

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

Section: \_\_\_\_\_

### **Physical Science Final Exam Study Guide Semester 2**

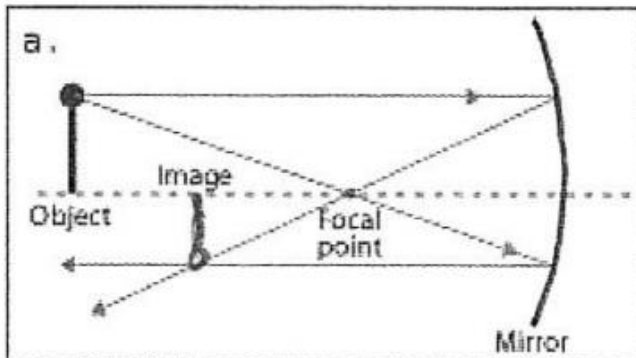
General Topics: Heat and Heat Technology; Environmental Science; Sound & Light; Astronomy

1. The temperature of a substance is determined by the average kinetic energy of its particles. If the average kinetic energy increases, the temperature increases. If the average kinetic energy decreases, the temperature decreases.
2. The coldest an object can be in theory is known as absolute zero, or 0 K. This is would occur when the average kinetic energy would be zero Joules. Essentially all particle motion would stop. Note, the upper limit of temperature is limited by the fact, the particles could never exceed the speed of light.
3. Water boils at 212 F, which is equivalent to 100 C, which is equivalent to 373 K.
4. The temperature of a substance will remain unchanged while a material is undergoing a change of state, even if thermal energy is added or removed.
5. However, the temperature of a substance will increase if thermal energy added, or decrease if thermal energy removed, if the substance is not undergoing a change of state.
6. All heat engines convert fuel to thermal energy to do useful work. Examples include internal combustion engines, steam engines, jet engines and rocket engines.
7. Abiotic factors are “non-living” factors, such as temperature, air pressure, amount of rainfall, and amount of sunlight.
8. Biotic factors in a biome refer to anything living, such as grass, trees, insects, etc.
9. The base of the ocean’s food chain is formed by plankton.
10. The place where the ocean meets the land is the intertidal zone. This is the zone between high tide and low tide. All tides on Earth are caused by the gravitational tidal forces of the moon.
11. The parts of the ocean floor which get no sunlight is the benthic zone.
12. The warmer area of the ocean where sunlight can penetrate, and where the ocean floor begins to slope downward is known as the neritic zone.
13. Many plants can grow in the littoral zone of a lake because sunlight can reach the bottom.
14. The tropical rain forest is the most biologically diverse biome.
15. Permafrost is a region of soil that is permanently frozen.
16. The five major kinds of pollution include: garbage, chemicals, high-powered wastes, gases and noises.
17. Conservation helps to prevent habitat destruction and reduce pollution.
18. Three ways to conserve resources are: reducing, recycling and reusing.
19. Conservation is the preservation and wise use of natural resources.
20. Recycling is the process of recovering valuable or useful materials from waste or scrap.
21. We can reduce our need for fossil fuels by developing alternative energy sources, such as solar, geothermal, and nuclear.
22. Biodiversity is the number and variety of organisms in a given area at a certain time.
23. Sound waves are a type of mechanical wave which requires a physical medium.
24. All electromagnetic waves do not require a physical medium, which means they can travel in a vacuum. EM waves can also travel through a medium.
25. EM waves include: Radio, Micro, Infrared, Visible (ROYGBIV), UV, x-rays, and gamma rays.
26. If a wave is traveling at a certain speed and its frequency is cut in half, its wavelength would be doubled. If its frequency were cut in third, its wavelength would triple.

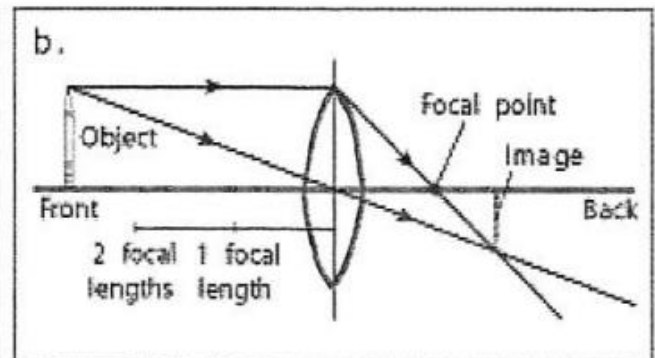
27. Rarefactions are the sections or parts of a longitudinal wave where particles are spread apart (low pressure zones). Compressions are where the particles are crowded together (high pressure zones).
28. Constructive interference occurs when the crest of one wave overlaps with the crest of another. Destructive interference occurs when the crest of one wave overlaps with the trough of another.
29. Wavelength is the measure of the distance between two similar points on a wave.
30. Frequency of a wave is measured in Hertz, and determines the pitch of a sound.
31. A violinist can change the pitch by changing the length of the string bowed. A shorter string produces a higher pitch, and a longer string produces a lower pitch.
32. Sound quality is the result of mixing pitches through interference. Typically caused by a mixing of various overtones.
33. Sounds with frequencies higher than 20,000 Hz are considered ultrasonic for humans.
34. The Doppler Effect is caused by the motion of the listener or the source.
35. Amplitude of a sound's wave determines the loudness.
36. A person hears a sonic boom when a shock wave reaches your ear.
37. When a wave is refracted, it is bent.
38. It is important to protect your hearing from loud sounds. To help minimize or eliminate damage to your hearing, you can move further away from a sound source, wear ear protection, or turn the volume down. So, it is better to sit in the back of an auditorium, away from the speakers, during a rock concert compared to the front. Rock stars are at higher risk of suffering from tinnitus (loss of hearing).
39. An echo is the result of a reflected sound wave.
40. Light travels at 300,000 km/s (or 300,000,000 m/s), and takes about 8.3 minutes to travel from the sun to Earth. The major source of energy on Earth comes from EM waves from the sun.
41. EM waves are produced by the vibration of an electric field and a magnetic field together.
42. The electromagnetic spectrum consists of all EM waves, which are arranged by wavelength. See # 25.
43. White light is the entire range of colors of visible light combined.
44. Refraction (through a prism) can separate white light into different colors.
45. The ability of an object to transmit light determines if the object is transparent, translucent, or opaque.
46. Colors of translucent and transparent objects are determined by the color they transmit. A green tinted glass transmits green light.
47. The mixing of colors of light is called color addition: RGB are the primaries.
48. The mixing of pigments is called color subtraction: CYM are the primaries.
49. Gamma rays, though harmful in high doses, can be used under medical supervision to treat some types of cancerous tumors.
50. When you view an opaque object, the colors of light that are reflected determine its color.
51. Ultraviolet light is the type of electromagnetic wave your skin needs to produce Vitamin D.
52. The moon is an illuminated object that does not generate its own light.
53. Infrared waves are the type of electromagnetic waves that causes the warmth you feel when you sit in the sun.
54. A plane mirror is a type of mirror that has a flat surface.
55. A transparent object that forms an image by refracting light is called a lens.

56. A concave lens is a transparent object that is thinner in the middle than at the edges.
57. Astronomers put telescopes in space to avoid interference from the Earth's atmosphere.
58. Hubble was able to tell that galaxies were moving apart from each other by redshift.
59. The celestial sphere is the imaginary sphere, created by scientists, that surrounds the Earth.
60. The zenith is the imaginary point directly above an observer's head.
61. The days would be shorter if the Earth rotated faster.
62. The vernal equinox is used to establish a star's right ascension.
63. An X-ray telescope is not used on Earth because X-rays are blocked by the Earth's atmosphere.
64. Ptolemy thought that the Earth was at the center of the universe.
65. It takes a year for the Earth to orbit once around the sun.
66. The color of a star depends on its temperature.
67. The color of the hottest stars are blue.
68. The H-R diagram shows the relationship of a star's surface temperature and absolute magnitude.
69. The universe is about 13.7 billion years old according to the big bang theory.
70. A galaxy is larger than a nebula, a neutron star, and a globular cluster.
71. The pattern of lines in a star's absorption spectrum represents some of the elements in the star's atmosphere.
72. The halos of spiral galaxies and elliptical galaxies contain groups of stars called globular clusters.
73. Parallax is a star's apparent shift in position, which can be used to calculate the distance to the star from Earth.
74. Newton's third law of motion states that for every action there is an equal and opposite reaction.
75. A rocket must carry enough oxygen to burn its fuel in the vacuum of outer space.
76. People can get information about their exact location from a GPS which is a form of group of satellites.
77. Life on Jupiter's moon, Titan was not discovered by a man-made space probe.
78. Thrust is the pushing or pulling force exerted by a rocket engine and is the force that accelerates the rocket.
79. The orbital velocity is the speed and direction a rocket must travel in order to orbit a planet.
80. Titan's atmosphere is of interest to scientists because it may be similar to the Earth's early atmosphere.
81. A space probe is an uncrewed vehicle that carries instruments into space to collect scientific data.
82. The space probes that transmitted the first images of the surface of Venus back to Earth was the *Venera 9*.
83. The cornea is the membrane that protects the eye.
84. The iris is the colored part of the eye.
85. The lens is the convex part of the eye that refracts light.
86. The pupil is the opening in the eye.
87. The retina is the back surface of the eye.
88. The rods and cones are the receptors that detect light and are located in the retina of the eye.

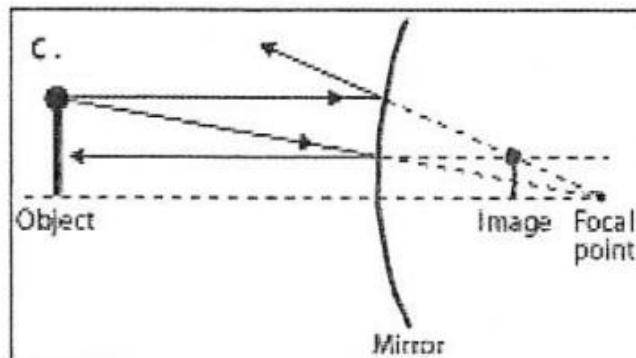
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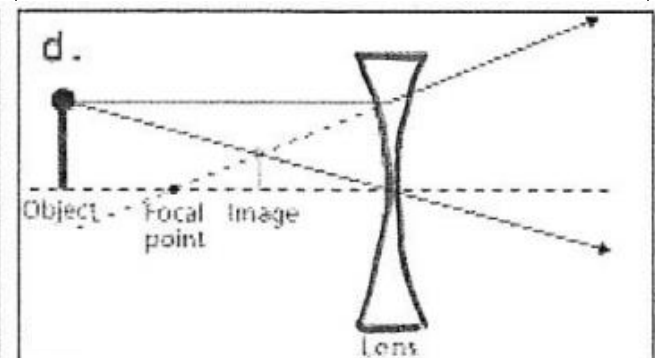
This is a ray diagram of a concave mirror forming a real image.



This is a ray diagram of a convex lens forming a real image.



This is a ray diagram of a convex mirror forming a virtual image.



This is a ray diagram of a concave lens forming a virtual image.

90. Cosmology is the study of the origin, structure, and future of the universe.
91. A light-year is the distance light travels in 1 year, about 9.5 trillion kilometers.
92. A quasar is a distant, starlike source of light.
93. The apparent magnitude is the brightness of a star as seen from Earth.
94. The main sequence is the diagonal pattern on the H-R diagram where most stars appear.
95. A black hole is an object so massive and dense that not even light can escape its gravitational pull.
96. The absolute magnitude is the brightness of a star at a distance of 32.6 light-years from Earth.
97. Robert Goddard launched the first liquid-fuel rocket.
98. A rocket burns fuel and uses escaping gases to move.
99. NASA stands for the National Aeronautics and Space Administration.
100. The escape velocity is the speed needed to break away from a planet's gravity.
101. President Kennedy wanted the United States to put someone on the moon.
102. Yuri Gagarin was the first person to orbit the Earth.
103. John Glenn was the first American in orbit.
104. Neil Armstrong was the first human to set foot on the moon.