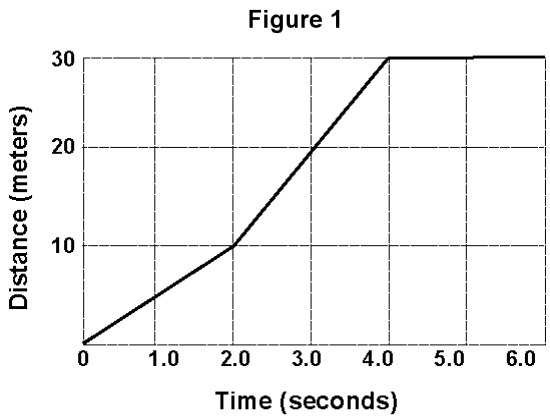
ANN ARBOR PUBLIC SCHOOLS
8th grade PHYSICAL SCIENCE
Second Semester STUDY GUIDE

P 2.1D -Describe and analyze the motion that a position-time graph represents, given the graph.
P 2.1A- Calculate the average speed of an object using the change of position and elapsed time.

The distance-time graph below represents the position of a bicycle rider moving in a straight line. Answer the questions below based on this graph and your knowledge of graphing.



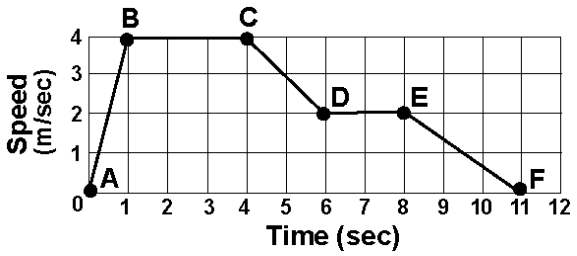
1) According to the graph in Figure 1, the average speed of the bicycle rider during the 6.0 seconds of the trip is: **(page 63)**
   A. 5 m/s
   B. 10 m/s
   C. 20 m/s
   D. 30 m/s

2) The variables you need to know to calculate speed are: **(page 36)**
   A. Force and motion
   B. Mass and volume
   C. Velocity and momentum
   D. Time and distance

P2.2B- Use the change of speed and elapsed time to calculate the average acceleration for linear motion.

3) Starting from rest, a ball rolling down an incline reaches a speed of 30 m/s after 6 seconds. The rate of acceleration of the ball is: $A = \frac{V_2 - V_1}{t}$
   A. 3 m/s^2
   B. 5 m/s^2
   C. 15 m/s^2
   D. 10 m/s^2

Figure 4



P.2.2C- Describe and analyze the motion that a velocity-time graph represents, given the graph.

4) During which interval on the graph in **Figure 4** is the cart experiencing a positive acceleration?
   A. during interval AB **(page 69)**
   B. during interval BC
   C. during interval CD
   D. during interval DF

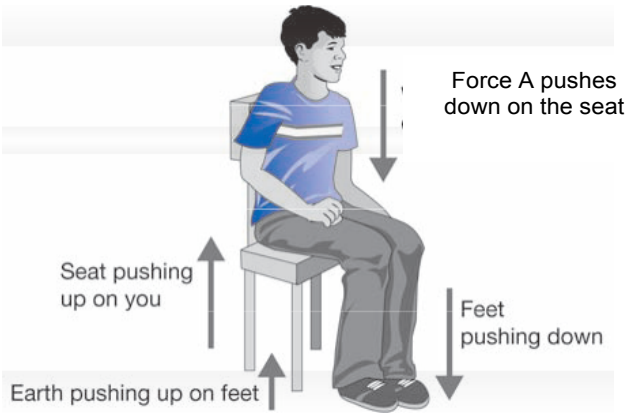
P2.2A- Distinguish between the variables of distance, displacement, speed, velocity, and acceleration.

5) Of the following measurements, the one that must include a direction would be:
   A. speed **(page 55)**
   B. temperature
   C. length
   D. velocity

P2.2D- State that uniform circular motion represents acceleration without a change in speed.

