ASTRONOMY 2
THIRD HOUR SESSION "A"

ACTIVITY: COSMIC SCALES

NAME **KEY-A**

DATE

ID#

Answer the following questions about scales (the objects in the blanks will be given in class):

1. **If one edge of cube A is __5__ times longer than one edge of cube B, and one edge of cube B is ___7__ times longer than cube C (exhibited on front desk), then how long is one edge of cube A? Would it fit in the classroom?**

3500 mm (350 cm) i.e. factor 1 x factor 2 x cube C length	no

2. **What is the volume of cube A?**

(factor 1 x factor 2)^{3}x(100 mm)^3=4.2875x10^{10} mm^3

3. **What is the diameter of the marble? What is its radius? What is its volume?**

16 mm	8 mm	(4/3)π x (8 mm)^3 ~ 2145 mm^3

4. **About how many marbles would fit in cube A? (Disregard the effects of air gaps between marbles.) Considering the accuracy of your ability to measure the size of your marble, what might be a more realistic guess for how many marbles could fit in cube A?**

1.9988x10^7	2.0x10^7 = 20,000,000

5. **What is the ratio of diameters between the planets ____Venus_____ and ____Mars_____? Suppose the marble you were given in class represented the size of the planet __Venus___. What diameter (mm) marble would be required to represent the size of the planet___Mars__?**

1.78	marble diameter (mm)/1.78 = 8.97 mm~9.0 mm

6. **Estimate how many people set end-to-end would reach from the Earth to _____the Moon_____ ? Do we have enough people in __the U.S__ to do this?**

200 to 250 million	yes

7. **Rewrite your first answer from question #6 in scientific (exponential) notation.**

2.0×10^8 to 2.5×10^8

8. **The distance from the Earth to the Sun is 1 Astronomical Unit (AU). What is the distance from the Sun to ____(current position of) Voyager 1__ in AU's?**
Give Voyager 1 distance to students= 22,176,000,000 km . 1 AU = Find in Appendix A

148.2 AU

Open the web site http://htwins.net/scale2/scale2.swf?bordercolor=white and click "START." Notice the grey ring that is 1 meter in diameter.

9. **Slowly drag the slider near the bottom of the screen to the left until you see another circle appear. What size does this circle represent?**

10^{-3} m = 0.001 m = 1 mm

10. **Drag the slider to the left, until another _____5_____ grey rings appear; the number in the lower-right part of the screen should be ____10^{-15}_____. What objects are approximately this size?**

Proton or neutron

11. **Drag the slider to the right, until the number in the lower-right part of the screen reads _____10^6_____. What is the smallest astronomical body just outside the grey ring?**

Ceres

12. **Drag the slider until the number in the lower-right part of the screen reads $10^{19.4}$; you will start to see the smallest galaxies. Continue moving the slider to the right until you see __ The Milky Way _____. How large is it in meters?**

10^{21} meters (Zettameter) or 1.2×10^{21} meters (if clicked on)