The AhaBulb Party Game

STUFF EVERY ASTRONOMER SHOULD KNOW

How to play (30 seconds)

1. The reader reads a card and its three answers out loud.
2. Everyone says "One, two, three, Goldilocks!" and holds up 1, 2, or 3 fingers.
3. The reader flips the card and reads the answer and the Why.
4. Everyone who was right takes a point.
5. The reader reads the joke with a straight face. Anyone laughs or groans? The reader takes a point. Nobody got it right? The reader takes a point.
6. Pass the deck left. Most points when the points run out wins.

What you need

These cards and the point tokens on the last two pages. No tokens? Use coins, buttons, pebbles, or marshmallows. 3 to 10 players, ages 8 and up.

Expert rule: Bet It

Before the reader flips the card, you may put one of your points on your answer. Right: take your normal point plus one extra. Wrong: your bet goes back to the pile. That's it.

Printing

Print single-sided, on cardstock if you have it. Cut on the dashed lines. Each card is a 3.5 x 5 inch index card. The answer half is upside down on purpose, so the table can't peek.

Cards 1 to 50 of 165. More cards and the free daily online game at sesk.info. Built 2026-10-14.

ASTRONOMY & SPACE

Why is infrared astronomy best done from mountaintops, airplanes or space?

- **A** Water vapor and carbon dioxide absorb it
- **B** City lights drown out infrared
- **C** Infrared only travels in a vacuum

FLIP FOR THE ANSWER

A Water vapor and carbon dioxide absorb it

WHY Infrared is soaked up by water and carbon dioxide molecules, which are concentrated low in the atmosphere. Getting high and dry puts most of that gas below the telescope.

STRAIGHT FACE
Infrared astronomers are always chasing new highs.

SESK.INFO #3230

ASTRONOMY & SPACE

Roughly what wavelength range is visible light?

- **A** About 4 to 7 nanometers
- **B** About 400 to 700 nanometers
- **C** About 4 to 7 millimeters

FLIP FOR THE ANSWER

B About 400 to 700 nanometers

WHY Our eyes see waves from about 400 nm (violet) to 700 nm (red). That band passes easily through the air, which is no coincidence: eyes evolved to use the light the Sun delivers best.

STRAIGHT FACE
Why did the photon skip the luggage check? It was traveling light.

SESK.INFO #3228

ASTRONOMY & SPACE

Who discovered infrared light in 1800 by putting a thermometer past the red end of a spectrum?

- **A** Isaac Newton
- **B** Galileo Galilei
- **C** William Herschel

FLIP FOR THE ANSWER

C William Herschel

WHY Herschel spread sunlight into a rainbow and measured each color's heat. A thermometer beyond the red still warmed up, revealing invisible light. It was the first hint of light we cannot see.

STRAIGHT FACE
Infrared is just light that gets cold feet about being seen.

SESK.INFO #3229

ASTRONOMY & SPACE

Which kind of light has the shortest wavelength, under 0.01 nanometer?

- **A** Gamma rays
- **B** X-rays
- **C** Radio waves

FLIP FOR THE ANSWER

A Gamma rays

WHY The spectrum runs from long radio waves to short gamma rays. Shorter wavelength means more energy per photon, so gamma rays come from the most violent events, like dying stars.

STRAIGHT FACE
Why did the gamma ray get kicked out of the party? It was way too energetic.

SESK.INFO #3227

ASTRONOMY & SPACE

Why must X-ray telescopes like Chandra orbit above Earth's atmosphere?

- **A** X-rays are too faint to see from the ground
- **B** The atmosphere absorbs X-rays
- **C** X-rays are blocked by city lights

FLIP FOR THE ANSWER

B The atmosphere absorbs X-rays

WHY X-rays can pass through skin, but the huge number of atoms in our air stops them. That is good for our health, but it means X-ray astronomy only works from space.

STRAIGHT FACE
Chandra goes to great heights to get a clear picture.

SESK.INFO #3231

ASTRONOMY & SPACE

A 4-meter telescope mirror collects how much more light than a 1-meter mirror?

