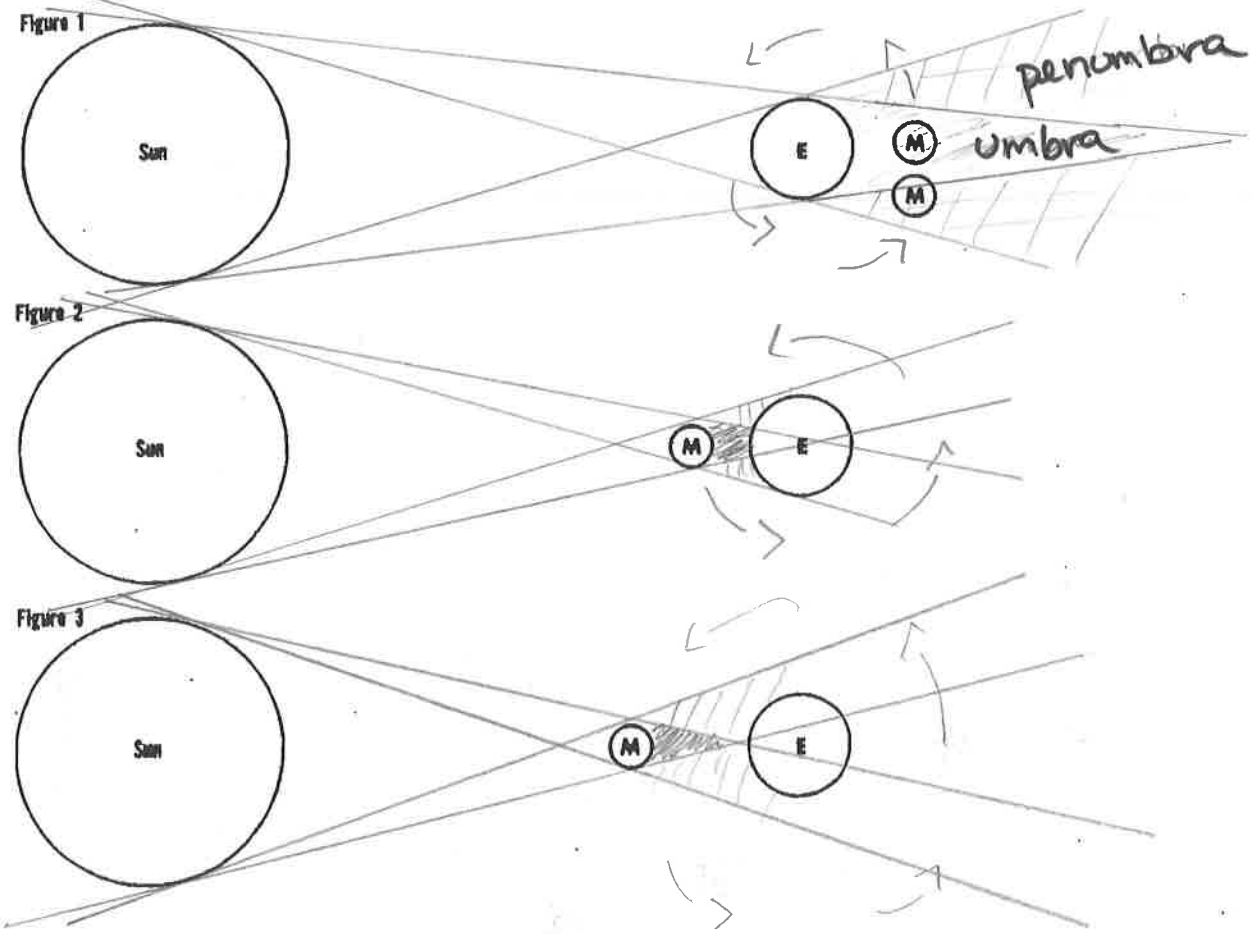
NAME Auger ..... CLASS ..... DATE .....

Activity 19-B. Eclipses of Moon and Sun

Introduction: In this activity you will study in detail eclipses of the moon and of the sun. In particular, you will make graphical representations of the shadows cast by the earth and by the moon when they are in the proper position with respect to the sun to cause a lunar or a solar eclipse.

Directions:

1. On figure 1, draw two external tangent lines from the sun to the earth and continue them until they meet, thus forming the earth's *umbra*. Draw two internal tangent lines from the sun to the earth and continue them, thus forming the earth's *penumbra*. Shade and label the umbra and crosshatch and label the penumbra. Indicate with a circle the moon's orbit and show its direction of revolution.
2. On figure 2, draw two external tangent lines from the sun to the moon and continue them until they meet, thus forming the moon's umbra. Draw two internal tangent lines from the sun to the moon and continue them, thus forming the moon's penumbra. Shade and label each shadow as in figure 1. Indicate with a circle the moon's orbit and show its direction of revolution.
3. On figure 3, draw two external and two internal tangent lines from the sun to the moon as in figure 2. Shade and label each shadow. Indicate with a circle the moon's orbit and show its direction of revolution.



ACTIVITY QUESTIONS

1. What kinds of eclipses are shown in figure 1? lunar
2. At what phase of the moon does a lunar eclipse occur? full
3. (a) Is there an eclipse every time this phase occurs? no (5° tilt)
   (b) Why? because of plane of moons abit is tilted w/ respect to plane of Earth's orbit around sun
4. (a) Under what conditions will an eclipse of the moon be total? Sun, Earth, moon form straight line
   (b) Under what conditions will an eclipse of the moon be partial? not a straight line
5. From what portion of the earth can each lunar eclipse be seen? ~ 1/2 of earth - large area
6. What kinds of eclipses are shown in figure 2? solar - total
7. At what phase of the moon does a solar eclipse occur? New moon
8. Why can a total solar eclipse be seen on only a small portion of the earth? differences in distance: not total alignment
9. In what direction does the shadow of the moon move across the earth?
10. What kind of eclipse is shown in figure 3? solar - partial
11. (a) Is the shadow of the moon always long enough to reach the earth? no
    (b) Why? moon is too small - further away
12. At what phase of the moon does an annular eclipse occur? new
13. Show by a freehand drawing how the sun appears from the earth as seen from the center of an annular eclipse.