



Ponce de Leon Middle School

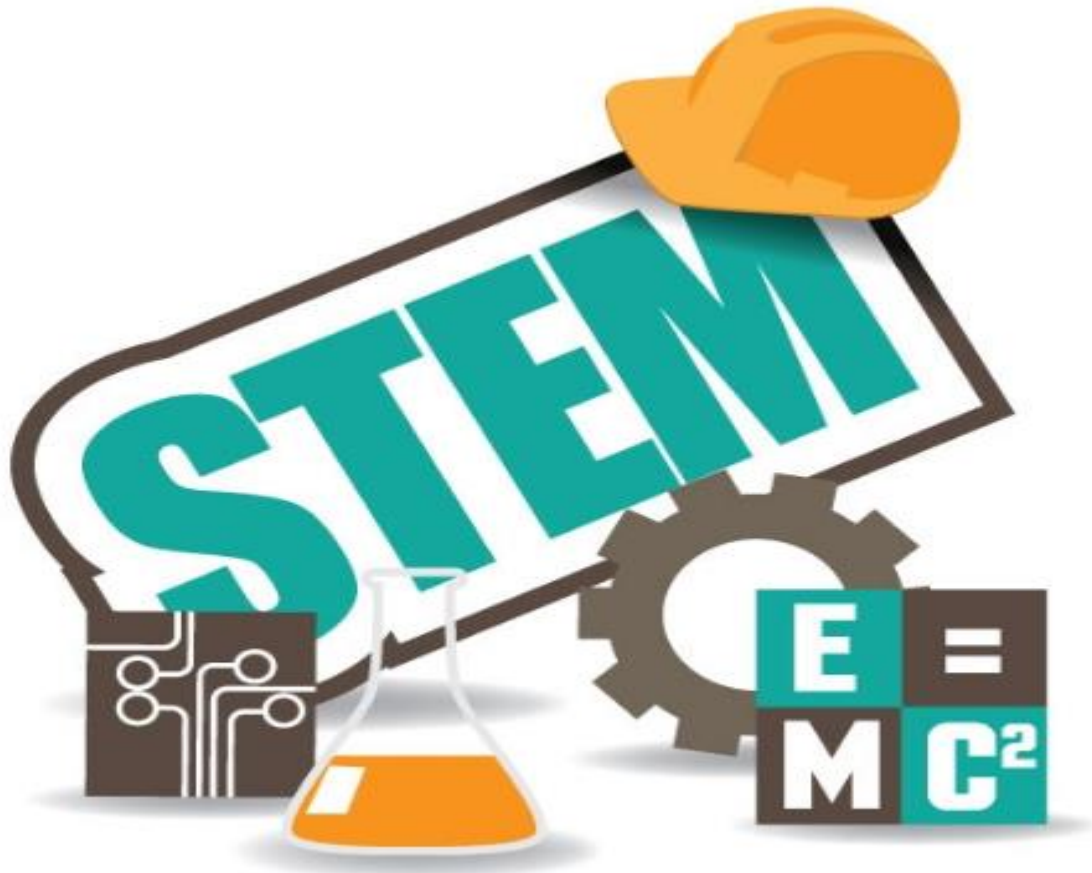
Physical Science Honors

Summer 2018 Instructional Packet



DIRECTIONS:

1. You are required to complete the Summer Instructional Packet.
2. Turn in your completed package to your Science teacher, when you return to school in August.



Physical Science Summer '18 Instructional Review Package

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

- 1 A scientific hypothesis:
 - A is one that can be tested.
 - B is a prediction of the outcome of an experiment.
 - C may be modified as new evidence becomes available.
 - D may be described by all of the above.
- 2 Natural laws are:
 - F rules that explain how all things in the entire universe always behave.
 - G a process of discovering the answers to questions.
 - H a preliminary explanation.
 - I a form of inquiry.
- 3 All of the following are very important parts of learning through inquiry EXCEPT:
 - A asking questions instead of being given answers.
 - B proposing explanations.
 - C collecting evidence to evaluate your hypotheses.
 - D always getting the right answer immediately.
- 4 Which of the following hypotheses could be tested by an experiment?
 - F A chocolate bar tastes better than potato chips.
 - G The harder you push a small wagon, the faster it goes.
 - H Aliens control everything that happens on Earth.
 - I All of the above

Jordan noticed that as he stood farther away from his desk lamp, the light from the lamp seemed dimmer. He borrowed a light meter from his brother, who is a photographer, and decided to test his observation.