6) A satellite circles earth in a low orbit at a constant speed of 27, 400 km/hr. While maintaining a constant speed, the satellite is actually accelerating because a change is taking place in the:
   A. distance **(page 55)**
   B. time
   C. direction
   D. mass

P3.2A- Identify the magnitude and direction of everyday forces (e.g. wind, tension in ropes, pushes and pulls, weight).



7) In the picture above, what type of force is force A? **(page 110)**

A. friction
B. weight
C. Normal
D. mass

P3.2C-- Calculate the net force acting on an object.

4 forces are acting on an object as shown in the diagram below:

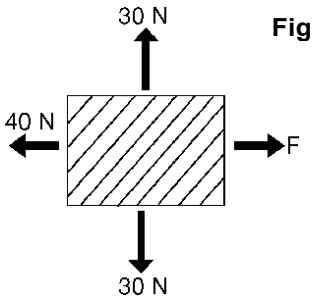


Figure 8

8) If the object in **Figure 8** is moving with a constant velocity, the size of force F must be: **(page 110)**

A. 0 N
B. 30 N
C. 40 N
D. 100 N

9) In **Figure 8** above, if the force F is equal to 75 N, what is the net force of the object?

A. 75 N to the right
B. 35 N to the right
C. 40 N to the left
D. 30 N downward

10) When forces are balanced, the motion of the object: **(page 109)**

A. is decreased
B. is increased
C. does not change
D. is completely stopped

P3.6C - Explain how your weight on Earth could be different from your weight on another planet.

11) If your weight on Earth is 500 N, how much would you weigh on a planet that had twice Earth's gravity? **(page 82-83)**

A. 250 N
B. 500 N
C. 1,000 N
D. 750 N

P3.2C – Calculate the net force acting on an object.

12) A force of 50 Newtons is exerted by a bat on a baseball. Using Newton's 3rd law, determine the force exerted by the baseball on the bat: **(page 119)**

A. less than 50 N
B. 50 N
C. more than 50 N
D. cannot be determined from the data

P3.4C – Solve problems involving force, mass, and acceleration in linear motion (Newton's second law).

13) A 3.0-kilogram ball rolls down a ramp. If the ball accelerates at a rate of 15 m/s^2, use Newton's 2nd law (Force (in Newtons) = mass (in kilograms) x acceleration (in meters per second squared) to calculate the net force causing this acceleration: **(page 114-115)**

A. 3 N
B. 5 N
C. 10 N
D. 45 N

14) Which of the following objects has the most inertia?

A. a bike resting on the side of a building (at rest = 0 m/sec)
B. a rocket launching into space at 900 m/sec
C. a softball pitched at 155 km/hour
D. a ping pong all flying through the air at 10 m/sec

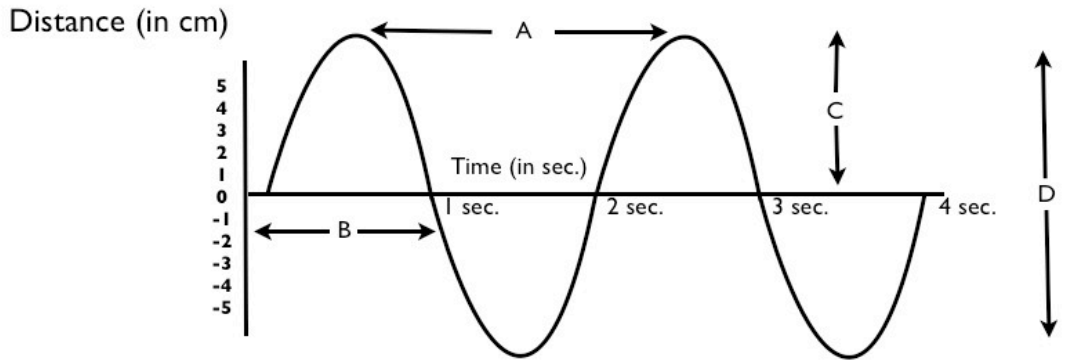
P2.1E - Describe and classify various motions in a plane as one dimensional, two dimensional, circular, or periodic.

