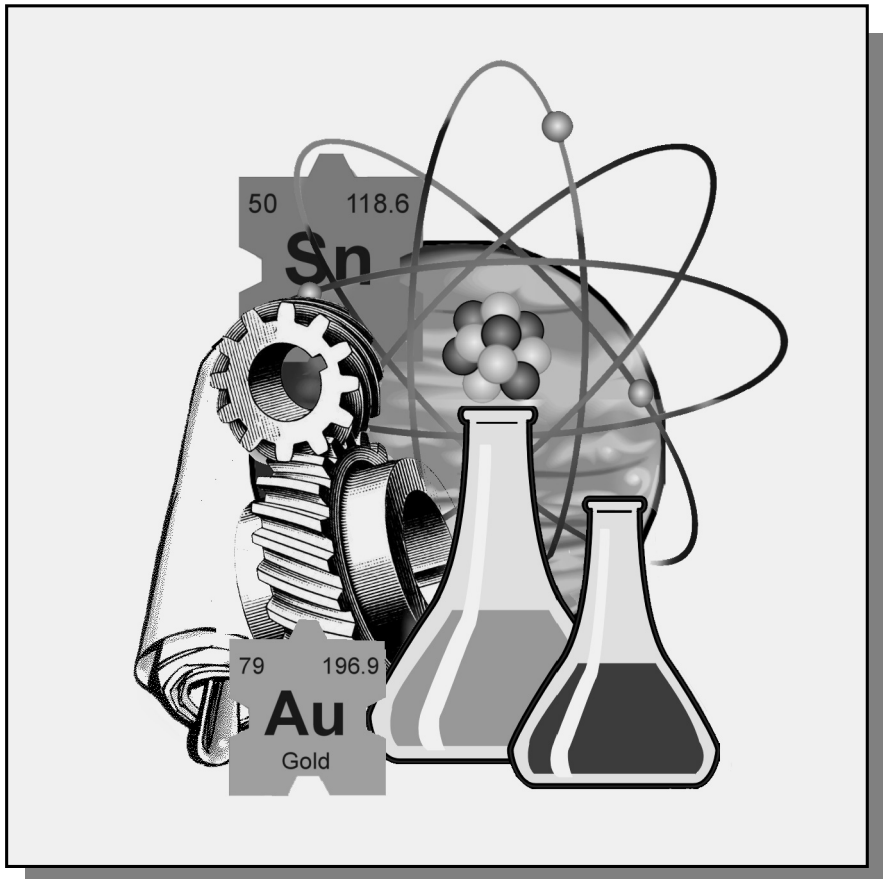
Integrated Physics & Chemistry

ACTIVITIES



Chapter 4

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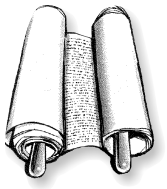
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ACTIVITIES
Lesson 1:
Scientific Laws

Properties of Solids: Elasticity

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. A rubber band is described as elastic because it will: _____.
(a) return to its original shape (c) cause injury
(b) stretch (d) bounce up and down

2. If a wooden ruler springs back to its original shape after being bent, then the wooden ruler is elastic.
(a) True or (b) False

3. The solid with the greatest ***elasticity*** is: _____.
(a) a soccer ball (b) a rubber ball (c) glass (d) lead

*4. The higher a ball bounces after being dropped, the greater is its _____.

5. The solid that is more elastic is: _____.
(a) steel (b) putty (c) rubber band (d) musical instrument

*6. An object that will change and keep its new shape easily is described as being: _____.
(a) ***elastic*** (b) bouncy (c) solid (d) ***plastic***

7. Robert Hooke lived at about the same time as: _____.
(a) Archimedes (c) Isaac Newton
(b) Sir Charles I (d) Aristotle

8. Robert Hooke helped Robert Boyle make an improved: _____.
(a) telescope (b) air pump (c) *microscope* (d) motor

9. Robert Hooke was one of the first scientists to study nature through a: _____.
(a) test tube (c) kaleidoscope
(b) microscope (d) telescope

10. The book, *Micrographia*, is about what Robert Hooke saw through a: _____.
(a) microscope (c) phonograph
(b) telescope (d) kaleidoscope

11. Robert Hooke served as an assistant to both _____ _____ and _____ _____.

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*12. *Hooke's Law* relating force and deformation of a solid states "_____
_____
_____."

13. Twisting is an example of a force that _____ a solid.

14. When a solid is deformed beyond its ability to spring back, it has reached its _____ _____.

15. Hooke's Law applies to rubber bands and _____ _____.

*16. If a weight of four ounces causes a rubber band to stretch three inches, then eight ounces will stretch the rubber band _____ inches.

