Experimental Design Scenarios

Instructions: After reading through each scenario identify the variables within the experiment.

Scenario 1: Miracle-Gro and Basil

John really likes the herb basil. He likes it so much he eats it faster than it grows in the 8 pots he has on his window sill. John decided he needed to find a way to make the basil grow faster because he is limited on space. He decided to design an experiment. John took eight seeds and planted them in 8 pots that all received equal amounts of sun and were all spaced 4 inches apart. Each day John gave each of the eight plants equal amounts of water using a large graduated cylinder, depending on how dry the soil was. John then divided the eight plants into four groups, A-D. For the two plants in Plant Group A, John only gave them water. For the two plants in Plant Group B, John gave each plant a cup of Miracle-Gro solution mixed at 25% less than the recommended concentration once a week in place of the water. For the two plants in Plant Group C, John gave each plant a Miracle-Gro solution mixed exactly at the recommended concentration once a week in place of water. For the two plants in Plant Group D, John gave each plant a cup of Miracle-Gro solution mixed at 25% more than the recommended concentration once a week in place of the water. After 30 days, John measured the height of each plant. The results were as follows:

	Basil Plant Height After 30 Days (cm)			
Plant Group	A	B	C	D
Plant Height (cm)	21	23	30	26

Identify the Dependent Variable:____Plant Height_____
Identify the Independent Variable:_____fertilizer_____
Control Group:_____Group with just water_____
Constants:

Equal sunlight, type of plant (basil), spaced 4 inches apart, time, soil type, pot size

What can be concluded based on the results presented and how do you know?

Possible answers: The recommended amount (Group C) achieved the greatest height after 30 days.

Technically the sample size it too small to draw a conclusion.

How can the experiment and data table be improved?

The experiment needs more trials and data. The data table could provide more specific information for each plant groups. For example, Group A had only water. The table would be easier to read if it included the level of the independent variable.

Scenario 2: Rats and diets

Jenn was very interested in nutrition and fitness, especially in children. She wanted to determine the effect of diet on the growth of children however, she was not able to get anyone to give her permission to complete experimentation on their kids. She had to resort to using rats. She designed an experiment that measured the effect of a sugar water diet compared to a diet of whole milk. One measure she used to determine the effect of the diet was mass which she measured weekly. In the experiment she used 6 rats that were split into two groups: sugar and water (Group A) and milk (Group B). She gave them all the same amount of "food" each day.

		Rats			
		Week 1	Week 2	Week 3	Week 4
Group A	Rat 1	7.0	8.0	8.5	9.2
	Rat 2	6.0	8.0	9.0	9.7
	Rat 3	7.0	7.0	8.0	9.0
Group B (milk)	Rat 1	7.0	8.0	9.6	11.0
	Rat 2	7.0	8.0	9.9	10.8
	Rat 3	6.0	7.8	10.0	10.6

Identify the Dependent Variable:_____Mass of the rat
Identify the Independent Variable:_____Diet of the rat.
Control Group:_____Group receiving milk since milk a normal diet of young rats.
Constants: The amount of "food", species of animal

What can be concluded based on the results presented and how do you know?

The rats that were given the milk (Group B) experienced a higher change in mass.

Technically, there is not enough data to draw a conclusion and more data needs to be collected.

How can the experiment and data table be improved?
The experiment could use more a lot more trials and could look at other measures to determine overall effects of the diet on the rats. (blood pressure, heart rate, bone density)

The data table would be easier to read if it displays the change in mass for each rat.