- **A** 4 times
- **B** 8 times
- **C** 16 times

FLIP FOR THE ANSWER

C 16 times

WHY Light gathering depends on the mirror's area, and area grows with the square of the diameter. Four times wider means 4 x 4 = 16 times the collecting area.

STRAIGHT FACE
Why did the telescope bring a bucket? It wanted to catch more starlight.

SESK.INFO #3232

ASTRONOMY & SPACE

With the main optic fixed, what can you swap to change a telescope's magnification?

- **A** The eyepiece
- **B** The aperture stop
- **C** The mirror coating

FLIP FOR THE ANSWER

A The eyepiece

WHY The main lens or mirror forms an image. The eyepiece magnifies it, and changing eyepieces changes the power. Useful magnification is still limited by aperture and atmospheric turbulence.

STRAIGHT FACE
My telescope salesman promised 500x power. I saw right through him.

SESK.INFO #3233

ASTRONOMY & SPACE

What lens flaw makes each color focus at a slightly different spot in a refracting telescope?

- **A** Spherical aberration
- **B** Chromatic aberration
- **C** Atmospheric seeing

FLIP FOR THE ANSWER

B Chromatic aberration

WHY Glass bends each wavelength by a slightly different amount, so colors focus at different distances and the image blurs. Mirrors reflect every color the same way, so reflectors avoid this problem.

STRAIGHT FACE
My refractor gave every color its own focus. Talk about a lens with commitment issues.

SESK.INFO #3234

ASTRONOMY & SPACE

How big is the largest working refracting telescope, at Yerkes Observatory?

- **A** 40 inches
- **B** 200 inches
- **C** 10 meters

FLIP FOR THE ANSWER

A 40 inches

WHY Big lenses must be flawless all the way through and can only be held at their edges, so they sag. That limit near 40 inches is why every giant telescope since is a reflector.

STRAIGHT FACE
The Yerkes refractor has been the biggest since 1897. It really knows how to hold a lens.

SESK.INFO #3236

ASTRONOMY & SPACE

Who built the first successful reflecting telescope, in 1668?

- **A** Galileo Galilei
- **B** Johannes Kepler
- **C** Isaac Newton

FLIP FOR THE ANSWER

C Isaac Newton

WHY Newton used a curved mirror instead of a lens to form the image. Mirrors avoid color blur and can be supported from behind, which is why nearly every big research telescope today is a reflector.

STRAIGHT FACE
Newton's telescope really reflected well on him.

SESK.INFO #3235

ASTRONOMY & SPACE

How does each 10-meter Keck telescope make its giant mirror?

- **A** One solid 10-meter glass disk
- **B** 36 hexagonal segments kept aligned by motors
- **C** A spinning pool of liquid mercury

FLIP FOR THE ANSWER

B 36 hexagonal segments kept aligned by motors

WHY Each Keck mirror is 36 hexagons, each 1.8 meters wide. Computer-driven actuators keep adjusting them so they act like one perfectly shaped mirror. Webb later used the same segmented idea.

STRAIGHT FACE
Keck has 36 mirrors and still never has a bad hair day.

SESK.INFO #3238

ASTRONOMY & SPACE

How does adaptive optics undo the blurring caused by Earth's turbulent air?

- **A** It moves the telescope above the atmosphere
- **B** A flexible mirror reshapes to cancel the distortion
- **C** Software averages many blurry photos later

FLIP FOR THE ANSWER

B A flexible mirror reshapes to cancel the distortion

WHY A sensor measures how the air has distorted the image, and a small flexible mirror in the light path bends to cancel it, as often as 500 times per second. It works best in the infrared.

STRAIGHT FACE
Adaptive optics: a mirror that's always flexible about your plans.

SESK.INFO #3237

ASTRONOMY & SPACE

What three things make the best sites for big optical telescopes?

- **A** Low, dark and humid
- **B** High, bright and wet
- **C** High, dark and dry

FLIP FOR THE ANSWER

C High, dark and dry

WHY Altitude puts the telescope above much of the air and water vapor, darkness avoids light pollution, and dry air absorbs less infrared. That is why giant telescopes sit in Chile, Hawaii and the Canary Islands.

