## Project 1: Light Beam

Tools: Flashlight, measuring tape, graph paper and pencil.

## **Experiment:**

- 1. Shine the light on the wall from the following distances: 2in, 4in, 6in, 8in, 10in, and 12in.
- 2. At each step measure the diameter of the circular image produced by the light beam.
- **3.** Since we do not know the exact output of the flashlight, let's assume a convenient number (100 lumens). For the purposes of this example, the value really does not matter because the output is constant. Calculate the intensity for each distance by dividing 100 lumens by the area of the circle.
- 4. Make a table out of your data rounding answers to one decimal place:

d=Distance (in)	D = Diameter (in)	r = Radius (in)	A = Area of a Circle $(in^2)$	I = Intensity (lumens/in <sup>2</sup> )
2				
4				
6				
8				
10				
12				

## **Questions:**

- 1. What happens to the circles of light as you move closer and further away?
- 2. Graph the data from the table:
  - (i) Distance vs. Diameter.
  - (ii) Radius vs. Area
  - (iii) Distance vs. Intensity
- 3. Are the graphs from (i)-(iii) increasing or decreasing?
- 4. What functions best describe your graphs in (i) and (ii): linear, quadratic, etc?
- 5. Find the formula that describes the best your graphs in (i) and (ii).
- 6. What is the diameter and area of a circle at 0in, 50 in, and 100in?
- 7. Describe the meaning of the graph in (iii), i.e. what happens to the intensity of light as you move further away. What function behaves in the similar way as your graph in (iii).
- Research on the following topic: **Is it possible to see a flashlight beam from Earth on the moon?** Make a short report.