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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Name ____________________

Distance & Scale

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 the 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		
	____________________	**Earth's 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		
	____________________	**Sun's diameter**
10 billion km		
	____________________	**Length of city block**

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Name ____________________

Distance & Scale

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)

Diameter of a basketball
Deepest part of the Pacific Ocean
Denver, CO to Salt Lake City, UT
Distance to nearest star
House
Earth-Sun distance
Earth-Moon distance
Earth's diameter
Height of doorway
Height of Mt. Everest
Moon's diameter
Sun-Mercury distance
Ping pong ball
Sun to Saturn distance
Sun's diameter
Length of city block

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