

QUIZ 1 - AY4 Spring 2008YOUR NAME: _____

Possibly useful formulae:

$$c = 186,000 \text{ miles/second} = 3 \times 10^8 \text{ meters/second.}$$

$$\lambda \times f = v$$

$$E = h \times f$$

$$h = 6.63 \times 10^{-34} \text{ meters}^2 \text{kg/second}$$

1. KZSC broadcasts at 88.1 MHz (88.1×10^6 Hz). What is the wavelength that KZSC is broadcasting at? Show your work.

[1pt]

$$\lambda = \frac{c}{f} = \frac{3 \times 10^8 \text{ m/s}}{88.1 \times 10^6 \text{ Hz}} = \frac{3 \times 10^8}{88.1 \times 10^6} \text{ m} = \boxed{3.4 \text{ m}}$$

($\lambda \times f = v$
w/v = c =
speed of
light)

[2pts]

[3pts]

2. What color would a yellow banana slug appear if illuminated with white light?

Yellow

Since white light contains ^{light} ~~colors~~ of all wavelengths, and a yellow object reflects only at the yellow wavelength (absorbing light at other wavelengths), the yellow slug will appear yellow.

[1pt for a guess
3pts for correct answer]

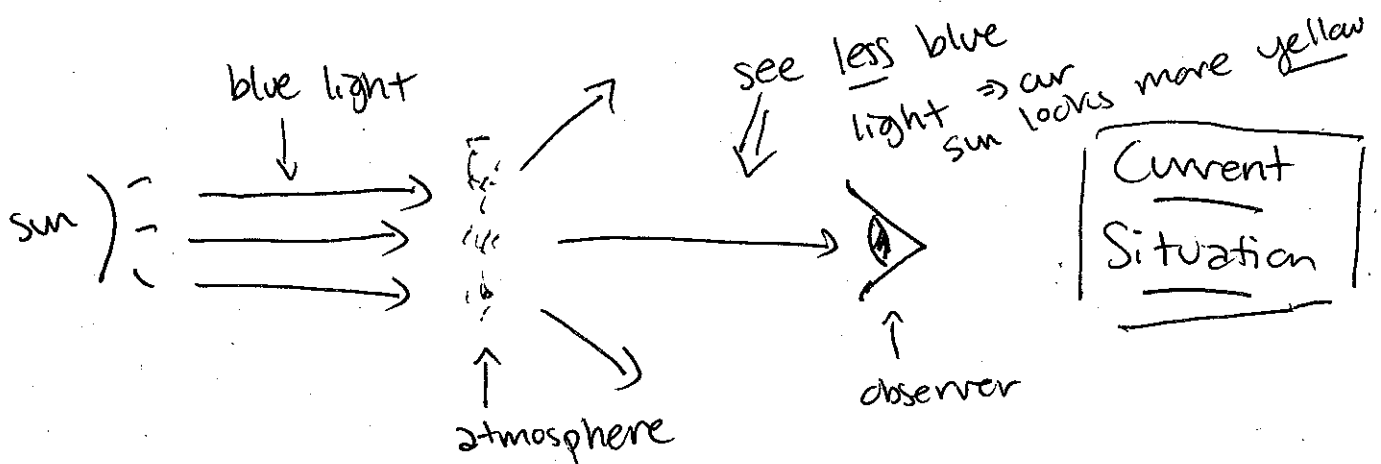
3. Suppose the particles in the Earth's atmosphere scattered red light effectively, but not blue light. Which of the following would be true, which false?

- 1 F The daylight sky looking away from the Sun would be black
- 2 T The Sun would appear bluer than it does with our current atmosphere
- ~~The greenhouse effect would no longer act to heat up your car when it was parked in the sun with the windows rolled up~~
- 3 F At sunset the Sun's apparent color would be no different than the noontime Sun

[1pt for each correct]

(i) Since the current sky is not black looking away from the sun due to the presence of the atmosphere and the fact that it scatters light @ a specific wavelength, changing the wavelength at which the atmosphere scatters light will not change the fact that the sky does not look black away from the sun

(ii) The sun appears more yellow than it actually is due to the fact that our current atmosphere scatters the direct sun-rays more in the blue:

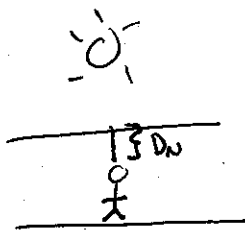


3(cont.)