- 5 Jordan used a light meter to measure the brightness of his lamp at various distances. Distance is the:
 - A control variable.
 - B hypothesis.
 - C analysis.
 - D experimental variable.
- 6 Which of the following information is scientific evidence that could be used to evaluate Jordan's hypothesis?
 - F A sketch of the layout of his room showing the lamp and the brightness of the light at different distances.
 - G A paragraph describing exactly how far away Jordan was from the light and what the light meter reading was each time.
 - H A chart of the light meter measurements at different distances.
 - I All of the above

A friend tells you that a different size of ball bearing might make your skateboard move faster. You try three different sizes and keep track of the time to roll 50 feet. You write down exactly how you tried the ball bearings on your skateboard and make a chart of the time it took to roll the 50 feet for each size ball bearing.

- 7 Which of the following could be considered control variables?
 - A The skateboard, the ball bearings
 - B The skateboard, the distance rolled
 - C The ball bearings, the time it took to roll
 - D The ball bearings, the distance rolled

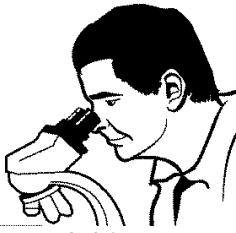


Figure 3-2A

8 **Figure 3-2A** shows a person looking through a microscope at a sample.

Which part of the picture shows technology?

- F The person
- G The microscope
- H The sample
- I The eyes

9 How can scientists reduce the bias in their experiments?

- A By being truthful in reporting their results
- B By reporting only the results that support their conclusions
- C By getting their results on the news
- D All of the above

10 The equation which correctly represents the relationship between speed, distance, and time is:

- F $v = t \times d$
- G $d = v \times t$
- H $v = t/d$
- I $d = v/t$

11 A plane flies 200 km West and then flies 300 km South. Its new position is:

- A +200km, +300km
- B +300km, -200km
- C -200km, +300km
- D -200km, -300km

12 If an automobile travels at 30. m/s for 2 minutes, how far has the car traveled?

- F 60. m
- G 1,800 m
- H 3,600 m
- I 216,000 m

13 A graph can be described as:

- A a mathematical diagram.
- B a scientific model.
- C a way to show relationships between variables.
- D All of the above

14 When constructing a graph, the x -axis is most closely related to:

- F the dependent variable.
- G the vertical axis.
- H the independent variable.
- I the slope.

- 15 If large changes in the independent variable cause small changes in the dependent variable:
- A the relationship is strong.
 - B the relationship is inverse.
 - C the relationship is weak.
 - D there is no relationship between variables.

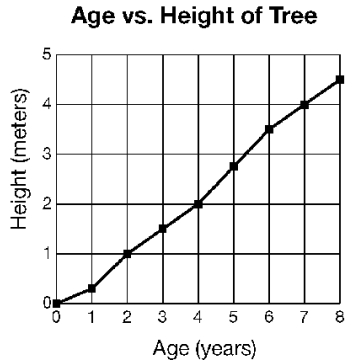
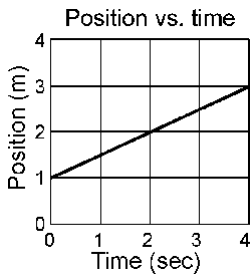


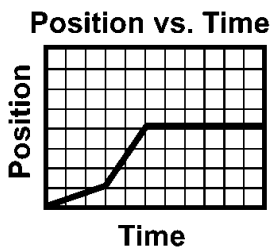
Figure 4-1A

The above graph is of the height of an avocado tree plotted against its age from the time it is planted to when it is 8 years old.

