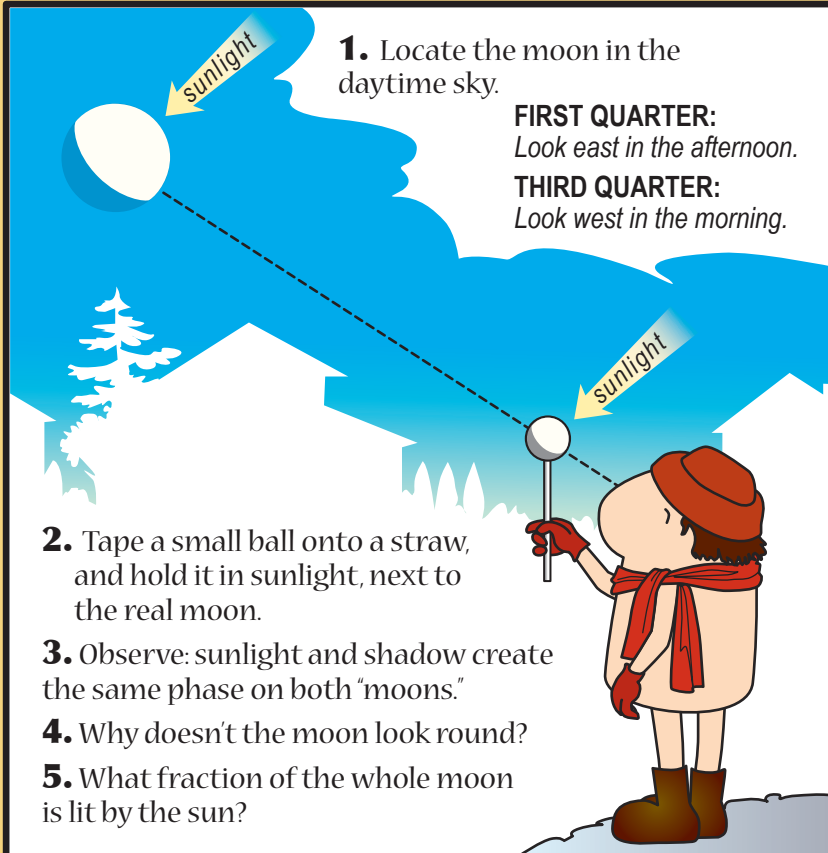


## Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This TOPS Idea is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

### moon on a stick

...adapted from **EARTH, MOON & SUN #40**  
by TOPS Learning Systems



**1.** Locate the moon in the daytime sky.

**FIRST QUARTER:**  
*Look east in the afternoon.*

**THIRD QUARTER:**  
*Look west in the morning.*

**2.** Tape a small ball onto a straw, and hold it in sunlight, next to the real moon.

**3.** Observe: sunlight and shadow create the same phase on both "moons."

**4.** Why doesn't the moon look round?

**5.** What fraction of the whole moon is lit by the sun?

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- 21 MOTION (gr 7-12)
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- 34 PENDULUMS (gr 4-9)
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- 38 Green Thumbs: RADISHES (gr 3-8)
- 39 Green Thumbs: CORN & BEANS (gr 4-12)
- 40 EARTH, MOON & SUN (gr 7-12)
- 41 PLANETS & STARS (gr 7-12)
- 42 FOCUS POCUS (gr 5-10)
- 43 FAR OUT MATH (gr 9-12)
- 44 SCALE THE UNIVERSE (gr 5-12)
- 45 PI IN THE SKY (gr 5-12)
- 61 A SUMMER START (gr 1-8)
- 62 Intermediate ABC SOUP (gr 4-8)
- 63 PEACEFUL PROCEDURES (gr 1-8)
- 64 Primary ABC SOUP (gr 1-3)
- 71 Primary LENTIL SCIENCE (gr K-3)
- 72 Intermediate LENTIL SCIENCE (gr 3-6)
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- 91 GLOBAL TOPS (gr 3-10)
- 100 TRIPLE MAGNIFIER (gr 3-12)
- 200 CARTESIAN DIVER (adapts K-12)

#### OBJECTIVE

To understand why our always-round moon doesn't usually look round!

#### LAB NOTES

**Step 1.** A waxing first-quarter moon rises in the east at noon and culminates (overhead or southward in the northern hemisphere) at sunset. A waning third-quarter moon culminates at sunrise and sets in the west at noon. These are fine opportunities for viewing both sun and moon together, and understanding moon phases.

**Steps 2-3.** Folks often think we are seeing Earth's shadow "shaping" the moon. Not so. Both the real and model moon, lit by the sun from the same direction, create their own similar shadows. (Earth's shadow crosses the moon only during a lunar eclipse.)

#### ANSWERS

**4.** Only the lighted part of the moon is reflecting sunlight. Its shadowed side is not reflecting enough light to be clearly seen from Earth (unlike the ball).

**5.** Exactly half of both "moons" are always lit by the sun. (You must place your head *almost* between the sun and ball to see all of its fully illuminated side.)

#### EVALUATION

**Q.** What fraction of our planet is always in sunlight? Would an astronaut in Earth orbit always see this same fraction illuminated?

**A.** One half of Earth is always illuminated (except during a solar eclipse), but depending on her position relative to Earth and Sun, an astronaut would see different portions of lighted and shadowed sides.

#### MATERIALS

- A straw (dowel, chopstick, etc.), masking tape, and Ping Pong (or similar) ball.
- The moon, at or near first or third quarter, on a sunny day.

#### EXTENSION

No daytime moon needed to try this! Turn full circle in bright sunlight while holding your moon on a stick. What can you observe? (See your "moon" wax and wane with each full-circle turn. See it eclipsed by your own "earth" shadow. See it eclipse the sun, but guard your precious eyes.)

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