Activity – Size and Distance Scale

Objective

Students will match descriptions of various objects and distances to actual metric measurements. This is a great activity to investigate students' preconceptions about astronomical distances.

CORE concepts covered:

STANDARD IV: Students will understand the scale of size, distance between objects, movement, and apparent motion (due to Earth's rotation) of objects in the universe and how cultures have understood, related to and used these objects in the night sky.

Objective 1: Compare the size and distance of objects within systems in the universe.

a. Compare distances between objects in the solar system.
b. Compare the size of the Solar System to the size of the Milky Way galaxy.
c. Compare the size of the Milky Way galaxy to the size of the known universe.

Note: This is a good activity to complement the film Powers of Ten by Charles and Ray Eames. There is also a good Powers of Ten website at: http://micro.magnet.fsu.edu/primer/java/scienceopticsu/powersof10/

Materials Needed

"Distance & Scale" Worksheet
Pencil

Planning

Copy worksheet, one per student

Procedure

1. Hand out worksheets which contain the list of challenge objects.
2. Students should write each challenge object from the list on the right side in the appropriate place between the distances on the distance scale to the left. Give class members plenty of time to match up the objects with their distances. Encourage opinions and discussions with other students.
3. End the activity with a vote of which object matches with the appropriate distance. Give the correct distances and sizes from the answer sheet (page 3). Be certain to discuss the difference between distance and size. It might be best to do this using an overhead projector. Alternatively, you could post several copies of the "answer sheet" and let students correct any answers that missed the mark –after having the appropriate discussion.

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CLARK PLANETARIUM
SEE WHAT'S OUT THERE

Distance & Scale

Name: _____

Directions: Using the spaces between the distances in the left column, write the objects or distances in the right column that best fit between those distances.

1 cm	_____	**Diameter of a basketball**
10 cm	_____	**Deepest part of Pacific Ocean**
1 meter	_____	**Denver, CO to Salt Lake City, UT**
10 meters	_____	**Distance to nearest star**
100 meters	_____	**House**
1 km	_____	**Earth-Sun distance**
10 km	_____	**Earth-Moon distance**
100 km	_____	**Earths diameter**
1000 km	_____	**Height of doorway**
10,000 km	_____	**Height of Mt. Everest**
100,000 km	_____	**Moon's diameter**
1 million km	_____	**Sun-Mercury distance**
10 million km	_____	**Ping pong ball**
100 million km	_____	**Sun to Saturn distance**
1 billion km	_____	**Length of city block**

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SEE WHAT'S OUT THERE

Distance & Scale - Key

Directions: Using the spaces between the distances in the left column, write the objects or distances in the right column that best fit between those distances.

1 cm	**Ping pong ball (**about 3 cm**)**
10 cm	**Diameter of a basketball (**about 30 cm**)**
1 meter	**Height of doorway (**about 2 m**)**
10 meters	**House (**about 15 to 20 m**)**
100 meters	**Length of city block (**201 m**)**
1 km	**Height of Mt. Everest (**8.85 km**)**
10 km	**Deepest part of the Pacific Ocean (**11 km**)**
100 km	**Denver to Salt Lake City (**880 km**)**
1000 km	**Moon's diameter (**3475 km**)**
10,000 km	**Earth diameter (**12,756 km**)**
100,000 km	**Earth Moon distance (**384,400 km**)**
1 million km	**Sun's diameter (**1,392,000 km**)**
10 million km	**Sun Mercury distance (**58 million km**)**
100 million km	**Earth Sun distance (**150 million km**)**
1 billion km	**Sun to Saturn distance (**1.4 billion km**)**
10 billion km	**Distance to nearest star (**40 trillion km**)**

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