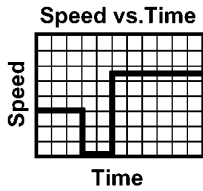
- 16 Use **Figure 4-1A** to choose which of the following would be the best prediction of the avocado tree's height when it is 10 years old?
- F 4.5 m
 - G 5 m
 - H 5.5 m
 - I 10 m
- 17 Calculate the speed of the object from the position vs. time graph shown below.



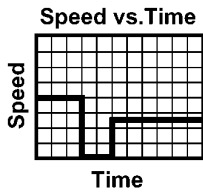
- A 0.5 m/s
 - B 0.75 m/s
 - C 2 m/s
 - D 3 m/s
- 18 Match the position vs. time graph with the correct speed vs. time graph.



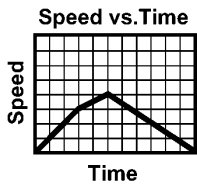
F



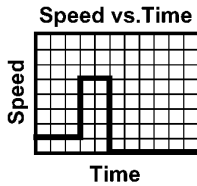
G



H



I



19 On the surface of Earth, the force of gravity acting on one kilogram is:

- A 22 pounds
- B 9.8 pounds
- C 2.2 newtons
- D 9.8 newtons

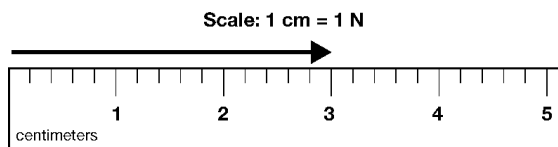
20 Weight is a force that depends on mass and:

- F friction.
- G gravity.
- H magnetism.
- I energy conservation.

21 Which of the following is one of the Four Elementary Forces?

- A Tension
- B Vector
- C Newton
- D Gravity

22



Which is the best description for the force vector drawn above?

- F +3 cm
- G +3 N

H -3 cm

I -3 N

- 23** What is the mass of a rock that weighs 49 newtons?
A 1 kilogram
B 2 kilograms
C 5 kilograms
D 10 kilograms
- 24** Brandon weighs 600. newtons. What is his mass?
F 0.0163 kg
G 9.8 kg
H 61.2 kg
I 2940 kg
- 25** Of the following measurements, the one that would be incomplete without giving a direction is:
A time.
B temperature.
C length.
D force.
- 26** A vector, such as force, can be represented by drawing an arrow. Which of the following statements is CORRECT?
F The length of the arrow indicates the direction of the force.
G The length of the arrow indicates the strength of the force.
H The length of the arrow indicates the unit of force used.
I The point of the arrow indicates the strength of the force.
- 27** On a vector drawing, Alexi decides to use a scale of 1.0 cm = 2.0 N. The force represented by an arrow 3.5 cm long would be:
A 1.0 N
B 2.0 N
C 3.5 N
D 7.0 N
- 28** The tread on the bottom of your sneakers is designed to:
F increase the friction between your foot and the ground.
G decrease the friction between your foot and the ground.
H not affect the friction between your foot and the ground.
I change the direction of the friction between your foot and the ground.
- 29** How can the force of friction between two surfaces be reduced?
A By changing rolling friction to sliding friction.
B By making smooth surfaces rougher.
C By separating surfaces with a lubricant.
D By increasing the force between the surfaces.
- 30** A net force must be applied to an object to do all of the following EXCEPT:
F turn.
G maintain constant speed.
H slow down.
I stop moving.
- 31** When the forces on an object are balanced, we say that the object:
A is in equilibrium.
B is accelerating.

- C must be at rest.
- D must be moving at a constant speed.

- 32 The inertia of an object is related to its:
- F mass and speed.
 - G mass and force.
 - H mass only.
 - I speed only.

