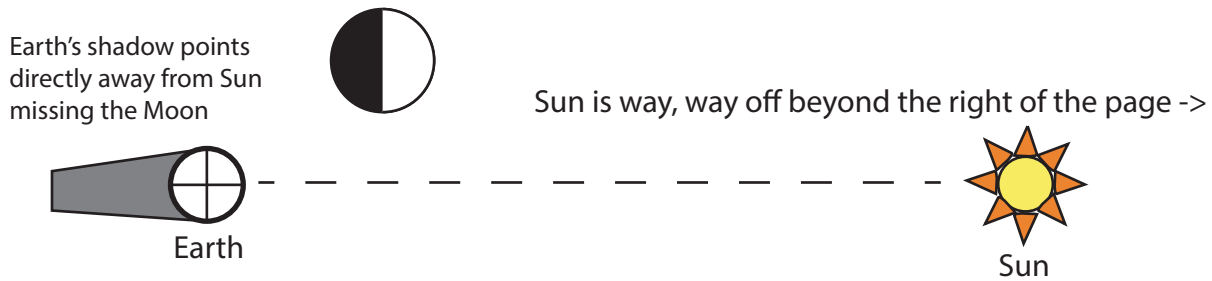
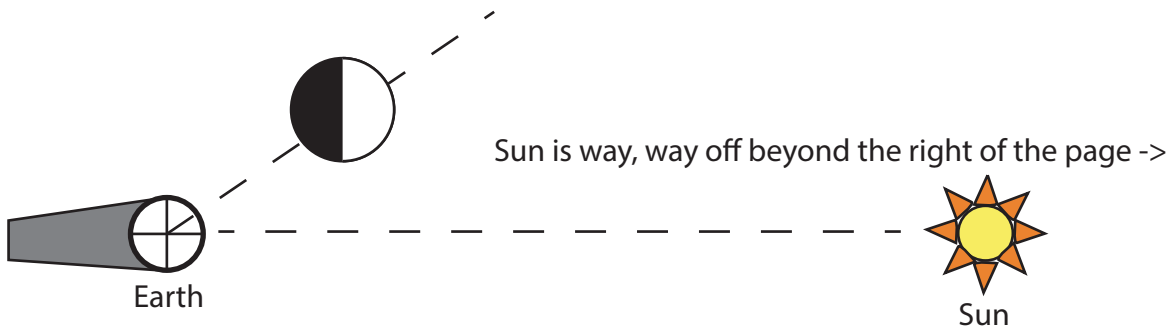


Orrery to ground view: Waxing Crescent example

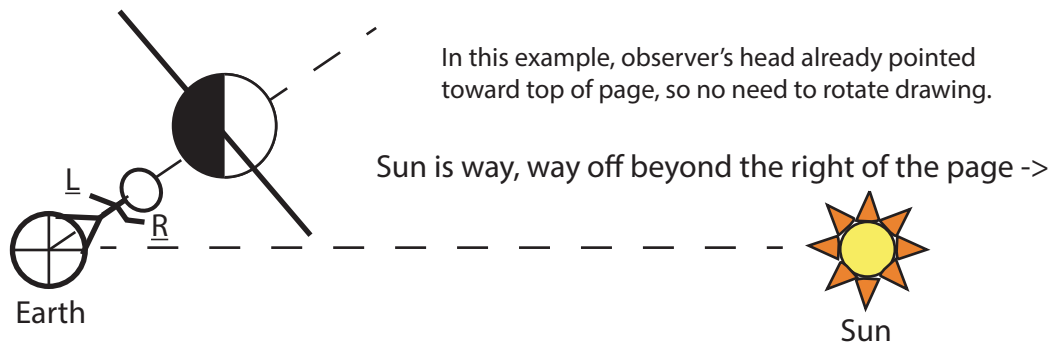
Step 1: Viewed from high above Earth, shade half the Moon with lit half facing the Sun



