

# ASTRONOMY 101 QUIZ 1+2 FORM A

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

Lab section number: \_\_\_\_\_

(In the format "M0\*\*". See back page; if you get this wrong you may not get your quiz back!)

## Contents:

- Question 1: which form do you have?
- Questions 2-12: Quiz 2 (10 questions and one extra-credit question)
- Questions 13-22: Quiz 1 retake (10 questions)

## Instructions:

- Quiz time: 45 minutes
- Please put bags under your seats to allow proctors to move around the room.
- There is scratch paper, a blank seasons diagram, and two blank phase-of-moon diagrams for you on the back. You may tear these off.
- You may use notes that you handwrote yourself, or wrote with a stylus and printed, along with your exercises and globes. No electronic devices or things written by others are allowed, with the exception of a photocopy of a lab prepared by your group together if we ran out of printouts.
- If you have a question, raise your hand, and a proctor will assist you.
- Do not attempt to communicate with anyone other than teaching staff during the quiz.
- **Circle your answers on this paper as well as completing the Scantron. Turn both in to us at the end of class.**

Good luck!

## LAB SCHEDULE

<b>Section</b>	<b>Instructor</b>	<b>Time</b>
M024	Sierra Thomas	Monday 8:00 AM-9:20 AM
M003	Sierra Thomas	Monday 9:30 AM-10:50 AM
M004	Kishan Sankharva	Monday 11:00 AM-12:20 PM
M005	Kishan Sankharva	Monday 12:45 PM-2:05 PM
M006	Chad Skerbec	Monday 2:15 PM-3:35 PM
M007	Chad Skerbec	Monday 3:45 PM-5:05 PM
M008	Tyler Hain	Monday 5:15 PM-6:35 PM
M009	Tyler Hain	Monday 6:45 PM-8:05 PM
M010	Vidyesh Rao	Monday 8:15 PM-9:35 PM
M027	Tyler Hain	Tuesday 3:30 PM-4:50 PM
M028	Tyler Hain	Tuesday 5:00 PM-6:20 PM
M029	Vidyesh Rao	Tuesday 6:30 PM-7:50 PM
M030	Vidyesh Rao	Tuesday 8:00 PM-9:20 PM
M025	Sierra Thomas	Wednesday 8:00 AM-9:20 AM
M011	Sierra Thomas	Wednesday 9:30 AM-10:50 AM
M012	Chad Skerbec	Wednesday 11:00 AM-12:20 PM
M013	Chad Skerbec	Wednesday 12:45 PM-2:05 PM
M014	Byron Sleight	Wednesday 2:15 PM-3:35 PM
M015	Byron Sleight	Wednesday 3:45 PM-5:05 PM
M016	Byron Sleight	Wednesday 5:15 PM-6:35 PM
M017	Patrick Adams	Wednesday 6:45 PM-8:05 PM
M018	Patrick Adams	Wednesday 8:15 PM-9:35 PM
M019	Byron Sleight	Thursday 5:00 PM-6:20 PM
M020	Patrick Adams	Thursday 6:30 PM-7:50 PM
M031	Vincent Musso	Thursday 8:00 PM-9:20 PM
M026	Vidyesh Rao	Friday 8:00 AM-9:20 AM
M021	Kishan Sankharva	Friday 9:30 AM-10:50 AM
M022	Vincent Musso	Friday 11:00 AM-12:20 PM
M023	Vincent Musso	Friday 12:45 PM-2:05 PM

1. What form is your exam? (Your exam is form A.)

- (A) Form A
- (B) Form B
- (C) Form C
- (D) Form D
- (E) Form E

2. You are observing one November night in Syracuse and see the star Kochab low on the northern horizon, directly below Polaris, at midnight.

Six months later, you plan to observe Kochab again exactly at midnight. Where will it be located?

*Hint: This problem is difficult and is extra credit. Think about how many days are in six months, and what kind of days you should be thinking about.*

- (A) At the same elevation as Polaris, to the West
- (B) Directly below Polaris, in the same position it was before
- (C) You won't be able to see Kochab six months from now
- (D) Directly above Polaris
- (E) At the same elevation as Polaris, to the East