17. Hooke's Law is only true for substances that are not deformed beyond their _____ _____.

*18. All matter shares the properties of inertia and: _____.
(a) gravitational attraction (c) minertia
(b) elasticity (d) obtrusion

*19. The one with both a fixed volume and a fixed shape is a: _____.
(a) gas (b) solid (c) band-aid (d) liquid

*20. The one that flows but keeps the same volume is a: _____.
(a) solid (b) liquid (c) gas (d) plastic container

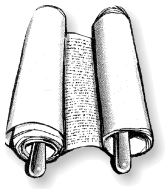
*21. The one that would expand to fill a room is a: _____.
(a) solid (b) liquid (c) gas (d) mixture

22. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



Cohesion and Adhesion

ACTIVITIES
Lesson 2:
Scientific Laws

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. Solids and liquids have definite: _____.
(a) shapes (b) volumes (c) sizes (d) smells

*2. Liquids and gases: _____.
(a) have a definite shape
(b) are similar in all aspects
(c) can flow
(d) are unlike in all aspects

3. A *fluid* can flow. (a) True or (b) False

*4. The property that binds molecules of the same substance is _____.

*5. Molecules of a substance cling to one another primarily because of: _____.
(a) gravity
(b) static electric charges
(c) friendship
(d) likeness

*6. In spite of its small size, the ***electron*** has a vast role in _____ bonds.

7. Cohesion does not exist in liquids.
(a) True or (b) False

8. Surface tension in water is due to: _____.
(a) air pressure
(b) a thin film of rubber on the surface of the water
(c) stress
(d) an imbalance of cohesive forces

9. Surface tension causes a drop of water to take the shape of a: _____.
(a) cone (b) cylinder (c) sphere (d) rectangle

10. The insect known as the water strider can live on the surface of water because of: _____.
(a) surface tension
(b) the insect's low density
(c) high blood pressure
(d) low blood pressure

*11. The attraction between two different surfaces is: _____.
(a) ***adhesion*** (b) buoyancy (c) fluency (d) ***cohesion***

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12. Water molecules are more strongly attracted to the surface of clean glass than they are to each other.
(a) True or (b) False

*13. Water can rise in a fine glass tube by (a): _____.
(a) gravitational attraction (c) water strider ***bond***
(b) air pressure (d) ***capillary action***

*14. Adhesive forces are not always stronger than _____ ones.

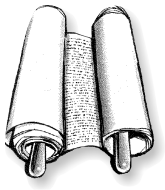
*15. Water and oil have _____ adhesive forces between one another.

16. Write the **Life Principle:** *"*_____
_____.*"*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 3:
Scientific Laws

Density and Pressure

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Which is correct? _____
   (a) Lead is heavier than feathers. (c) Feathers are heavier than lead.
   (b) Lead is denser than feathers. (d) All birds and feathers weigh the same.

*2. Grams per cubic centimeter and pounds per cubic foot are a measure of: _____.
   (a) shape (b) size (c) density (d) volume

*3. State the definition of density as an equation: density = _____.

4. _____ is the element with the greatest density.

*5. As a solid is heated, its density usually: _____.
   (a) decreases (c) remains the same
   (b) increases (d) does nothing that can be scientifically proven

*6. When a solid changes into a liquid, its density usually: _____.
   (a) remains the same (c) increases
   (b) decreases (d) does nothing that can be proven scientifically

*7. ***Specific gravity*** compares the density of a substance to the density of water.
   (a) True or (b) False

*8. Newtons per square meter and pounds per square inch are both measures of:
   _____.
   (a) relative humidity (b) ***pressure*** (c) atmosphere (d) ***density***

9. State the definition of pressure as an equation: pressure = _____.

10. Each tire of a car rests 800 pounds against an area of 25 square inches. To compute the pressure a person would: _____.
   (a) divide 800 pounds by 25 square inches
   (b) divide 25 square inches by 800 pounds
   (c) multiply 800 by 25 square inches
   (d) guess at the correct answer

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11. A heavy object such as a car will always produce more pressure than a lighter object such as a human being.
(a) True or (b) False

*12. The pressure of a liquid is directly related to the distance: _____.
(a) to the bottom of the container
(b) from the top of the container
(c) to the top of the liquid
(d) to the surface of the liquid

*13. State the equation for liquid pressure: pressure = _____.

