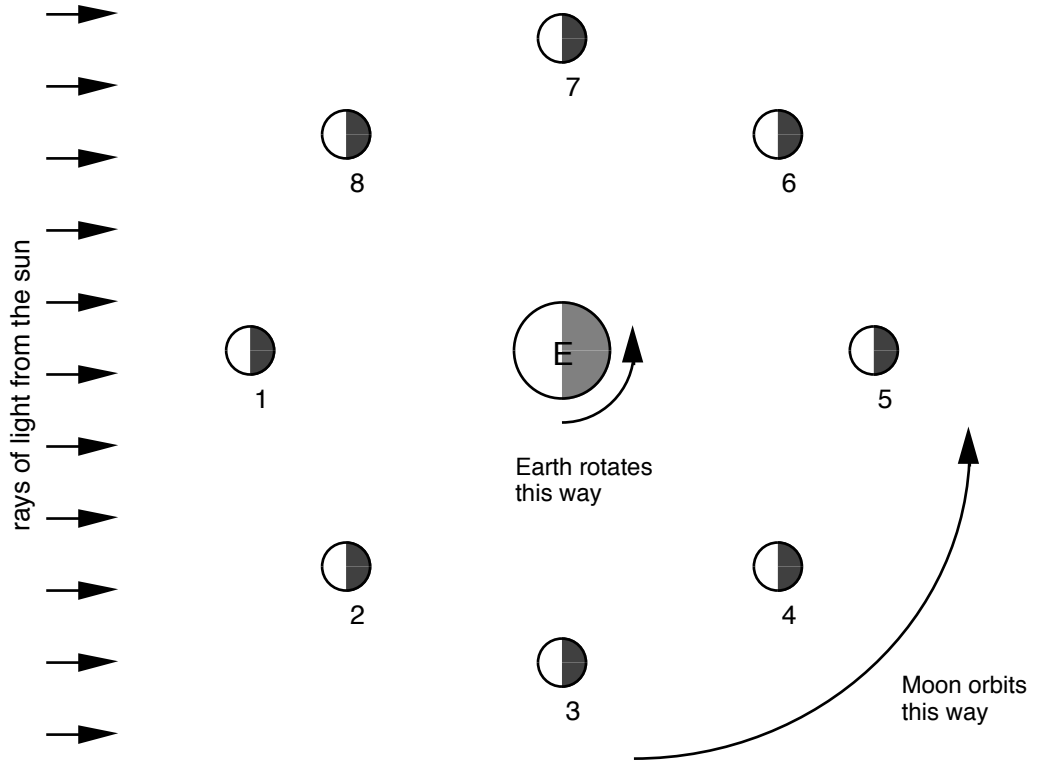
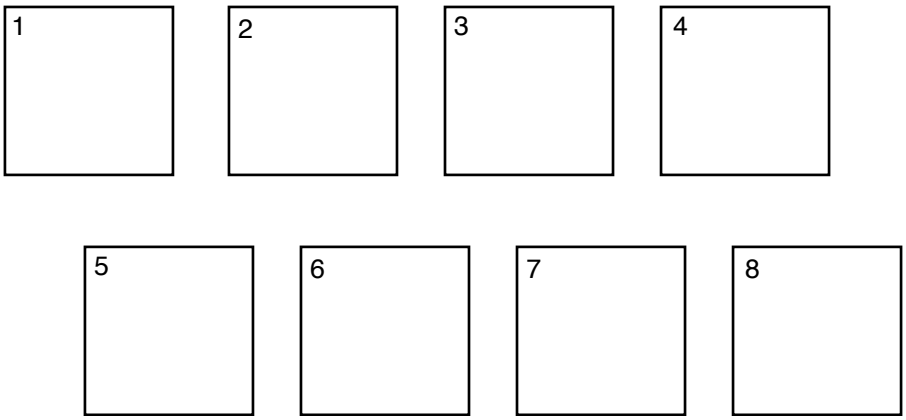
Phases of the Moon

This is a view of the earth looking down on the north pole. In this diagram, everything is rotating counter-clockwise. The scale in this diagram is not correct. The sun is very large, and very far away so that the rays of light from the sun are essentially parallel by the time they get to the earth and moon.



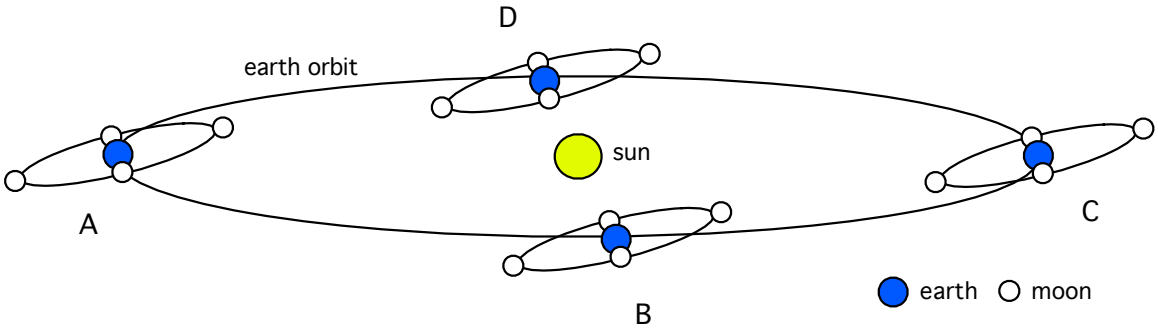
In the boxes below, draw what the moon would look like from earth for each position shown above. Remember that we can only see the lit portion of the moon.



What are the two types of eclipses, and where could each occur? (Give the position above.)

Phases of the Moon

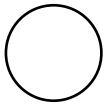
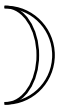
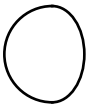
The moon orbiting the earth has a certain angular momentum. Because there are no other torques acting on the moon, its angular momentum must be constant. This means that the plane of the moon's orbit is oriented the same way in space, even as the earth itself goes around the sun. The plane of the moon's orbit is not parallel to the plane of the earth's orbit around the sun; it is tilted about 5°. The diagram below (not to scale) shows the orienteation of the moon's orbit with respect to the earth's orbit at four intervals three months apart.



1. Why do we not have a lunar eclipse every time there is a full moon?

2. In the diagram above, when could there potentially be an eclipse?

3. Imagine you go out and see the moon as shown in the pictures below. In each case, where would the sun be located?

a.  b.  c.  d. 

4. During a full moon, what time of day does the moon rise? Where does it rise?

5. Sketch what the moon would look like for each of the following (include a horizon):
   a. The moon is rising just before dawn. b. The moon is rising just after dawn.

   c. The moon is rising in the middle of the night. d. The moon is setting at "midnight."