Tonica Grade School
Learning Lesson
Packet 1

Grade: 8 Science

Teacher: Mrs. Sadler

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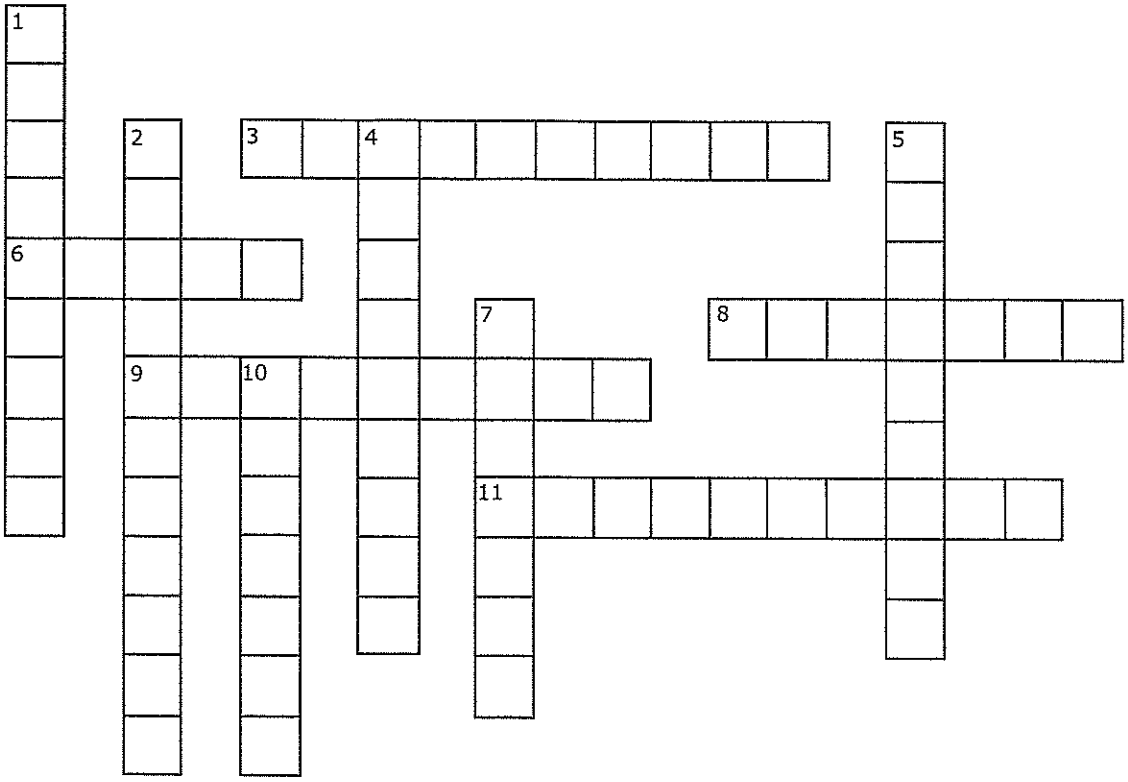
Name _____ Date ____ / ____ / ____

CROSSWORD PUZZLE: ELECTRICITY



ACROSS

3. These are made from semiconductors and require little voltage
6. An electric _____ converts electrical energy to kinetic energy.
8. This device measures electrical current
9. This device changes alternating current to direct current
11. This type of circuit may contain thousands of very small transistors

DOWN

1. This device measures potential difference
2. This type of electrical current changes direction
4. Magnifies a small electric signal
5. This device produces current by moving a magnetic field across a wire
7. This material is a semiconductor
10. A _____ ray tube is a device that uses electrons to produce images on a screen

