Name: KEY

Period_____

Semester I Test Review

Chapter 1:

Select the correct term to complete each sentence. There are extra terms in the list.

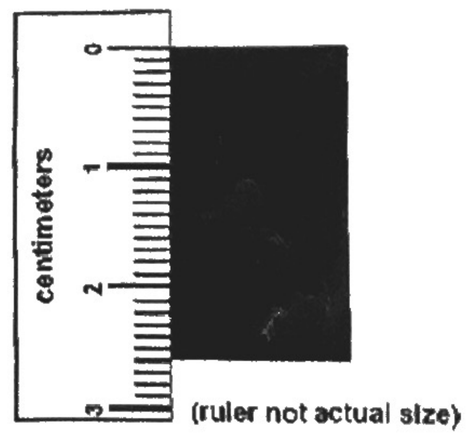
Direction	foot	12
~~unit~~	second	~~Dependent~~
measurement	English System	~~independent~~
kilometer	10	~~1~~
hour	Inverse	Length
SI	~~direct~~	~~meter~~

1. A proper measurement consists of a value and a unit.
2. The units of measurement used world-wide by scientists belong to the SI system.
3. Most road signs in the United States use EnglishSys. units.
4. The amount of space between 2 points is measured in units of length.
5. Although many units exist for measuring time, the basic unit of time for scientists is the second.
6. The basic SI distance unit is the meter.
7. A conversion factor is a ratio with a value of 1.
8. The variable plotted on the *x*-axis of a graph is usually the independent variable.
9. The responding variable in an experiment is the variable that can be influenced and is called the dependent.
10. If an increase in one variable causes an increase in another, the variables have a(n) direct relationship.

11. Convert 150 milligrams to grams.

150 mg → 1.150 grams

12. What is the length of the object pictured next to the metric ruler? Give your answer in centimeters and include the unit label in your answer.



(ruler not actual size)

2.60 cm

13. The school nurse measures Leo's height at 67 inches. What is his height in meters? Be sure to use correct significant digits. 1 inch = 2.54 centimeters

$$67\,\text{in} \times \frac{2.54\,\text{cm}}{1\,\text{in}} \times \frac{1\,\text{m}}{100\,\text{cm}} = \frac{170.18}{100} = 1.7\,\text{m}$$

Chapter 2:

Select the correct term to complete each sentence. There are extra terms in the list.

objective	~~experimental~~	engineer
scientific	~~control~~	natural law
method	~~prototype~~	hypothesis
~~engineering cycle~~	technology	
~~repeatable~~	scientist	

14. Scientific evidence that allows others who do the same experiment the same way to observe the same results is regarded as repeatable.
15. The underlying logic of science is a process of learning that begins with a hypothesis and is called the ~~engineering cycle~~ scientific method
16. The variable in an experiment that is changed by the investigator is known as the experimental variable.
17. During an experiment, a variable whose value is kept constant is a(n) control variable.
18. Scientific discoveries are used by a(n) ~~engineer~~ to design technology to solve problems.
19. A working model of a design that can be tested to see if it works is called a prototype.

20. You are designing an experiment to determine what factors will cause a hard candy to dissolve faster in water. You decide to see if changing the temperature of the water has any effect on how fast a candy dissolves. Answer the following questions based on this particular experiment.

What is the experimental variable in this candy experiment?

water temp.

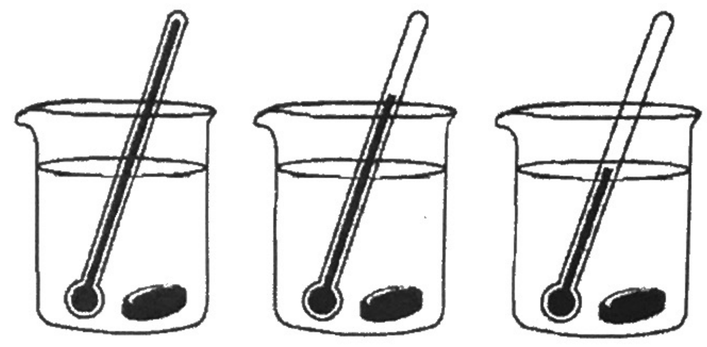


Figure 2-1

Why is it important to change only one experimental variable at a time in an experiment?

- to many variables changing makes it hard to figure out which one is causing the result.

21. Describe how you could present or communicate the results of a scientific experiment you worked on in class. How does this differ from the way a professional scientist would present results?