STRAIGHT FACE
Astronomers love a good night out, as long as it's dark, dry and up a mountain.

SESK.INFO #3239

ASTRONOMY & SPACE

Why can a single giant radio dish see less detail than a small optical telescope?

- **A** Radio waves are too faint
- **B** Radio dishes are not pointed precisely
- **C** Radio waves are very long, so resolution is poor

FLIP FOR THE ANSWER

C Radio waves are very long, so resolution is poor

WHY Resolution depends on aperture and wavelength. Radio waves are far longer than visible light, so even the largest single dish resolves less detail than a typical small optical telescope.

STRAIGHT FACE
Radio astronomers have long waves and short patience for blurry maps.

SESK.INFO #3240

ASTRONOMY & SPACE

At a fixed wavelength, what sets how fine a detail an interferometer can resolve?

- **A** The diameter of each telescope
- **B** The distance between the telescopes
- **C** The total collecting area

FLIP FOR THE ANSWER

B The distance between the telescopes

WHY Two dishes 1 km apart resolve detail like a single 1 km dish. They do not collect that much light, though, because their real collecting area is still just the two small dishes.

STRAIGHT FACE
Interferometers prove that sometimes the best relationships are long distance.

SESK.INFO #3241

ASTRONOMY & SPACE

The Very Long Baseline Array links 10 radio dishes stretching between which places?

- **A** New Mexico and Arizona
- **B** The Virgin Islands and Hawaii
- **C** Chile and Australia

FLIP FOR THE ANSWER

B The Virgin Islands and Hawaii

WHY The VLBA dishes are not wired together. Each records the incoming waves with precise timing, and computers combine the data later, giving resolution of 0.0001 arcseconds.

STRAIGHT FACE
The VLBA is the ultimate long-distance group project, and everybody actually does their part.

SESK.INFO #3242

ASTRONOMY & SPACE

Karl Jansky discovered the first cosmic radio waves in the early 1930s. Where were they coming from?

- **A** The Sun
- **B** The Moon
- **C** The Milky Way

FLIP FOR THE ANSWER

C The Milky Way

WHY Jansky, a Bell Labs engineer, noticed static that peaked about four minutes earlier each day. That matches Earth's spin relative to the stars, so the source was fixed among the stars: our galaxy.

STRAIGHT FACE
Jansky was trying to fix static and found the galaxy instead. Best wrong number ever.

SESK.INFO #3243

ASTRONOMY & SPACE

In 1815, Joseph Fraunhofer counted about how many dark lines in the Sun's spectrum?

- **A** About 6
- **B** About 600
- **C** About 60,000

FLIP FOR THE ANSWER

B About 600

WHY The dark lines are colors missing from sunlight, absorbed by atoms in the Sun's cooler outer gas. Each element leaves its own pattern, which later let astronomers read what stars are made of.

STRAIGHT FACE
Fraunhofer kept drawing lines in the Sun's spectrum. He had no boundaries.

SESK.INFO #3244

ASTRONOMY & SPACE

Which element was found in the Sun's spectrum before it was found on Earth?

- **A** Helium
- **B** Hydrogen
- **C** Neon

FLIP FOR THE ANSWER

A Helium

WHY A set of spectral lines in sunlight matched no known element. It was named helium and only later identified in rocks and gas on Earth. Spectroscopy let us do chemistry on something 150 million km away.

STRAIGHT FACE
I'd tell you a helium joke, but you wouldn't react.

SESK.INFO #3245

ASTRONOMY & SPACE

What kind of spectrum shows only bright lines at certain wavelengths?

- **A** A continuous spectrum
- **B** An absorption spectrum
- **C** An emission spectrum

FLIP FOR THE ANSWER

C An emission spectrum

WHY A hot dense object gives a continuous rainbow. Thin glowing gas gives bright emission lines. Thin cooler gas in front of a hot source removes colors, making dark absorption lines.

STRAIGHT FACE
Emission spectra: when a gas only wants to show off its best colors.

