1. Orange light has a frequency of $5.0 \times 10^{14}$ hertz in a vacuum. What is the wavelength of this light?
   (A) $1.5 \times 10^{23}$ m
   (B) $1.7 \times 10^6$ m
   (C) $6.0 \times 10^{-7}$ m
   (D) $2.0 \times 10^{-15}$ m

2. What is the frequency of a light wave with a wavelength of $6.0 \times 10^{-7}$ meter traveling through space?
   (A) $2.0 \times 10^{-15}$ Hz
   (B) $5.0 \times 10^1$ Hz
   (C) $1.8 \times 10^{14}$ Hz
   (D) $5.0 \times 10^{14}$ Hz

3. What is the wavelength of x rays with a frequency $1.5 \times 10^{18}$ hertz traveling in a vacuum?
   (A) $4.5 \times 10^{26}$ m
   (B) $2.0 \times 10^{-10}$ m
   (C) $5.0 \times 10^{-10}$ m
   (D) $5.0 \times 10^9$ m

4. The time required for light to travel a distance of $1.5 \times 10^{11}$ meters is closest to
   (A) $5.0 \times 10^2$ s
   (B) $2.0 \times 10^{-3}$ s
   (C) $3.00 \times 10^{10}$ s
   (D) $3.33 \times 10^{-7}$ s

5. The distance from the Moon to Earth is $3.9 \times 10^8$ meters. What is the time required for a light ray to travel from the Moon to Earth?
   (A) 0.65 s
   (B) 1.3 s
   (C) 2.6 s
   (D) 3.9 s

6. A typical microwave oven produces radiation at a frequency of $1.0 \times 10^{10}$ hertz. What is the wavelength of this microwave radiation?
   (A) $3.0 \times 10^1$ m
   (B) $3.0 \times 10^{-2}$ m
   (C) $3.0 \times 10^0$ m
   (D) $3.0 \times 10^{18}$ m

7. How long will it take a light wave to travel a distance of 100. meters?
   (A) $3.00 \times 10^2$ s
   (B) $3.00 \times 10^8$ s
   (C) $3.33 \times 10^{-7}$ s
   (D) $3.33 \times 10^7$ s

8. Which formula represents a constant for light waves of different frequencies in a vacuum?
   \[
   f = \frac{\lambda}{\lambda}
   \]
   (A) \[
   \frac{\lambda}{f}
   \]
   (B) \[
   \frac{f}{\lambda}
   \]
   (C) \[
   f + \lambda
   \]
   (D) \[
   \lambda + f
   \]

9. A light wave has a frequency of $5.4 \times 10^{14}$ cycles per second and a wavelength of $5.5 \times 10^{-7}$ meter. What is the approximate speed of the wave?
   (A) $1.0 \times 10^8$ m/s
   (B) $2.0 \times 10^8$ m/s
   (C) $3.0 \times 10^8$ m/s
   (D) $4.0 \times 10^8$ m/s

10. Compared to the speed of microwaves in a vacuum, the speed of x rays in a vacuum is
    (A) less
    (B) greater
    (C) the same

11. Which wave characteristic is the same for all types of electromagnetic radiation traveling in a vacuum?
    (A) speed
    (B) wavelength
    (C) period
    (D) frequency

12. How much time does it take light from a flash camera to reach a subject 6.0 meters across a room?
    (A) $5.0 \times 10^{-9}$ s
    (B) $2.0 \times 10^{-8}$ s
    (C) $5.0 \times 10^{-8}$ s
    (D) $2.0 \times 10^{-7}$ s

13. In a vacuum, all electromagnetic waves have the same
    (A) wavelength
    (B) frequency
    (C) speed
    (D) amplitude

14. Base your answer to the following question on the information below.
    A $2.00 \times 10^6$-hertz radio signal is sent a distance of $7.30 \times 10^{10}$ meters from Earth to a spaceship orbiting Mars.
    Approximately how much time does it take the radio signal to travel from Earth to the spaceship?
    (A) $4.11 \times 10^{-3}$ s
    (B) $2.43 \times 10^2$ s
    (C) $1.46 \times 10^{17}$ s
    (D) $2.19 \times 10^8$ s

15. All electromagnetic waves have the same speed in
    (A) water
    (B) flint glass
    (C) alcohol
    (D) a vacuum

16. Compared to the speed of light in a material medium, the speed of light in a vacuum is
    (A) less
    (B) greater
    (C) remains the same

