

SAMPLE TEST 1 QUESTIONS

Physics 2022

1. In a radio wave transmitter, when the frequency of the signal is decreased
 - a. the wavelength is decreased
 - b. the wavelength remains constant
 - c. the amplitude increases
 - d. the speed of transmission of the waves is increased
 - e. the wavelength is increased

2. One micron is
 - a. 10^{+6} m
 - b. 10^{-6} m
 - c. 10 \AA
 - d. 10^{-10} m
 - e. 10^{-9} m

3. A typical refracting telescope is made up of
 - a. A short-focal-length lens at the front and a long-focal-length lens at the rear (next to your eye as you look through the telescope)
 - b. A long-focal-length lens at the front and a short-focal-length lens at the rear (next to your eye as you look through the telescope)
 - c. A mirror that gathers and focuses the light, and a lens next to your eye to examine the image
 - d. Two mirrors, one concave and the other convex
 - e. Two mirror, one concave and one flat

4. Light with a wavelength of 100 nm is in which part of the spectrum:
 - a. X-ray
 - b. UV
 - c. Visible
 - d. IR
 - e. Radio

5. An astronomer photographs the spectrum of an object and finds a spectral line at 501 nm wavelength. In the laboratory, this spectral line occurs at 500 nm. According to the Doppler effect, this object
 - a. has no motion
 - b. is moving away from the Earth at $501/500$ the speed of light
 - c. is moving away from the Earth at $1/500$ the speed of light
 - d. is moving toward the Earth at $501/500$ the speed of light
 - e. is moving toward the Earth at $1/500$ the speed of light

6. Calculate the magnification for this telescope:
- | | | |
|-----------------|-------------------|------------------------|
| Objective lens: | diameter 1 meter; | focal length 4 meters. |
| Eyepiece: | diameter 5 cm; | focal length 25 mm. |
- a. 100 X
b. 20 X
c. 10 X
d. 160 X
e. 40 X
7. Calculate the resolution of the Hubble Space Telescope ($D = 2.4$ m) at 500 nm.
- a. 0.001 arcseconds
b. 2.2 arcseconds
c. 0.1 arcseconds
d. 0.05 arcseconds
e. 0.02 arcseconds
8. Using Wien's law, what is the approximate peak wavelength of radiation emitted by Mars, which has an average surface temperature of about 220 K?
- a. 94 μm
b. 31 μm
c. 3.1 μm
d. 13.2 μm
e. 9.4 μm
9. The thickness of the photosphere is
- a. varies from 50,000 to almost 100,000 km
b. 300-400 km
c. several times 10,000 km
d. 3,000-4,000 km
e. only about 1 km
10. An arching column of gas suspended over a sunspot group is called a
- a. plage
b. spicule
c. prominence
d. flare
e. coronal hole

ANSWERS

1. e speed = wavelength times frequency
2. b [know your unit conversions!]
3. b refracting telescope has a long-focal-length lens in front
4. b $100 \text{ nm} < 400 \text{ nm}$, which is violet light
5. c $(501 - 500) / 500 = 1 / 500 = v / c$
6. d $M = F / f = 4000 \text{ mm} / 25 \text{ mm}$
7. d angle (in arcsec) = 2.5×10^5 wavelength / diameter
8. d wavelength (in meters) = $0.0029 / T$
9. b [know the layers of the Sun]
10. c [know the phenomena on the Sun]