- discuss data + talk about it.
- write it down
- Prof. science
  - have to present data that needs to be reviewed.

Modified True/False

Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

F 22. The information you collect in an experiment in order to answer a question is called ~~evidence~~. data

T 23. The water temperatures of a pond measured with a thermometer would be considered *objective* scientific evidence. _____

T 24. *Inquiry* is the process of learning by asking questions. _____

F 25. If scientific evidence disproves a scientific theory, then the theory must be ~~wrong~~. _____

F 26. A prediction that can be tested with an experiment is known as a ~~variable~~. hypothesis

Chapter 4:

Select the correct term to complete each sentence. There are extra terms in the list

~~constant~~	~~acceleration~~	weak
speed	velocity	~~instantaneous~~
~~strong~~	~~free fall~~	distance
~~average~~	projectile	position

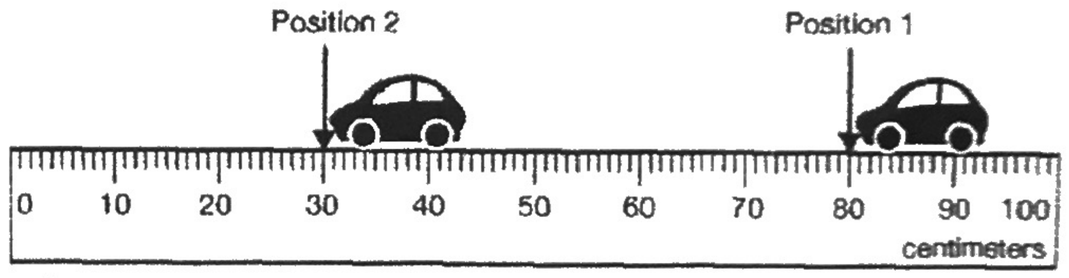
27. The total distance traveled divided by the total time of a trip is called Average speed.
28. Speed that stays the same is called Constant speed.
29. The speed you have at a specific point in your journey is best called instantaneous speed.
30. If a small change in one variable causes a large change in another, the relationship between the two variables is said to be strong.
31. An object falling only under the force of gravity is said to be in free fall.
32. The rate of change in the velocity of an object is called acceleration.

Choose the type of acceleration from the list below that would BEST describe the motion of the objects described. Types of acceleration may be used once, more than once, or not at all.

a. positive acceleration
b. negative acceleration
c. no acceleration

C. 33. A car traveling straight on a highway at 60 mph using cruise control
B. 34. A motorcycle slowing down
A. 35. A baseball dropped from the roof of a building
C. 36. A girl on a skateboard going around a corner at a speed of 3 m/s
C. 37. A truck parked at a rest area

38. A toy car travels along the centimeter ruler from position 1 to position 2 in 2.0 seconds. What was the **velocity** of the car?



50 cm

$V = \frac{50\text{ cm}}{2\text{ sec}} = 25\text{ cm/s}$

39. The skater shown below is skating at a constant speed in a circle. Is the skater shown in **Figure 4-2** accelerating? Explain your answer. If the skater in **Figure 4-2** is accelerating, in which direction is the acceleration?

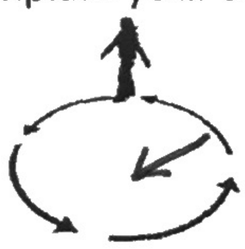


Figure 4-2

Yes. b/c no change in speed, but change in direction. in.

4.3

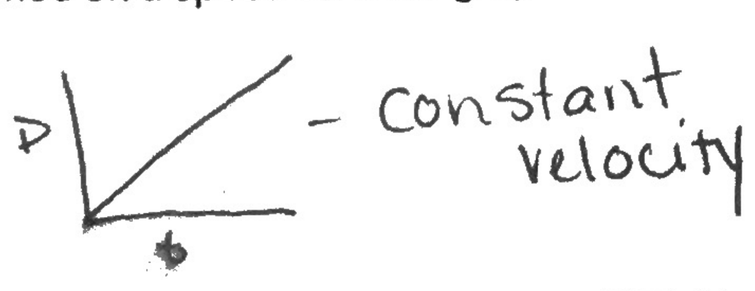
40. Apoorva runs 1500. meters in 300. s. What is her speed?

$= \frac{1500\text{ m}}{300\text{ s}} = 5\text{ m/s} \rightarrow 5.00\text{ m/s}$

41. Maria rolls a ball down her driveway. The ball leaves her hand traveling at 2 m/s and is traveling at 10 m/s after 4 seconds. What is the acceleration of the ball? Show your work.

