



Tackling Astronomical Misconceptions

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STAEKEL PLANETARIUM

WALK OF HONOR

Is the Earth round?

[a]



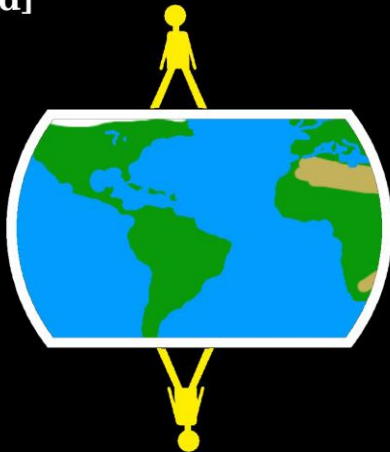
[b]



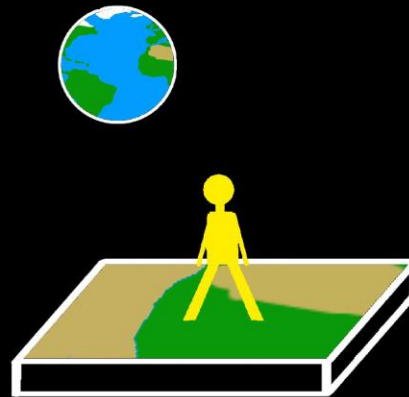
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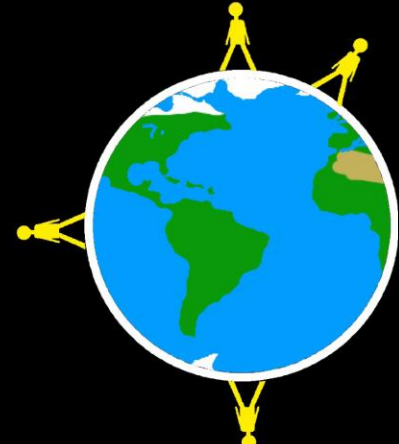
[d]



[e]



[f]





1.Space Systems: Patterns and Cycles

[How to read the standards »](#)[Go back to search results](#)[Related Content »](#)

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Students who demonstrate understanding can:

- 1-ESS1-1.** Use observations of the sun, moon, and stars to describe patterns that can be predicted. [Clarification Statement: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.] [Assessment Boundary: Assessment of star patterns is limited to stars being seen at night and not during the day.]
- 1-ESS1-2.** Make observations at different times of year to relate the amount of daylight to the time of year. [Clarification Statement: Emphasis is on relative comparisons of the amount of daylight in the winter to the amount in the spring or fall.] [Assessment Boundary: Assessment is limited to relative amounts of daylight, not quantifying the hours or time of daylight.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

- **1.ESS1.1 = Patterns from observation (sun/moon rise/set, stars visible at night, apparent motions)**
- **1.ESS1.2 = Daylight different at different times of year**
- **5.PS2.1 = Gravity pulls things down**
- **5.ESS1.1 = Apparent brightness relating to distance**
- **5.ESS1.2 = Shadows (length & direction), different stars in different seasons**

- **MS.ESS1.1 = Earth/Sun/Moon model to explain lunar phases, eclipses, & seasons**
- **MS.ESS1.2 = Model role of gravity to explain motions**
- **MS.ESS1.3 = Scale in solar system, data from telescopes, compare/contrast solar system objects**

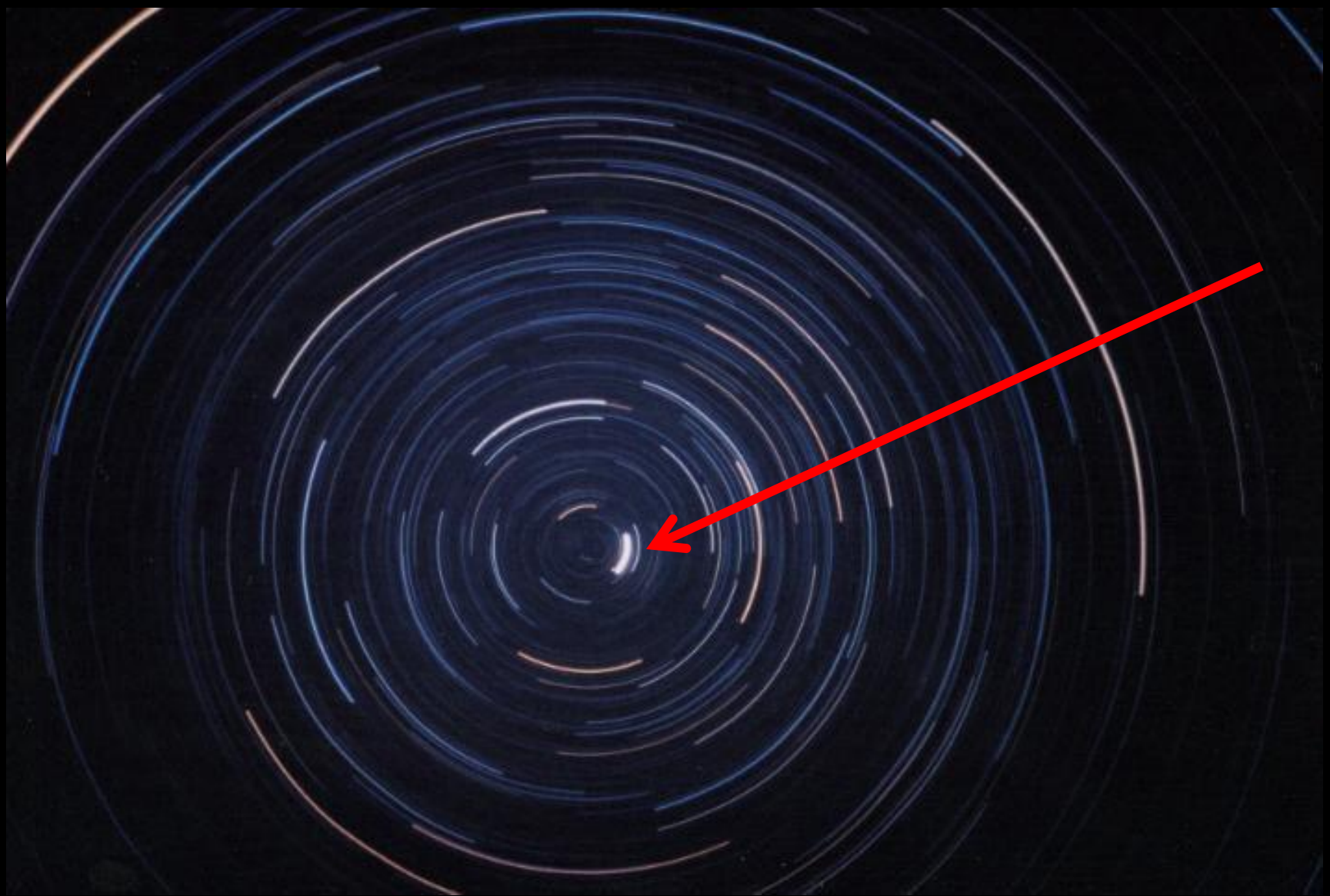
- **HS.ESS1.1 = Model lifespan of Sun, role of fusion, flow of energy, stellar lifetimes, spaceweather & flares**
- **HS.ESS1.2 = Big Bang theory, background radiation, light spectra, Hubble Law, composition of universe**
- **HS.ESS1.3 = stellar lifetimes, nucleosynthesis, stellar masses**
- **HS.ESS1.4 = Motion of solar system objects, Newton's Laws, Kepler's Laws**

“MISCONCEPTIONS” . . .*THE LIST!*



Is the North Star the brightest star?