14. The pressure of a liquid is directly proportional to the _____ of the liquid.

15. The greater pressure would be found: _____.
(a) at the bottom of a deep lake
(b) at the bottom of a shallow lake
(c) in the middle of the lake
(d) at the end of the old mill stream

*16. The bottom of a dam is usually thicker than the top because the bottom of the dam must: _____.
(a) hold back a greater volume of water
(b) be hidden from view
(c) release a greater volume of water
(d) resist a greater pressure from the water

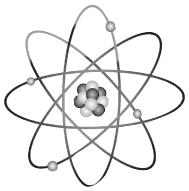
17. Pressure is directly proportional to the density of the liquid.
(a) True or (b) False

*18. Two columns, one of mercury and the other of water, are the same height. The one that will exert the greater pressure is: _____.
(a) mercury
(b) water
(c) an unknown substance
(d) the missing element

19. Solids and liquids exert pressure in equal amounts in all directions.
(a) True or (b) False

20. Write the **Life Principle:** *"_____ _____."*

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ACTIVITIES
Lesson 4:
Energy

Hydrostatics

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. The density of the ***atmosphere*** is greater: _____.
(a) at the earth's surface (c) over the mountain
(b) on a mountain peak (d) beyond the earth's layer

*2. Water and most liquids can be compressed when put under pressure.
(a) True or (b) False

*3. As a person dives deeper into the ocean, _____ increases.
(a) density (b) atmospheric depth (c) volume (d) pressure

4. The highest point on the earth's surface was reached several years after the first manned moon landing.
(a) True or (b) False

5. William Beebe descended no further than 3,000 feet into the ocean.
(a) True or (b) False

6. August Piccard's ocean exploring ship was in many ways like a(n): _____.
(a) battleship (b) turtle (c) balloon (d) army tank

7. To rise, the ***bathyscaphe*** released: _____.
(a) gasoline (b) metal shot (c) oil (d) fumes

8. The bathyscaphe reached the deepest point on the earth's surface.
(a) True or (b) False

*9. _____ is the study of fluids at rest.

*10. *Hydrodynamics* is the study of fluids in _____.

11. Blaise Pascal used his playtime to: _____.
(a) carve models (c) play marbles
(b) play baseball (d) study geometry

12. Blaise Pascal built one of the first _____ calculators.
(a) electronic (b) mechanical (c) automatic (d) make believe

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13. Blaise Pascal was aided in his study of air pressure by: _____.
    (a) Pierre de Fermat (c) Jacques Cousteau
    (b) one of his brothers-in-law (d) Franz Schubert

14. Blaise Pascal developed the Laws of Probability with: _____.
    (a) Pierre de Fermat (c) Jacques Cousteau
    (b) one of his brothers-in-law (d) Franz Schubert

15. Probability has no role in science.
    (a) True or (b) False

16. Pascal believed scientific laws could be discovered by reasoning alone.
    (a) True or (b) False

*17. State Pascal's Principle for Fluid Pressure. "_____
_____."

18. During the last years of his life, Blaise Pascal became one of the most important writers in Christian literature.
    (a) True or (b) False

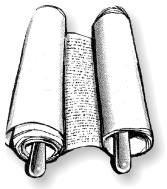
19. Blaise Pascal's accomplishments are nearly forgotten today.
    (a) True or (b) False

*20. State the equation for the mechanical advantage of a hydraulic press:
    M.A. = _____.

*21. Pressure exerted on a confined _____ is exerted at right angles to the walls of the container.

22. Write the **Life Principle:** *"*_____
_____."

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ACTIVITIES
Lesson 5:
Scientific Laws

Buoyancy

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. August Piccard filled the container of the bathyscape with gasoline because gasoline: _____.
   (a) is heavier than water (c) can be easily processed
   (b) cannot be compressed (d) is thicker than water

*2. Water exerts a pressure against all surfaces of a submerged object, but the water pressure is greatest on the _____ surface of the object.
   (a) underneath (b) top (c) lower (d) bottom

*3. Water exerts a ***net*** _____ force on a submerged object.

4. A person with weak muscles may be able to do exercises in a swimming pool because of the _____ of the water.
   (a) ***therapy*** (b) coolness (c) ***buoyancy*** (d) fluency

*5. Any solid object of any shape immersed in any liquid or gas will appear to _____ weight.

*6. The name for the lifting force of a liquid or gas is: _____.
   (a) buoyancy (b) diffusion (c) confusion (d) disturbance

7. Archimedes's king gave him the assignment to find out if a gold crown was: _____.
   (a) from other parts of the world (c) from Japan
   (b) from India (d) made of pure gold

*8. State Archimedes's Principle of Buoyancy. "_____
_____
_____."