$\frac{10-2}{4} = \frac{8}{4} = 2\text{ m/s}^2$

42. Describe the difference between **constant velocity** and **constant acceleration**. Sketch what each would look like when graphed on a speed vs. time graph?



Chapter 5:

Select the correct term to complete each sentence. There are extra terms in the list.

greater than	~~friction~~	~~pound~~
less than	tension	kilogram
~~equal to~~	compression	~~net~~
~~vector~~	~~normal~~	equilibrium
scalar	~~newton~~	free-body

43. If you traveled to Mars, your mass would be equal to than your mass on Earth.
44. Force is a(n) vector because it has both an amount and a direction.
45. The pound is the English unit of weight equal to about 0.454 kg of mass.
46. The SI unit of force required for a 1-kg object to accelerate at 1 m/s2 is the Newton.
47. A force that resists the motion of objects or surfaces as they move over one another is called friction.
48. The force exerted by a surface on an object that is pressing on it is the normal force.
49. The force which is the sum of all forces acting on a object is called net force.
50. A diagram shows all the forces acting on an object is a free-body diagram.

51. What does it mean when the net force on an object is zero?

No outside forces acting on the object/moving at constant speed

52. An astronaut brings her lucky horseshoe on a mission to the Moon. Answer the following questions about this horseshoe. Would the lucky horseshoe's **mass** on the Moon be the same, greater than, or less than the mass of the horseshoe when it is on the Earth? Explain your answer.

mass = same b/c takes up the same amount of space.

53. Explain how the same object could weigh 50 pounds on Earth and 8.3 pounds on the Moon.

$W = m \times g$ — different force of gravity = different affect.

54. According to legend, Galileo dropped two balls from the Tower of Pisa to see which would fall faster. Suppose one of the balls had a mass of 5.0 kilograms. Given the acceleration of gravity is 9.8 m/s², what was the weight of the ball in newtons?

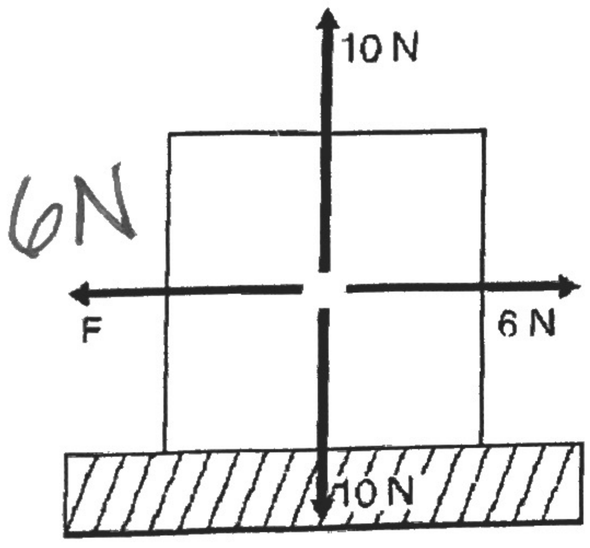
$N = kg \cdot m/s^2$

$W = m \times g$

$W = 5.0\,kg \times 9.8\,m/s^2$

49 N

55. The diagram below represents an object moving to the right with a constant velocity. What is the value of force *F*?



$F = 6N$

56. Why does it take longer for a skidding car to stop on an icy road than on a dry road?

less friction present.

hapter 6:

Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.

F 57. The inertia of an object is determined by its ~~*acceleration*~~. mass

F 58. The "law of inertia" is a name sometimes used to refer to Newton's ~~*second*~~ law. first

F 59. The sum of all forces acting on an object is given the name ~~*normal*~~ force. net force

T 60. The acceleration of an object is inversely related to the *mass*.

F 61. The law of conservation of ~~*energy*~~ can be used to predict motion of interacting objects after they collide. momentum

Select the correct term to complete each sentence. There are extra terms in the list.

first	momentum	balanced
second	equal	normal
third	acceleration	unbalanced
inertia	force	equilibrium

62. An object at rest tends to stay at rest and an object in motion tends to stay in motion in a straight line summarizes a portion of Newton's first law.