SESK.INFO #3246

ASTRONOMY & SPACE

A star moves sideways across our line of sight, not toward or away. What Doppler shift do we see?

- **A** A redshift
- **B** A blueshift
- **C** No Doppler shift

FLIP FOR THE ANSWER

B About 300 km/s

WHY For speeds well below light, the fractional shift equals v divided by c. Light moves at about 300,000 km/s, so a 1/1000 shift means about 300 km/s.

STRAIGHT FACE
I asked the star how fast it was going. It said, just do the math, it's relative.

SESK.INFO #3249

ASTRONOMY & SPACE

A galaxy's spectral lines are shifted toward shorter wavelengths. What does that tell you?

- **A** It is moving toward us
- **B** It is moving away from us
- **C** It is very hot

FLIP FOR THE ANSWER

A It is moving toward us

WHY An approaching source squeezes its waves, shortening the wavelength: a blueshift. A receding source stretches them: a redshift. The Andromeda Galaxy is one of the few blueshifted galaxies.

STRAIGHT FACE
Andromeda is blueshifted. It's coming over and doesn't even call first.

SESK.INFO #3248

ASTRONOMY & SPACE

As a star gets hotter, its peak emission moves which way?

- **A** To longer wavelengths
- **B** To shorter wavelengths
- **C** It stays the same

FLIP FOR THE ANSWER

B To shorter wavelengths

WHY Hotter matter radiates more at every wavelength, and its peak shifts toward the blue. That is why a stove burner goes from dull red to orange as it heats, and blue stars are hotter than red ones.

STRAIGHT FACE
Blue stars are so hot, they're cool.

SESK.INFO #3250

ASTRONOMY & SPACE

A spectral line shifts by 1/1000 of its wavelength. How fast is the source moving along our line of sight?

- **A** About 3 km/s
- **B** About 300 km/s
- **C** About 30,000 km/s

FLIP FOR THE ANSWER

C No Doppler shift

WHY The Doppler effect measures only radial velocity, the part of motion along our line of sight. Purely sideways motion leaves the wavelengths unchanged.

STRAIGHT FACE
The star moved sideways and the spectrograph didn't notice. Some stars just fly under the radar.

SESK.INFO #3247

ASTRONOMY & SPACE

Hubble's law says a galaxy's recession speed is proportional to what?

- **A** Its distance from us
- **B** Its mass
- **C** Its age

FLIP FOR THE ANSWER

A Its distance from us

WHY In 1931 Hubble and Humason showed that farther galaxies recede faster, in direct proportion. The constant H is the Hubble constant. For galaxies following smooth cosmic expansion, recession speed can estimate distance.

STRAIGHT FACE
The universe is expanding. That explains why I can never find my keys.

SESK.INFO #3252

ASTRONOMY & SPACE

If you move twice as far from a star, how much of its light reaches you?

- **A** One half
- **B** One quarter
- **C** One eighth

FLIP FOR THE ANSWER

B One quarter

WHY Light spreads over a sphere whose area grows with distance squared. Twice as far means 2 x 2 = 4 times less light; ten times as far means 100 times less.

STRAIGHT FACE
The inverse square law: light needs more space whenever it goes the distance.

SESK.INFO #3251

ASTRONOMY & SPACE

A star has a parallax of 0.1 arcsecond. How far away is it?

- **A** 10 parsecs
- **B** 0.1 parsecs
- **C** 100 parsecs

FLIP FOR THE ANSWER

A 10 parsecs

WHY Distance in parsecs equals 1 divided by the parallax in arcseconds. A smaller shift means a farther star, so 0.1 arcsecond means 10 parsecs and 0.05 means 20.

STRAIGHT FACE
Parallax is easy: just look at it from both sides of the Sun.

SESK.INFO #3254

ASTRONOMY & SPACE

One parsec, the distance at which a star shows 1 arcsecond of parallax, equals about how many light-years?