17. As the frequency of an electromagnetic wave increases, its speed in a vacuum
    (A) decreases
    (B) increases
    (C) remains the same

18. In a vacuum, radio waves and visible light waves must have the same
    (A) amplitude
    (B) frequency
    (C) speed
    (D) wavelength

19. Which phenomenon can not be exhibited by longitudinal waves?
    (A) reflection
    (B) refraction
    (C) diffraction
    (D) polarization
20. Which waves can be polarized?
   (A) light waves from an incandescent bulb
   (B) sound waves from a tuba
   (C) longitudinal waves
   (D) seismic waves (P-waves)

21. The diagram below shows sunglasses being used to eliminate glare.

Which phenomenon of light is represented in the diagram?
   (A) dispersion  (C) internal reflection
   (B) diffraction  (D) polarization

22. Which phenomenon can occur with light, but not with sound?
   (A) interference  (C) refraction
   (B) polarization  (D) the Doppler effect

23. Which phenomenon cannot be exhibited by longitudinal waves?
   (A) reflection  (C) diffraction
   (B) refraction  (D) polarization

24. The diagram below shows a beam of light entering and leaving a "black box."

The box most likely contains a
   (A) prism  (C) double slit
   (B) converging lens  (D) polarizer

25. Which phenomenon can be observed for transverse waves only?
   (A) reflection  (C) polarization
   (B) diffraction  (D) refraction

26. Which characterizes a polarized wave?
   (A) transverse and vibrating in one plane
   (B) transverse and vibrating in all directions
   (C) circular and vibrating at random
   (D) longitudinal and vibrating at random

27. A microwave and an x ray are traveling in a vacuum. Compared to the wavelength and period of the microwave, the x ray has a wavelength that is
   (A) longer and a period that is shorter
   (B) longer and a period that is longer
   (C) shorter and a period that is longer
   (D) shorter and a period that is shorter

28. Which wavelength is in the infrared range of the electromagnetic spectrum?
   (A) 100 nm  (C) 100 m
   (B) 100 mm  (D) 100 µm
29. Electromagnetic radiation having a wavelength of $1.3 \times 10^{-7}$ meter would be classified as
   (A) infrared  (C) blue
   (B) orange    (D) ultraviolet

30. Radio waves are propagated through the interaction of
   (A) nuclear and electric fields
   (B) electric and magnetic fields
   (C) gravitational and magnetic fields
   (D) gravitational and electric fields

31. Compared to the period of a wave of red light the period of a wave of green light is
   (A) less  (C) the same
   (B) greater

32. Which pair of terms best describes light waves traveling from the Sun to Earth?
   (A) electromagnetic and transverse
   (B) electromagnetic and longitudinal
   (C) mechanical and transverse
   (D) mechanical and longitudinal

33. A monochromatic beam of light has a frequency of $6.5 \times 10^{14}$ hertz. What color is the light?
   (A) yellow  (C) violet
   (B) orange   (D) blue

34. Compared to the frequency of the green light in the prism, the frequency of the red light in the prism is
   (A) less  (C) the same
   (B) greater

35. If the monochromatic green ray is replaced by a monochromatic red ray, $\theta_2$ will
   (A) decrease  (C) remain the same
   (B) increase

36. After the ray leaves the prism, it will most likely pass through point
   (A) $A$   (C) $C$
   (B) $B$   (D) $D$

37. As the color of light changes from red to yellow, the frequency of the light
   (A) decreases  (C) remains the same
   (B) increases

38. Compared to the period of red light, the period of violet light is
   (A) less  (C) the same
   (B) greater

39. Which color of light has the greatest period?
   (A) violet    (C) orange
   (B) green     (D) red

40. To which part of the electromagnetic spectrum will a photon belong if its wavelength in a vacuum is $5.6 \times 10^{-7}$ meters?
   (A) x-ray  (C) visible light
   (B) ultraviolet    (D) infrared

41. Increasing the amplitude of an electromagnetic radiation increases its
   (A) frequency  (C) intensity
   (B) speed      (D) period

42. The color of visible light is determined by its
   (A) frequency  (C) intensity
   (B) amplitude  (D) speed
43. The diagram below shows an antenna emitting an electromagnetic wave.