63. If the net force on an object is zero, the forces acting on it are equal.

64. The property of an object that resists a change in its motion is called inertia.

65. Any action that is able to change the motion of a body is called a(n) force.

66. A(n) unbalanced force may cause an object to accelerate.

67. Increasing the force on an object increases its acceleration.

68. The scientific law that states that every action force causes a reaction force of equal size in the opposite direction is Newton's third law.

69. Every force creates a reaction force that is equal in strength and opposite in direction.

70. A carpenter pounds a 0.005-kg nail into a board using a 1.000-kg hammer. If the hammer applies a force of 50 newtons on the ~~hammer~~ nail, what force does the nail apply on the hammer?

50N, 3rd Law

71. When you walk, you push against the ground with your feet. What pushes **you** and allows you to move forward? Use Newton's third law to explain walking.

ground pushes you back. 3rd Law

72. Calculate the momentum of a 20-kilogram cart moving at a speed of 2.0 meters per second.

$p = m \times v$ $p = 20 \times 2 = 40\ kg \cdot m/s$

73. A 50-kg boy standing on a friction-free skateboard throws a 5.0-kg ball backward off the skateboard at a speed of 10 m/s. At what speed does the boy move forward?

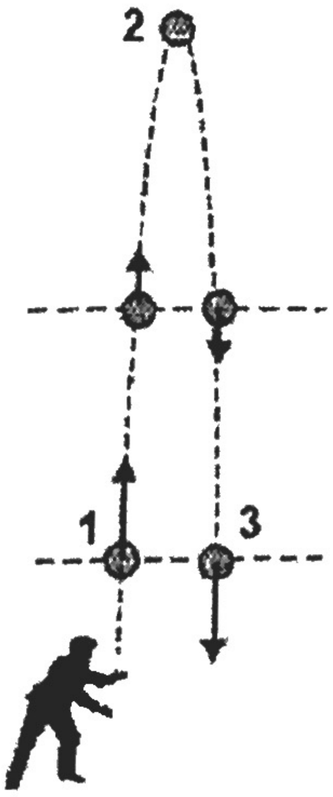
$m_1 v_1 = m_2 v_2$

$(50) v_1 = 5 \times 10$

$50 v_1 = 50$

$v_1 = 1.0\ m/s$

Chapter 7:



74. A ball is thrown from position (1) to a height of 3 meters (position 2) to give it potential energy. The ball then falls to position (3). Assuming there is no energy loss due to friction **compare:**

a. kinetic energy at position (1) with kinetic energy at position (3)

KE = same

b. potential energy at position (2) with kinetic energy at (3)

PE - highest @ 2 lower @ 3

75. How much kinetic energy does a 1,000-kg car have when it is traveling at 30 m/s?

$E_K = \frac{1}{2} m v^2 = \frac{1}{2}(1000)(30)^2 = 450{,}000\,J$

76. A 4.0-kg steel ball is dropped from a platform 15 meters above the ground.

a. Find the kinetic energy of the ball just before it hits the ground.

$E_p = E_k \qquad E_p = mgh = (4.0)(9.8)(15) = 588\,J$

b. What is the speed of the ball just before it hits the ground?

$mgh = \frac{1}{2}mv^2 \qquad (9.8)(15) = \frac{1}{2}v^2$

$\sqrt{v^2} = \sqrt{294}$

$v = 17\,m/s$

77. How are work and energy related?

Work is tranfer of energy

$W = F \times d$

CHAPTER 16 - Electricity

Matching: *Select the correct term to complete each sentence. There are extra terms in the list.*

Semiconductor	~~resistor~~	superconductor
~~current~~	~~voltage~~	~~chemical~~
positive	negative	~~neutral~~
~~ammeter~~	~~circuit~~	~~static~~
increase	~~decrease~~	circuit breaker

78. Electricity flows through a complete path called a(n) circuit.
79. An object that has equal amounts of positive and negative charge is considered to be electrically neutral.
80. The tiny imbalance of charge that develops on your body as you scuff your feet along a carpet is called static electricity.
81. Charge is caused to flow by the difference in the _____ between two points in circuit.
82. A battery transforms chemical energy into electrical energy to move charges.
83. Devices that can be used to measure current in a circuit include the multimeter and the ammeter.
84. Fuses protect a circuit from too much current by creating a break in the circuit but must be replaced. A device that may be reset while providing the same protection is a(n) resistor.
85. Materials through which charge flows with no loss of energy as heat or light are called semiconductor
86. According to Ohm's law, resistance is the ratio of current to voltage.
87. As more resistors are added in parallel, the total circuit resistance decreases.
88. You install two batteries in a flashlight so that their positive ends are connected together. Will the flashlight work? Why or why not?