RANK	PROPER NAME	GREEK LETTER NAME	CLASS	DIST (LY)	APP MAG	ABS MAG
<u>1</u>	<u>Sirius</u>	<u>Alpha CMa</u>	<u>A1V</u>	8.6	-1.46	1.43
<u>2</u>	<u>Canopus</u>	<u>Alpha Car</u>	<u>F0II</u>	309	-0.72	-5.60
<u>3</u>	<u>Rigil Kentaurus</u> <u>A</u>	<u>Alpha Cen A</u>	<u>G2V</u>	4.36	-0.01	4.34
<u>3</u>	<u>Rigil Kentaurus</u> <u>B</u>	<u>Alpha Cen B</u>	<u>K1V</u>	4.36	1.33	5.68
<u>4</u>	<u>Arcturus</u>	<u>Alpha Boo</u>	<u>K1.5III</u>	37	-0.04	-0.30
<u>5</u>	<u>Vega</u>	<u>Alpha Lyr</u>	<u>A0V</u>	25	0.03	0.60
<u>6</u>	<u>Capella</u>	<u>Alpha Aur</u>	<u>G8III+G0III</u>	43	0.08	-0.51
<u>7</u>	<u>Rigel</u>	<u>Beta Ori</u>	<u>B8Iab</u>	860	0.12	-7.0
<u>8</u>	<u>Procyon</u>	<u>Alpha CMi</u>	<u>F5IV-V</u>	11.5	0.34	2.61
...
<u>48</u>	<u>Algieba</u>	<u>Gamma Leo</u>	<u>K1III+G7III</u>	131	1.99	...
<u>49</u>	<u>Hamel</u>	<u>Alpha Ari</u>	<u>K2III</u>	66	2.00	0.47
<u>50</u>	<u>Polaris</u>	<u>Alpha UMi</u>	<u>F7Ib-II</u>	430	2.02	-3.58
<u>51</u>	<u>Nunki</u>	<u>Sigma Sgr</u>	<u>B2.5V</u>	225	2.02	-2.17
<u>52</u>	<u>Deneb Kaitos</u>	<u>Beta Cet</u>	<u>K0III</u>	96	2.04	-0.30



PHASES OF THE MOON

Clicker: Why does the Moon change its appearance?

- A. The Earth's shadow covers the Moon
- B. Clouds cover the Moon
- C. The Moon turns its dark side towards us
- D. We see different parts of the lighted face

Lets have a ball!

- How much is lit?

Try [this!](#)

***The Moon is
ALWAYS* HALF
LIT!!!***

**exception: lunar eclipse*

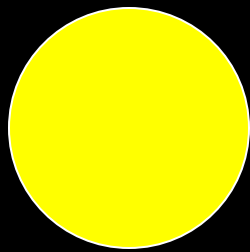


Clicker: If we see the Moon in the south at 7pm tonight, just below a star, where will the Moon be at 7pm tomorrow night?

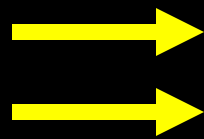
- A. Still below the star (same place)
- B. To the right (west) of the star
- C. To the left (east) of the star
- D. Above the star (north)

But the Moon doesn't always look half-lit. What gives?

- Depends on where your eye is!
- Try [this!](#)



Sun



A [Quiz?](#)



Does the Moon spin?

2007 Oct 11 00:00:00 UT



Class participation!

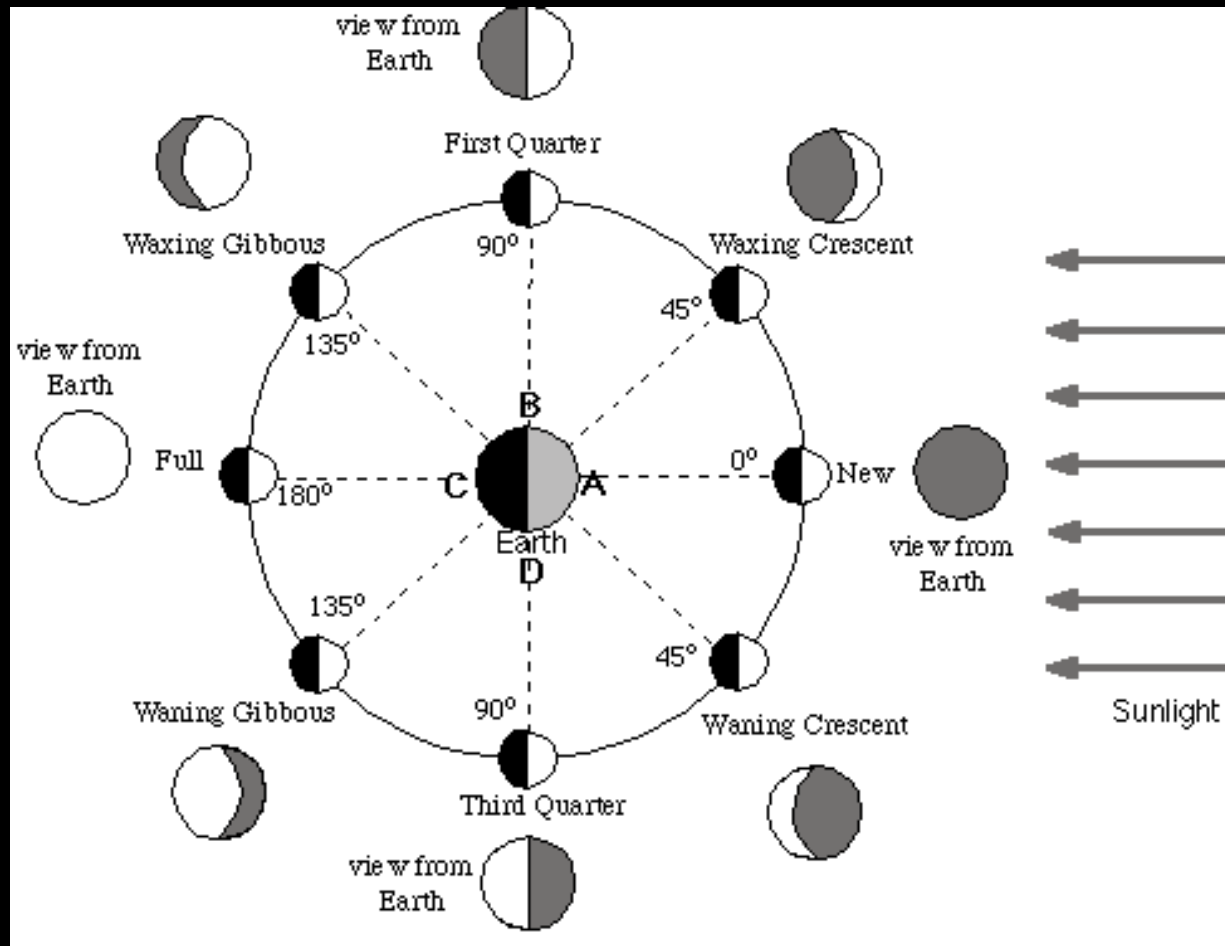
Your job:

- Come up and sign the sheet
- Take a cookie and a post-it note (*you lose the points if you eat the cookie!*)
- Using chocolate & vanilla icing, ice your cookie based on the Moon phase you've been assigned.
- *Wait*



Rise/Set times

- “It’s a marvelous night for a Moondance”

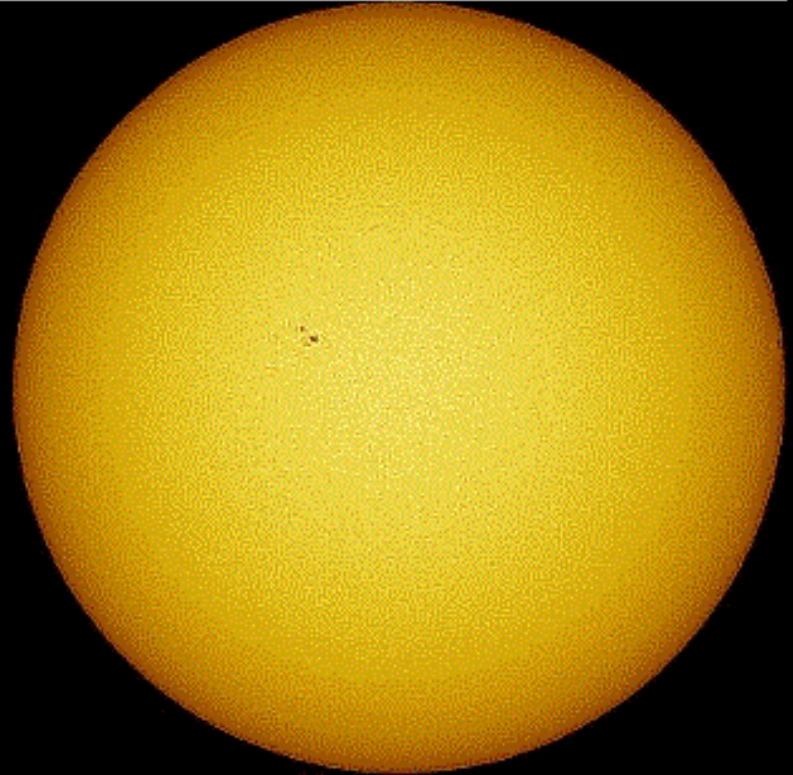
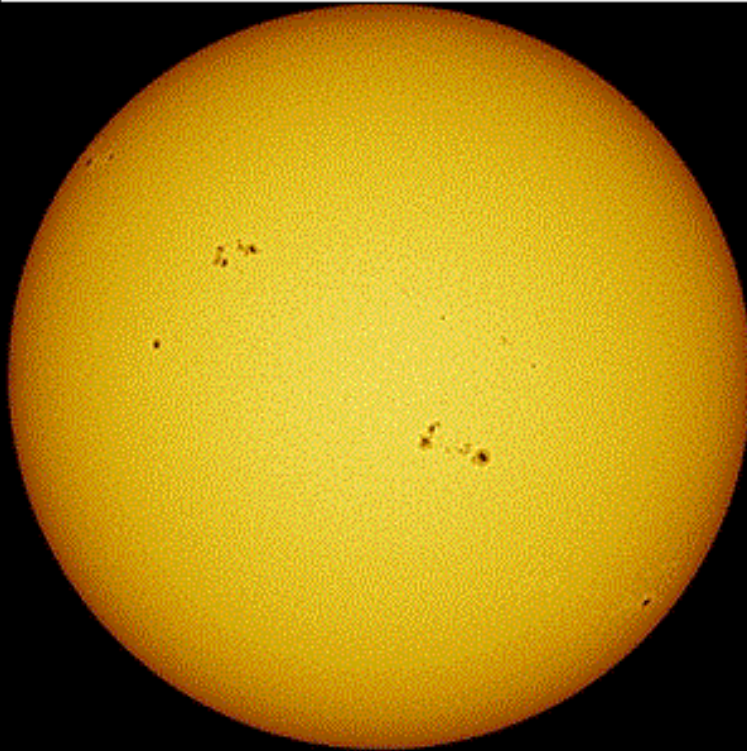


**THE FOUR SEASONS OR . . . “*WHY IS
IT COLD IN THE WINTER?*”**

Clicker: Why is it cold in the winter time?

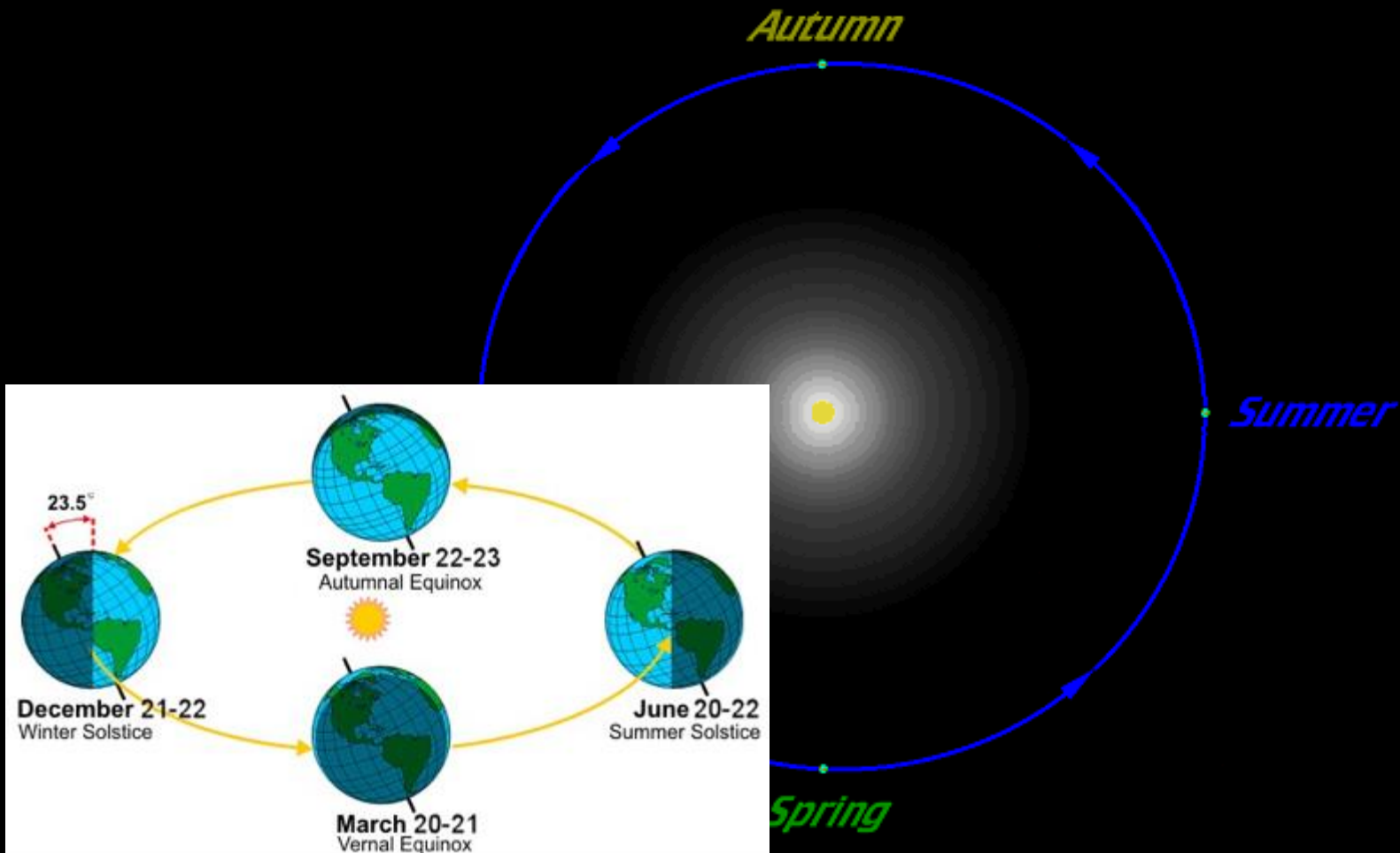
- A. The Earth is farther from the Sun
- B. The Earth is tilted away from the Sun
- C. The snow makes it colder
- D. The sunlight isn't as concentrated
- E. It has something to do with Dave's in-laws