15) Which of these is the best example of <u>periodic</u> (harmonic, not linear) motion? **(page 218)**

A. A person riding on a merry-go-round.
B. A person bicycling from Ann Arbor to Ypsilanti.
C. A person sliding down a water slide.
D. A person throwing a ball.

P4.4A -- Describe specific mechanical waves (e.g., on a demonstration spring, on the ocean) in terms of wavelength, amplitude, frequency, and speed.

The graph below represents the motion of a pendulum that was allowed to swing for 4 seconds.



16) Which letter correctly identifies the amplitude of the pendulum? **(page 222)**

A. A
B. B
C. C
D. D

17) The diagram shows_____complete cycles of the pendulum. **(page 218)**

A. ½
B. 1
C. 2
D. 4

18) What is the frequency of the pendulum? (F = 1/P) **(page 220)**

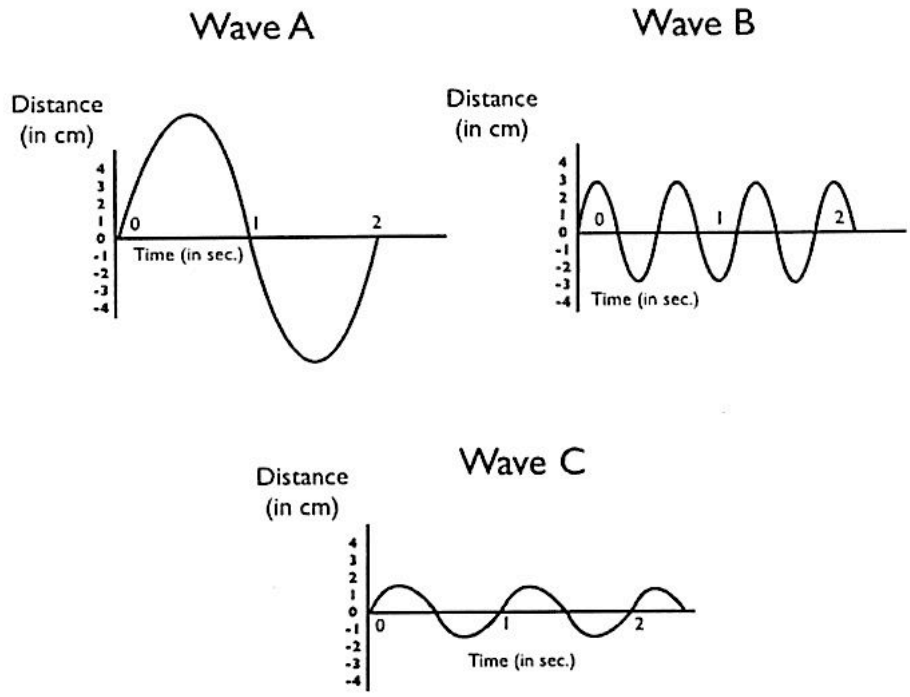
A. 0.5 Hz
B. 1 Hz
C. 2 Hz
D. 4 Hz

19) As the period of a vibration <u>increases</u>, its frequency **(page 220)**

A. decreases
B. remains the same
C. increases
D. can't tell from information given

20) How can you make a <u>longitudinal (compressional)</u> wave in a Slinky? **(Lab)**