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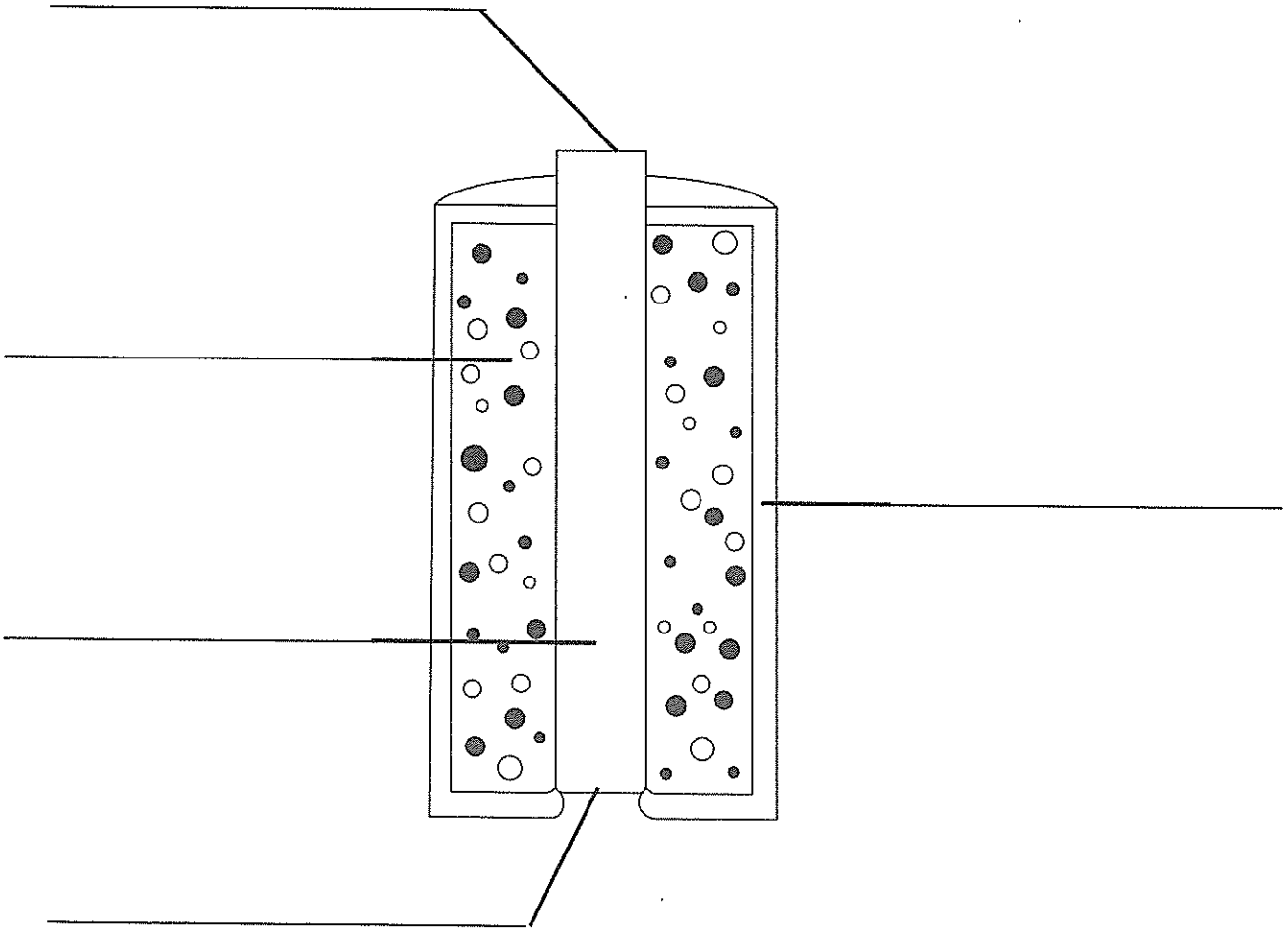
DRY CELL BATTERIES

Dry cell batteries are the source of electrical power used in many small devices like flashlights, toys, and radios. There are three kinds of dry cells that are typically used which differ in the chemical reactions used; they are carbon-zinc, alkaline, and mercury cells.

Provide the labels for the parts of this carbon-zinc dry cell battery shown below using the following:

carbon rod	negative terminal	zinc container
chemical paste	positive terminal	



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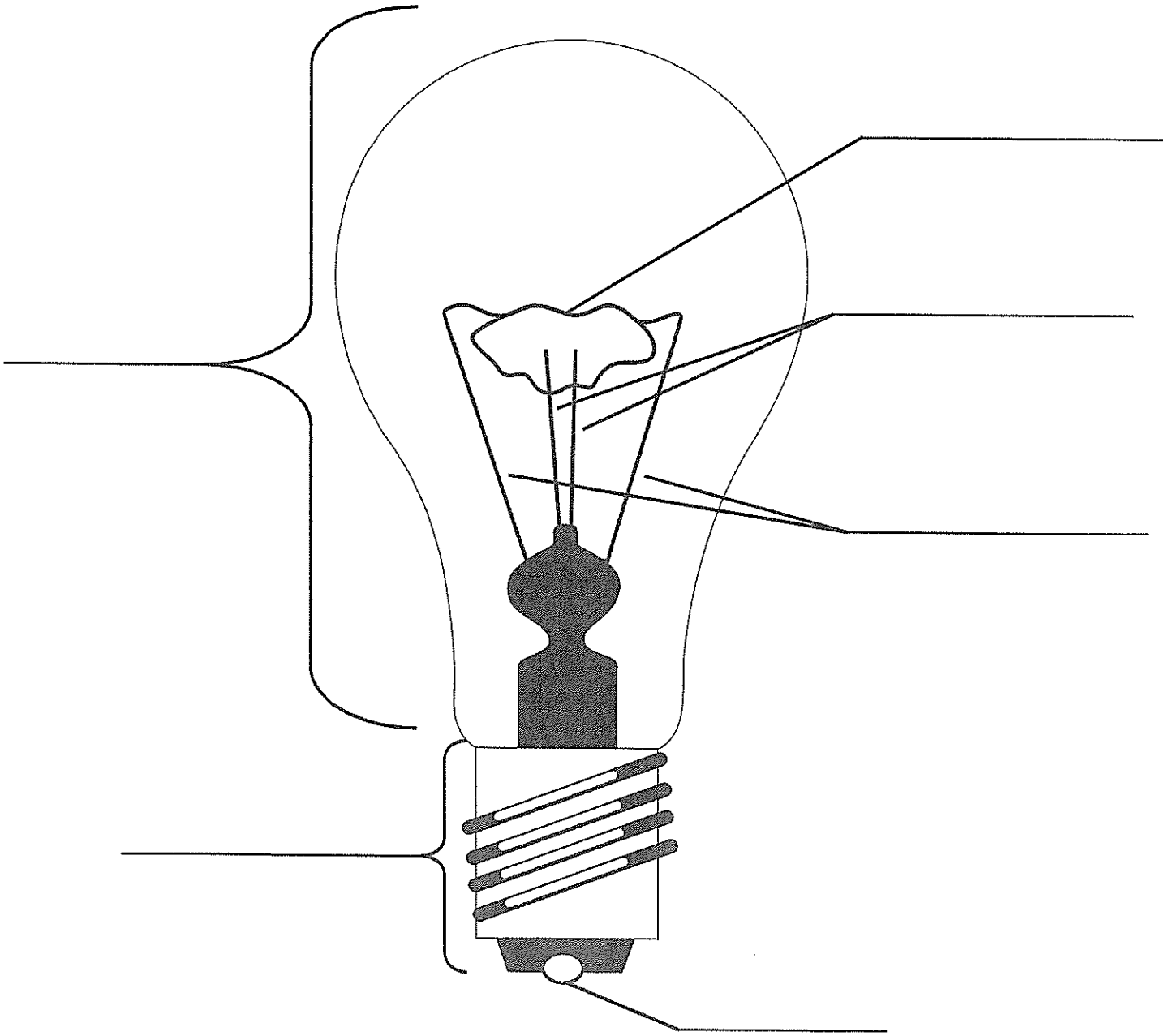
LIGHT BULB ANATOMY

Provide the labels for the parts of the incandescent light bulb shown below using the following:

base	contact	glass support
bulb	filament	connecting and supporting wires

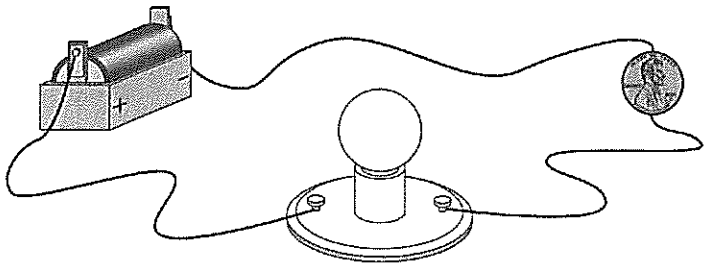


Name: _____

Conductors and Insulators

A **conductor** is a material that allows electricity to flow through it.
An **insulator** is a material that electricity cannot flow through.

To determine whether an object is a conductor or insulator, you can build a simple circuit with a battery, light bulb, and three pieces of wire.