- **A** Exactly 1 light-year
- **B** About 1.5 light-years
- **C** About 3.26 light-years

FLIP FOR THE ANSWER

C About 3.26 light-years

WHY Parsec is short for parallax arcsecond. Using Earth's orbit as the baseline, a star 206,265 AU away shifts by 1 arcsecond. That is about 3.26 light-years, or 31 trillion km.

STRAIGHT FACE
I'd tell you a parsec joke, but it's a bit of a stretch. About 3.26 light-years, actually.

SESK.INFO #3253

ASTRONOMY & SPACE

In what year was stellar parallax first successfully measured?

- **A** 1610
- **B** 1687
- **C** 1838

FLIP FOR THE ANSWER

C 1838

WHY The shifts are tiny, under 1 arcsecond even for the closest star, so it took until 1838. Bessel measured 61 Cygni, Henderson Alpha Centauri and Struve Vega, independently.

STRAIGHT FACE
Parallax took 200 years after the telescope. Stars really don't like to be pinned down.

SESK.INFO #3255

ASTRONOMY & SPACE

How long does sunlight take to cross one astronomical unit, the average Earth to Sun distance?

- **A** About 8.3 minutes
- **B** About 8.3 seconds
- **C** About 1.3 seconds

FLIP FOR THE ANSWER

A About 8.3 minutes

WHY One AU is about 150 million km, and light covers 300,000 km each second, so the trip takes about 500 seconds. The Sun you see is the Sun of about 8 minutes ago.

STRAIGHT FACE
The Sun is 8 minutes away, and still always on time for sunrise.

SESK.INFO #3256

ASTRONOMY & SPACE

About how far is one light-year?

- **A** About 9.46 trillion km
- **B** About 150 million km
- **C** About 300,000 km

FLIP FOR THE ANSWER

A About 9.46 trillion km

WHY A light-year is a distance, not a time: how far light goes in a year at 300,000 km/s. 150 million km is one AU, and 300,000 km is one light-second.

STRAIGHT FACE
A light-year is like a regular year, but with fewer calories.

SESK.INFO #3257

ASTRONOMY & SPACE

How far into the past are you seeing the Moon?

- **A** With no delay
- **B** About 8 minutes old
- **C** About 1.3 seconds old

FLIP FOR THE ANSWER

C About 1.3 seconds old

WHY Light from the Moon takes about 1.3 seconds to reach us, so we see it as it was. Over billions of light-years, that delay lets telescopes like Webb see galaxies as they were in the young universe.

STRAIGHT FACE
Every time you look at the Moon, you're living in the past. Very retro.

SESK.INFO #3258

ASTRONOMY & SPACE

For cepheid variable stars, how is the pulsation period linked to luminosity?

- **A** Longer period means more luminous
- **B** Longer period means less luminous
- **C** Period and luminosity are unrelated

FLIP FOR THE ANSWER

A Longer period means more luminous

WHY Time a cepheid's brightness cycle and you know its true luminosity. Compare that with how bright it looks and the inverse square law gives the distance. That makes cepheids standard candles.

STRAIGHT FACE
Cepheids take their time to shine, and the slow ones shine brightest.

SESK.INFO #3260

ASTRONOMY & SPACE

Who discovered the cepheid period-luminosity relation in 1908?

- **A** Annie Cannon
- **B** Henrietta Leavitt
- **C** Vera Rubin

FLIP FOR THE ANSWER

B Henrietta Leavitt

WHY Leavitt studied variable stars in the Magellanic Clouds. Since those stars are all at about the same distance, brighter-looking cepheids had to be truly brighter, and they had longer periods.

STRAIGHT FACE
Leavitt found stars with rhythm. You could say she discovered the universe's beat.

SESK.INFO #3259

ASTRONOMY & SPACE

A difference of 5 magnitudes means what brightness ratio?

- **A** Exactly 100 times
- **B** Exactly 5 times
- **C** Exactly 10 times

FLIP FOR THE ANSWER

A Exactly 100 times

WHY Astronomers defined 5 magnitudes as a factor of 100. Each single magnitude is the fifth root of 100, about 2.5 times. So a magnitude 1 star is 100 times brighter than a magnitude 6 star.