9. A stone lowered into water will weigh _____than the same stone in the air.

10. A crown made of silver mixed with gold would tend to float more than one made of pure gold.
   (a) True or (b) False

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11. An object that weighs 27 grams displaces 10 grams of water. The object will weigh _____ when put into water.

*12. An object with a density greater than the density of water will _____ in water.
(a) float (b) sink (c) swim (d) drown

13. How high a solid piece of wood floats in a liquid is a measure of the liquid's density.
(a) True or (b) False

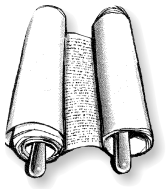
14. A ***hydrometer*** is used to measure the: _____.
(a) density of a liquid (c) weight of a liquid
(b) fluid pressure in a hydraulic system (d) volume of a liquid

15. Write the **Life Principle:** *"*_____
_____
_____*."*

Note: Ask your teacher for the quiz over topics 1-5 before proceeding to the next section. Reminder: If you score 85% or higher on the three section quizzes, you may be exempt from the chapter test!



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ACTIVITIES
Lesson 6:
Scientific Laws

Gases and Diffusion

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. State Pascal's Principle of Fluid Pressure. "_____
_____
_____."

2. Pascal's Principle applies to both liquids and gases.
(a) True or (b) False

*3. State Archimedes' Principle of Buoyancy. "_____
_____."

4. Archimedes' Principle of Buoyancy applies to both _____ and _____.

*5. A balloon stops rising in the air when its weight _____ the weight of the air it displaces.
(a) greater than (b) sharper than (c) equals (d) is less than

*6. Dropping ***ballast*** would cause a balloon to: _____.
(a) fall (b) rise (c) remain in the same spot (d) decrease in size

*7. Flooding the tanks of a submarine with water would cause it to: _____.
(a) disappear (b) rise (c) make no change at all (d) sink

8. A ship will float provided the ***displacement*** of water is an amount _____ its weight.
(a) less than (b) equal to (c) greater than (d) smaller than

9. Under ordinary conditions water can be compressed.
(a) True or (b) False

10. An object stops sinking in water because the density of the water becomes greater.
(a) True or (b) False

11. Steam is _____ dense than water.

*12. Density of gases is usually stated in: _____.
(a) grams per cubic centimeter (c) liters per gram
(b) grams per liter (d) density per ***liter***

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13. Molecules of a gas occupy about _____ times as much space as the same molecules in a liquid.
(a) one thousand (b) ten (c) one hundred (d) ten-thousand

14. Gases are _____ to compress.

*15. State Boyle's Law relating volume and pressure of a gas. "_____ _____."

*16. The volume of a gas is directly proportional to the _____ temperature.

*17. The mixing of two substances by the ceaseless motion of their molecules is _____.

18. The gases that diffuse more rapidly are _____ dense gases.

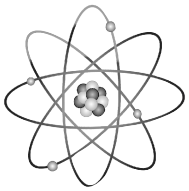
*19. The rate of ***diffusion*** of a gas is inversely proportional to the _____ of its molecular weight.

20. Faster moving molecules of gases diffuse _____ quickly than slower moving molecules of liquids and solids.

21 Diffusion does not take place in liquids.
(a) True or (b) False

22. Write the **Life Principle:** *"*_____ _____ _____."

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ACTIVITIES
Lesson 7:
Energy

Fluid Flow

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. Pascal's Principle applies to both fluids at rest and fluids in motion.
(a) True or (b) False

*2. The name for the study of fluids at rest is _____.

*3. The name for the study of fluids in motion is _____.

4. Laws that are true for fluids at rest will also be true for fluids in motion.
(a) True or (b) False

*5. ***Friction*** acts in the _____ direction as motion.
(a) opposite (b) same (c) circular (d) irrational

6. *Viscosity* is the internal _____ of fluids.

*7. A fluid that pours slowly is _____ viscous than a fluid that pours quickly.

8. If a marble falls more slowly through shampoo than water, then the shampoo is _____ viscous than water.

*9. _____ causes molecules to resist being forced apart.

*10. Ships that sail cleanly through the water use _____ energy than those that cause waves and eddies.
(a) more (b) less (c) the same (d) unlike

11. A *streamlined* shape reduces _____.

12. A _____ shape is streamlined.

*13. Fluids that flow in smooth layers have a _____ flow.

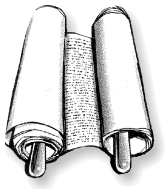
*14. As a body moves more quickly through a fluid, the resistance to its motion: _____.
(a) changes in size
(b) decreases
(c) remains the same
(d) increases

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*15. When a falling body reaches a speed at which the resisting force of the air balances the force of gravity, the body has reached its _____.