Touch the free ends of the wire to the object you are testing. If the light bulb lights up, the object is made from a conductor. if it does not, the object is made from an insulator.

Complete the table. Predict whether each item is made from a material that is a conductor or insulator. Then test each item to determine if it is made from a conductor or insulator.

Object	Prediction: Conductor or Insulator?	Result: Conductor or Insulator?
rubber band		
penny		
nickel		
toothpick		
key		
paper clip		
brass paper fastener		
glass microscope slide		
(your choice)		
(your choice)		

Name: _____

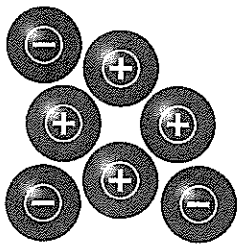
Electrical Charges

If an object has more positive charges (⊕) than negative charges (⊖), its electrical charge is positive (⊕).

If an object has more negative charges (⊖) than positive charges (⊕), its electrical charge is negative (⊖).

If an object has the same number of positive (⊕) and negative (⊖) charges, it has no electrical charge or is neutral.

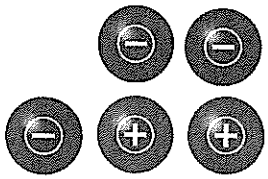
Example:



Electrical charge: positive charge

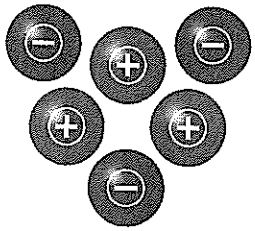
Count the positive and negative charges in each picture. Write *positive charge*, *negative charge*, or *no charge* on each line.

1.



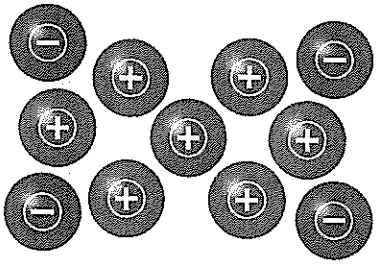
electrical charge: _____

2.



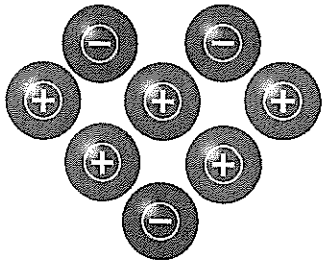
electrical charge: _____

3.



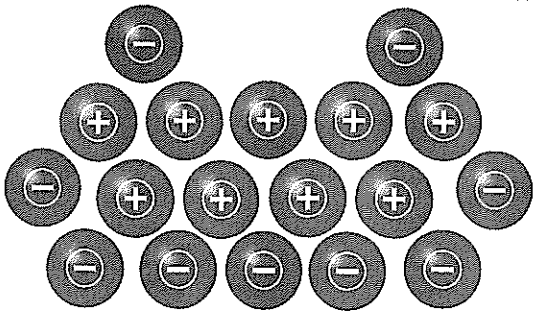
electrical charge: _____

4.



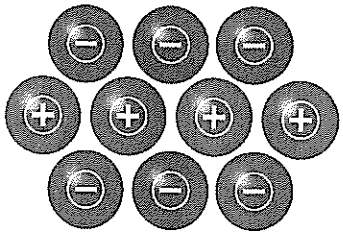
electrical charge: _____

5.



electrical charge: _____

6.



electrical charge: _____

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CALCULATING CURRENT WITH OHM'S LAW

Ohm's law describes the relationship between current, voltage, and resistance. The equation for this relationship is shown in the box.

Ohm's Law states that $I = \frac{V}{R}$

where I = current (amperes or amps)
V= voltage (volts)
R = resistance (ohms)

Provide the answers to the questions below.