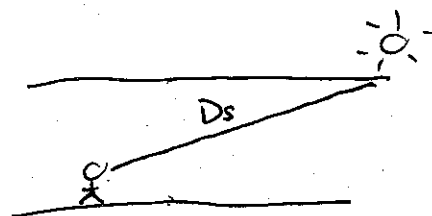
If the atmosphere instead scatters more red light $\Rightarrow$ more red light is removed from the direct sun-rays so the sun appears blue

(iii) Like in (i), it is the very presence of an atmosphere that scatters light @ any preferred wavelength that changes the sun's appearance at sun set vs. noon.

This has to do with the fact that one is looking through more atmosphere @ sunset vs. noon time:



VS.



$$D_n < D_s$$

$\Rightarrow$ less atmospheric effects at noon than sunset

4. The speed of light is $c = 186,000$ miles/second. Calculate the speed of light in units of miles/hour.

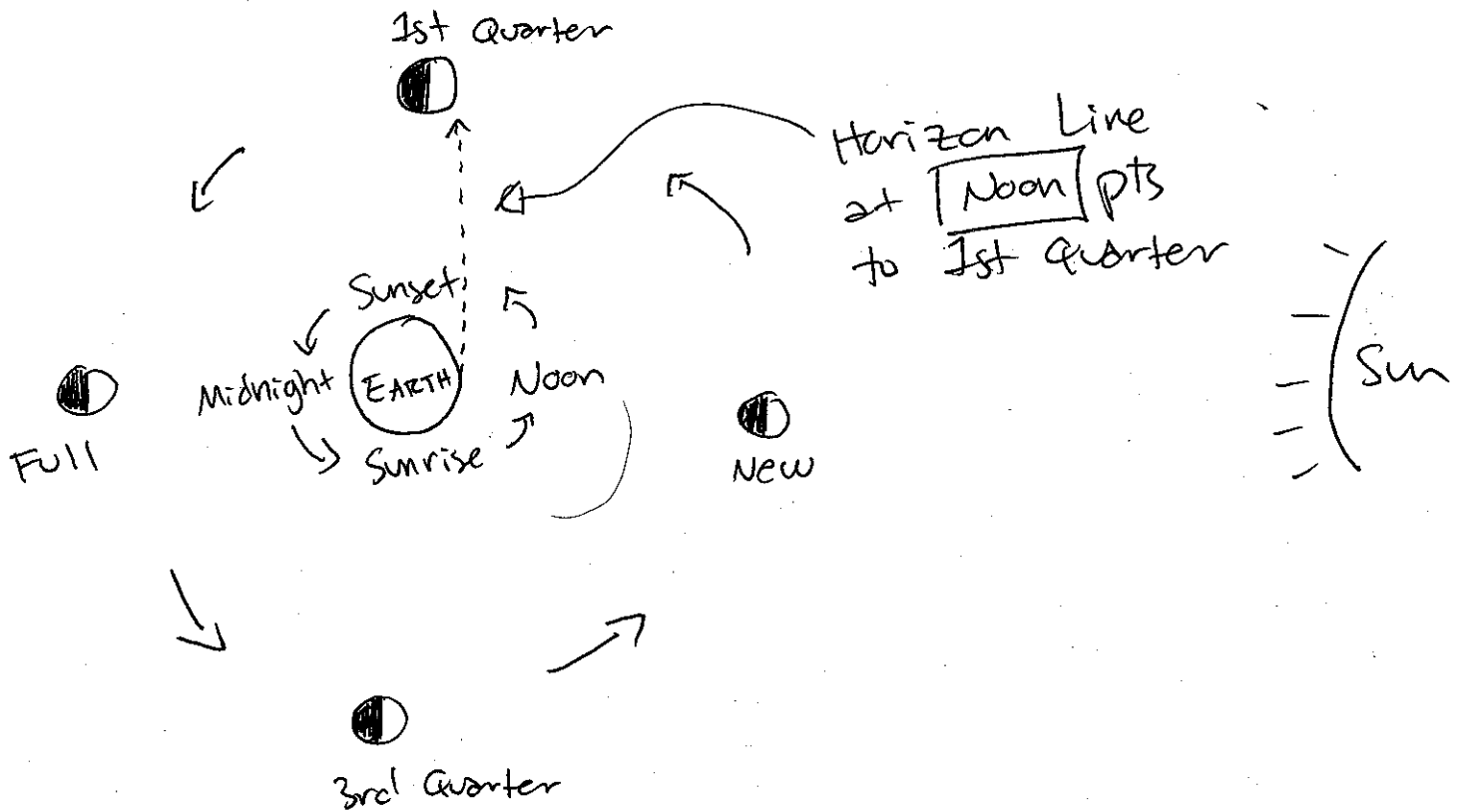
$$c \text{ in } \frac{\text{miles}}{\text{hr}} = \frac{186,000 \text{ miles}}{\text{sec}} \cdot \frac{60 \text{ sec}}{1 \text{ min}} \cdot \frac{60 \text{ min}}{1 \text{ hr}} = 6.7 \times 10^8 \frac{\text{miles}}{\text{hr}}$$

[2 pts]

[3 pts]

[1 pt] for an attempt

5. What time does the first quarter moon rise? Draw a picture of the relative positions of the Moon, Sun and Earth that demonstrates your answer.