Are we farther from the Sun in the
winter?



Almost a perfect circle!

The Distance of the Earth from the Sun



Average temperatures

Location	Latitude	January	July
Minneapolis, MN	45°N	13	73
Champaign, IL	40°N	26	75
Quito, Ecuador	0°	58	58
Santiago, Chile	33°S	70	48

Source: Weatherbase.com

Clicker: What time of the day do we have our longest shadows?

A. Noon

B. Sunrise/Sunset

C. At mid-morning (like 10am)

D. Mid-afternoon (like 3pm)

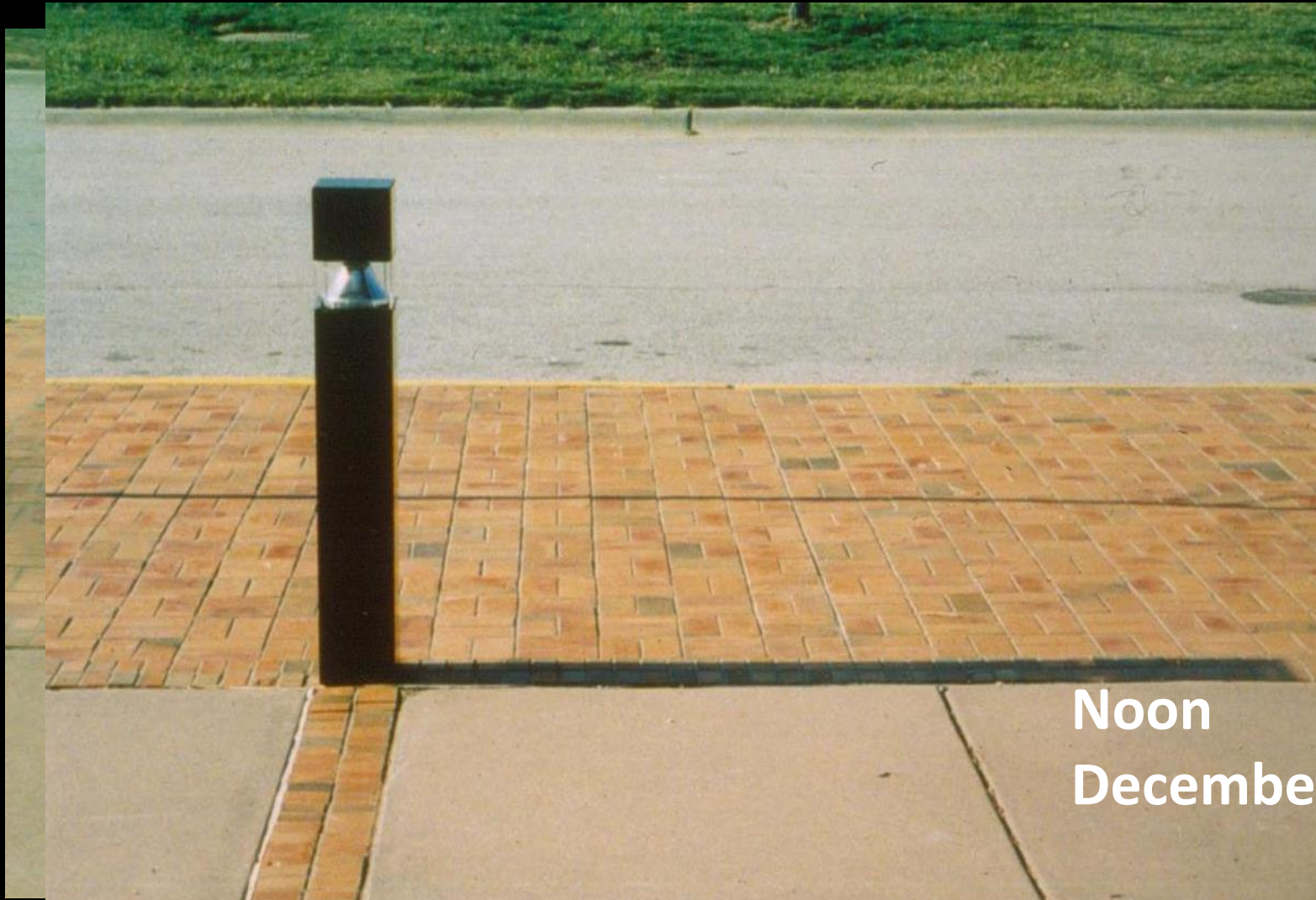
E. At midnight (?)



Clicker: During which month do we have our longest shadows (at noon)?

- A. December
- B. June
- C. March
- D. August

Prove it!