16. Write the **Life Principle:** *"*_____
_____
_____
_____.*"*

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ACTIVITIES
Lesson 8:
Scientific Laws

Bernoulli's Principle

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. State Archimedes Principle of Buoyancy. "_____
_____
_____."

2. A hot air _____ is an example of a lighter-than-air craft.

3. The gas in the first balloons made by the Montgolfier brothers was: _____.
(a) oxygen (b) carbon dioxide (c) hot air (d) hydrogen

4. The first humans to fly in a Montgolfier balloon were the Montgolfier brothers themselves.
(a) True or (b) False

5. The first person to fly in a hydrogen-filled balloon was a _____.

6. Otto Lilienthal tested gliders without flying in them.
(a) True or (b) False

7. Both Wilbur and Orville Wright _____ their airplane.

*8. State *Bernoulli's Principle* relating pressure and velocity of a fluid. "_____
_____."

*9. A moving fluid speeds up when it passes through a pipe that becomes: _____.
(a) wider (b) narrower (c) shorter (d) taller

*10. The ***venturi tube*** makes use of: _____.
(a) Pascal's Principle
(b) Archimedes' Principle of Buoyancy
(c) Boyle's Law
(d) Bernoulli's Principle

*11. A curve ball changes course because one side of the ball has lower _____
_____ than the other side of the ball.

*12. The _____ or _____ of a golf ball can be explained in terms of Bernoulli's Principle.

*13. The lift of an airplane wing can be explained in terms of: _____.
(a) Archimedes' Principle of Buoyancy
(b) Bernoulli's Principle
(c) Pascal's Principle
(d) Boyle's Law

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*14. A moving fluid has kinetic energy from its: _____.
(a) steadiness (b) pressure (c) motion (d) stability

*15. A moving fluid has potential energy from its: _____.
(a) motion (b) pressure (c) steadiness (d) stability

*16. Bernoulli's Principle that increased speed of a fluid results in lower pressure applies only to _____ flow.
(a) laminar (b) turbulent (c) steady (d) coherent

*17. _____ flow is harder to predict.
(a) Stable (b) Coherent (c) Laminar (d) Turbulent

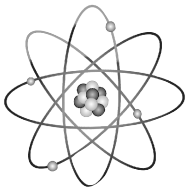
18. ***Wind tunnel*** tests help _____ what would happen to the surfaces of _____ in real flight.

19. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 9:
Energy

Changes of State

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. ***Heat*** is due to the _____ of the molecules of a substance.
(a) position (b) discipline (c) motion (d) attitude

*2. The ***calorie*** is a measure of: _____.
(a) heat energy (b) temperature (c) fat grams (d) exercises

3. Dieticians use the same size calorie as the one used by physicists.
(a) True or (b) False

*4. The amount of heat required to raise the temperature of one gram of a substance by one degree Celsius is the: _____.
(a) *latent heat of vaporization* (c) *specific heat*
(b) *latent heat of fusion* (d) *heat capacity*

5. Heat capacity of water is _____ cal/g.

6. All liquids have the same heat capacity.
(a) True or (b) False

7. The heat capacity of a substance compared to the heat capacity of water is the: _____.
(a) heat capacity (c) latent heat of fusion
(b) specific heat (d) latent heat of vaporization

8. The specific heat of water is: _____.
(a) 0.031 (b) 1.00 (c) 1.50 (d) 2.00

*9. The heat capacity of a substance is the same whether it is a solid, liquid or gas.
(a) True or (b) False

*10. _____ solids such as metals have definite melting temperatures.

*11. _____ solids such as butter do not have definite melting temperatures.

12. As a substance is heated, its regular rise in temperature halts as it _____.

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13. Joseph Black showed that melting water violated the Law of Conservation of Energy.
(a) True or (b) False

*14. The amount of heat required to melt one gram of a substance is the: _____.
(a) heat capacity (c) latent heat of fusion
(b) specific heat (d) latent heat of vaporization

15. The latent heat of fusion for water is _____ calories.

*16. The amount of heat required to vaporize one gram of a substance is its: _____.
(a) heat capacity (c) latent heat of fusion
(b) specific heat (d) latent heat of vaporization

17. The latent heat of vaporization of water is _____ calories.

18. Water has a very high latent heat of _____.

19. The one that can cause a more serious burn is _____ at 100ºC.
(a) water (b) steam (c) ice (d) snow

*20. _____ can change from a solid to a vapor without becoming a liquid.