1. What is the current produced when a 12-volt battery encounters a resistance of 20 ohms?

Answer:

2. What is the current when a 9-volt battery is connected to a circuit with a resistance of 50 ohms.

Answer:

3. What would the current be for a circuit with a potential difference of 120 volts and a resistance of 40 ohms?

Answer:

4. What would the current in Problem 3 become if the potential difference were doubled?

Answer:

5. What would the current in Problem 3 become if the resistance were doubled?

Answer:

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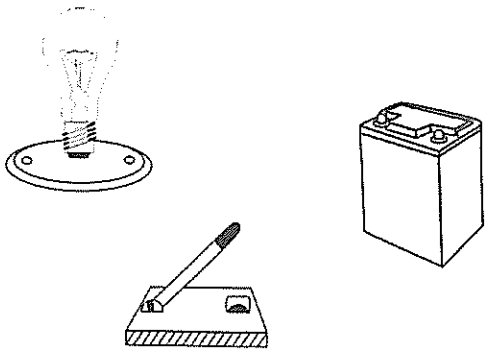
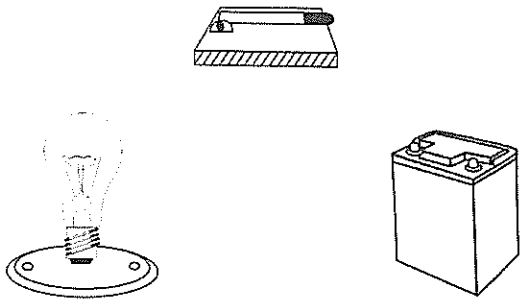
DRAWING SIMPLE ELECTRICAL CIRCUITS

There are two basic kinds of electrical circuits, parallel and series. A circuit can be considered open or closed depending on whether current can pass through the circuit. For the six circuits shown below, provide lines to show where the wires should connect.

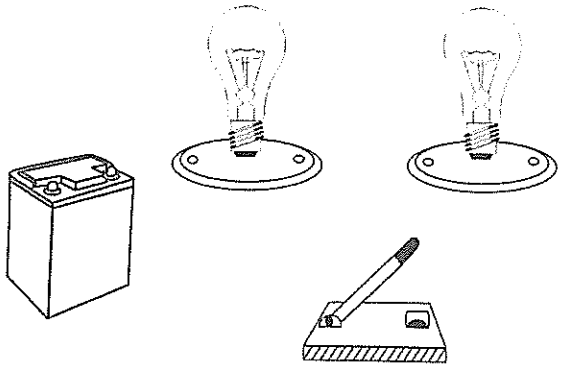
Open circuit



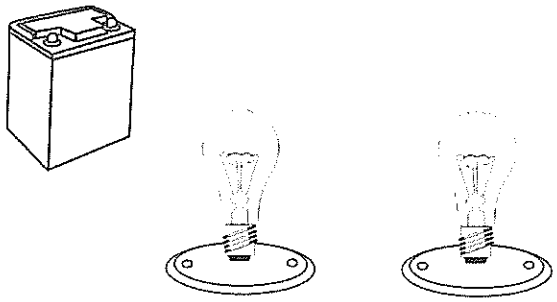
Closed circuit



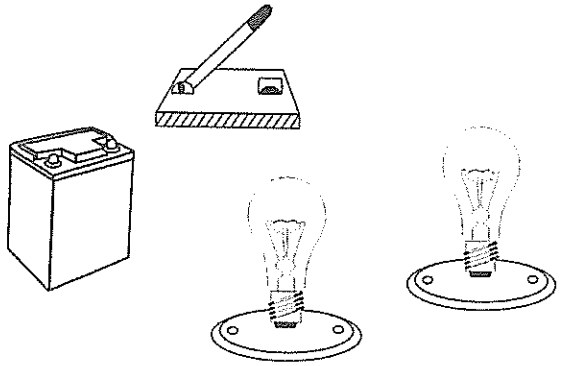
Series circuit 1



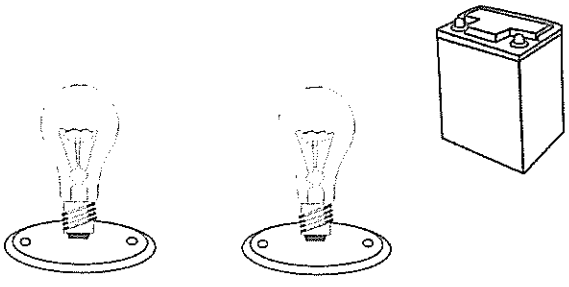
Series circuit 2



Parallel circuit 1



Parallel circuit 2



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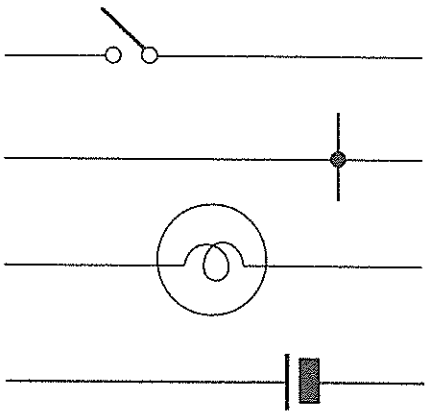
CIRCUITS AND SWITCHES