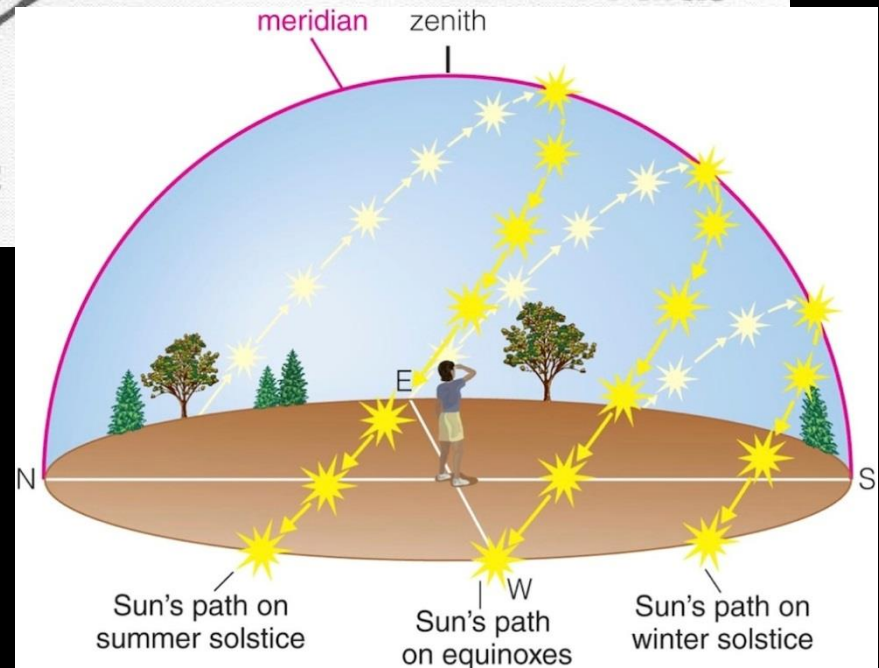
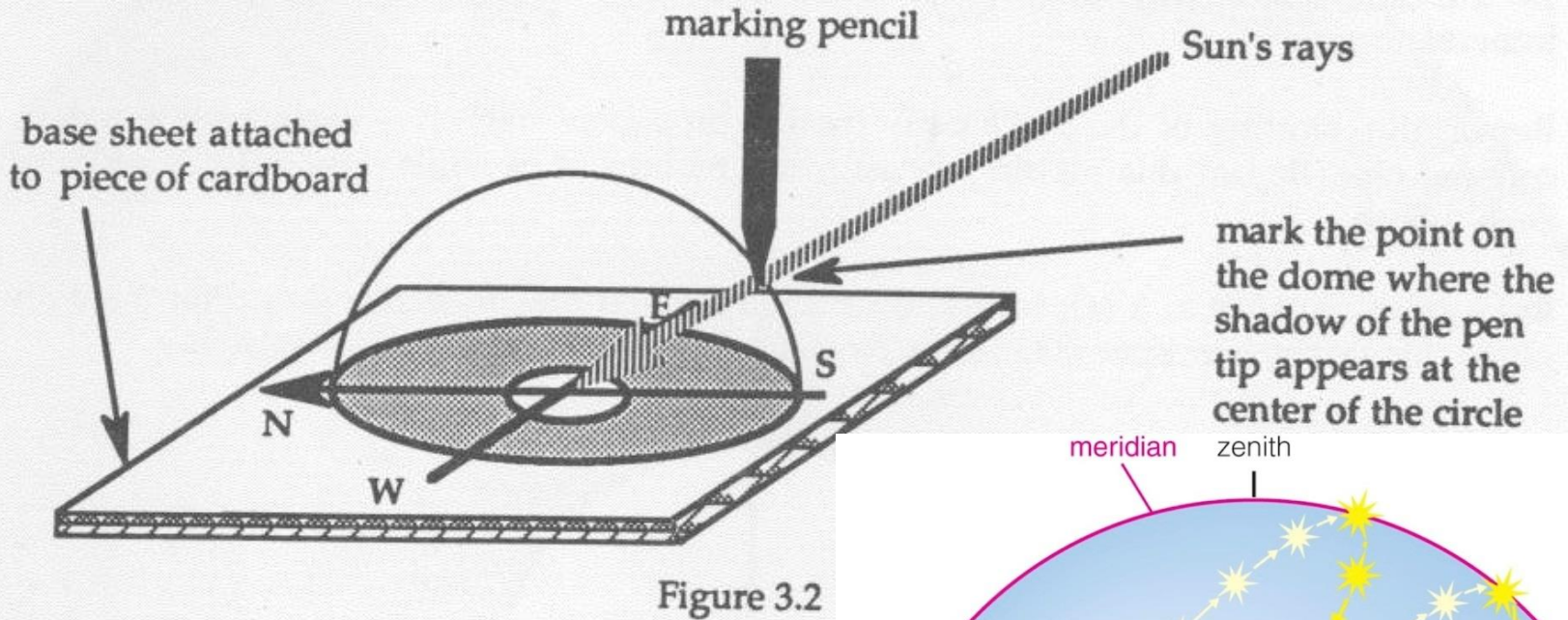


Noon
June 21

Noon
December 21



Sun hemispheres



The Sun's Changing Position



Daylight!

- For Champaign:

	<u>Sunrise</u>	<u>Sunset</u>	<u>#hours daylight*</u>
June 21	5:24am	8:26pm	15 hours
Sept. 23	6:42am	6:28pm	12 hours
Dec. 21	7:12am	4:31pm	9 hours
Mar. 21	6:54am	7:07pm	12 hours