21. During ***evaporation***, the molecules that escape from the liquid are those that move the: _____.
(a) fastest (b) slowest (c) hardest (d) softest

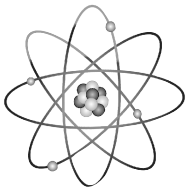
*22. Evaporation is a cooling process.
(a) True or (b) False

23. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 10:
Energy

Heat

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. *Heat* flows from a body of high ***temperature*** to a body with: _____.
(a) less heat (c) higher temperature
(b) lower temperature (d) more heat

2. James Clerk Maxwell and William Thomson showed that heat was actually a substance that flows like water.
(a) True or (b) False

*3. Heat is a measure of the _____ kinetic energy of the molecules of a substance.

*4. Temperature is a measure of the _____ kinetic energy of the molecules of a substance.

*5. The _____ of two bodies shows which way heat will flow between them.

6. Two steam engines are equally well built. The one that will provide the greater amount of work is one in which the temperature changes more.
(a) True or (b) False

*7. State the equation for ***efficiency*** of a machine: Efficiency =
_____.

8. The actual efficiency of a steam engine in Carnot's time was about _____ percent.

*9. One way to increase the efficiency of a *heat engine* is by increasing the _____ difference.

10. An *internal combustion engine* is an example of a: _____.
(a) reaction motor (c) reaction engine
(b) electromagnetic engine (d) heat engine

*11. Energy cannot be created nor destroyed, but it can change _____.

12. At small temperature differences, the efficiency of a machine is: _____.
(a) high (b) low (c) medium (d) long

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13. Extracting useful work from a warm wire would be: _____.
(a) unmanageable (b) undisciplined (c) difficult (d) easy

*14. ***Entropy*** is a measure of: _____.
(a) efficiency (b) heat (c) calories (d) disorganization

*15. In the universe as a whole, entropy is: _____.
(a) decreasing (c) remaining constant
(b) increasing (d) not available for comment

16. To reverse entropy: _____.
(a) work must be done (c) nothing can be done
(b) disorganization must increase (d) organization must decrease

17. A ***heat pump*** causes heat to flow from hot to cold.
(a) True or (b) False

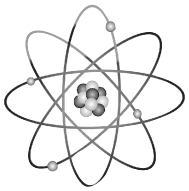
18. When ammonia expands from a liquid to a gas the ammonia becomes: _____.
(a) cooler (b) swifter (c) colder (d) warmer

19. Write the **Life Principle:** *"*_____
_____.*"*

Note: Ask your teacher for the quiz over topics 6-10 before proceeding to the next section. Reminder: If you score 85% or higher on the three section quizzes, you may be exempt from the chapter test!



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ACTIVITIES
Lesson 11:
Energy

Heat Flow

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. Heat is the potential energy of molecules of a body.
   (a) True or (b) False

2. Heat transfer is the movement of _____ from one place to another.

*3. The transfer of heat by direct contact is _____.

*4. The best heat ***conductors*** are: _____.
   (a) solids (b) liquids (c) gases (d) fumes

5. Nonmetals are better heat conductors than metals.
   (a) True or (b) False

6. A heat ***insulator*** conducts heat: _____.
   (a) poorly (b) well (c) not at all (d) somewhat immeasurable

7. Air conducts heat: _____.
   (a) poorly (b) well (c) not at all (d) uniquely

*8. The transfer of heat by currents is _____.

*9. ***Convection*** takes place most readily in _____.

10. Water changes temperature primarily by: _____.
   (a) condensation (b) convection (c) radiation (d) motivation

*11. *Conduction* and convection require a substance to be present to act as a medium through which the _____ is transferred.

*12. Light is a type of electromagnetic _____.

*13. Heat transfer by electromagnetic energy is _____.

14. Dark, rough surfaces are good _____ of heat.

*15. A surface that is a good radiator is also a good absorber of heat.
   (a) True or (b) False

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16. Copper is a _____ conductor of heat than aluminum.

*17. In a heat transfer, conduction, convection and ***radiation*** take place at the same rate.
(a) True or (b) False

18. Because of _____, it is entirely possible for frost to form on blades of grass, although the air temperature itself stays above freezing.

19. The reason a Thermos bottle has silver walls is because silver: _____.
(a) stops conduction
(b) is not capable of being broken
(c) shines brighter
(d) reflects radiant heat

20. Write the **Life Principle:** *"*_____
_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 12:
Motion

Waves in Fluids

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The line across undisturbed water is the _____.