Electricity only becomes useful when it slows in a circuit. Circuits can become quite complicated and a variety of symbols are used to indicate parts of the circuit. Provide the names for the part that each of the symbols below represents using the following terms:

battery	light bulb	wire
connection	switch	



_____

_____

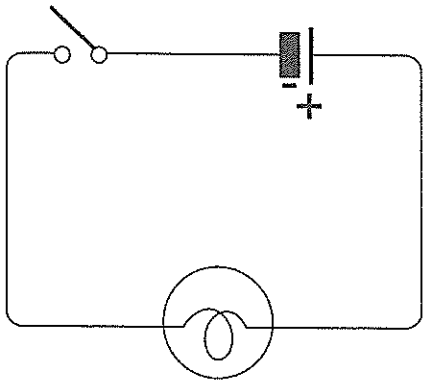
_____

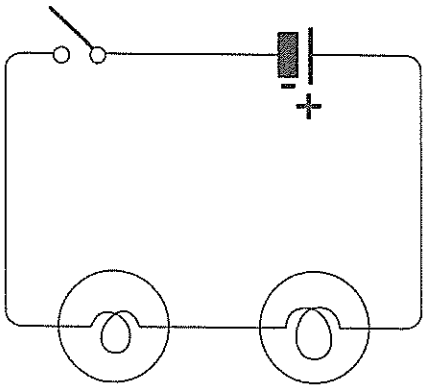
_____

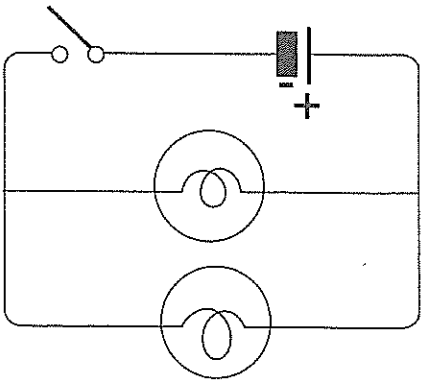
_____

_____

Classify each of the circuits shown below as one of the following: parallel, series, or simple.







_____ _____ _____

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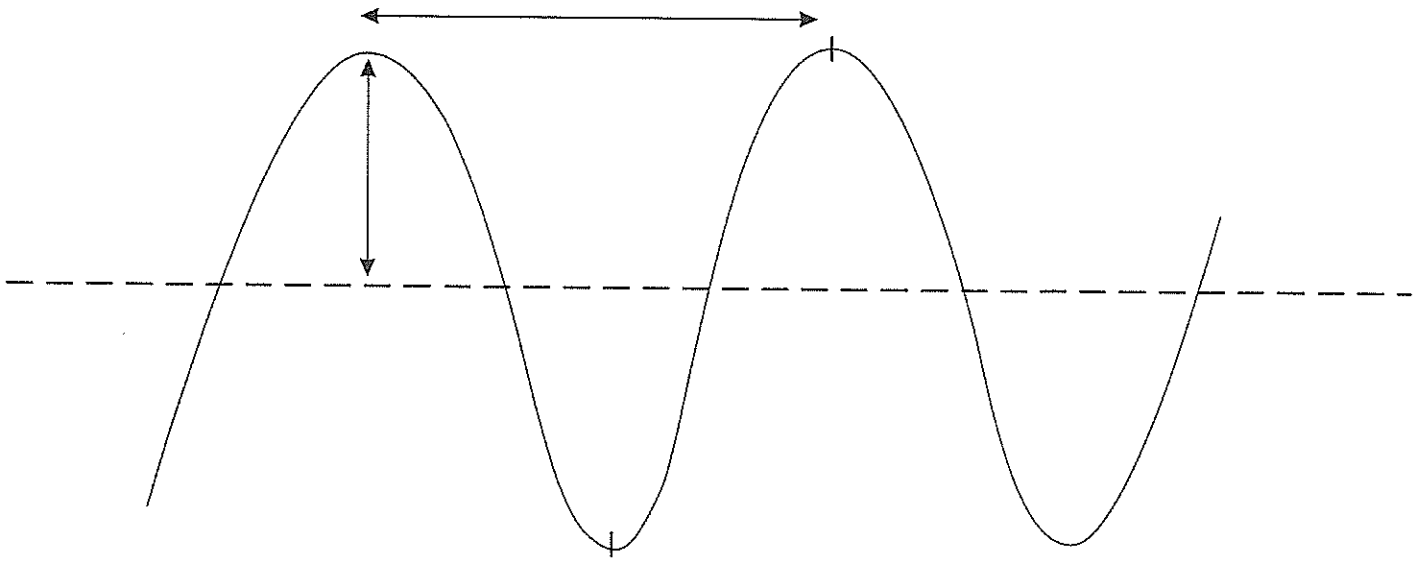
WAVE DIAGRAMS

