

## Chapter 5

## CHEMACTIVITY

## Felt-tip Electron Distribution

The position of an electron in an atom at a given moment cannot be predicted. The region of space in which the electron can probably be found is, however, predictable. This region is often called an "electron cloud" and is represented by a fuzzy shape with the nucleus at the center. The shape is determined by mathematical calculations using the wave-mechanical model of the atom. The electron cloud is not absolute. Infrequently, the electron may be found outside the cloud.

The purpose of this activity is to demonstrate a probable distribution of locations around a central point.

## Objectives

- **Graph** the distribution of marks on a target.
- **Observe** the region of highest probability of marks.

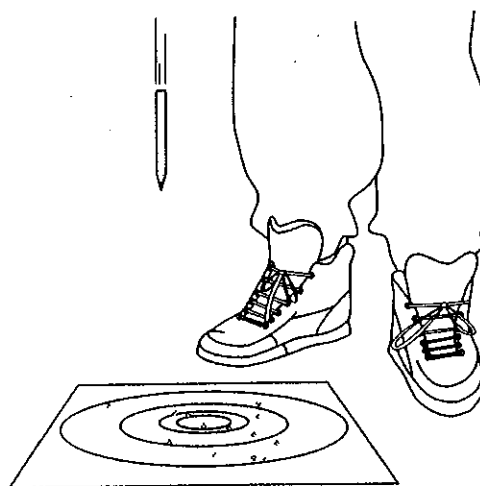
## Materials



fine-point felt-tip marker  
paper target

## Procedure

1. Place your target on a notebook on the floor.
2. Drop your marker from a height of about 1 m onto the target so that it makes a mark. Try to hit the center. Repeat 100 times.
3. Count the number of marks in each numbered region of the target and record the numbers in the data table shown.



## Data and Observations

Area	Number of marks
1	
2	
3	
4	
5	

### Analysis and Conclusions

1. Plot your results on the graph grid provided by your teacher, with the number of marks on the y axis and the numbered area on the x axis.

2. Determine from your graph which target area had the highest probability of a hit.

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3. How does the shape of your graph compare with the shape of the graph for the probability of finding an electron in a hydrogen atom as in Figure 5.2, page 113?

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### Extension and Application

1. How are orbital pictures similar to your target? How are they different?

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2. Explain why a photo of the blur of a fast-moving fan blade is a better analogue to an electron cloud picture than your target with its marks.

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