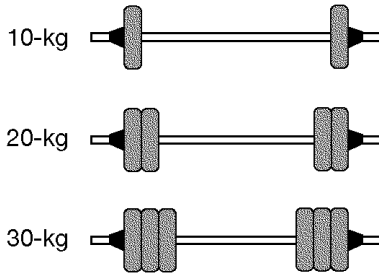


Figure 6-1A

- 33 If each of the barbells in **Figure 6-1A** were pushed with a force of 100 newtons, which would be harder to move?
- A The 10-kg barbell
 - B The 20-kg barbell
 - C The 30-kg barbell
 - D They would all move equally
- 34 A tow truck pulls a 2,000-kg car with a net force of 4,000 N. What is the acceleration of the car?
- F 0.5 m/s^2
 - G 2 m/s^2
 - H 200 m/s^2
 - I $2,000 \text{ m/s}^2$

In the graph below, the acceleration of an object is plotted against the net force applied to the object.

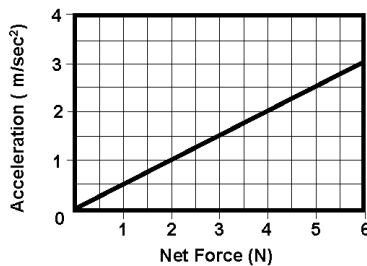


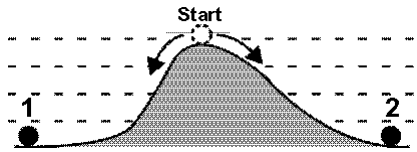
Figure 6-2A

- 35 The mass of the object being accelerated in **Figure 6-2A** is:
- A 0.2 kg
 - B 0.5 kg
 - C 1 kg
 - D 2 kg
- 36 “Forces occur in pairs” is another way of stating Newton’s:
- F first law of motion.
 - G second law of motion.

- H third law of motion.
 - I universal law of motion.
- 37** Even though every action force has an equal but opposite reaction force, they do not cancel one another and motion may still occur because the:
- A action and reaction forces are applied to the same object.
 - B action and reaction forces are applied to different objects.
 - C two forces have different magnitudes.
 - D two forces have equal magnitudes.
- 38** A boy and the skateboard on which he is standing have a combined mass of 60 kilograms. He throws a 1-kilogram rock forward at 20 m/s. At what speed will the boy roll backward?
- F 0.33 m/s
 - G 3.0 m/s
 - H 30 m/s
 - I 1,200 m/s
- 39** A force of 50 newtons is exerted by a bat on a baseball. The force exerted by the baseball on the bat is:
- A less than 50 newtons.
 - B 50 newtons.
 - C more than 50 newtons.
 - D Cannot be determined from the data
- 40** You stand on a skateboard and push off the ground with one of your feet. The reason that the skateboard moves forward is that the force you apply to the skateboard:
- F equals the force applied to you by the skateboard.
 - G is larger than the force applied by you to the skateboard
 - H equals the force applied by the ground to the skateboard.
 - I is larger than the force applied by the ground to the skateboard.
- 41** Energy is measured in:
- A newtons.
 - B joules.
 - C kg/m^2
 - D $\text{kg}\cdot\text{m/s}^2$
- 42** What is a requirement of doing work?
- F Speed
 - G Energy
 - H Mass
 - I Weight
- 43** Kinetic energy increases with:
- A mass and distance.
 - B mass and speed.
 - C speed and distance.
 - D speed and time.
- 44** What happens to the kinetic energy of a moving car if you double the mass of the car?
- F It increases by 4 times
 - G It increases by 2 times
 - H It decreases by 4 times
 - I It decreases by 2 times.
- 45** What is the kinetic energy of a go-cart with a mass of 150 kilograms and a speed of 20. m/s?
- A 1,500 J

- B 3,000 J
- C 30,000 J
- D 60,000 J

- 46 Ball #1 is rolled down the steeper side of a hill while ball #2 rolls down the opposite side which is less steep. Both balls roll out onto a flat surface at the same level. Assuming there is no friction, how do the speeds of the balls compare when they reach the flat surface?