In what way did the electrons in the antenna produce the electromagnetic wave?
(A) by remaining stationary
(B) by moving at constant speed upward, only
(C) by moving at constant speed downward, only
(D) by accelerating alternately upward and downward

44. When electrical charges are accelerated in a vacuum, they may generate
(A) sound waves
(B) water waves
(C) light waves
(D) torsional waves

45. Radiations such as radio, light, and gamma are propagated by the interchange of energy between
(A) magnetic fields, only
(B) electric fields, only
(C) electric and gravitational fields
(D) electric and magnetic fields

46. Electromagnetic radiation can be produced by charged particles that are
(A) held stationary in a uniform magnetic field
(B) held stationary in an electric field
(C) moving at a constant velocity
(D) being accelerated

47. A ray of light strikes a plane mirror at an angle of incidence equal to 34°. The angle between the incident ray and the reflected ray is
(A) 124°
(B) 34°
(C) 56°
(D) 68°

48. A ray of monochromatic light traveling in air is incident on a plane mirror at an angle of 30°, as shown in the diagram below.

The angle of reflection for the light ray is
(A) 15°
(B) 30°
(C) 60°
(D) 90°
49. A light ray is incident on a plane mirror as shown in the diagram below.

Which ray best represents the reflected ray?
(A) A  (C) C
(B) B  (D) D

50. When a ray of light strikes a mirror perpendicular to its surface, the angle of reflection is
(A) 0°  (C) 60°
(B) 45°  (D) 90°

51. Parallel light rays are incident on the surface of a plane mirror. Upon reflection from the mirror the light rays will
(A) converge  (C) be parallel
(B) diverge  (D) be scattered

52. A light ray is incident upon a cylindrical reflecting surface as shown in the diagram at the right. The ray will most likely be reflected toward letter
(A) A  (C) C
(B) B  (D) D

53. In the diagram below, light ray AO is incident on a Lucite-air surface at point O.

Through which point will the reflected ray pass?
(A) 1  (C) 3
(B) 2  (D) 4

54. A light ray is incident upon a plane mirror. If the angle of incidence is increased, the angle of reflection will
(A) decrease  (C) remain the same
(B) increase

55. What is the angle of incidence of the light ray shown below?
(A) 30°  (C) 90°
(B) 60°  (D) 150°

56. The diagram below represents a light ray being reflected from a plane mirror. From the data given in the diagram, what is the angle of reflection?

(A) 10°  (C) 50°
(B) 40°  (D) 100°
57. The diagram below shows a ray of light being reflected from a plane mirror. Which letter indicates the angle of reflection?

(A) A
(B) B
(C) C
(D) D

Base your answers to questions 58 through 60 on the diagram below. The diagram shows two light rays originating from source S in medium y. The dashed line represents a normal to each surface.

58. Which two angles must be equal?
(A) 1 and 2  (C) 3 and 4
(B) 2 and 3  (D) 1 and 4

59. A reflected light ray is ray
(A) A
(B) B
(C) C
(D) E

60. Which light ray would not be produced in this situation?
(A) A
(B) B
(C) C
(D) E

61. When a ray is incident upon a plane mirror as shown in the diagram, what is the angle of reflection?

(A) 0º  (C) 45º
(B) 30º  (D) 90º

62. The diagram below shows parallel rays of light incident on an irregular surface.

Which phenomenon of light is illustrated by the diagram?
(A) diffraction  (C) regular reflection
(B) refraction  (D) diffuse reflection

63. When a student looks into a plane mirror, she sees a virtual image of herself. However, when she looks into a sheet of paper, no such image forms. Which light phenomenon occurs at the surface of the paper?
(A) regular reflection  (C) polarization
(B) diffuse reflection  (D) resonance
64. Which diagram best represents the reflection of light from an irregular surface?

(A) 

(B) 

(C) 

(D) 

Irregular surface

65. Which phenomenon of light is illustrated by the diagram at the right?

(A) regular reflection  (C) diffraction

(B) diffuse reflection  (D) refraction

66. The diagram below shows light rays in air about to strike a glass window.

When the rays reach the boundary between the air and the glass, the light is

(A) totally refracted

(B) totally reflected

(C) partially reflected and partially diffracted

(D) partially reflected and partially refracted
67. Which diagram best represents the path taken by a ray of monochromatic light as it passes from air through the materials shown?

![Diagram options A, B, C, D]

68. A laser beam is directed at the surface of a smooth, calm pond as represented in the diagram below.

![Diagram of laser beam hitting pond with organisms]

Which organisms could be illuminated by the laser light?

