AY1 Homework for Quiz 1: Spring 2017

1. **If the Earth's spin axis was not tilted with respect to the Earth's orbital plane (around the Sun), which of the following would be true, which false?**

__T__ The number of daylight hours in a day would not change through the year.

__F__ The length of a day would increase from 24 hours to 365 days

__F__ The change of seasons would become more pronounced in the Northern Hemisphere.

__F__ There would be no change in the pattern of the seasons compared to the real situation

2. **What time does the new moon rise? Draw a picture to demonstrate your answer.**

New moon rises at dawn

3. **Given that speed of light, c=300,000 km/sec, how many miles are there in a "light minute"?**

$$300{,}000\frac{km}{sec}\times\frac{60\ sec}{min}\times\frac{0.62\ mile}{km}=11{,}160{,}000\ \text{miles in a minute}$$

4. **Suppose you lived on the Moon where there is essentially no atmosphere. Label the following statements as True (T) or False (F)**

__F__ The Sun would appear redder compared to as seen from Earth during the day

__T__ The color of the sky (looking away from the Sun during the day) would be black

__F__ At sunset on the moon, the Sun would appear redder than it does at noon

__F__ The "green flash" would be a "red flash"

5. **Use scientific notation to express the following numbers.**

   A. 1000 = 10^3
   B. 0.02 = 2×10^{-2}
   C. 1/2 = 0.5
   D. 300,000 = 3×10^5

6. **Humans have been present for approximately what fraction of the Earth's history?**

   A. 90%
   B. 50%
   C. 1%
   D. a tiny fraction much less than 0.0001% ☑

7. **What are the primary advantages of using telescopes (name three)?**

1. gather more light per unit time than the unaided eye
2. increase magnification compared to the unaided eye
3. integrate for longer than the eye
4. finer diffraction limit than the unaided eye

8. **Day and night on Earth are due to:**

   A. The spin of the Earth on its axis ☑
   B. The tilt of the Earth's spin axis with respect to its orbital plane around the Sun
   C. The Proclamation of 1497
   D. The motion of the Sun through space

9. **Why isn't there a lunar eclipse every month when the full moon passes through the Earth's shadow?**
   The orbital plane of the moon around the Earth is tilted 5° compared to the orbital plane of the Earth around the Sun.

10. What do radio waves and visible light electromagnetic radiation have in common and in what properties do they differ?

In common: electromagnetic radiation, travel at speed of light in vacuum
Differences: wavelength, frequency

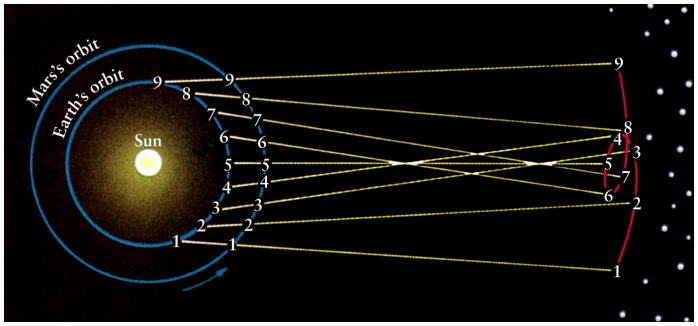
11. What color is a yellow banana slug illuminated with blue light?

A. Yellow
B. Green
C. Blue
D. Black

12. Consider a 1-meter-radius copper sphere heated to 100C and a 1-meter-radius clay sphere painted black heated to 100C. Label the following true (T) or false(F):

A. The copper sphere will produce radiation at shorter wavelengths (higher energies) False
B. The copper sphere will produce more total electromagnetic radiation False
C. The two spheres will produce an electromagnetic spectrum that is identical True
D. The copper sphere will produce a distinctive emission-line spectrum False

13. Make a diagram that demonstrates "retrograde motion" of Mars as seen from Earth.



14. Which of the following are found in the Solar System?

_x__ asteroids

_x__ gas-giant planets

_x__ comets

_x__ planets

15. The emission-line spectrum of each element shows a unique pattern of wavelengths. Which of the following statements best states the underlying physical reason for that?

___ Each element has a unique atomic weight

_x__ Each element has a unique set of electron "allowed" orbital levels

___ Each element travels at a different speed in a gas of a given temperature

___ Each element has a different number of neutrons in its nucleus

16. A hot gas emits what kind of spectrum?

___ Absorption-line spectrum

_x__ Emission-line spectrum

___ Continuum

___ All of the above

17. Why is there almost no atomic hydrogen or helium in the atmospheres of the inner four planets in the Solar System?

At the temperature of the atmospheres, the velocity of hydrogen and helium exceeds escape velocity for those planets

18. Why is the surface of Venus hotter than the surface of Mercury even though Mercury is much closer to the Sun?

The Greenhouse effect