- F Ball #1 has the greater speed.
 - G Ball #2 has the greater speed.
 - H The speed will be the same for both balls.
 - I Not enough information is given.
- 47 Which of the following is a TRUE statement?
- A Electric power plants make energy.
 - B Once all the oil and gas on Earth is used up, all Earth's energy will be gone.
 - C Power plants convert other sources of energy into usable electrical energy.
 - D Every time you turn on a light, you destroy a little more of Earth's total energy.
- 48 Work may be measured using units of:
- F watts.
 - G newtons.
 - H joules.
 - I newtons per second.
- 49 The equation used to calculate work when force is applied to move an object some distance is:
- A $\text{Work} = \text{force} + \text{distance}$
 - B $\text{Work} = \text{force} \div \text{distance}$
 - C $\text{Work} = \text{distance} \div \text{force}$
 - D $\text{Work} = \text{force} \times \text{distance}$
- 50 What is the most work that can be done with 100 joules of energy?
- F 10 J
 - G 100 J
 - H 1,000 J
 - I 10,000 J
- 51 Robert lifts a 150-newton bucket of water 0.5 meters in 3 seconds. What is the amount of work done on the bucket?
- A 25 joules
 - B 25 watts
 - C 75 joules
 - D 75 watts
- 52 Jake, who weighs 680 newtons, climbs a 6 meter ladder in 8 seconds. What was Jake's power?
- F 510 watts
 - G 4080 watts
 - H 5440 watts
 - I 32640 watts
- 53 Efficiency is defined as the ratio of:

- A work input to the work output.
- B work output to work input.
- C output force to input force.
- D input force to output force.

54 The measure of how effective a machine is in using energy to do work is called:

- F work output.
- G transformation.
- H mechanical advantage.
- I efficiency.

55 If a 75-percent efficient machine produces 7,500 joules of output work, what is the machine's maximum input work?

- A 0.0001 joules
- B 5,625 joules
- C 10,000 joules
- D 1,000,000 joules

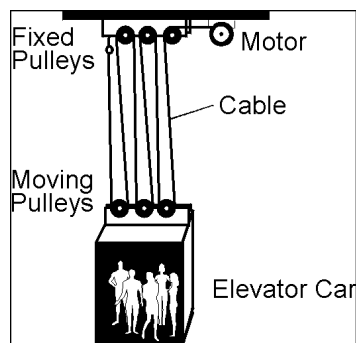
56 Jordan lifts a 100-kilogram barbell from the floor to a height of 2.0 meters in 1.5 seconds. The amount of power he generates is about ____ watts.

- F 130
- G 200
- H 1,310
- I 1,960

57 An incandescent light bulb uses 60 joules of electrical energy every second. Due to heat loss, the energy available for light is reduced to only 6 joules per second. If this bulb is used to keep eggs warm in an incubator, about how efficient is the light bulb at producing HEAT?

- A 10 percent.
- B 20 percent.
- C 60 percent.
- D 90 percent.

58 A system of pulleys is used to lift an elevator carrying a 3,300-newton load. Assuming the pulley system is nearly friction-free, approximately how far would 10,000 joules of energy lift the elevator?



- F 0.3 meters
- G 3 meters
- H 30 meters
- I 300 meters

59 Heat is defined as the:

- A average kinetic energy of the molecules of an object.
- B amount of thermal energy an object contains.

- C average temperature of a substance.
 - D flow of thermal energy from one object to another object.
- 60 If you hold a paper cup containing hot chocolate in your hand, thermal energy:
- F does not flow.
 - G flows from the air to the hot chocolate.
 - H flows from the hot chocolate to your hand.
 - I flows from your hand to the hot chocolate.
- 61 The best reason to use water as a coolant is because water:
- A is a small molecule.
 - B is a fluid.
 - C conducts heat well.
 - D has a high specific heat.

Specific Heats of Some Common Substances

Substance	Specific Heat in calories/gram °Celsius
water	1.00
ethanol	0.584
aluminum	0.215
gold	0.031

Table 11-1

Refer to **Table 11-1** to answer the following questions.