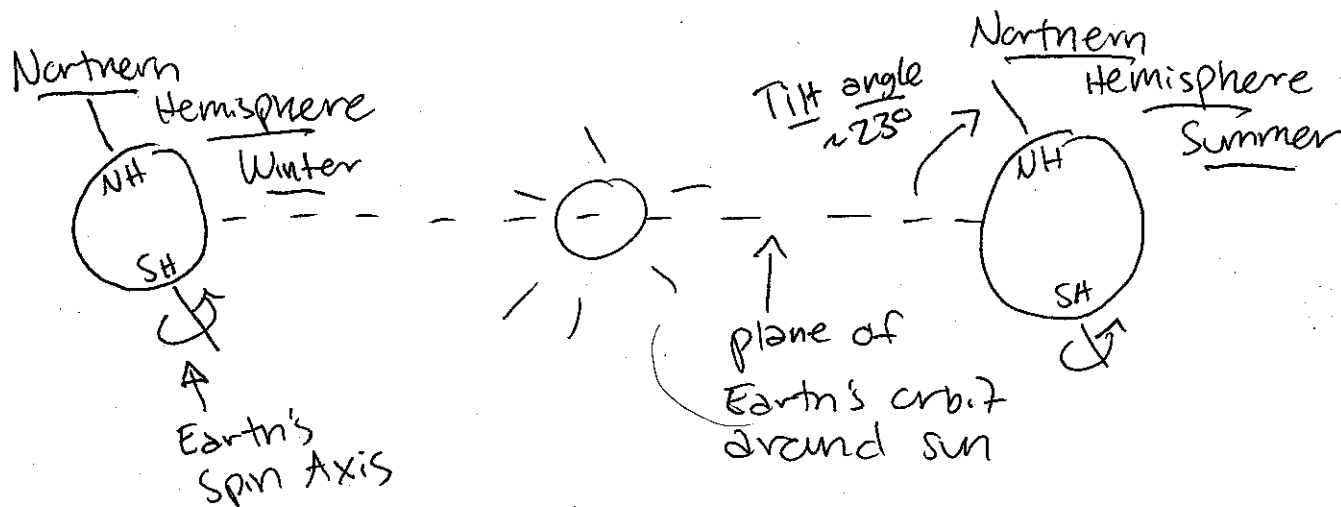


1pt for attempt
 2pts for picture
 3pts for picture w/horizon
 line
 5pts correct

6. In complete sentences, explain why we experience seasons. Draw a picture to support your answer.

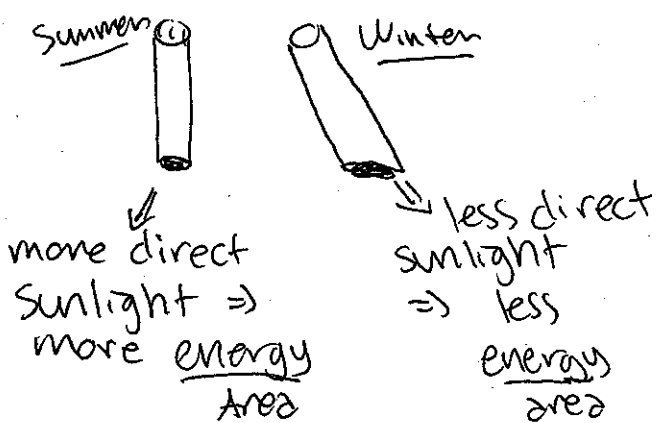
✱ less direct sunlight
✱ shorter days

✱ more direct sunlight
✱ longer days



We have seasons ~~due~~ because of the tilt of the Earth's spin axis with respect to its orbital plane around the Sun.

When the tilt axis is tilted away from the Sun (N.H. facing away) the N.H. experiences winter due to a decrease in the effective energy per area deposited on Earth's surface from the Sun, and visa versa for the N.H. winter.



1pt for attempt
2pts for mentioning "tilt of Earth's axis"
3pts for mention of "less direct, more direct sunlight", "colder/warmer" or "different # of daylight hours"