(A) the bird and the fish  
(B) the bird and the seaweed  
(C) the crab and the seaweed  
(D) the crab and the fish
69. The diagram below represents a ray of monochromatic light \((\lambda = 5.09 \times 10^{14} \text{ Hz})\) passing from medium \(X\) \((n = 1.46)\) into fused quartz.

Which path will the refracted ray follow in the quartz?
(A) \(A\)  
(B) \(B\)

70. A beam of monochromatic light \((f = 5.09 \times 10^{14} \text{ hertz})\) passes through parallel sections of glycerol, medium \(X\), and medium \(Y\) as shown in the diagram below.

What could medium \(X\) and medium \(Y\) be?
(A) \(X\) could be flint glass and \(Y\) could be corn oil.  
(B) \(X\) could be corn oil and \(Y\) could be flint glass.  
(C) \(X\) could be water and \(Y\) could be glycerol.  
(D) \(X\) could be glycerol and \(Y\) could be water.

71. The diagram below shows a light ray in air incident on a crown glass block.

As the light ray enters the crown glass block, it will
(A) slow down and bend toward the normal  
(B) slow down and bend away from the normal  
(C) speed up and bend toward the normal  
(D) speed up and bend away from the normal

72. A pencil appears to be bent at a point where it enters the water in a beaker. This phenomenon is called
(A) refraction  
(B) reflection  
(C) dispersion  
(D) rarefaction

73. In the diagram below a light ray passes obliquely from air into a glass block. Which path represents the refracted ray of light?

(A) \(A\)  
(B) \(B\)  
(C) \(C\)  
(D) \(D\)
74. The diagram below shows a ray of light being refracted as it passes from air into glass. Which letter represents the angle of refraction for the light ray?

(A) A  (C) C  
(B) B  (D) D

75. In the diagram shown below, at which point did the refracted ray OX originate?

(A) A  (C) C  
(B) B  (D) D

76. In the diagram below, a ray of light enters a glass block from air. Which path best indicates the direction of the refracted light ray?

(A) A  (C) C  
(B) B  (D) D
77. A ray of monochromatic light traveling in air enters a rectangular glass block obliquely and strikes a plane mirror at the bottom. Then the ray travels back through the glass and strikes the air-glass interface. Which diagram below best represents the path of this light ray? [N represents the normal to the surface.]

(A) [Image A]

(B) [Image B]

(C) [Image C]

(D) [Image D]

78. Lucite is replaced by medium X, which makes \( \theta_2 \) smaller for the same \( \theta_1 \) in air. Compared to the speed of the yellow light in Lucite, the speed of the yellow light in medium X is

(A) less

(B) greater

(C) the same

79. If the light ray were reversed in direction with the angle in the Lucite remaining the same, the angle in the air would be

(A) less than 45º

(B) 45º

(C) between 45º and 72º

(D) between 72º and 90º

80. What is the sine of the critical angle for a ray passing from Lucite into air?

(A) 0.866

(B) 0.707

(C) 0.667

(D) 0.500
81. As represented in the diagram below, the speed of a wave increases as it passes from medium 1 into medium 2. Which arrow best represents the direction of the wave in medium 2?

(A) 1  (B) 2  (C) 3  (D) 4

82. The ray $R$ of monochromatic yellow light shown in the diagram is incident upon a glass surface at an angle of $\theta$. Which resulting ray is not possible?

(A) $A$  (B) $B$  (C) $C$  (D) $D$

83. The diagram at the right represents the path of periodic waves passing from medium $A$ into medium $B$. As the waves enter medium $B$, their speed

(A) decreases  (B) increases  (C) remains the same

84. In this diagram, if $i = r$ medium $X$ could be

(A) water  (B) diamond  (C) glycerol  (D) alcohol

85. The diagram below shows a ray of light, $R$, entering glass from air.

Which path is the ray most likely to follow in the glass?

(A) $A$  (B) $B$  (C) $C$  (D) $D$
86. Base your answer to the following question on the diagram below which represents two media with parallel surfaces in air and a ray of light passing through them.

Which line best represents the incident ray in the air?
(A) $AE$  (C) $CE$
(B) $BE$  (D) $DE$

Base your answers to questions 87 and 88 on the diagram below which represents a ray of light moving from air through substance $B$, through substance $C$, and back into air. The surfaces of substances $B$ and $C$ are parallel.