STRAIGHT FACE
Magnitudes are like golf scores: lower is better.

SESK.INFO #3262

ASTRONOMY & SPACE

What explodes to make a Type Ia supernova, the standard candle for far galaxies?

- **A** A massive star whose core collapses
- **B** Two neutron stars merging
- **C** A white dwarf in a binary system

FLIP FOR THE ANSWER

C A white dwarf in a binary system

WHY A Type Ia is the thermonuclear explosion of a white dwarf in a binary system. The trigger may be material from a companion or a white dwarf merger. Their calibrated brightness makes them useful across billions of light-years.

STRAIGHT FACE
Why do Type Ia supernovae make good markers? They set a stellar standard.

SESK.INFO #3261

ASTRONOMY & SPACE

Absolute magnitude is how bright an object would look from what distance?

A 10 parsecs

B 1 astronomical unit

C 1 light-year

FLIP FOR THE ANSWER

A 10 parsecs

WHY Apparent magnitude depends on distance. Absolute magnitude puts every star at the same 10 parsecs so their true brightness can be compared. The Sun, -26.7 from Earth, would be a dim +4.7.

STRAIGHT FACE
At 10 parsecs, the Sun would be just another face in the crowd.

SESK.INFO #3264

ASTRONOMY & SPACE

On the magnitude scale, what does a smaller (or negative) number mean?

A A fainter object

B A closer object

C A brighter object

FLIP FOR THE ANSWER

C A brighter object

WHY The scale goes back to Hipparchus, who called the brightest stars first magnitude. So lower numbers are brighter, and the brightest objects go negative.

STRAIGHT FACE
Astronomy is the only place where getting a negative score means you're a star.

SESK.INFO #3263

ASTRONOMY & SPACE

Where does the James Webb Space Telescope operate?

A Near L2, 1.5 million km from Earth

B In low Earth orbit like Hubble

C On the far side of the Moon

FLIP FOR THE ANSWER

A Near L2, 1.5 million km from Earth

WHY At the second Lagrange point Webb stays in line with Earth as both circle the Sun. Its sunshield then blocks the Sun, Earth and Moon at once, keeping the telescope cold enough to see faint infrared.

STRAIGHT FACE
Webb went a million miles to get some peace and quiet. Very cool of it.

SESK.INFO #3266

ASTRONOMY & SPACE

Hubble launched in 1990 with a flawed mirror. When did astronauts fix it?

A It was never fixed

B December 1993

C 2009

FLIP FOR THE ANSWER

B December 1993

WHY The 2.4-meter primary mirror had an aberration that blurred early images. Astronauts installed corrective optics on the first of five servicing missions, and Hubble has delivered sharp images since.

STRAIGHT FACE
Hubble got glasses in 1993 and has been seeing clearly ever since.

SESK.INFO #3265

ASTRONOMY & SPACE

What is the celestial sphere in modern astronomy?

- **A** An imaginary mapping surface
- **B** Earth's physical atmosphere
- **C** The edge of the universe

FLIP FOR THE ANSWER

A An imaginary mapping surface

WHY The celestial sphere is a geometric model centered on the observer or Earth. Stars are not actually fixed to one shell, but projecting them onto it makes positions and apparent motions easier to describe.

STRAIGHT FACE
Why did the sky bring a map? It had too many points to make.

SESK.INFO #3270

ASTRONOMY & SPACE

What is the Vera C. Rubin Observatory's main job?

- **A** Imaging one galaxy in extreme detail
- **B** Re-imaging the whole southern sky every few nights for 10 years
- **C** Listening for radio signals from aliens

FLIP FOR THE ANSWER

B Re-imaging the whole southern sky every few nights for 10 years

WHY Rubin's 8.4-meter telescope and the largest digital camera ever built cover the whole visible sky every few nights. The result is a movie of the sky that catches asteroids, supernovae and other changes.

STRAIGHT FACE
Rubin takes a selfie of the whole sky every few nights. Talk about commitment.

SESK.INFO #3269

ASTRONOMY & SPACE

The first image of a black hole, released in 2019, showed the black hole in which galaxy?

