

**חיזון המדע הירושלמי תשס"ח - 2008-2009 Jerusalem Science Contest**  
**Electromagnetic and Ionizing radiation**  
**Exam 2 — Chapter 27; Color**

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

Date: \_\_\_\_\_

Raw Score: \_\_\_\_\_

Percentage Score: \_\_\_\_\_ %

Proctor for this Examinaton: \_\_\_\_\_

Form: \_\_\_\_\_

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) Why does the sky appear to have a blue color during the day?
  - A) Electronically excited nitrogen molecules emit blue light as they fall to the ground state
  - B) Violet light is scattered the most, followed by blue, to which the human eye is most sensitive.
  - C) Paramagnetic oxygen molecules absorb strongly in the red, causing the blue color.
  - D) All of the preceding contribute to the blue color of the sky.
  - E) None of the preceding cause the blue color of the sky.
  
- 2) A combination of low and mid frequency visible light will stimulate cone receptors to produce which of the following colors?
  - A) blue
  - B) red
  - C) yellow
  - D) green
  - E) violet
  
- 3) The bluish-green (cyan) color of large bodies of water is due to
  - A) scattering of light by water molecules
  - B) selective absorption of red light by water molecules
  - C) dissolved pigments from decaying algae
  - D) reflection of the color of the sky
  - E) none of the preceding
  
- 4) A person's eyes appear brown because of light
  - A) scattering
  - B) absorption
  - C) emission
  - D) diffraction
  - E) refraction
  
- 5) When blue and yellow pigments as in paint are mixed the resulting color is
  - A) red
  - B) orange
  - C) black
  - D) brown
  - E) green
  
- 6) Sunlight warms water because of the absorption of what kind of photons?
  - A) red
  - B) infrared
  - C) ultraviolet
  - D) blue
  - E) violet
  
- 7) Blue eye color is caused by light
  - A) emission
  - B) refraction
  - C) diffraction
  - D) scattering
  - E) absorption

- 8) The color of an object
- A) is an inherent property of that object
  - B) none of the preceding
  - C) is always the complement of the color it absorbs
  - D) depends on the wavelength of light that is used to illuminate the object
  - E) is determined solely by its chemical composition
- 9) A golf ball is simultaneously illuminated by three lights. A blue light is to the left, a red light is to the right and a green light is in front of the ball. What color shadow does the green light cast?
- A) black
  - B) red
  - C) cyan
  - D) yellow
  - E) magenta
- 10) In the video lecture, Dr . Friedman illuminated a red ruler with white, red and green light. It appeared red when red or white light was used to illuminate it. What color was it when it was illuminated with green light?
- A) yellow
  - B) white
  - C) black
  - D) red
  - E) none of the preceding
- 11) What is the energy of the photon in question 4 ? ( $h = 6.626 \times 10^{-34}$  joule seconds)
- A)  $1.26 \times 10^{-26}$  joule
  - B)  $6.63 \times 10^{-16}$  joule
  - C)  $4.21 \times 10^{-9}$  joule
  - D)  $3.75 \times 10^{-17}$  joule
  - E)  $2.50 \times 10^{-18}$  joule
- 12) Which of the following determines what colors we see?
- A) polarization
  - B) frequency
  - C) phase
  - D) photon velocity
  - E) none of the preceding
- 13) The combination of magenta and green light produces light of what color?
- A) yellow
  - B) blue
  - C) none of the preceding
  - D) green
  - E) red
- 14) Sunsets appear red because
- A) ozone in the atmosphere selectively absorbs all higher energy photons.
  - B) after blue wavelengths are scattered, the longer red wavelengths of sunlight are transmitted.
  - C) yellow photons produced in the sun's photosphere lose energy during the trip to earth and are converted to red photons.
  - D) smog particles in the atmosphere reflect red light.
  - E) none of the preceding

- 15) A photon of green light has a wavelength of 530 nm ( $5.30 \times 10^{-9}$  m). What is the frequency of this photon? ( $c = 3.00 \times 10^8$  m/s)?
- A)  $1.90 \times 10^8$  Hz
  - B) 1.59 Hz
  - C)  $5.66 \times 10^{16}$  Hz
  - D)  $1.77 \times 10^{-17}$  Hz
  - E)  $1.77 \times 10^{17}$  Hz
- 16) When white light passes through overlapping magenta, cyan and yellow filters, the resulting color is
- A) red
  - B) white
  - C) blue
  - D) black
  - E) green
- 17) If the resonant frequency of the electrons in atoms or molecules is the same frequency as an illuminating light source the light will be
- A) refracted
  - B) reflected
  - C) absorbed
  - D) diffracted
  - E) none of the preceding
- 18) An object's "true" color is best viewed in
- A) blue light
  - B) white light
  - C) yellow light
  - D) sunlight
  - E) green light
- 19) What color light must be subtracted from white light to produce magenta?
- A) green
  - B) yellow
  - C) cyan
  - D) blue
  - E) red
- 20) Clouds appear white in color because
- A) different size water droplets in cloud scatter all frequencies of light, which combine to appear white
  - B) white light is reflected from dust particles in clouds with little or no absorbance
  - C) of carbon dioxide emissions that reflect white light
  - D) water molecules scatter red light less than blue light
  - E) none of the preceding
- 21) Which of the following constitute the additive primary colors?
- A) red + blue + yellow
  - B) red + blue
  - C) red + blue + green
  - D) cyan + magenta
  - E) cyan + magenta + yellow
- 22) What are the subtractive primary colors?
- A) magenta, yellow and blue
  - B) red, green and blue
  - C) cyan, magenta and blue
  - D) magenta, cyan and green
  - E) none of the preceding

- 23) Only four colors are used to produce colored illustrations and photographs. They are
- A) red, yellow, blue and black
  - B) cyan, red, blue and black
  - C) red, green, blue and black
  - D) cyan, magenta, yellow and black
  - E) none of the preceding
- 24) When light is indirectly reflected off of particles that are much smaller than the wavelength of the incident light, what occurs?
- A) Rayleigh scattering
  - B) Black body radiation
  - C) Raman absorption
  - D) Mössbauer scattering
  - E) none of the preceding
- 25) In the absence of an atmosphere, our planet's sky would be
- A) violet
  - B) black
  - C) white
  - D) yellow
  - E) red