87. If the angle of incidence of the light ray in air is increased, the angle of refraction in substance $B$ will
(A) decrease  (C) remain the same.
(B) increase

88. At the boundary between substance $C$ and air what is the sine of the critical angle?
(A) 0.866  (C) 0.667
(B) 0.707  (D) 0.500

89. Base your answer to the following question on the diagram below which represents a ray of monochromatic yellow light ($\lambda = 5.9 \times 10^{-7}$ meter) incident upon a block of lucite at point $A$, and continuing through the lucite to point $B$.

After the ray reaches point $B$, it will pass through point
(A) $E$  (C) $C$
(B) $F$  (D) $D$
90. Base your answer to the following question on the following information:

A ray of monochromatic orange light passes into a glass tank containing a lucite block that is submerged in a liquid. The wavelength of the light in air is $6.0 \times 10^{-7}$ meter. (the Index of Refraction for Benzene = 1.50)

Which diagram shows the path that the light could follow if the liquid were Canada balsam?

(A)  
(B)  
(C)  
(D)  

91. The angle of refraction of the beam of light will be greater than the angle of incidence in diagram

(A) A  
(B) B  
(C) C  
(D) D

92. The direction of the beam of light will not change in diagram

(A) A  
(B) B  
(C) C  
(D) D

93. The beam of light will undergo total internal reflection at the boundary in diagram

(A) A  
(B) B  
(C) C  
(D) D
94. A straight glass rod appears to bend when placed in a beaker of water, as shown in the diagram below.

What is the best explanation for this phenomenon?
(A) The water is warmer than the air.
(B) Light travels faster in water than in air.
(C) Light is reflected at the air-water interface.
(D) Light is refracted as it crosses the air-water interface.

95. The diagram below shows how an observer located at point P on Earth can see the Sun when it is below the observer's horizon.

This observation is possible because of the ability of Earth's atmosphere to
(A) reflect light (B) diffract light (C) refract light (D) polarize light
96. Which diagram best represents the path of light rays passing through a glass prism?
(A) 

(B) 

(C) 

(D) 

97. In which diagram below could the light source and optical device be used to demonstrate the phenomenon of dispersion?
(A) 

(B) 

(C) 

(D) 

98. The diagram below shows white light being dispersed as it passes from air into a glass prism.

This phenomenon occurs because, in glass, each frequency of light has a different
(A) intensity
(B) amplitude
(C) angle of incidence
(D) absolute index of refraction
99. In the diagram below, a ray of monochromatic light (A) and a ray of polychromatic light (B) are both incident upon an air-glass interface.

Which phenomenon could occur with ray B, but not with ray A?
(A) dispersion  (C) polarization
(B) reflection  (D) refraction

100. Polychromatic light passing through a glass prism is separated into its component frequencies. This phenomenon is called
(A) diffraction  (C) reflection
(B) dispersion  (D) polarization

101. A prism disperses white light, forming a spectrum. The best explanation for this phenomenon is that different frequencies of visible light
(A) move at different speeds in the prism
(B) are reflected inside the prism
(C) are absorbed inside the prism
(D) undergo constructive interference inside the prism

102. Compared to the speed of light in a vacuum, the speed of light in a dispersive medium is
(A) less  (C) the same
(B) greater

103. Which phrase best describes the phenomenon illustrated by the diagram below?
(A) scattering and diffraction
(B) reflection and interference
(C) transmission and Doppler effect
(D) refraction and dispersion

104. If the critical angle of glass is 45°, the light rays, shown in the diagram will be
(A) reflected  (C) dispersed
(B) refracted  (D) diffracted

105. As shown in the diagram below, a beam of light can pass through the length of a curved glass fiber.

This phenomenon is possible due to the effect of
(A) dispersion  (C) polarization
(B) internal reflection  (D) diffraction

106. In the diagram below, a monochromatic light ray is passing from medium A into medium B. The angle of incidence $q$ is varied by moving the light source $S$.

When angle $\theta$ becomes the critical angle, the angle of refraction will be
(A) 0°
(B) $q$
(C) greater than $q$, but less than 90°
(D) 90°

107. If a ray of light in glass is incident upon an air surface at an angle greater than the critical angle, the ray will
(A) reflect, only
(B) refract, only
(C) partly refract and partly reflect
(D) partly refract and partly diffract
108. Light \((\lambda = 5.9 \times 10^{-7} \text{ meter})\) travels through a solution. If the absolute index of refraction of the solution is increased, the critical angle will
(A) decrease  (C) remain the same
(B) increase

