2011-2012

Camas Division B Invitational

Optics

KEY

Physical Optics

1. Cyan, Magenta, Yellow, Black
2. Vitreous Humor
3. Decrease
4. A. Galaxy B
   B. Galaxy A
5. Black
6. Spectrum of frequencies of electromagnetic radiation emitted by the element's atoms or the compound's molecules when they are returned to a lower energy state.
7. 299,792,458
8. Cornea
9. The grains are small but much larger than the wavelengths involved, so light enters each transparent particle, is reflected and refracted several times, and emerges. There is no distinciton among any of the frequency components, so the reflected light reaching the observer is white.
10. 3.1225×10^7 Hz
11. 0
12. Lens
13. Pink
14. Cone
15. a. 856.5 THz ; Ultraviolet (UVa)
    b. Fluorescence.
16. Yes. It is moving away from you. (The speed can be found using the Pythagorean theorem)
17. Green (or Yellow)
18. Radio, Microwave, Infrared, Visible, UV, X-Ray, Gamma
19. Absorption spectrum
20. Lens
21. White

Geometric Optics

MULTIPLE CHOICE

1. ANS: D DIF: I OBJ: 14-2.1
2. ANS: D DIF: I OBJ: 14-2.2
3. ANS: A DIF: I OBJ: 14-2.2
4. ANS: D DIF: II OBJ: 14-2.2
5. ANS: C DIF: I OBJ: 14-2.3
6. ANS: C DIF: I OBJ: 14-2.3
7. ANS: D DIF: I OBJ: 14-3.3
8. ANS: D DIF: IIIB OBJ: 14-3.3
9. ANS: A DIF: I OBJ: 14-3.4
10. ANS: B DIF: I OBJ: 15-1.1
11. ANS: B DIF: II OBJ: 15-1.1
12. ANS: C DIF: I OBJ: 15-1.1
13. ANS: C DIF: I OBJ: 15-1.1
14. ANS: D DIF: I OBJ: 15-1.2
15. ANS: A DIF: II OBJ: 15-1.2
16. ANS: A DIF: I OBJ: 15-3.1
17. ANS: B DIF: IIIB OBJ: 15-3.2
18. ANS: C DIF: I OBJ: 15-3.2

SHORT ANSWER

19. ANS:
diffuse

DIF: I OBJ: 14-2.1

20. ANS:
specular

DIF: I OBJ: 14-2.1

21. ANS:
spherical aberration

DIF: I OBJ: 14-3.4

22. ANS:
parabolic; small

DIF: I OBJ: 14-3.4

23. ANS:
principal axis

DIF: I OBJ: 14-3.4

24. ANS:
Refraction occurs when light's velocity changes.

DIF: I OBJ: 15-1.1

25. ANS:
In order to be seen, the object under a microscope must be at least as large as a wavelength of light. An atom is several times smaller than a wavelength of visible light.

DIF: II OBJ: 15-2.4

26. ANS:
It is inverted on the objective lens, and the eyepiece magnifies this inverted object.

DIF: I OBJ: 15-2.4

27. ANS:
The light will undergo total internal reflection.

DIF: IIIB OBJ: 15-3.1

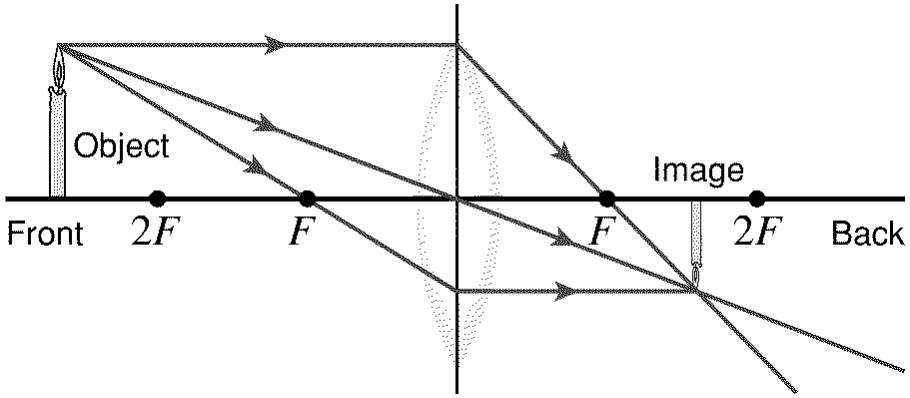
28. ANS:
Light rays from the blue sky above are refracted by the warm air next to the dark, hot road and end up traveling upward into the motorists' eyes.

DIF: I OBJ: 15-3.2

29. ANS:
Dispersion is the process of separating polychromatic light into its component wavelengths because *n* is a function of wavelength for all material mediums. Snell's law says that the angles of refraction will be different for different wavelengths even if the angles of incidence are the same.

DIF: I OBJ: 15-3.2

30. ANS:
A real image will be produced between *F* and 2*F*.



DIF: II OBJ: 15-2.1

PROBLEM

31. ANS:
12 cm directly behind the mirror

DIF: I OBJ: 14-2.3

32. ANS:
–34 cm

DIF: IIIB OBJ: 14-3.1

33. ANS:
13□

DIF: IIIA OBJ: 15-1.3

34. ANS:
0.57 m

DIF: IIIB OBJ: 15-2.2

35. ANS:
The light will be refracted.

DIF: IIIB OBJ: 15-3.1