- **A** Our own Milky Way
- **B** Messier 87
- **C** Andromeda

FLIP FOR THE ANSWER

B Messier 87

WHY The Event Horizon Telescope linked radio dishes worldwide into an Earth-sized virtual telescope. It imaged the shadow of M87's black hole, 6.5 billion times the Sun's mass. The Milky Way's black hole followed in 2022.

STRAIGHT FACE
I'd tell you a black hole joke, but it sucks.

SESK.INFO #3268

ASTRONOMY & SPACE

Ordinary mirrors do not focus X-rays. How does Chandra focus them?

- **A** With a large glass lens
- **B** With a dish like a radio telescope
- **C** With nested mirror shells hit at a glancing angle

FLIP FOR THE ANSWER

C With nested mirror shells hit at a glancing angle

WHY Chandra has four very smooth barrel-shaped mirrors nested inside each other. X-rays skim off their insides and focus onto detectors at the end of a 9.2-meter optical bench.

STRAIGHT FACE
X-rays don't bounce straight back. They only take a glancing interest.

SESK.INFO #3267

ASTRONOMY & SPACE

How many degrees equal one hour of right ascension?

- **A** 10 degrees
- **B** 15 degrees
- **C** 24 degrees

FLIP FOR THE ANSWER

B 15 degrees

WHY Right ascension divides the full 360-degree sky circle into 24 hours. Dividing 360 by 24 gives 15 degrees per hour.

STRAIGHT FACE
Right ascension keeps good hours because the stars hate overtime.

SESK.INFO #3271

ASTRONOMY & SPACE

Which Earth coordinate is declination most like?

- **A** Longitude
- **B** Altitude
- **C** Latitude

FLIP FOR THE ANSWER

C Latitude

WHY Declination measures angular distance north or south of the celestial equator. Positive values are north, negative values are south, and the celestial poles sit at plus or minus 90 degrees.

STRAIGHT FACE
Declination declined to go east or west. It prefers north and south.

SESK.INFO #3272

ASTRONOMY & SPACE

What does the ecliptic trace on the celestial sphere?

- **A** The Sun's apparent yearly path
- **B** The Moon's daily horizon path
- **C** Earth's equator projected outward

FLIP FOR THE ANSWER

A The Sun's apparent yearly path

WHY As Earth orbits the Sun, the Sun appears to move against the background stars. That annual great-circle path is the ecliptic.

STRAIGHT FACE
The Sun follows the ecliptic because it likes a well lit route.

SESK.INFO #3273

ASTRONOMY & SPACE

What primarily causes Earth's seasons?

- **A** Earth's changing orbital speed
- **B** Earth's 23.5-degree axial tilt
- **C** Monthly changes in solar output

FLIP FOR THE ANSWER

B Earth's 23.5-degree axial tilt

WHY Earth's tilted axis changes solar angle and daylight duration through the year. Distance is not the main cause, and Earth is actually closest to the Sun during Northern Hemisphere winter.

STRAIGHT FACE
Earth has seasons because it approaches the year from a different angle.

SESK.INFO #3274

ASTRONOMY & SPACE

What causes the Moon's phases?

- **A** Earth's shadow covers it nightly
- **B** We see different parts of its sunlit half
- **C** The Moon produces varying light

FLIP FOR THE ANSWER

B We see different parts of its sunlit half

WHY The Sun always illuminates half of the Moon. As the Moon moves around Earth, we see different fractions of that illuminated hemisphere.

STRAIGHT FACE
The Moon changes phases, but it never loses its sunny half.

ASTRONOMY & SPACE

Why does a higher summer Sun warm the ground more effectively?

- **A** The Sun becomes hotter
- **B** Earth stops radiating heat
- **C** Light is concentrated over less area

FLIP FOR THE ANSWER

C Light is concentrated over less area

WHY A high Sun angle spreads the same incoming beam over a smaller surface area. Summer also provides more daylight time, so heating continues longer each day.

STRAIGHT FACE
Summer sunlight gets straight to the point.

1
AhaBulb POINT

1
AhaBulb POINT