* rounded figure

Source: US Naval Observatory

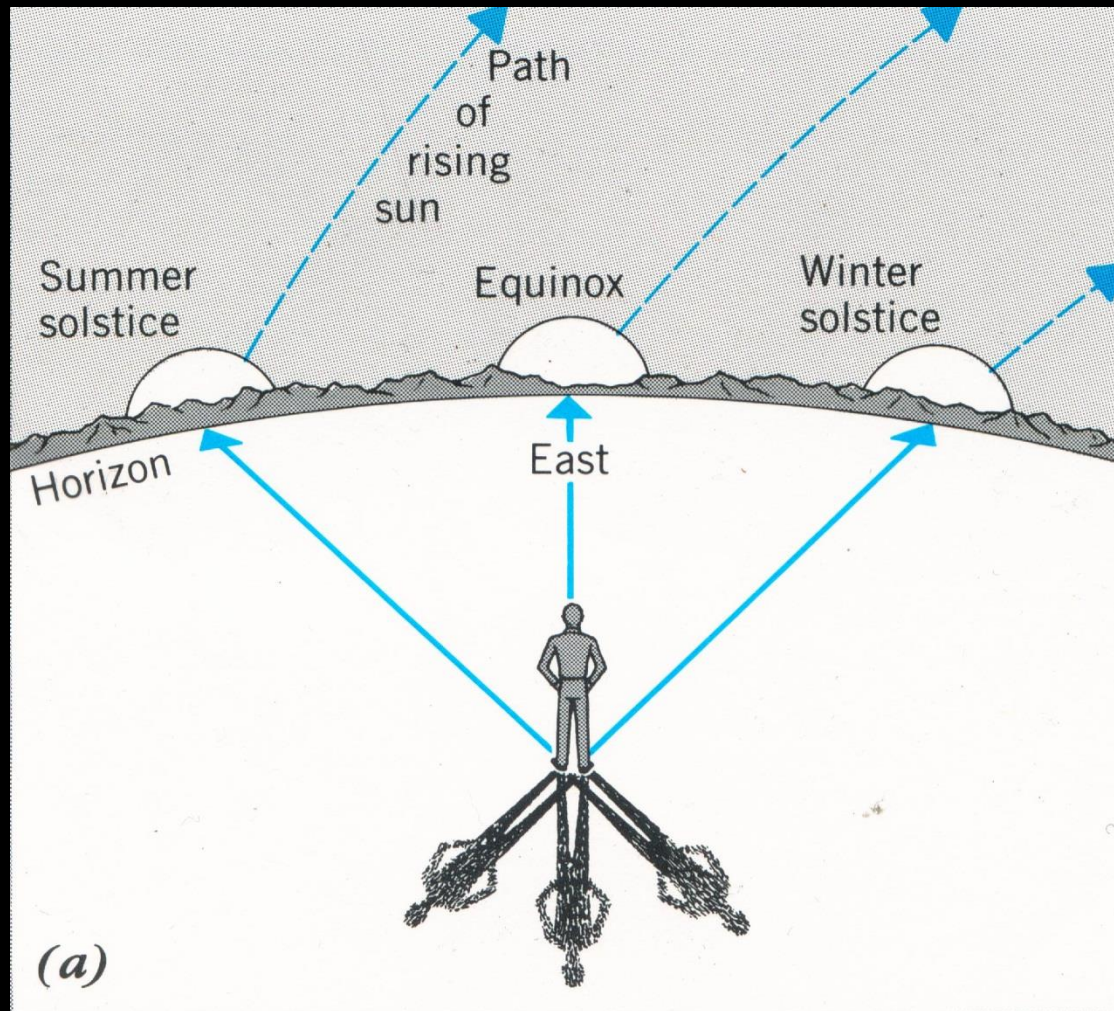
Terms

- “Solstice” (Sun still) = extreme! Sun at highest or lowest.
 - Summer = June 21
 - Winter = December 21
- “Equinox” (equal night) = in between times
 - Spring (vernal) = March 21
 - Autumn = September 23

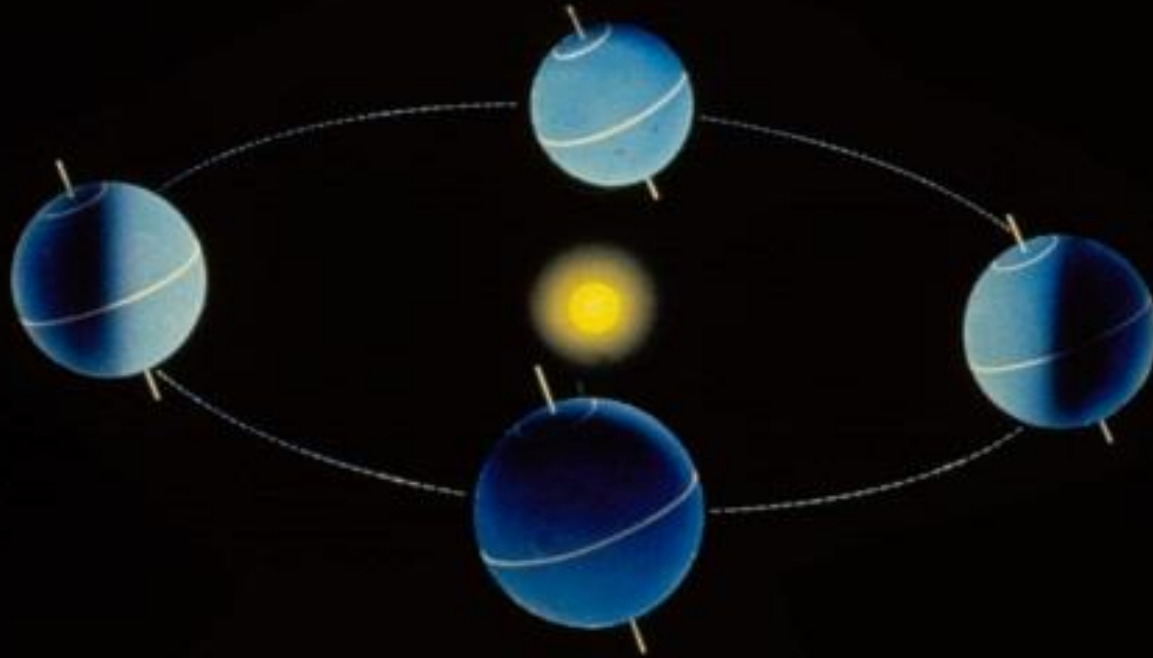
Clicker: When the Sun is highest at noon, we have

- A. Longest days
- B. Shortest days
- C. Same number of day & night hours
- D. Vacation (don't pick this one)