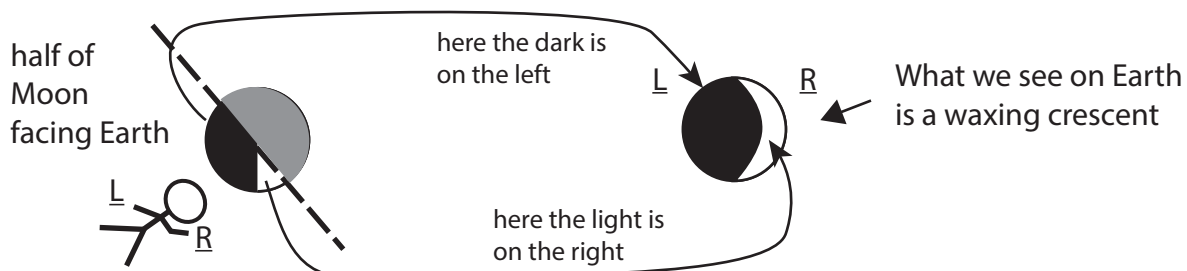
Step 2: Draw line from Earth center to Moon



Step 3: Place observer on Earth in direction of the Moon. The person is raising his **RIGHT** hand. **If** observer's head is pointed toward the bottom of the page in your drawing, rotate Earth-Moon-Sun drawing 180°. Draw line perpendicular (90°) to Earth-Moon line.



Step 4: Focus attention on half of Moon facing Earth. (Side facing away from Earth has been grayed out.) If less than half of side facing Earth is lit => crescent (or new). If more than half of side facing Earth is lit => gibbous (or full)

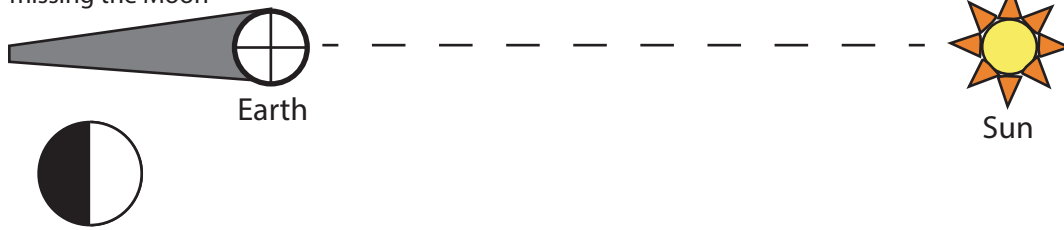


Orrery to ground view: Waning Gibbous example

Step 1: Viewed from high above Earth, shade half the Moon with lit half facing the Sun

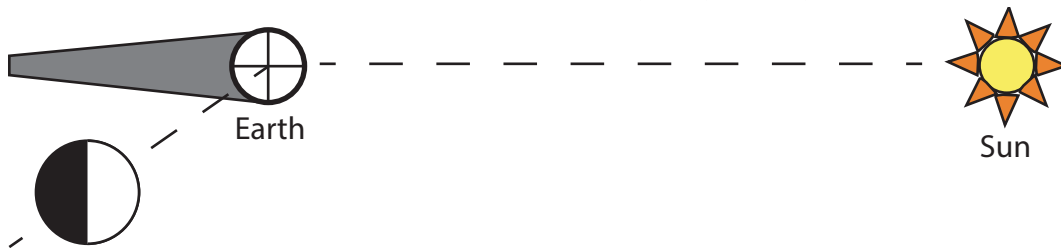
Earth's shadow points directly away from Sun missing the Moon

Sun is way, way off beyond the right of the page ->



Step 2: Draw line from Earth center to Moon

Sun is way, way off beyond the right of the page ->

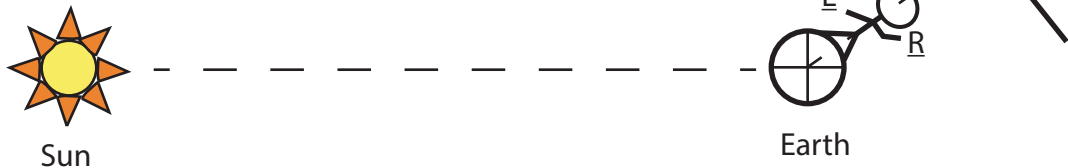


Step 3: Place observer on Earth in direction of the Moon. The person is raising his **RIGHT** hand. **If** observer's head is pointed toward the bottom of the page in your drawing, rotate Earth-Moon-Sun drawing 180°. Draw line perpendicular (90°) to Earth-Moon line.

Observer's head in step 2 drawing would have pointed down toward bottom of page, so rotate drawing 180°.

observer now pointed upward toward top of page

<- Sun is way, way off beyond the left of the page



Step 4: Focus attention on half of Moon facing Earth. (Side facing away from Earth has been grayed out.) If less than half of side facing Earth is lit => crescent (or new). If more than half of side facing Earth is lit => gibbous (or full)

