**Angular Size Lab Honors** Names and

**Purpose:**

To see how we can measure the size of objects based on their distance from us.

To see how we can measure the distance of objects based on their size.

**Question:**

What is the relationship between the size of an object and its distance from us? What are ratios? How can we set up a ratio to determine either the size of an object or the distance of an object?

**Procedure:**

You will hold a ruler at the end of a meter stick and sight along the meter stick from a distance of 50 cm as demonstrated by your teacher. You will record your findings in the data tables below.

1. **Size of object**

* There are 8 objects around the room that are a set distance away (either 370 cm or 500 cm).
* Record the angular size of the objects in **data table 1: Size of object**
* Set up a ratio and determine the size of the object.
* Compare the calculated size with the actual size

1. **Distance of object**

* There are 4 objects in the hall that have a certain size.
* You will move your head (eye) toward or away from the ruler until the object has the correct angular size (3 cm).
* Record the distance that your head is away from the ruler in **Data Table 2: Distance of Object**
* Set up a ratio and determine the distance of the object

**Data:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **Data Table 1: Size of Object** | | | | | | | | | | | |
| Object | | Distance | | | Sighting Distance | | Angular Size | | Calculated Size | | Actual Size | | % Error |
| Book | | 370 cm | | | 50 cm | |  | |  | |  | |  |
| Fan | | 370 cm | | | 50 cm | |  | |  | |  | |  |
| Clock | | 370 cm | | | 50 cm | |  | |  | |  | |  |
| Radiometer | | 370 cm | | | 50 cm | |  | |  | |  | |  |
| Loveland Poster | | 500 cm | | | 50 cm | |  | |  | |  | |  |
| Tiger | | 500 cm | | | 50 cm | |  | |  | |  | |  |
| Globe | | 500 cm | | | 50 cm | |  | |  | |  | |  |
| Marker | | 500 cm | | | 50 cm | |  | |  | |  | |  |
|  | **Data Table 2: Distance of Object** | | | | | | | | | | |
| Object | Size | | Sighting Distance | Angular Size | | Calculated Distance | | Actual Distance | | % Error | |
| Mitosis Poster | 73 cm | |  | 10 cm | |  | |  | |  | |
| Door | 91 cm | |  | 10 cm | |  | |  | |  | |
| Cart | 81 cm | |  | 5 cm | |  | |  | |  | |
| Display Case | 191 cm | |  | 5 cm | |  | |  | |  | |

**Calculations:**

Set up ratio

Angular Size = Size

Sighting Distance Distance

Cross multiply

(angular Size) (distance) = (sighting distance)(size)

Solve for missing variable

Size = (angular Size) (distance) / sighting distance

Distance = (sighting distance)(size) / angular size

% Error = ((Experimental value – Actual Value) / Actual Value ) x 100