

# The yearly motion of the sky

Astronomy 101  
Syracuse University, Fall 2021  
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# Announcements

- Paper 1 will be assigned Thursday
- The takehome labs will also be assigned next Thursday
- Please submit your homework to your TA's mailbox or to us at the end of class when you turn in your quiz.

# Announcements: Quiz 1

Your first quiz is today, during the last portion of class.

It will cover all material up to that point, including the things we do in class during the *first* portion of class and during Lab 1.

# Which is true about the Sun?

A: The celestial sphere model predicts its motion exactly

B: The celestial sphere model predicts its daily motion, but isn't accurate for longer times

C: The celestial sphere model is completely wrong for the Sun

Why is the celestial sphere model a bit wrong for the Sun?

A: The Sun is close enough that the Earth's movement matters, unlike for other stars

B: The Sun lies on a different celestial sphere than the stars, which turns at a different rate

C: Angels push the Sun around on the celestial sphere, so it moves

D: The Sun is close enough that we notice its movement, unlike the other stars

# A demonstration

Let's use *Stellarium* to revisit the same time every night – say, midnight.

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... What's wrong?

# A demonstration

Let's use *Stellarium* to revisit the same time every night – say, midnight.

... What's wrong?

... isn't the celestial sphere supposed to rotate once per day?

... Why are the stars moving?

... What's wrong?



# A demonstration

Now let's look at the sky during the *daytime*, pretending the atmosphere is gone.

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Now let's look at the sky during the *daytime*, pretending the atmosphere is gone.

Which moves more, the sun or the stars?

# A demonstration

Now let's look at the sky during the *daytime*, pretending the atmosphere is gone.

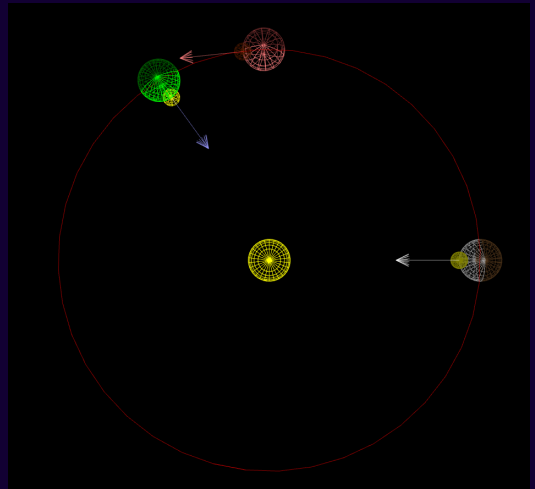
Which moves more, the sun or the stars?

- The Sun just moves up and down a little bit, and the stars spin!
- ... why is this?

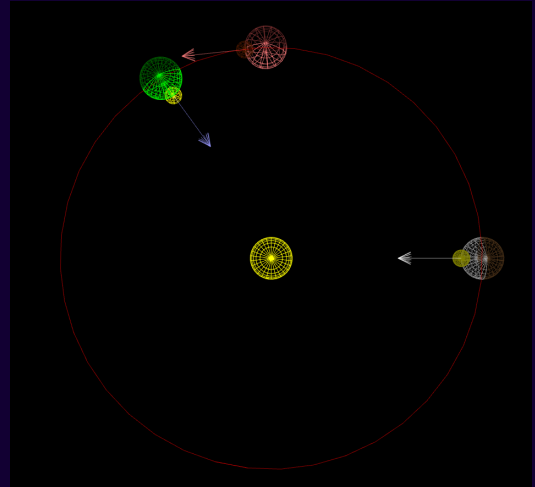
Let's try to understand this on paper.

If the Earth is in the white position here, and the observer is the yellow dot (with the arrow sticking out of their head), what time is it?

- A: Noon
- B: Midnight
- C: Sunrise
- D: Sunset



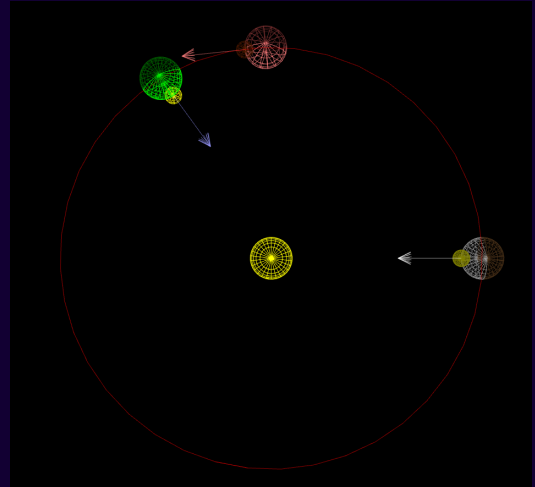
Which image shows the position of the Earth **exactly** one day later?



A: The red one

B: The green one

Which image shows the position of the Earth **exactly** one day later?

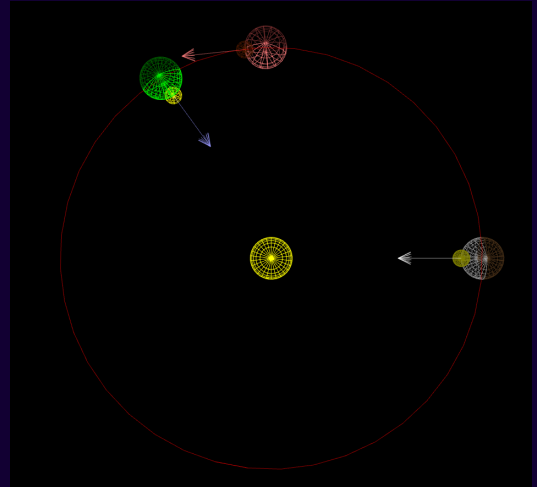


A: The red one

B: The green one

C: Depends on what you mean by “a day”

Which image shows the position of the Earth **exactly** one day later?



A: The red one

B: The green one

C: Depends on what you mean by “a day”

D: The Earth moves? BURN THE HERETIC!



There are *two kinds* of day!

- Solar day: judged by the position of the Sun
- Sidereal day (sih-dee-ree-al): judged only by the rotation of the Earth with respect to the stars

# Two kinds of day!

## Demo in *Stellarium*:

### In one solar day...

- The stars move a lot
- ...since the Earth isn't pointed in the same direction
- The Sun moves higher or lower in the sky a little bit
- Exactly 24h

### In one sidereal day...

- The stars don't move at all
- ... since the Earth is pointed in the same direction
- The Sun moves a lot, since the Earth has moved
- A little bit less than 24h