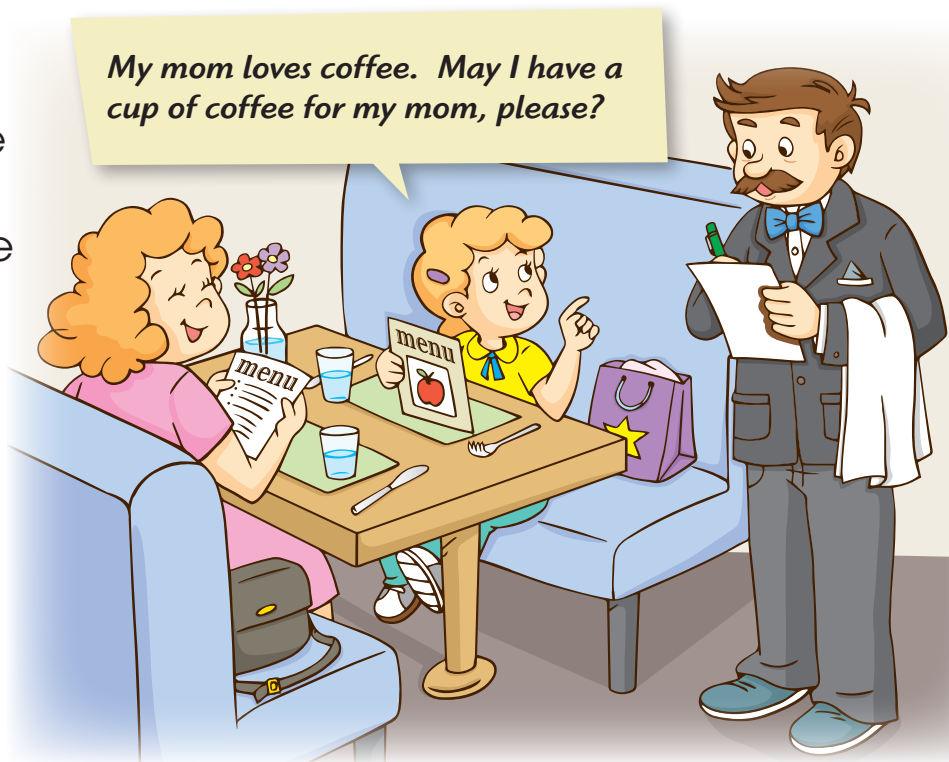
EXPLORATION 2

Caffeine vs. No Caffeine

Study the effect of caffeine on heart rate.

Heart rate is the number of times your heart beats each minute. Our heart normally beats in a regular rhythm, but if we are active or experience fear, anxiety, or excitement, our heart rate increases. When that happens, our heart pumps out a greater volume of oxygen-rich blood with every beat to support our body.

Many people like to have a cup of coffee in the morning or a can of cola during the day. They not only find these beverages tasty but also feel awake and energetic after drinking them. These beverages contain a substance called caffeine. Caffeine can be found in many other everyday foods and beverages, like chocolate, cocoa, and energy drinks. After consuming food with caffeine, people usually feel their energy levels increase. Does this mean that our heart will beat faster to accommodate the increased energy level? Try the experiment to study the effect of caffeine on heart rate.



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In this experiment, we will conduct a blind study* to determine the effect of caffeine on our heart rate.

Level of Difficulty:

moderate

Time Needed:

1 hour

Hypothesis:

If two adults are given caffeinated soft drinks and another two adults are given non-caffeinated ones, the heart rates of the adults who have drunk the caffeinated soft drinks will be

higher than/lower than/the same as

the heart rates of the adults who have drunk the non-caffeinated ones.

Materials:

- 4 or more adult participants
- a clock or stopwatch
- a 2-L bottle of a caffeinated version of a soft drink
- a 2-L bottle of a non-caffeinated version of the same type of soft drink
- small cups

Let's use a blind study to conduct this experiment.

*blind study

Many medical researchers use blind studies to conduct their research or experiments. A blind study is a study in which participants do not know whether they are taking the drug itself or a placebo (a pill or drink containing no drugs). It helps make participants less biased and leads to more reliable results.



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Steps:

1. Divide the participants into two groups – Group A and Group B.
2. Measure and record the resting heart rate of each person in the chart below.
3. Let each person in Group A drink a cup of the caffeinated soft drink and each person in Group B drink the non-caffeinated one.
4. Ask each person to sit quietly and to relax.
5. After 20 minutes, measure and record their heartbeats.
6. Repeat Steps 3 to 5 twice to conduct three trials for each person.



Use your fingertips to find the pulse on each person's wrist.

Notes

Be sure that the participants

- do not know whether the drinks are caffeinated or non-caffeinated.
- sit quietly after consuming the drinks.
- do not eat or drink anything else during the experiment.

Heart Rate		Initial (per min.)	20 Minutes After Consuming the Drink		
			1st Cup	2nd Cup	3rd Cup
Group A	1				
	2				
Group B	1				
	2				

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Conclusion:

Circle the correct words after conducting the experiment.

The heart rates of the participants who drank the caffeinated soft drinks were **higher than / lower than / the same as** the heart rates of the participants who drank the non-caffeinated ones.

My hypothesis was **correct / incorrect** .

Explanation:

Caffeine is a stimulant that stimulates the intensity of the heart's contraction. It results in an increase in your heart rate and makes you more energetic. However, the effects of caffeine among the tested individuals are not the same. Some people are born with a natural tolerance to caffeine, meaning that the effects on them are not obvious. People without a natural tolerance can develop one over time by consuming caffeine regularly.

If we want to have a set of more useful data, we have to test as many people as possible. It helps get a more reliable result which fully supports the argument that caffeine affects heart rates.