Names: _____ Period: _____ Assigned on Tuesday, August 26, 2025

2.1 Lab: Bean Bag Toss – Accuracy vs. Precision

Due Tuesday, August 26, 2025

Objective

1. Apply the concepts of accuracy and precision to tossed beanbags.

Materials

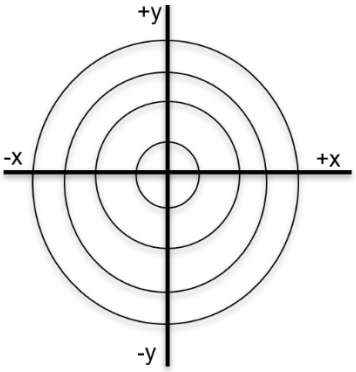
Bean bags Chalk Meter Stick Hula Hoop

Procedure

1. Acquire all of the materials listed above and go outside as directed by your teacher.
2. Place the Hula Hoop on the ground and construct a bullseye with 3 concentric circles within the Hula Hoop.
3. Draw a coordinate system through the center of the bullseye as shown in the diagram in the data section.
4. Make a line 6m away from the center of the bullseye.
5. One partner should stand at the line and throw each of the 3 bean bags toward the bullseye.
6. Measure the distance from each beanbag to the x-axis (+ or -) and the y-axis (+ or -) and record these values in the data table.
7. On diagram in the data section, record approximately where each shot lands relative to the bullseye.
8. Calculate the average distances of the 4 beanbags in both the x- and y-directions.
9. Repeat steps 5-8 for each partner. Use a different color on the diagram for each partner and create a key of which partner each color represents.
10. Repeat steps 4-9 for a second trial.

Data

Diagram of Group Data



Key

Group Member	Color on Diagram

Distance of Each Beanbag from the X- and Y-Axes

	Distance from Axis (cm)							
	Bag 1		Bag 2		Bag 3		Avg Distance from Axis (cm)	
Group Member	x-direction	y-direction	x-direction	y-direction	x-direction	y-direction	x-direction	y-direction
1.								
2.								
3.								

Analysis

1. For a shot to be considered accurate, what would the x-direction and y-direction measurement have to be? _____

2. Which partner was the most accurate? How did you determine this? _____

_____

_____

3. Which partner was the most precise? How did you determine this? _____

_____

_____

4. Which partner was the least precise? How did you determine this? _____

_____

_____

5. Which partner was the least accurate? How did you determine this? _____

_____

_____

6. Why did you measure the distances from the x- and y- axes rather than just measure the distance to the bullseye? _____

_____

_____

_____

_____

7. Give an example where reporting distances from the bullseye of three beanbag tosses rather than in the x- and y- directions would look like the three tosses were precise but where they were in fact very imprecise.

_____

_____

8. Three students were experimentally determining the density of ethanol which has an accepted density of 0.789 g/mL. Each student performed three trials measuring the mass of different volumes of ethanol. The data is shown below.

	Trial 1			Trial 2			Trial 3			Avg
Student	Mass (g)	Volume (mL)	Density (g/mL)	Mass (g)	Volume (mL)	Density (g/mL)	Mass (g)	Volume (mL)	Density (g/mL)	Density (g/mL)
Ava	61.5	76.4		72.6	98.1		33.9	41.3		
Ben	38.6	55.2		50.6	72.3		69.5	99.4		
Cameron	41.6	53.1		10.3	13.1		14.3	18.2		

a. Which student's results were the most precise? Explain your reasoning. _____

_____

_____

b. Which student's result was the most accurate? Explain your reasoning. _____

_____

_____

c. Which student's trials were consistently the most accurate? Explain your reasoning. _____

_____

_____

d. Give plausible reason for what might have caused Cameron's specific error in his results. _____

_____

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