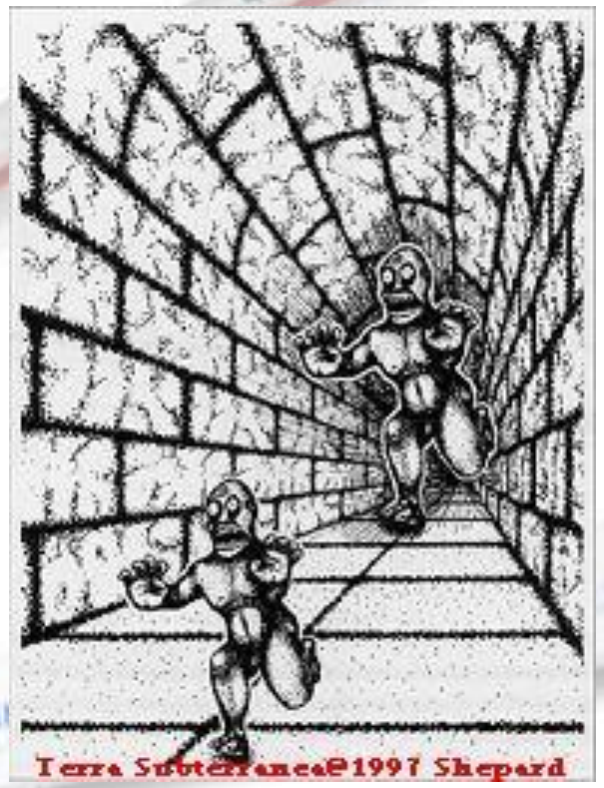
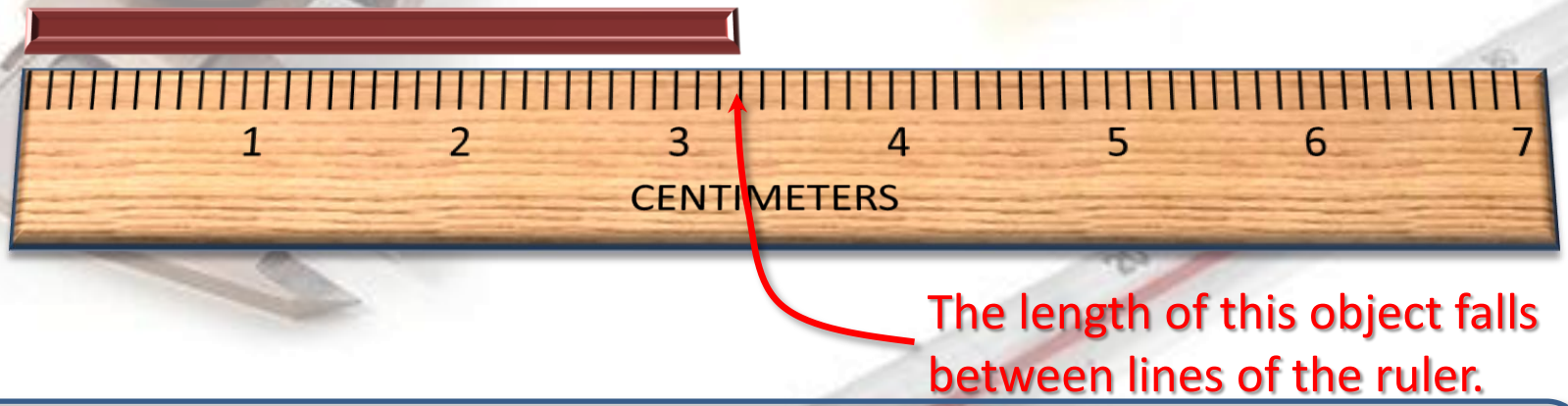
Quantitative Observations

- Observations are made through the five senses and instruments that extend these senses.
- The senses can fool us, however . The two creatures to the right are the same size.
- That is why we often rely on instruments that extend the senses to make measurements.
- Measurements give us quantitative observations.



Estimation

- Measuring instruments have limitations:



- It is always necessary to estimate one place beyond the finest division of a measuring device to complete a measurement.
- As a result, there are always errors of measurement.

Bulls Eye!

- Making a measurement is like trying to shoot a bulls eye. You want to get it right.
- The possibilities are illustrated below.

	Accurate	Not Accurate
Precise		
Not Precise		

Definitions

- Precision
  - Repeatability of a measurement
  - Also refers to the number of decimal places. (*Note*: The more decimal places an instrument reads, the more closely the measurements tend to be clustered.)

- Accuracy - how close a measurement is to an actual or accepted value.