3. On June 1, you note that the constellation Scorpius is directly overhead, exactly at midnight.

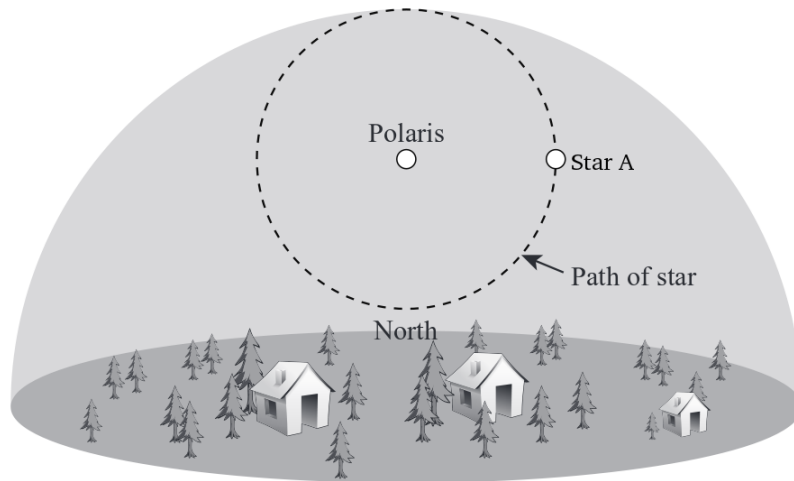
Which will be true about Scorpius six months later, on December 1?

- (A) It will again be highest in the sky at midnight
- (B) It will be highest in the sky at 6 AM
- (C) It will be located behind the Sun, and will thus be highest in the sky at solar noon
- (D) It will be highest in the sky at 1 AM
- (E) It will never come above the horizon in December

4. You look at the night sky and see a sky full of stars, rotating around the zenith (the point directly above your head). They appear to be rotating clockwise.

Where on Earth might you be standing?

- (A) In Rovaniemi, Finland, at  $66^\circ$  N latitude (on the Arctic Circle)
  - (B) The South Pole
  - (C) On the Larsen Ice Shelf, in Antarctica, at  $66^\circ$  S latitude (on the Antarctic Circle)
  - (D) The North Pole
  - (E) The Equator
5. You look north and see the following in front of you:



In what direction is Star A *moving* at this time?

- (A) East
- (B) Upward
- (C) Downward
- (D) South
- (E) North

6. You can see the star Procyon very low on the eastern horizon tonight in Syracuse at 3:00 AM.

Tomorrow night at 3:00 AM, where will Procyon be located?

- (A) Slightly lower in the sky and slightly to the South
- (B) Slightly lower in the sky
- (C) Slightly higher in the sky
- (D) At the exact same place
- (E) Slightly higher in the sky and slightly to the South

7. Suppose that one day the direction of Earth's rotation around its axis was reversed, so that instead of rotating counterclockwise as seen from above the North Pole, it instead rotated clockwise as seen from above the North Pole.

The direction that it revolves around the Sun doesn't change.

Which of the following would still be true?

- (A) The solar day would continue to be four minutes longer than the sidereal day
- (B) The Sun would still proceed through the constellations in the Zodiac in the same order as it does now (that is, the Sun would first be lined up with Sagittarius, then Capricorn, then Aquarius, etc.)
- (C) The stars would continue to rotate counterclockwise around Polaris as seen from Syracuse
- (D) The stars would continue to rise in the East and set in the West, as they do now
- (E) Either none of the above are true, or more than one is

8. As seen from Syracuse (latitude  $43^\circ$  N), where is the South Celestial Pole?

- (A) 43 degrees above the southern horizon
- (B) We don't have a South Celestial Pole, only a North one
- (C) Right on the southern horizon
- (D) Straight downward, beneath our feet
- (E) Below the southern horizon

9. The celestial sphere model most accurately describes:

- (A) The changes in the sky over one day
- (B) The changes in the sky over one year
- (C) The changes in the sky over many thousands of years
- (D) The changes in the sky over one month
- (E) The celestial sphere model doesn't describe the motion of anything very well, since it is founded on the incorrect idea that the Earth is at the center of the Universe.

10. Suppose that you are standing on the North Pole in December at 3:00 AM. You see the star Betelgeuse low in the sky, slightly above the horizon, directly in front of you.

Where could you look to see Betelgeuse six hours from now?

- (A) Betelgeuse will be directly overhead
- (B) You can't see Betelgeuse, since the Sun will be above the horizon at this time
- (C) Betelgeuse will be high in your northeastern sky
- (D) You can't see Betelgeuse, since it will be below the horizon at this time
- (E) Betelgeuse will be low in the sky, slightly above the horizon to your right

11. Suppose you spend an entire night watching the eastern horizon in Syracuse, observing the paths of the stars.

What will you see?

- (A) Stars will appear over the horizon, then move upward and to your right.
- (B) Stars will appear over the horizon, then move upward and to your left.
- (C) Stars will appear over the horizon, then move straight upward.
- (D) Stars will appear to move from left to right, but not get higher or lower
- (E) Stars will appear to move from right to left, but not get higher or lower

12. Imagine that you could see the Sun and the stars at the same time.

On September 28, 2021, you observe that the constellation Virgo lies behind the Sun. On which *other* days would the constellation Virgo also lie behind the Sun?

