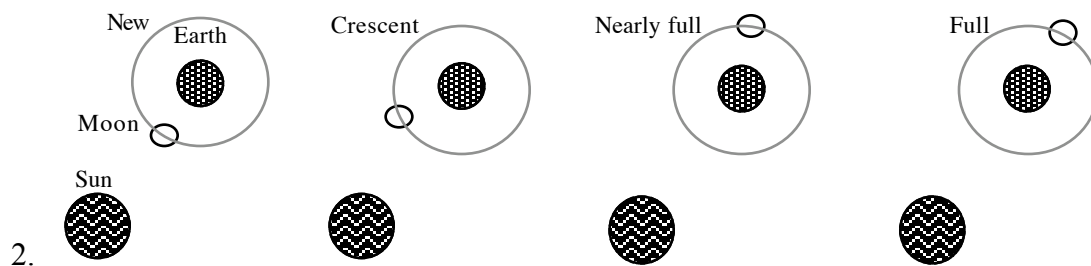


1. THE WAY OF SCIENCE: *Experience and Reason*

Answers to conceptual exercises

1. Follow its position in the sky for a few weeks. If its position relative to the surrounding stars changes, it is a planet.



6. If planets simply changed their speeds and directions along circular, their motion would be quite irregular, with no underlying pattern. The Greeks (and all scientists) looked for an underlying regular pattern that would explain the apparently irregular observed motion.
10. Because Venus' orbit lies inside Earth's orbit, it always lies close to the line from Earth to the sun. Thus it always appears fairly close to the sun, rising in the east at about sunrise and setting in the west at about sunset.
17. Move the thumbtacks far apart.
27. Voltaire's sarcasm was not justified. New scientific predictions must be verified by observation, even though they are sometimes first predicted by theory.
31. 0.5 AU and 2.5 AU.
32. Divide 4 years by 8 minutes. First, we must express 4 years in minutes: $4 \text{ yrs} \times 365 \text{ days/year} \times 24 \text{ hrs/day} \times 60 \text{ min/hr} = 374400 \text{ min}$. Then $374400 / 8 = 46800$. Thus the distance is 46800 AU.