*2. A *water wave* is an example of a(n): _____.
(a) torsional wave (c) adverse wave
(b) *transverse wave* (d) converse wave

*3. The part of the wave above the undisturbed level is the _____.

*4. The part of the wave below the undisturbed level is the _____.

*5. Points on the axis at an undisturbed level are the _____.

6. The vertical distance from the ***axis*** to a point on a wave is the: _____.
(a) ***displacement*** (b) ***node*** (c) module (d) replacement

*7. The maximum distance from the position of rest is the: _____.
(a) node (c) amplitude
(b) replacement value (d) displacement value

8. A single wave with a large *amplitude* carries less energy than a single wave with small amplitude.
(a) True or (b) False

9. The ***crest*** portion of a wave is: _____.
(a) one half of a wave (c) three fourths of a wave
(b) a complete wave (d) an incomplete wave

*10. The distance between any two successive identical points on a wave is the _____.

11. The *wavelength* can be measured from a variety of starting points.
(a) True or (b) False

12. Two corks that are both at the top of the crest of a wave are: _____.
(a) half through the phase (c) in phase
(b) middle of the phase (d) out of phase

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*13. To be in phase, two corks must be separated by: _____.
(a) a half wavelength (c) a three-quarter wavelength
(b) no wavelength (d) any number of full wavelengths

14. Two points that occupy different positions on a wave are _____ of phase.

15. The horizontal distance along the axis from the first cork at the top of the crest to the second cork at the bottom of the trough is one half of a wavelength.
(a) True or (b) False

*16. If a crest of one wave meets the crest of another wave, the result is _____ interference.
(a) obstructive (b) *destructive* (c) instructive (d) *constructive*

*17. The greatest destructive interference occurs when the two waves are out of phase by _____ of a wavelength.

18. Two water waves can meet in such a way as to cancel each other so that the water is still.
(a) True or (b) False

*19. Time divided by number of waves calculates a wave's: _____.
(a) *interference* (b) occupancy (c) *period* (d) frequency

20. Write the **Life Principle:** *"*_____
_____*."*

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ACTIVITIES
Lesson 13:
Motion

Transverse and Longitudinal Waves

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. A wave carries with it the medium through which the wave is passing.
   (a) True or (b) False

*2. Wave motion transfers _____ from one point to another.

3. A crest and a trough are different because they are not the same length.
   (a) True or (b) False

4. The distance along the wave from crest to crest is the: _____.
   (a) size of the currents (c) node
   (b) displacement theory (d) wavelength

*5. ***Frequency*** is: _____.
   (a) cycles/time (c) time/cycle
   (b) miles/hour (d) time * cycle

*6. Frequency and period are _____ of one another.

7. If 2 waves are made each second, the frequency is: _____.
   (a) 10.0 waves per second (c) 50 waves per second
   (b) .50 seconds per wave (d) 100 seconds per wave

*8. As frequency increases, wavelength: _____.
   (a) increases (c) remains the same
   (b) no noticeable change (d) decreases

9. The speed of transverse water waves on the surface of a pond is directly proportional to the amplitude.
   (a) True or (b) False

*10. Distance divided by time is a measure of a wave's: _____.
   (a) amplitude (b) speed (c) attitude (d) altitude

*11. Frequency times the wavelength is a measure of a wave's: _____.
   (a) size (b) distance (c) speed (d) period

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*12. The *wave equation* is: _____.
(a) frequency * wavelength (c) time divided by wavelength
(b) waves/time (d) wavelength * time

13. Given that sound waves in air have a frequency of 256 waves/sec and a wavelength of 4.4 feet/wave, to find the speed of sound a person would: _____.
(a) divide 256 by 4.4 (c) divide 4.4 by 256
(b) multiply 256 by 4.4 (d) find the square root of 256

14. Caution should be exercised in using the equations "speed = distance/time" and "speed = frequency * wavelength" because they give different answers.
(a) True or (b) False

*15. Sound waves are: _____.
(a) ***transverse*** (b) latitudinal (c) reverse (d) ***longitudinal***

16. Longitudinal means along the same line.
(a) True or (b) False

*17. The pressed together part of the longitudinal wave, corresponding to the crest of a transverse wave is the: _____.
(a) transversion (b) impression (c) ***rarefaction*** (d) ***compression***

18. The air has a _____ pressure in the compression.

19. A tuning fork is an example of a vibrating object making: _____.
(a) light waves (c) sound waves
(b) reflecting waves (d) refraction waves

20. Write the **Life Principle:** *"*_____
_____
_____*."*

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ACTIVITIES
Lesson 14:
Motion

Sound Waves: Amplitude and Pitch

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

*1. Longitudinal waves are also known as _____ waves.