- 62 The temperature of 500. grams of ethanol is increased by 5.00° Celsius. Based on **Table 11-1**, the increase in the thermal energy of the ethanol is:
- F 0.00068 calories
 - G 5.00 calories
 - H 292 calories
 - I 1,460 calories
- 63 One liter of water at 10° Celsius is added to one liter at 80° Celsius. What is the final temperature of the mixture?
- A 10° Celsius
 - B 45° Celsius
 - C 75° Celsius
 - D 90° Celsius
- 64 Which of the following is NOT a good insulator?
- F A pocket of air
 - G Foam packing material
 - H A down jacket
 - I Copper wire
- 65 The type of heat transfer which requires no matter in order for it to occur is called:
- A insulation.
 - B conduction.
 - C convection.
 - D radiation.
- 66 The phase of matter that makes the best **conductor** is:
- F solid
 - G liquid
 - H gas
 - I plasma

- 67** The best insulator is:
A goose down
B styrofoam
C a vacuum
D glass
- 68** Global wind cells and ocean currents are examples of heat transfer by:
F thermal conduction
G thermal radiation
H thermal equilibrium
I thermal convection
- 69** The amount of time required for one cycle to occur is called the:
A amplitude.
B frequency.
C harmonic.
D period.
- 70** In a mechanical system, the distance an oscillator moves from its average position is called:
F amplitude.
G cycle.
H frequency.
I period.
- 71** When damping occurs in a moving pendulum system, it causes the:
A mass of the pendulum to decrease.
B amplitude of the pendulum to decrease.
C length of the pendulum to increase.
D period of the pendulum to decrease.
- 72** A transverse wave:
F lasts no longer than one minute.
G oscillates perpendicular to the direction of wave travel.
H oscillates in the same direction as the direction of wave travel.
I has enough energy to travel at least 5,000 kilometers.
- 73** A longitudinal wave travels:
A only along the Earth's longitudinal lines.
B perpendicular to the direction of oscillations.
C in the same direction as the oscillations.
D perpendicular to a latitude wave.
- 74** Which of the following usually occurs inside a material instead of at the surface?
F Reflection
G Refraction
H Diffraction
I Absorption
- 75** As a wave front crosses a boundary between two different media, the wave front may change direction, an interaction known as:
A reflection.
B refraction.
C diffraction.
D absorption.

Completion - Complete each statement.

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

objective	scientific method	engineering cycle
repeatable	experimental	control
prototype	technology	scientist
engineer	x	y

76 During an experiment, a variable whose value is kept constant is a(n) _____ variable.

77 A(n) _____ uses scientific discoveries to design technology to solve problems.

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

constant	independent	dependent
average	acceleration	velocity
free fall	projectile	axis
origin	distance	position

78 Speed that stays the same is called _____ speed.

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

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

79 If you traveled to Mars, your mass would be _____ than your mass on Earth.

80 Force is a(n) _____ because it has both an amount and a direction.

81 The _____ is the English unit of weight equal to about 0.454 kg of mass.

82 The force which is the sum of two or more forces on a object is called _____ force.

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

first	second	third
energy	momentum	equal
greater than	less than	inertia
net	unbalanced	equilibrium

83 Every force creates a reaction force that is _____ in strength and opposite in direction.

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

increases	decreases	nuclear
chemical	mechanical	kinetic
potential	pressure	Btu
joule	energy	force

- 84 _____ is the ability of an object to change or cause changes.
- 85 The radiant energy given off by the Sun is formed from _____ energy.
- 86 As a car travels up a hill, its potential energy _____.

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

equilibrium	liquid	absorbs
thermal energy	solid	heat
natural convection	gas	thermal radiation
forced convection	emits	conduction
Btu	higher	kilocalorie
specific heat	lower	

- 87 If equal amounts of thermal energy were added to a solid, a liquid, and a gas, the **least** amount of expansion would generally occur in the _____.
- 88 The heat unit, Calorie, written with a capital C is also known as a _____.
- 89 When two substances in thermal contact starting at different temperatures reach the same temperature, their condition of thermal “balance” is called thermal _____.