No, b/c current goes + to −

89. Give two examples for each of the following: a conductor, an insulator and a semiconductor.

conductor: iron, paper clip
insulator: string, wood
semiconductor: silicon

90. Describe a resistor and its function in a circuit.

Resistor: slows down the current

91. According to Ohm's Law, how are current and voltage related?

$I = \frac{V}{R}$ $\frac{V}{I} = R$

92. According to Ohm's Law, how are current and resistance related?

$I \cdot R = V$

93. A miniature light bulb with a resistance of 3 ohms is connected to a 6-volt source. How much current will flow through the bulb?

$\frac{6\text{ V}}{3\Omega} =$ 2 amps

94. Typically, household appliances operate at 120 volts. What is the resistance of a microwave if 4 amps of current flow in the circuit of a microwave?

$4\text{amps} = \frac{120\text{ V}}{R}$

$\frac{120}{4} =$ 30 Ω

CHAPTER 17 – Magnetism

Modified True/False: *Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.*

95. F The difference between true north and the direction a compass needle points is called magnetic ~~*inspiration*~~. declination.

96. F The type of magnet created when a coil of wire carries an electric current is called a ~~*permanent magnet*~~. electromagnet

97. F The device that switches the direction of the electric current in the electromagnet of an electric motor is called the ~~*rotor*~~ commutor

98. F An electric ~~*generator*~~ changes electrical energy to mechanical energy. motor

Matching: *Select the correct term to complete each sentence. There are extra terms in the list.*

alternating	direct	~~permanent magnet~~	electric
generator	electromagnet	magnetic	electromagnetic induction motor
north	positive	renewable	south
negative	~~nonrenewable~~	positive	~~magnetic field~~

99. The influence created by a magnet that exerts forces on other magnets and magnetic material is called a(n) magnetic field

100. A device that keeps its magnetic properties even when it is not close to other magnets is known as a(n) permanent magnet.

101. A material that is attracted to a magnet, but never repelled, is described as magnetic

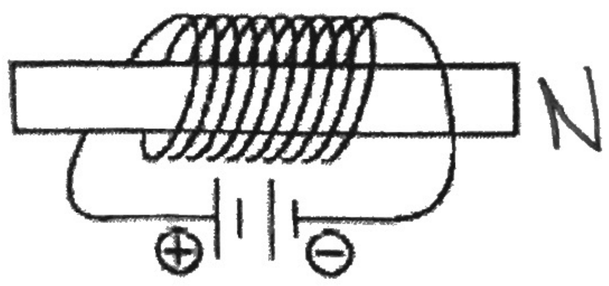
102. The opposite ends of a magnet are identified as N and S poles.

103. A device that changes mechanical energy to electrical energy is a(n) generator

104. The process of using a moving magnet to create an electric current is called electromagnet.

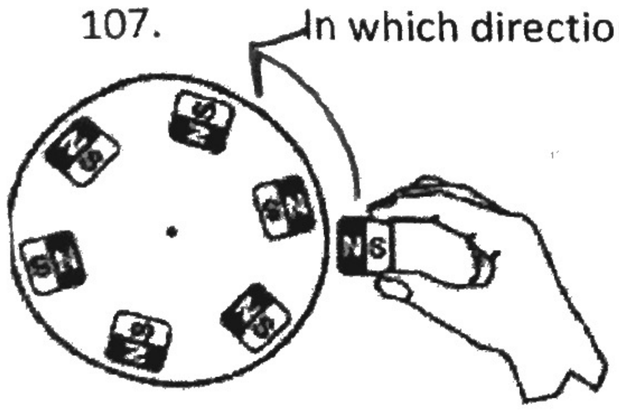
105. A natural resource that is not replaced as it is used is called a(n) non-renewable resource.

106. Which end of the electromagnet pictured below would be labeled north pole or "N"? Explain your answer.



Right-hand Rule

107. In which direction will the rotating disk below spin? Explain your answer.



counter-clockwise.

108. Describe how to induce current to flow in a coil of wire.

1. more voltage.
2. more coils of wire.