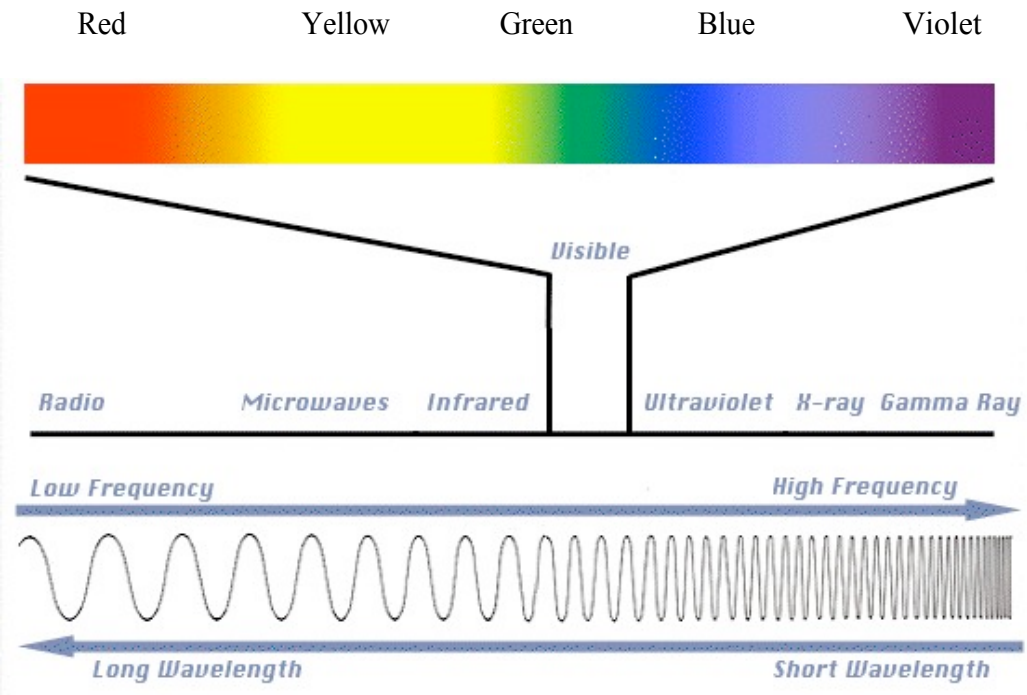
A. Wave your end of the Slinky up and down, while a partner holds the other end.
B. Gather some of the coils of the slinky in your hand and let them go, while a partner holds the other end.
C. Both these ways.
D. Neither of these ways.



P4.4C- Compare and contrast transverse and compression (longitudinal) waves in terms of wavelength, amplitude, and frequency

21) Which wave has the smallest amplitude? **(page 222)**
   A. wave A
   B. wave B
   C. wave C
   D. all waves have the same amplitude

22) Which diagram shows a wave with the wavelength twice the wavelength C ? **(page 226)**
   A. wave A
   B. wave B
   C. all waves have the same wave length



P4.6A- Identify the different regions on the electromagnetic spectrum and compare them in terms of wavelength, frequency, and energy

23) Which type of EM radiation has a frequency greater than visible light?

A. x rays
B. infrared rays
C. microwaves
D. radio waves

24) Which color of visible light has the longest wavelength?

A. purple
B. yellow
C. blue
D. red

25) What is the speed of all electromagnetic waves? **(page 227)**

A. they all have different speeds.
B. 3000 m/s
C. 300,000,000 m/s
D. too fast to measure

P4.5A- Identify everyday examples of energy transfer by waves and their sources

26) As 'The Wave' travels from one side of a stadium to another and back again, which of these statements is NOT true?

A. The energy of the wave travels around the stadium.
B. Each fan travels around the stadium.
C. The fans have periodic (harmonic) motion up and down.
D. The fans don't need to leave their sections of the stadium for the wave to travel.

27) A beach ball in the middle of a lake is bobbing up and down in water waves. The beach ball doesn't move toward the shore or away from the shore. Why not? **(page 225)**

A. Waves are a way for energy to move from one place to another. Matter the wave passes through only needs to have periodic motion, not linear motion.
B. The waves aren't strong enough to move the ball.
C. The wind must be blowing the opposite direction the waves are moving.
D. There must be underwater waves going the opposite directions from the surface waves.

P4.6D- Explain why we see a distant event before we hear it (e.g. lightning before thunder, exploding fireworks before the boom).

28) Sara is watching fireworks, and she notices that she sees a bright flash of light before she hears the boom of the explosion. The main reason for this is: **(page 227)**

A. The sound wave traveled less distance than the light wave.
B. Her eyes are closer to the fireworks than her ears.
C. Light waves travel much faster than sound waves.
D. Sound waves travel much faster than light waves.