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

damping	natural	harmonic
wavelength	speed	frequency
constructive	destructive	amplitude
transverse	longitudinal	speed

- 90 In one complete cycle, a wave moves forward one _____.

Problem

The students in Mr. Machado’s class worked on an investigation to measure the time it took the energy car to travel to different positions on a straight, level track. Using their data, they drew the **position vs. time** graph shown above. Use this graph to answer the following questions.

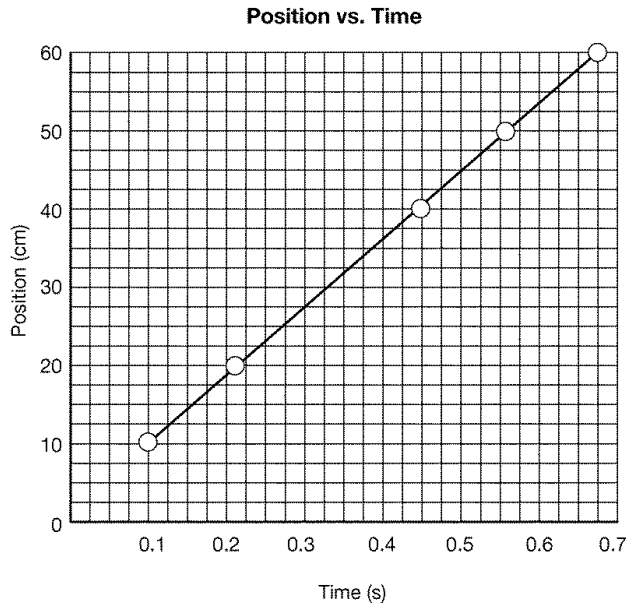


Figure 4-2

91 According to the graph in **Figure 4-2**, how long did it take the energy car to travel 30. cm?

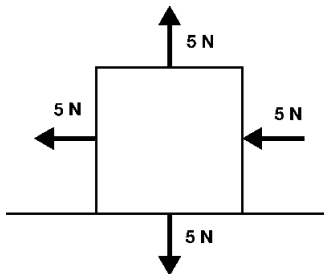


Figure 5-3

This box is being acted upon by forces in the up, down, left, and right directions. Use this diagram to answer the following questions.

- 92** Calculate the net force on the box shown in **Figure 5-3**.
- 93** Is the box in **Figure 5-3** accelerating? If not, what type of motion does it have?
- 94** One big chocolate cookie contains about 130 Calories of energy. One Calorie contains 4,184 joules. What is the amount of energy in joules in one big cookie?
- 95** Calculate the work required to move a 2,000-kilogram automobile to the top of a 100-meter hill.
- 96** How long will it take a machine to do 5000 joules of work if the power rating of the machine is 100 watts?

- 97 A 70-kilogram bicycle racer climbs a 500-meter hill by doing 400,000 joules of work. Calculate the efficiency of his bicycle.
- 98 A 4.50 kilogram block of wood at 20.0°C is uniformly heated using 90,000. joules of heat. What will be the resulting temperature of the block? (C_p for wood = 1,800. J/kg-°C)

Table 11-1

Food	Quantity	Joules	Calories
soda	12 ounces	502,000	120
spaghetti	1/2 cup	836,000	200
chicken	3 ounces	711,000	170
beef, lean	3 ounces	711,000	170
peanut butter	1 tablespoon	418,000	100

Table 11-2

Activity	Cal/hr.
running	850
swimming	300
biking	600
walking	210
studying	100
sitting	84
dancing	350

- 99 Based on **Tables 11-1** and **11-2**, how many hours of swimming will it take to burn off the Calories in one cup of spaghetti and two tablespoons of peanut butter?
- 100 If it takes Earth exactly 24 hours to rotate on its axis,
- What is the period of rotation for Earth measured in seconds?
 - What is the frequency of rotation for Earth measured in hertz?

Name: _____ Science Teacher: _____ Period: ____ Date: _____

NOTES: