

Unit Two Worksheet – Matter and Energy

WS – PS – U2

Name _____ Period _____

Section 4.1

Matching. Match the definition with the term that best correlates to it.

- | | |
|---|---------------------------|
| _____ 1. Chemical potential energy | _____ 4. Joule |
| _____ 2. Elastic potential energy | _____ 5. Kinetic energy |
| _____ 3. Gravitational potential energy | _____ 6. Potential energy |

- A) The SI unit of energy
- B) Stored energy due to position
- C) Energy due to motion; depends on the mass and velocity of an object
- D) Energy stored by things that stretch or twist or compress
- E) Energy stored in chemical bonds
- F) Energy stored by things attracted to each other by the force of gravity

Problem Solving. Answer the following questions. Show work or receive no credit. Use proper units.

7. What is the kinetic energy of a 100 kg cart moving at a velocity of 7 m/s?

8. What is the gravitational potential energy of a 2-kg vase resting on a shelf 3 meters high?

Short Answer. Answer the following questions.

9. A hammer falls off a roof top and strikes the ground with a certain kinetic energy. If it fell from a roof twice as tall, how would its kinetic energy compare? Explain.

10. Two books with different masses fall off the same bookshelf. As they fall, which has more kinetic energy? Explain.

What three things does gravitational kinetic energy depend on?

11. _____

12. _____

13. _____

What two things does kinetic energy depend on?

14. _____

15. _____

Section 4.2

Short Answer. Answer the following questions.

16. What is the law of conservation of energy?

17. Applying bicycle brakes as you ride down a long hill causes the brake pads and the wheel rims to feel warm. Explain.

18. What is the source of the large amounts of energy released in nuclear power plants and in the Sun?

19. Are the same energy releasing processes occurring in the Sun and in reactors? Explain.

20. Suppose you drop a tennis ball out of a second-story window. The first bounce will be the highest. Each bounce after that will be lower until the ball stops bouncing. Write a description of the energy conversions that take place, starting with dropping the ball.

21. Explain the role friction plays in the conservation of energy.

Section 6.1

Matching. Match the definition with the term that best correlates to it.

_____22. Temperature

_____25. Specific heat

_____23. Heat

_____26. Thermal energy

_____24. Calorimeter

- A) Device used to find specific heat of a substance
- B) Average kinetic energy of a substance
- C) Total amount of kinetic and potential energy for a substance
- D) Thermal energy that moves from objects of hot temperature to objects of cold temperature
- E) The amount of energy needed to raise the temperature of 1 kg of a substance 1 K

Short Answer. Answer the following questions.

27. If you put a heated rock in a bucket of water, the temperature of the water will increase and the temperature of the rock will decrease until the temperature is equal for both substances. If you drop a heated rock in the ocean, will the same thing happen? Explain.
28. Before the days of central heating, it was common to take a hot item to bed with you to keep you warm. Would you rather have a 10 kg heated brick or 10 kg jug of hot water that are the same temperature? Explain in such a way to clarify which would keep you warmer longer throughout the night.
29. During the winter, after a hot bath, is it more efficient to drain the tub immediately or let it sit? Explain.

Problem Solving. Answer the following questions. Show work or receive no credit. Use proper units.

30. If you warm a 35-kg pile of sand from 300 K to 350 K, and the specific heat of sand is 664 [J/(kg•K)], what is the change in thermal energy?
31. If you warm a 35-kg substance from 300 K to 350 K and find the thermal energy change is 15750 J, what is the specific heat in J/(kg•K)?
32. If you cool the same pile of sand from problem #9 from a temperature of 350 K to 300 K, will you have the same thermal change? Explain showing work.

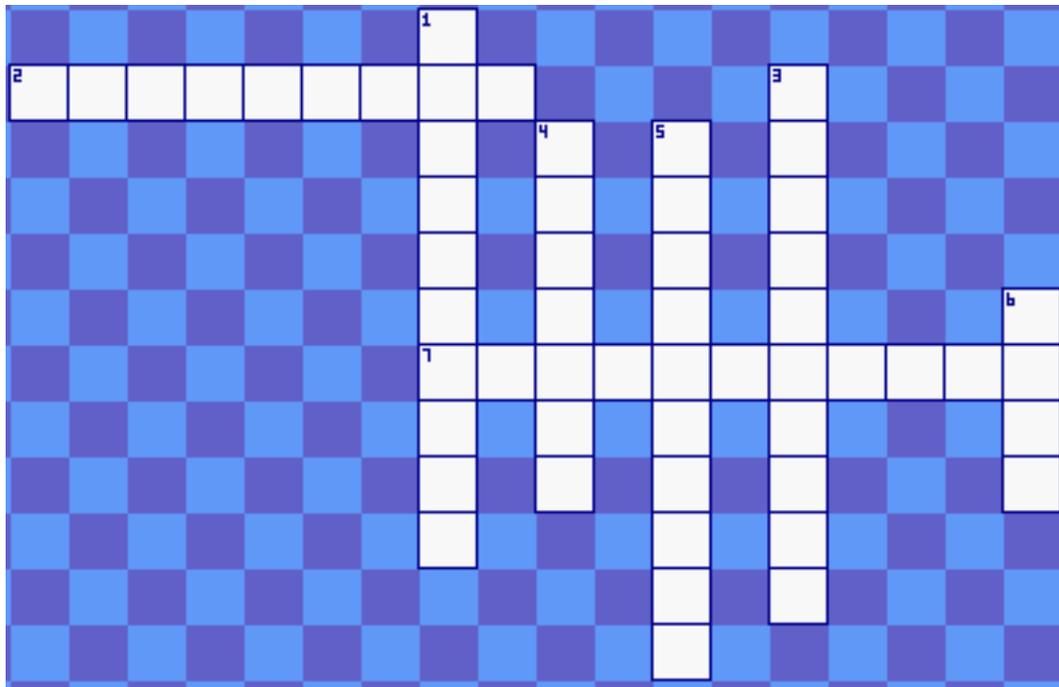
True/False. Determine whether the italicized and underlined term makes each statement true or false. If the statement is true, write "True" in the blank. If the statement is false, write in the blank the term that makes the statement true. Not following these directions will result in no credit.

- _____ 33. Particles that make up matter are in constant motion.
- _____ 34. The faster particles move the less kinetic energy they have.
- _____ 35. Temperature is the measure of the average kinetic energy of the particles in an object.
- _____ 36. When temperature increases, the kinetic energy of the particles decreases.
- _____ 37. The thermal energy of an object is the total energy of the particles in a material.
- _____ 38. A 5-kg chunk of aluminum and a 5-kg block of silver that are at the same temperature have the same thermal energy.
- _____ 39. Heat flows from a higher temperature to a lower temperature.
- _____ 40. Heat is measured in newtons.
- _____ 41. Different materials need the same amounts of heat to have similar changes in temperature.

- _____ 42. The amount of energy it takes to raise the temperature of 1 kg of a material 1 kelvin is the specific heat of the material.
- _____ 43. Water has a relatively low specific heat.
- _____ 44. Materials with a high specific heat can absorb a lot of energy and show little change in temperature.

Section 6.2

Crossword Puzzle. Complete the crossword puzzle with the words that best fit the descriptions.



Across:

2. Transfer of energy in the form of electromagnetic waves
7. A measure of the average kinetic energy of all the particles in an object

Down:

1. Transfer of energy through matter by colliding particles; takes place because the particles are in constant motion
3. Materials, such as fleece and fiberglass, that do not allow heat to move easily through them
4. Type of energy that is a combination of kinetic and potential energy and is the total energy that makes up a material
5. Transfer of energy by the motion of heated particles in a fluid
6. Thermal energy that flows from a warmer substance to a cooler substance and is measured in joules

Multiple Choice. Identify the letter of the choice that best completes the statement or answers the question.

- _____ 45. Wind and ocean currents are formed by ____.
- (A) radiation (B) convection (C) conduction (D) condensation

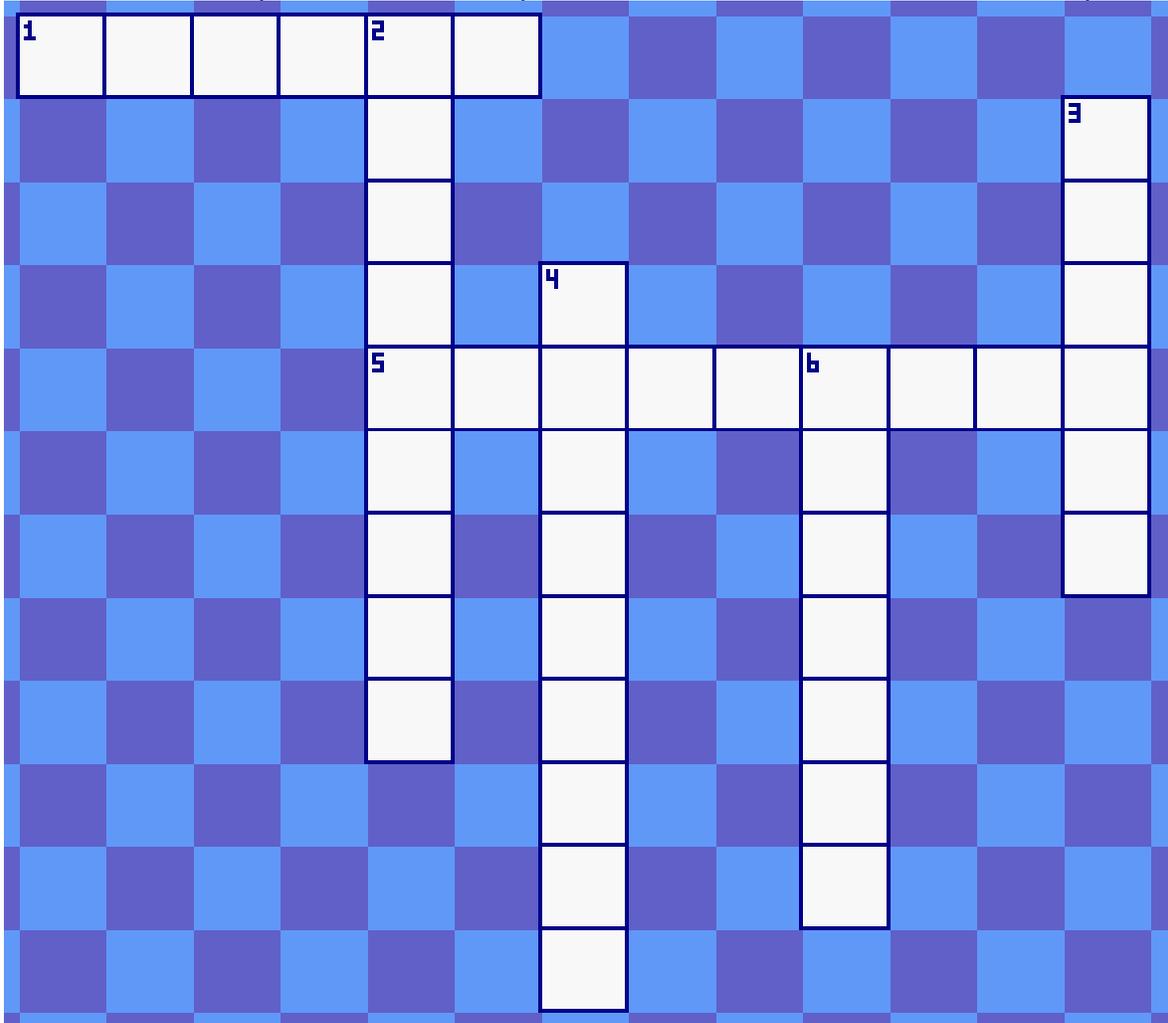
- _____46. The transfer of energy that does not require matter is ____.
(A) radiation (B) convection (C) conduction (D) condensation
- _____47. Through which of the following will convection most likely occur?
(A) solids and liquids (C) solids
(B) solids and gases (D) liquids and gases
- _____48. Of the following, the best insulator would be ____.
(A) silver (B) copper (C) air (D) iron
- _____49. Fluids expand as the temperature of the fluid ____.
(A) increases (B) decreases (C) stays the same
- _____50. The density of a fluids increases as the fluid ____.
(A) expands (B) contracts (C) stays the same

True/False. Determine whether the italicized and underlined term makes each statement true or false. If the statement is true, write "True" in the blank. If the statement is false, write in the blank the term that makes the statement true. Not following these directions will result in no credit.

- _____51. Materials that are poor conductors are poor insulators.
- _____52. The transfer of energy through matter by direct contact of its particles is convection.
- _____53. The transfer of energy in the form of invisible waves is conduction.
- _____54. Solids usually conduct heat better than liquids and gases.
- _____55. Air is a poor heat conductor.
- _____56. Energy is usually transferred in fluids by radiation.
- _____57. As water is heated, it expands, becomes less dense, and rises.
- _____58. Dark-colored materials absorb less radiant energy than light-colored materials.
- _____59. Only radiant energy that is reflected is changed to thermal energy.

Section 7.1

Crossword Puzzle. Complete the crossword puzzle with the words that best fit the descriptions.



Across:

1. Kind of electricity generated when more of one type of charge is on an object
5. Material, such as copper wire, through which an excess of electrons can move easily

Down:

2. Charging by ____: one transfers charge between objects by bringing a charged object near a neutral object
3. Law of conservation of ____: states that charge can be transferred from one object to another but cannot be created or destroyed
4. Material that does not allow an excess of electrons to move through it easily
6. Charging by ____: one transfers charge between objects by touching or rubbing them

Multiple Choice. Identify the letter of the choice that best completes the statement or answers the question.

- _____60. When a positively-charged object is brought near a positively-charged object, the two objects with charge will ____ each other.
 (A) attract (B) repel (C) stay the same distance from

- _____61. When a positively-charged object is brought near a negatively-charged object, the two objects with charge will ____ each other.
(A) attract (B) repel (C) stay the same distance from
- _____62. When a negatively-charged object is brought near a negatively-charged object, the two objects with charge will ____ each other.
(A) attract (B) repel (C) stay the same distance from

Short Answer. Answer the following questions.

63. What is an electroscope, and how does it work?

What are the three parts of an atom?

64. _____
65. _____
66. _____
67. How is lightning produced?

Section 7.2

Matching. Match the definition with the term that best correlates to it.

- _____68. Circuit
- _____69. Electric current
- _____70. Resistance
- _____71. Ohm's law
- _____72. Voltage difference

- A) Measured in amperes and is the flow of electric charge through a wire or any conductor
B) States that the current in circuit equals the voltage difference divided by the resistance
C) Closed conducting loop through which an electric current can flow
D) Measured in volts and is a push that causes electric charges to flow through a conductor
E) Measured in ohms and is the tendency of a material to oppose electron flow

Short Answer. Answer the following questions.

What are three factors that affect the resistance of a copper wire?

73. _____

74. _____

75. _____

76. How does a current traveling through a circuit differ from a static discharge?

77. Briefly explain how a dry cell battery supplies electric current for a device.

Problem Solving. Answer the following questions. Show work or receive no credit. Use proper units.

78. What is the voltage difference across a 30- Ω resistor if a 0.5 amp current is flowing through it.

79. What is the current flowing through a 20- Ω resistor if the voltage current across the resistor is 40 V?

80. What is the resistance of a resistor that has a voltage difference across it of 50 V and a current of 25 amps traveling through it?

Section 8.1

Multiple Choice. Identify the letter of the choice that best completes the statement or answers the question.

- _____ 81. The location of the strongest magnetic forces on a magnet are the ____.
- (A) magnetic fields (C) magnetic poles
(B) magnetic domains (D) electromagnets
- _____ 82. The region around a magnet where the magnetic forces act is the ____.
- (A) magnetic field (C) magnetic pole
(B) magnetic domain (D) electromagnet
- _____ 83. Objects that keep their magnetic properties for a long time are called ____.
- (A) permanent magnets (C) electromagnets
(B) magnetic domains (D) temporary magnets
- _____ 84. The atoms in a magnet are ____.
- (A) arranged randomly
(B) aligned according to their magnetic poles
(C) positively charged
(D) negatively charged
- _____ 85. Groups of atoms with aligned magnetic poles are called ____.
- (A) magnetic currents (C) magnetic domains
(B) magnetic poles (D) magnetic fields
- _____ 86. In the United States, power lines can carry power voltages as high as 750,000 V, but the voltage that is delivered to most homes for use is ____.
- (A) 60 V (B) 90 V (C) 120 V (D) 150 V

Short Answer. Answer the following questions.

87. What happens to the magnetic domains of a temporary magnet as its magnetic field weakens?
88. Why would a permanent magnet that was dropped lose some of its magnetic properties?
89. Is it possible to break a magnet into two pieces so one of the pieces has just one pole? Explain.

90. Why aren't all materials magnetic?

91. If a compass is placed in a magnetic field, how does the compass needle move? Be specific.

Sections 11.1 and 11.2

Identification. Identify each component of a wave by filling in the blanks below.

92. _____

93. _____

94. _____

95. _____

Short Answer. Answer the following questions.

List three characteristics of a wave that you can measure.

96. _____

97. _____

98. _____

What are the two types of waves?

99. _____

100. _____

101. If the frequency of a given wave increases, what happens to the wavelength?

Problem Solving. Answer the following questions. Show work or receive no credit. Use proper units.

102. What is the velocity of a wave with a frequency of 6 Hz and a wavelength of 2 m?

103. What is the frequency of a wave with a velocity of 10 m/s and a wavelength of 2 m?

104. What is the wavelength of a wave with a frequency of 50 Hz and a velocity of 250 m/s?

True/False. Determine whether the italicized and underlined term makes each statement true or false. If the statement is true, write "True" in the blank. If the statement is false, write in the blank the term that makes the statement true. Not following these directions will result in no credit.

_____ 105. Waves transfer *matter* as they travel.

_____ 106. A wave will travel *only as long as* it has energy to carry.

_____ 107. Anything that moves *up and down or back and forth* in a rhythmic way is vibrating.

_____ 108. *All* waves need a medium in order to travel.

_____ 109. Transverse and *congressional* waves are the two types of mechanical waves.

_____ 110. In a *compressional* wave, the matter in the medium moves back and forth at right angles to the direction that the wave travels.

_____ 111. In a *transverse* wave, the matter in the medium moves back and forth in the same direction that the wave travels.

_____ 112. In a transverse wave, the peak of the wave is the crest and the lowest spot is the *trough*.

_____ 113. The *refraction* of a wave is how many wavelengths pass a fixed point each second.

_____ 114. The speed of a wave is determined by multiplying the wavelength by the *frequency*.

_____ 115. In a compressional wave, the denser the medium is at the compressions, the *smaller* its amplitude.

_____ 116. In a transverse wave, the higher the amplitude, the *more* energy it carries.