

# Station Card: Moon Phases

The phase is the lit-half overlap we can see

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Name: \_\_\_\_\_ Section: \_\_\_\_\_

Date: \_\_\_\_\_

Station: \_\_\_\_\_ Group members: \_\_\_\_\_

*Goal:* Use the demo to make a claim supported by (1) at least one number/readout and (2) at least one sanity check.

**Demo:** /demos/moon-phases/

**Demo setup:** start at New → First Quarter → Full → Third Quarter.

**Tip:** Click **Station Mode** to add key-phase rows and print/copy your table.

**Your station artifact (fill in):** 1) **Control(s):** Moon angle  $\alpha$

2) **Observable(s):** phase name, illumination fraction  $f$

3) **Governing relationship:** write this equation in words:

$$f = \frac{1 + \cos \alpha}{2}$$

4) **Sanity check:** what is  $f$  at  $\alpha = 90^\circ$ ?

5) **Connection sentence:** “This matters for eclipses/totality because...”

## Word bank + sanity checks

**Word bank:** - **Phase:** the shape we see from Earth; it's the overlap of the Moon's lit half and the half facing Earth. - **Illumination fraction  $f$  (0–1):** fraction of the visible disk that is lit (0 = New, 1 = Full). - **Moon angle  $\alpha$  (degrees, this demo):**  $0^\circ$  = Full,  $180^\circ$  = New; quarter phases are at  $90^\circ$  and  $270^\circ$ . - **Waxing:** the illuminated fraction is increasing (after New → toward Full). - **Waning:** the illuminated fraction is decreasing (after Full → toward New). - **Quarter phase:** about 50% illuminated; “quarter” refers to the orbit position, not the lit fraction.

**Sanity checks:** - First/Third Quarter should be about 50% illuminated. - New Moon

is not “unlit” — the Sun still lights half the Moon; we’re mostly seeing the dark half. -  
Earth’s shadow is not what causes phases (it matters only during eclipses, which are rare).