The diagram below depicts a wave. Label the diagram with the following terms in the appropriate locations: amplitude, crest, rest position, trough, wavelength.



Provide a definition or description for the terms below.

Amplitude _____

_____

Wavelength _____

_____

Crest _____

_____

Trough _____

_____

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CALCULATIONS USING PROPERTIES OF WAVES

Velocity = Wavelength x Frequency	Unit of velocity = m/s Unit of frequency = hertz Unit of wavelength = m

Provide the answers to the questions below.

1. If a wave is moving toward shore with a velocity of 10.0 m/s and it has a frequency of 2.5 hertz, what is its wavelength?

   Answer:

2. If a tuning fork has a frequency of 320 hertz and the wavelength of the sound it produces is 1.5 meters, what is the velocity of the wave.

   Answer:

3. The speed of light in a vacuum is 3.0×10^{8} m/s. Red light has a wavelength of 7×10^{-7}, what is its frequency in a vacuum?

   Answer:

4. The frequency of violet light is 7.5×10^{14} hertz. What is its wavelength in a vacuum? (Note: use the speed of light given in the previous question)

   Answer:

5. If a jump rope is shaken fast enough to produce a wave with a wavelength of 0.5 m and the crest of the wave passes a specific point 6 times per second, what is the velocity of the wave?

   Answer:

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QUESTIONS ABOUT LIGHT PROPERTIES

Provide the letter of the definition or description in column II that matches the scientific terms in column I.

I		II	
1.	angle of incidence	a)	a continuous band of colors arranged according to frequency or wavelength
2.	angle of reflection	b)	an imaginary line drawn at a right angle to the surface of a material
3.	crest	c)	the bending of light rays as they pass through another substance
4.	frequency	d)	the distance between corresponding points on two waves
5.	hertz	e)	this is frequency times wavelength
6.	index of refraction	f)	the highest point of a wave
7.	light	g)	the lowest part of a wave
8.	normal	h)	the number of waves that pass a given point in one second
9.	photon	i)	a single particle of light
10.	prism	j)	describes how much a ray of light will bend as it travels through a specific material
11.	reflection	k)	the angle at which a ray "bounces off" a surface
12.	refraction	l)	the angle at which a ray of light strikes a surface
13.	trough	m)	the bouncing of a wave off another object
14.	visible light spectrum	n)	a clear or translucent material that separates white light into component colors
15.	wave velocity	o)	a type of electromagnetic radiation
16.	wavelength	p)	the unit for frequency

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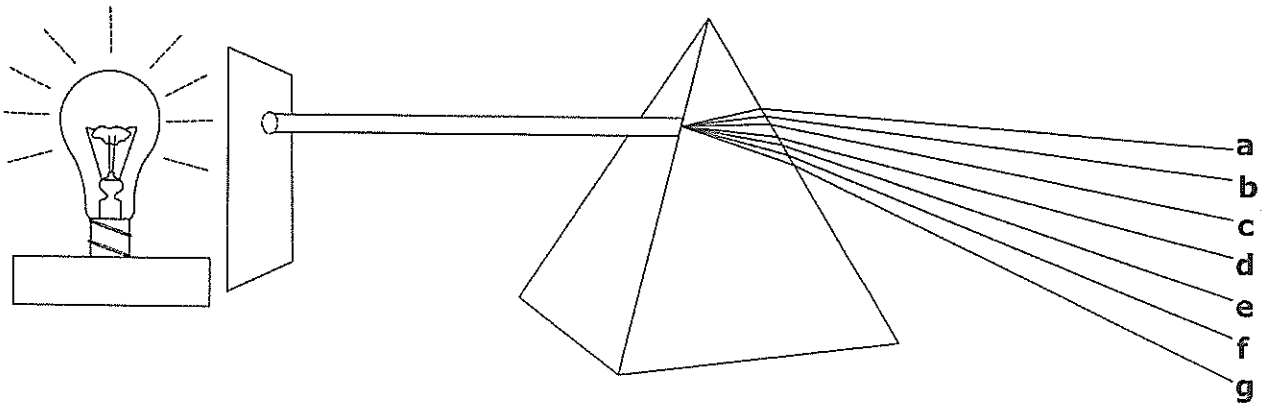
PRISMS AND THE WHITE LIGHT SPECTRUM