Look at the Sunrise/Sunset positions

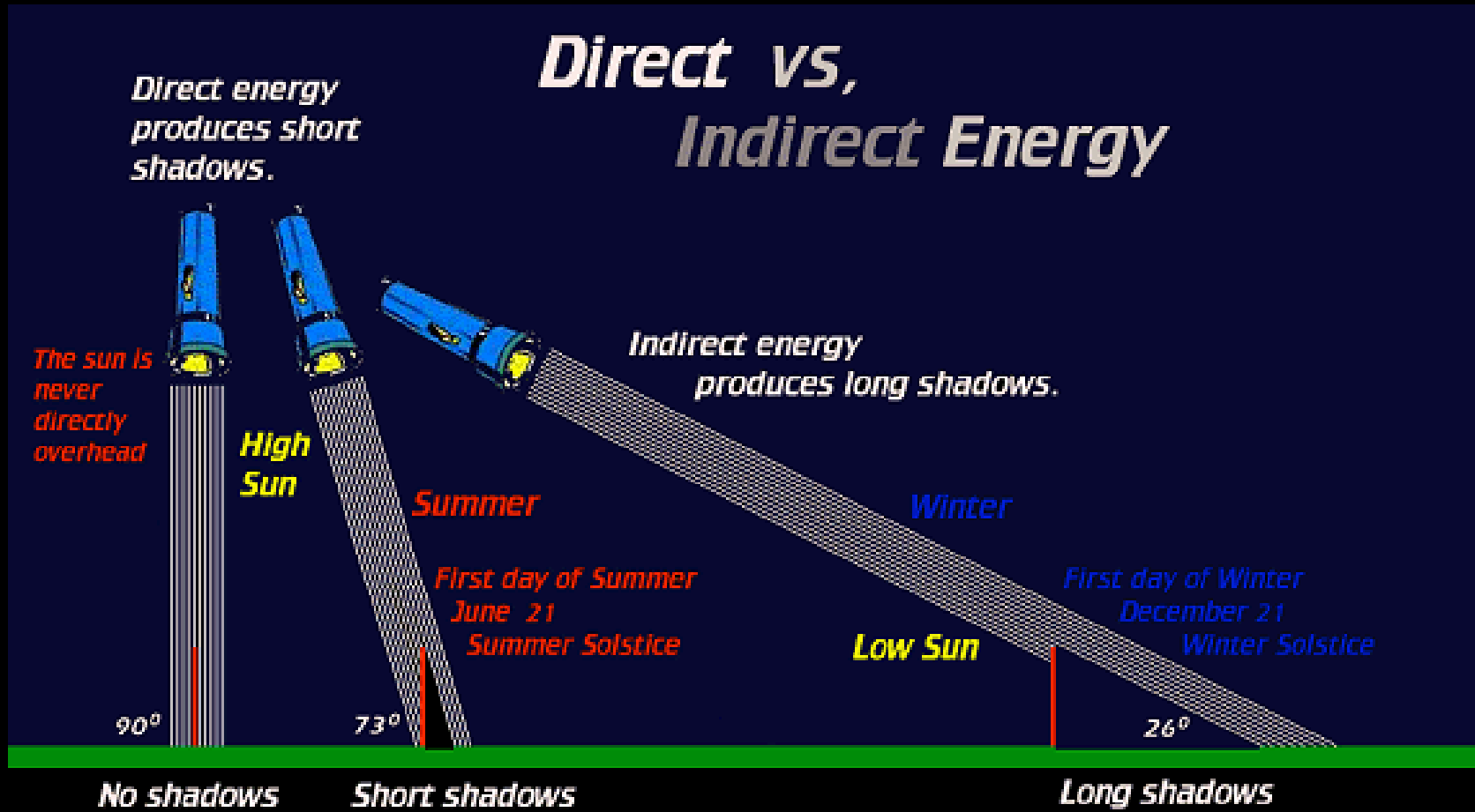


OK, so why is this happening?

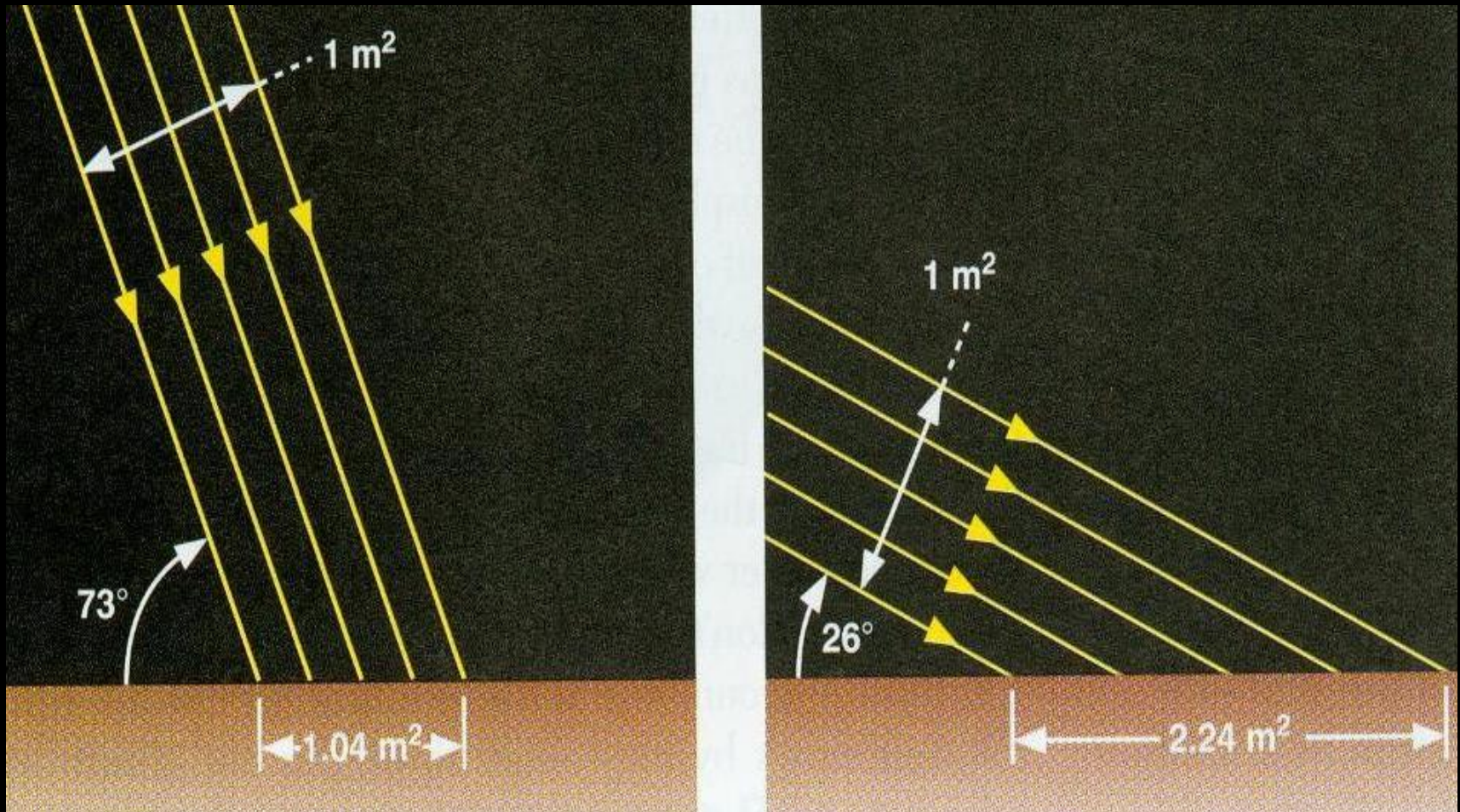


23.5° tilt. Try [this](#)

How does this make it cold in the winter?



Spreading out the light . . .



GRAVITY

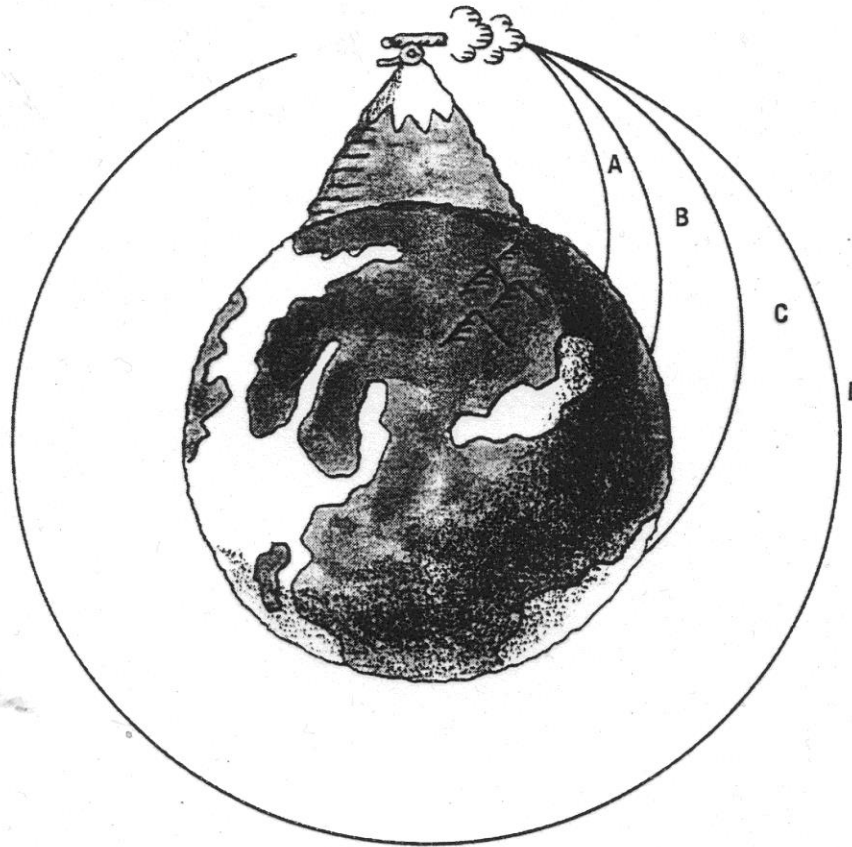
Clicker: Why do astronauts float inside the space station?