Peter and Ruth want to find out how fast various liquids evaporate. They place 100 mL of each liquid in an identical cup. Each day, they measure how much liquid remains in the cup, by carefully pouring the liquid into a graduated cylinder. Then they pour the water back in the cup and leave it for the next day. They measure each liquid each day for 5 days. Here is their data table:

Liquid	Day 1 Amount of liquid to start (in mL)	Day 2 Amount of liquid remaining in cup (in mL)	Day 3 Amount of liquid remaining in cup (in mL)	Day 4 Amount of liquid remaining in cup (in mL)	Day 5 Amount of liquid remaining in cup (in mL)
Water	100 mL	95 mL	89 mL	84 mL	79 mL
Salt Water	100 mL	98 mL	96 mL	93 mL	90 mL
Diet Coke	100 mL	97 mL	95 mL	93 mL	91 mL
Alcohol	100 mL	72 mL	47 mL	20 mL	Gone
Vinegar	100 mL	86 mL	73 mL	59 mL	44 mL
Vegetable oil	100 mL	100 mL	99 mL	99 mL	99 mL

Using the data table above, which statement is **NOT** well supported by the evidence

A. Vinegar evaporated more quickly than salt water.
B. It's easy to tell from this experiment whether salt water or Diet Coke evaporated faster.
C. Alcohol evaporated fastest of all the liquids.
D. Very little vegetable oil evaporated by Day 5 of the experiment.

Peter and Ruth realized afterward that some of the cups were closer to a sunny window than others. Because of this, they should

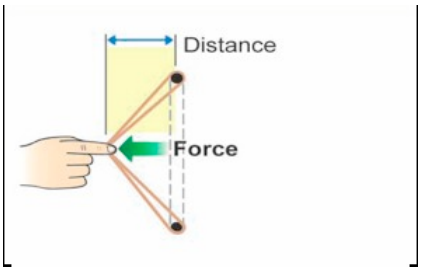
A. Repeat the experiment again, with different cups closer to the window this time.
B. Subtract 5 or 10 mL from the data for cups that were farther from the window.
C. Repeat the experiment, making sure all the cups are equally far from the window.
D. Decide the data are probably good enough, no need to make any changes.

29) Before trying their experiment, Peter and Ruth made the following hypothesis:

"If we measure the evaporation of different liquids, then colored liquids will always evaporate more quickly than transparent (clear) liquids, because colored liquids absorb more light and heat up more than clear liquids."

Their conclusion should be:

A. The data supported my hypothesis.
B. The data didn't support my hypothesis.



4.3A Identify the form of energy in given situations (e.g.,moving objects, stretched springs, rocks on cliffs, energy in food).

30) As the rubber band in the above diagram, is stretched backward, _____ energy is increased. **(page 131)**

A. potential
B. kinetic
C. total
D. thermal

P4.2B Name devices that transform specific types of energy into other types.

31) Which of these devices changes chemical energy into kinetic energy? **(page 16 & 130)**

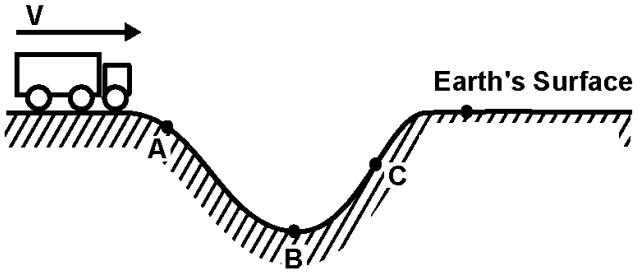
A. A flashlight bulb.
B. A gasoline powered boat engine.
C. A curling iron
D. All of the above

4.3A Identify the form of energy in given situations (e.g.,moving objects, stretched springs, rocks on cliffs, energy in food).