The diagram below depicts a beam of white light passing through a prism. On the blanks below, provide the colors that correspond to the labeled light rays exiting the prism.



a) _____

b) _____

c) _____

d) _____

e) _____

f) _____

g) _____

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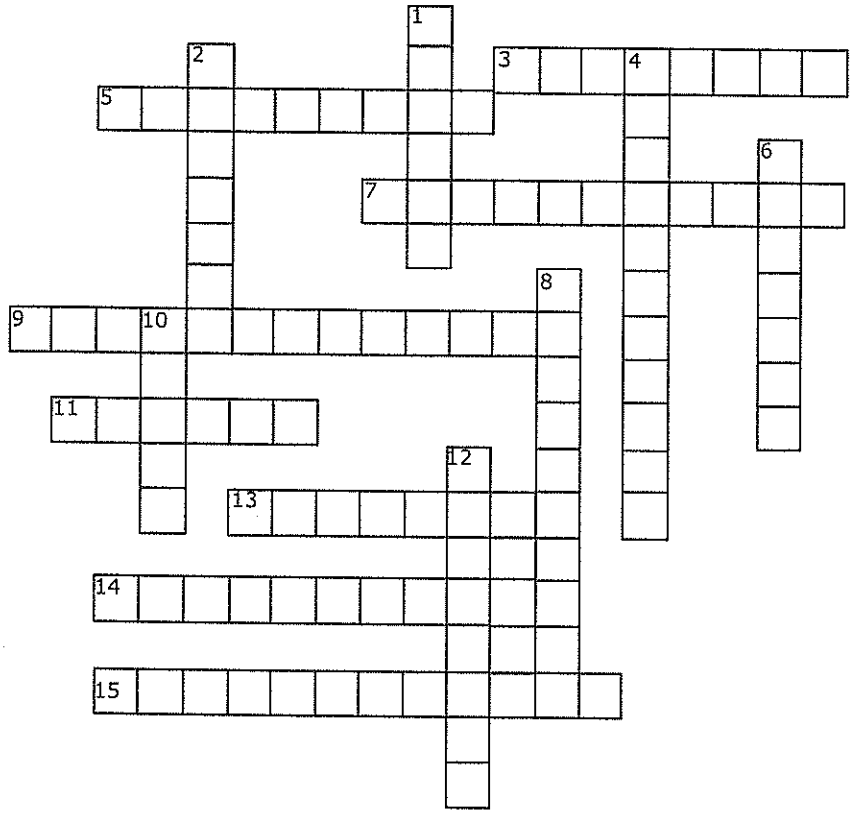
CROSSWORD PUZZLE: MUSIC AND SOUND



Across

3. This has a higher frequency than the fundamental frequency
5. The study and control of noise and the vibrations that cause or influence noise
7. The lowest frequency produced by an object making a musical sound.
9. A wave in which the matter vibrates in the same direction that the wave is traveling.
11. Term for the eight notes in a musical scale
13. As sound wave amplitude increases, this aspect of the sound increases
14. Term for the region where sound waves are pushed together
15. A combination of multiple sound waves can cause ___.

Down

1. Space with an absence of matter
2. A change in wave frequency caused by motion of the wave source
4. Term for the region where sound waves are pushed apart.
6. This is produced when overtones have frequencies that are whole number multiples of the fundamental frequency
8. These types of sounds cannot be heard by humans unassisted
10. This aspect of sound depends on the frequency of the sound waves
12. These units measure the intensity of sounds