- A. There is no gravity there
- B. The space station shields them from gravity.
- C. They're falling
- D. The motion of the station counteracts gravity
- E. There's no air where the station is orbiting



Orbit

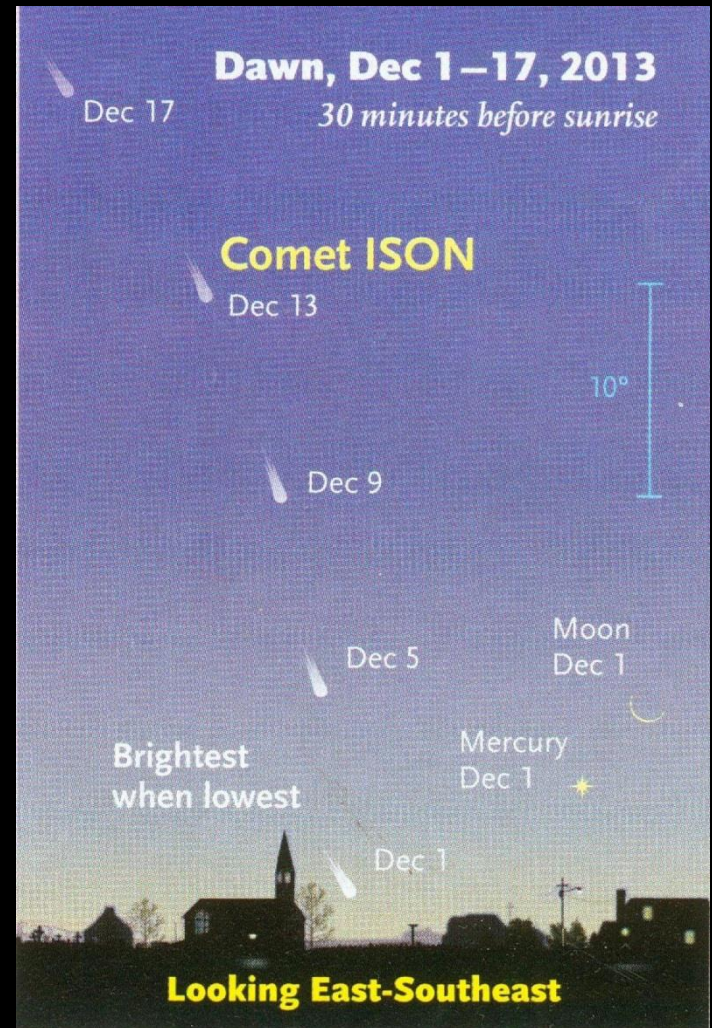
Gravity and Weightlessness—What's Up?



Or try [this](#)
Or [this](#)

Oh and by the way

- Comet ISON – Dec. 2013



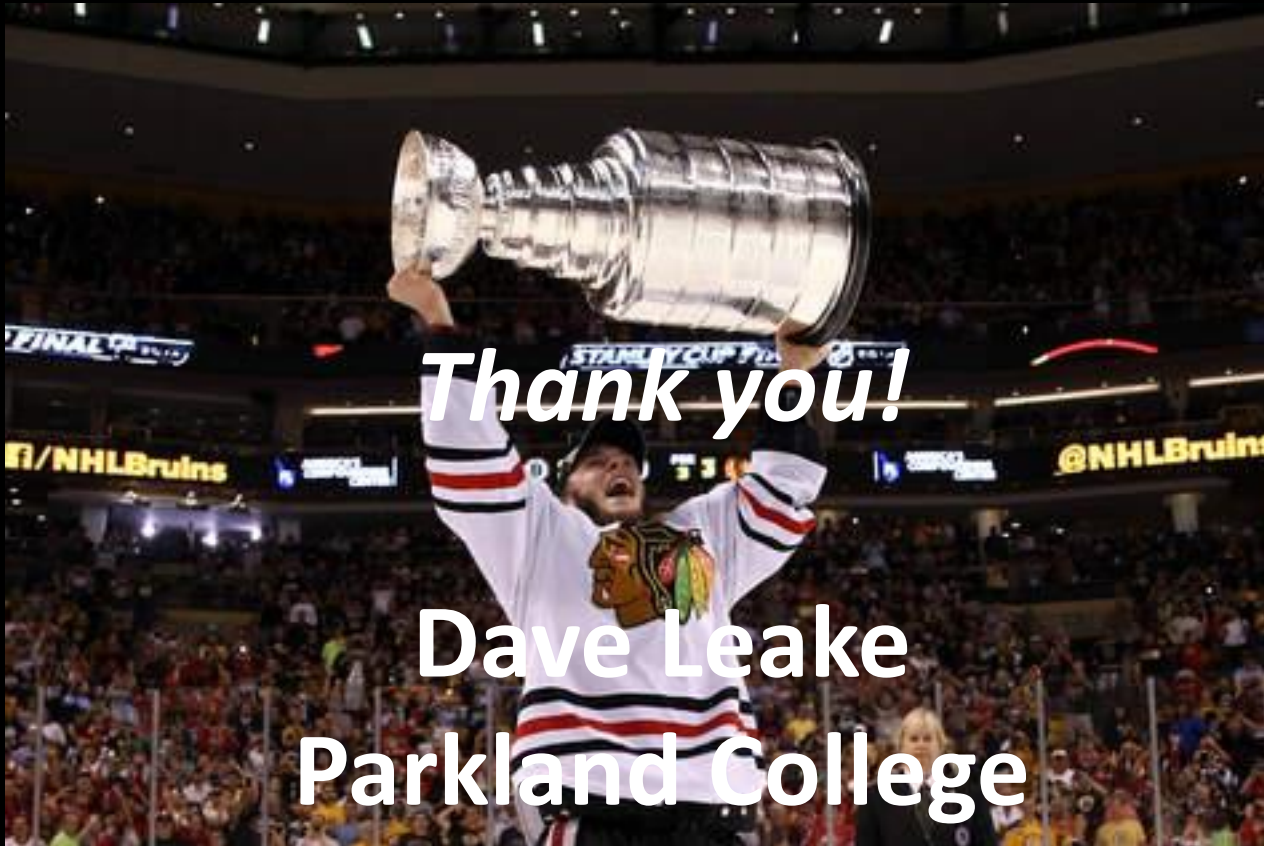
Perseid Meteors!

- Morning of Aug. 12 or 13



Say “cheese!”





Thank you!

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