2. A *sine curve* contains the features of both transverse and longitudinal waves.
(a) True or (b) False

*3. ***Loudness*** of sound is the sound's: _____.
(a) speed (b) frequency (c) modulation (d) amplitude

4. Loudness of sound falls by the square of the distance from the source.
(a) True or (b) False

*5. An *echo* is an example of a sound that has been: _____.
(a) retracted (b) obstructed (c) reflected (d) bent

*6. A _____ is a series of echoes of the same sound from different surfaces.

*7. Sound will ***reflect*** from an object that is _____ than the wavelength of the sound.

*8. _____ means *to bend*.

*9. ***Pitch*** of sound is the sound's: _____.
(a) amplitude (b) frequency (c) speed (d) modulation

10. A tuning fork that makes a high C has a frequency of _____ vibrations per second.

11. A sound at 15 cycles per second is _____ pitched.
(a) soft (b) medium (c) high (d) low

*12. As frequency increases, the length of sound waves become: _____.
(a) longer (b) shorter (c) equal (d) the same

13. The length of a sound wave with a frequency of 20,000 vibrations per second is: _____.
(a) about 75 feet (c) more than two inches
(b) less than one inch (d) more than 100 feet

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*14. The sound that is more likely to be reflected is a _____ pitched sound.
(a) high (b) low (c) medium (d) short

15. _____ is an acronym for sound navigation and ranging.

16. The range 15 cycles/sec to 20,000 cycles/sec covers the range of human: _____.
(a) talking (b) speech (c) hearing (d) voice

17. Robert Boyle and Robert Hooke proved that sound travels faster than light.
(a) True or (b) False

*18. Sound travels faster in: _____.
(a) air (b) water (c) sand (d) steel

19. If 10 seconds pass between the time of a lightning strike and the arrival of the thunder, then the lightning was about _____ miles away.

20. Write the **Life Principle:** *"*_____
_____*."*

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Name: _____

Date: _____ Grade: _____



ACTIVITIES
Lesson 15:
Motion

Properties and Sounds

You are making progress! ***Answer the following questions. Circle the correct answers or fill in the blanks with words, letters or numbers as each question indicates. Check your answers from the Answer Key. Correct all errors, then complete your next goal.***

1. The speed of sound in air is _____ than the speed of light.
   (a) greater (b) slower (c) better (d) faster

*2. Distance divided by time measures _____.

*3. Frequency times wavelength measures frequency.
   (a) True or (b) False

*4. The speed of sound in air at room temperature is about: _____.
   (a) 1,128 ft/sec (c) 2,256 ft/sec
   (b) 186,000 mi/sec (d) 93,000 mi/sec

*5. Frequency of sound is its _____.

6. A metal spoon and a wooden spoon sound differently because they have different: _____.
   (a) constructive interference (c) shapes and densities
   (b) ***fret*** vibrations (d) ***natural frequencies***

*7. The lowest pitch a musical instrument can make is its _____ frequency.

*8. Smaller objects vibrate at a _____ pitch than larger objects.

*9. Heavier, more massive objects vibrate at a _____ pitch than lighter, less massive objects.

*10. An object under more tension vibrates at a _____ pitch than the same object under less tension.

11. If the ***tension*** on a guitar string is increased, the pitch will be: _____.
   (a) higher (b) lower (c) the same (d) decreased

12. ***Overtones*** are usually simple multiples of the *fundamental frequency*.
   (a) True or (b) False

13. Musical instruments that produce sound can be distinguished by their: _____.
   (a) fundamental frequency (b) overtones (c) quality (d) price

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*14. If one vibrating tuning fork causes another to begin vibrating, the result is _____.

*15. ***Resonance*** results in an increase in amplitude.
(a) True or (b) False

16. The Tacoma Narrows Bridge collapsed because of: _____.
(a) exceptionally strong winds (c) poor materials
(b) weak structure (d) resonance

*17. Alternate reinforcements and cancellations caused by interference of sound waves will produce: _____.
(a) disturbances (b) resonance (c) beats (d) lack of quality

*18. _____ are the variations in the loudness of a sound caused by constructive and destructive interference.

19. Two musical instruments that cause 4 ***beats*** per second are in tune with one another.
(a) True or (b) False

20. Write the **Life Principle:** *"*_____
_____.*"*

Note: Ask your teacher for the quiz over topics 11-15 before proceeding to the next section. Reminder: If you score 85% or higher on the three section quizzes, you may be exempt from the chapter test!



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