109. The absolute index of refraction for a substance is 2.0 for light having a wavelength of \(5.9 \times 10^{-7} \text{ meter}\). In this substance, what is the critical angle for light incident on a boundary with air?
(A) 30.º  (C) 60.º
(B) 45º  (D) 90.º

110. In the diagram below, a ray of monochromatic light \((\lambda = 5.9 \times 10^{-7} \text{ meter})\) reaches the boundary between medium \(X\) and air and follows the path shown. Which medium is most likely medium \(X\)?
(A) diamond  (C) Lucite
(B) flint glass  (D) water

111. If the critical angle for a substance is 44º, the index of refraction of the substance is equal to
(A) 1.0  (C) 1.4
(B) 0.69  (D) 0.023

112. Which optical medium would have the smallest critical angle \(\left(\theta_c\right)\) in the situation shown in the diagram?

(A) Lucite  (C) Canada balsam
(B) water  (D) diamond

113. The critical angle for light traveling from a given medium to air is 38º. If light is traveling from another medium with a greater index of refraction to air, the critical angle is
(A) less than 38º  (C) equal to 38º
(B) greater than 38º

114. Four optical media have indices of refraction of 1.40, 1.50, 1.60, and 1.70, respectively. The medium that has the largest critical angle is the one whose index of refraction is
(A) 1.40  (C) 1.60
(B) 1.50  (D) 1.70

115. A light ray traveling through glass strikes a glass-air surface. As the angle of incidence increases, the critical angle
(A) decreases  (C) remains the same
(B) increases
116. Base your answer to the following question on the diagram below, which represents a light ray traveling from air to Lucite to medium Y and back into air.

Light travels **slowest** in
(A) air, only  
(B) Lucite, only  
(C) medium Y, only  
(D) air, Lucite, and medium Y

117. As yellow light \((f = 5.09 \times 10^{14} \text{ Hz})\) travels from zircon into diamond, the speed of the light
(A) decreases  
(B) increases

118. The speed of light in a material is \(2.50 \times 10^8 \text{ meters per second}\). What is the absolute index of refraction of the material?
(A) 1.20  
(B) 2.50  
(C) 7.50  
(D) 0.833

119. What is the speed of light in a medium having an absolute index of refraction of 2.3?
(A) \(0.77 \times 10^8 \text{ m/s}\)  
(B) \(1.3 \times 10^8 \text{ m/s}\)  
(C) \(1.5 \times 10^8 \text{ m/s}\)  
(D) \(2.3 \times 10^8 \text{ m/s}\)

120. The speed of light in glycerol is approximately
(A) \(1.0 \times 10^7 \text{ m/s}\)  
(B) \(2.0 \times 10^8 \text{ m/s}\)  
(C) \(3.0 \times 10^8 \text{ m/s}\)  
(D) \(4.4 \times 10^8 \text{ m/s}\)

121. Light travels from medium A where its speed is \(2.5 \times 10^8 \text{ meters per second}\) into medium B where its speed is \(2.0 \times 10^8 \text{ meters per second}\). Compared to the absolute index of refraction of medium A, the absolute index of refraction of medium B is
(A) less  
(B) greater  
(C) the same

122. In which of the following materials is the speed of light the greatest?
(A) quartz  
(B) alcohol  
(C) glycerol  
(D) lucite
1. C
2. D
3. B
4. A
5. B
6. B
7. C
8. A
9. C
10. C
11. A
12. B
13. C
14. B
15. D
16. B
17. C
18. C
19. D
20. A
21. D
22. B
23. D
24. D
25. C
26. A
27. D
28. D
29. D
30. B
31. A
32. A
33. D
34. A
35. B
36. D
37. B
38. A
39. D
40. C
41. C
42. A
43. D
44. C
45. D
46. D
47. D
48. B
49. C
50. A
51. C
52. C
53. D
54. B
55. B
56. C
57. C
58. D
59. C
60. A
61. A
62. D
63. B
64. C
65. A
66. D
67. B
68. A
69. C
70. A
71. A
72. A
73. C
74. D
75. C
76. D
77. A
78. A
79. B
80. C
81. A
82. C
83. B
84. C
85. C
86. B
87. B
88. C
89. D
90. C
91. B
92. A
93. C
94. D
95. C
96. A
97. D
98. D
99. A
100. B
101. A
102. A
103. D
104. A
105. B
106. D
107. A
108. A
109. A
110. D
111. C
112. D
113. A
114. A
115. C
116. C
117. A
118. A
119. B
120. B
121. B
122. B