32) A watermelon falls off the display at the grocery store. While it's falling, the watermelon loses_____energy. **(page 130)**

A. elastic
B. kinetic
C. potential
D. thermal

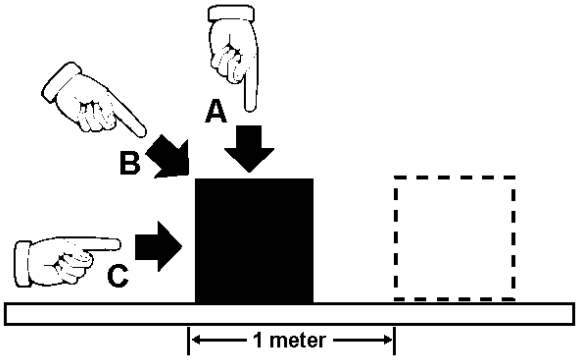
Figure 43



33) At what point in the diagram shown in **Figure 43** does the cart have the most potential energy? **(page 130)**

A. A
B. B
C. C
D. All the points have the same amount of potential energy.

Figure 44



3.1A-Identify the forces acting between objects in direct contact or at a distance (pushes or pulls, friction)
3.4A-Predict the change in motion of an object acted on by several forces.

34) If forces A, B, and C are equal, the work done by the forces as they are exerted on the box is: **(page 97)**

A. greatest for force A
B. greatest for force B
C. greatest for force C
D. the same for all of the forces

P3.2B - Compare work done in different situations.

35) Robert lifts a 150-newton bucket of water 0.5 meters in 3 seconds. What is the amount of work done by Robert? *(Work (in Joules) = Force (in Newton) x distance (in meters))* **(page 137)**

A. 25 joules
B. 25 watts
C. 75 joules
D. 75 watts

P4.1B - Explain instances of energy transfer by waves and objects in everyday activities (e.g. why the ground gets warm during the day, how you hear a distant sound, why it hurts when you are hit by a baseball).

36) Which of these may cause hearing loss? **(page 238)**

A. aging
B. listening to very loud music over a long period of time
C. working with loud tools without ear protection
D. all of the above

P4.2C -Explain how energy is conserved in common systems (e.g. light incident on a transparent material, light incident on a leaf, mechanical energy in a collision).

37) We see the colors we do because:

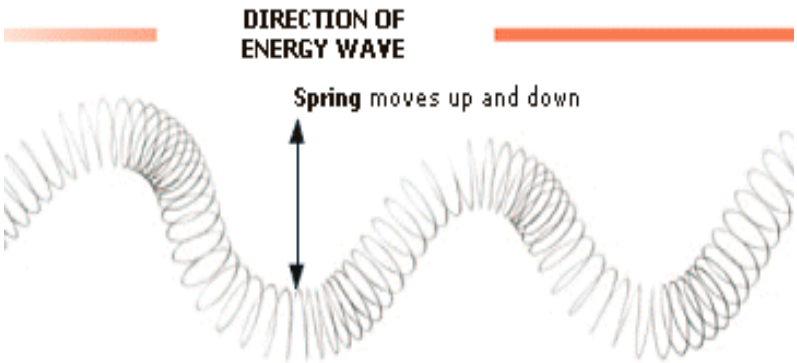
a. The color is absorbed
b. The color is refracted
c. The color is reflected
d. The color is just there

P4.4C- Compare and contrast transverse and compression (longitudinal) waves in terms of wavelength, amplitude, and frequency.

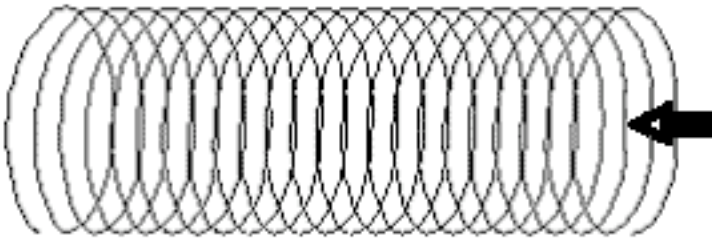
Label these waves

TRANSVERSE and COMPRESSIONAL/L

(page 228)



Type of Wave:



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