- 1. September 29, 2021 (one day later)
- 2. October 28, 2021 (one month later)
- 3. September 28, 2022 (one year later)

- (A) 1 and 3
- (B) 2 and 3
- (C) 2 only
- (D) 3 only
- (E) 1 only

13. In one scene in *The Lord of the Rings*, Frodo, Sam, and Sméagol are trying to sneak into Mordor. They are afraid of being seen, and so don't want to travel when either the Sun or the Moon is visible in the sky, since sunlight or moonlight would help someone see them.

Suppose that the phase of the Moon is waxing gibbous, and that the moon phases in this world work the same way that ours do. What time of day is it safe for our hobbit heroes to travel?

- (A) For a few hours after sunset
- (B) For a few hours before sunrise
- (C) All night, except for a few hours after sunset
- (D) Around midnight
- (E) All night, except for a few hours before sunrise

14. What phase of the Moon would be visible low on the western sky just after sunset?

- (A) A crescent
- (B) A full moon
- (C) A new moon
- (D) A half moon
- (E) A gibbous moon

15. It is noon in late June in Svalbard, Norway (latitude  $78^\circ$  N). About what time will the sun set?
- (A) A few months from now
  - (B) Around 11:00 PM (23:00)
  - (C) Around 6:00 PM (18:00)
  - (D) Around 3PM (15:00)
  - (E) The Sun isn't visible at noon in late June in Svalbard



16. This photograph, of a crescent Earth rising above the Moon's horizon, was taken by *Apollo 17* astronauts from the surface of the Moon.



What was the phase of the Moon, as seen from Earth, when this photo was taken?

*Hint: Use the space below to draw a diagram of the Earth, direction of the Sun, and Moon, and then shade in things that are visible/invisible and light/dark as you did in lab.*

- (A) New
- (B) Crescent
- (C) Full
- (D) Half
- (E) Gibbous

17. What fraction of the entire surface of the Moon is lit by the Sun during a full moon?
- (A) It depends on the latitude of the observer
  - (B) Half of it
  - (C) It depends on the time of day
  - (D) None of it
  - (E) All of it
18. Why do different moon phases rise and set at different times of day?
- (A) Because each moon phase corresponds to a different location in the Moon's orbit around the Earth relative to the direction to the Sun
  - (B) Because times of day are different in different places on Earth, and people in different places see different moon phases as the Moon travels around the Earth
  - (C) Because the position of the Sun determines which part of the Moon is in Earth's shadow, and the position of the Sun determines the time of day
  - (D) Because the rise and set times are the same from one sidereal day to another, but we tell time in solar days
  - (E) None of the above are good explanations
19. Which of the following locations on Earth experiences the shortest days on the December solstice?
- (A) Chongqing, China (latitude  $30^\circ$  N)
  - (B) Helsinki, Finland (latitude  $60^\circ$  N)
  - (C) Cape Town, South Africa (latitude  $33^\circ$  S)
  - (D) McMurdo Station, Antarctica (latitude  $78^\circ$  S)
  - (E) All of these places would have days that are the same length on the December solstice.
20. Where and when could we see the Sun at the zenith?
- (A) In Havana, Cuba (latitude  $23^\circ$  N), in late September
  - (B) In Syracuse (latitude  $43^\circ$  N), in late June
  - (C) At the North Pole (latitude  $90^\circ$  N), in late June
  - (D) In Quito, Ecuador (very near the Equator), in late December
  - (E) In São Paulo, Brazil (latitude  $23.5^\circ$  S), in late December

21. You observe that the full moon is located in front of the constellation Capricornus.

How long will it be before the Sun is located in front of the constellation Capricornus?

- (A) Twelve hours from now
- (B) As soon as the Sun rises
- (C) Six months from now
- (D) One sidereal day from now
- (E) Six hours from now

22. Suppose that the planet Twilo is different from Earth in two ways:

- (a) Twilo is in a more stretched-out elliptical orbit around its star, so that it is much closer to its star during part of the year than in the other part of the year
- (b) Twilo's axis of rotation is not tilted relative to its orbit.

Thus, the changing seasons in Twilo are caused by *differences in the distance to its star*, rather than axial tilt like on Earth.

Which things would be true on Twilo in the same way that they are on Earth?

- (A) Twileans who lived near its equator wouldn't experience seasons, while those living near its poles would experience very strong seasons
- (B) During the summer, Twileans would experience more hours of daylight than they would in the winter
- (C) Twileans who lived near its poles would never see the sun rise during the winter, and would never see it set during the summer
- (D) Twilo's northern hemisphere would experience winter at the same time that its southern hemisphere would experience summer
- (E) None of the above are true