109. Define frequency: cycles per 1 sec.

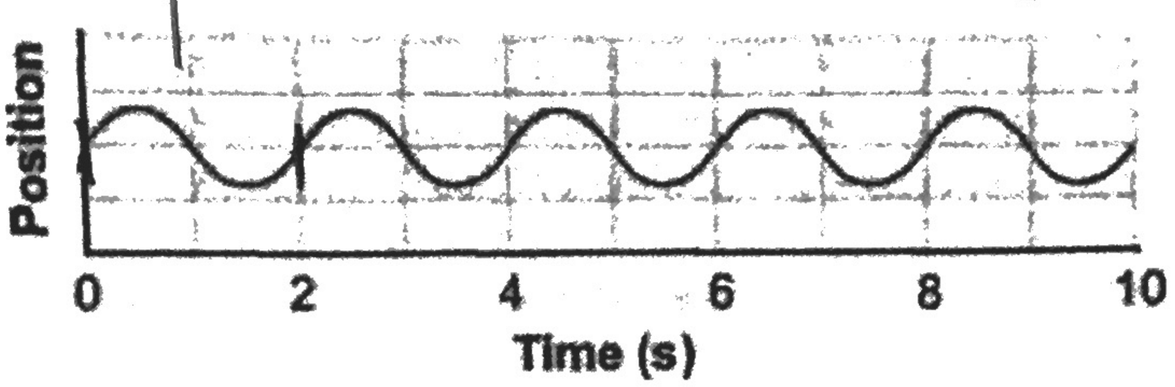
110. Define period: Time it takes to complete one cycle

111. An object with repeating cycles of motion is a(n) harmonic.

112. One unit of harmonic motion is called a(n) cycle.

113. The maximum distance an oscillator moves from its equilibrium position is called its amplitude.

114. What is the period of the oscillation shown below?

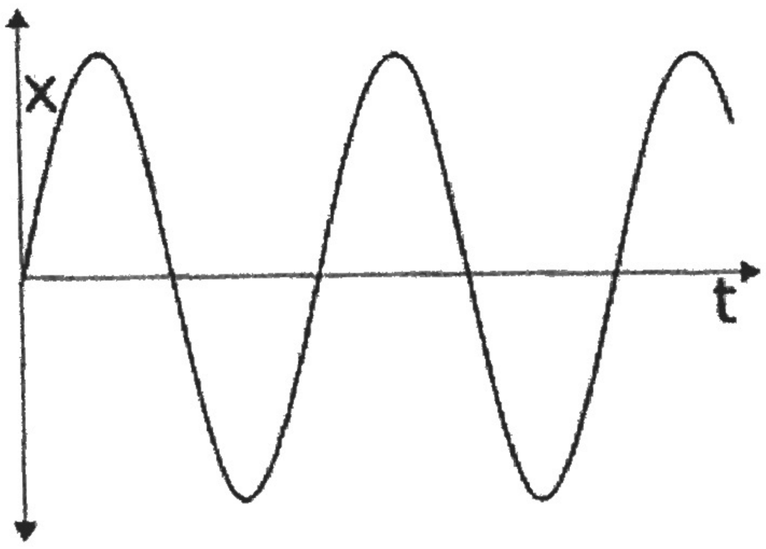


T = 2s

115. State whether the following are linear or harmonic motions.

a. skiing downhill linear
b. riding on a merry-go-round harmonic
c. hiking uphill linear
d. jumping on a trampoline harmonic

116. Draw an arrow on the diagram below that shows the amplitude of the wave.



117. What will happen to the period of a pendulum if you:

a. Increase its mass? same.
b. Increase its length? longer
c. Increase the amplitude? same.

118. A swing has a period of 7 seconds. What is its frequency?

$T = \frac{1}{f}$ $f = \frac{1}{T} =$ .143 ~~Hz~~

119. An oscillator makes 8 vibrations in 1 second. What is its period and frequency?

8 Hz, $T = \frac{1}{8} = .125s$

120. A wave has a frequency of 5 hertz and a wavelength of 6 meters. Calculate the speed of the wave.

$v = f\lambda$

$v = (5)(6)$

30 m/s

121. Below are diagrams representing interactions between waves and boundaries. Identify each interaction by name.

A Reflection B Absorption C Diffraction D Refraction

122. Read the descriptions below and indicate which of the four types of wave interactions (*absorption*, *reflection*, *refraction*, or *diffraction*) has occurred for each.

a. The distortion of your partially submerged arm makes it look "broken" when viewed from the air. ~~Diffraction~~ Refraction

b. You hear the music even though you are seated behind an obstruction at a concert. diffraction

c. You see yourself when you look at a polished car hood. Reflection

d. Heavy curtains are used to help keep a room quiet. Absorption