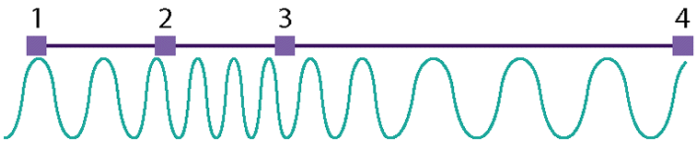
2nd Semester Exam Review

Short Answer

1. A plane pilot delivers supplies to ground troops. When should he release the supplies?

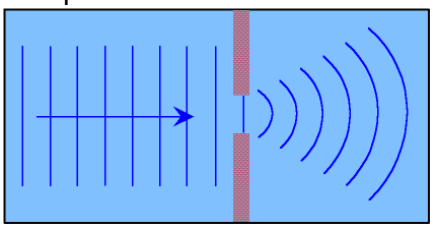
   The diagram shows how some properties of a wave change as the wave travels.



2. Refer to the diagram above. How does the wave frequency change from point 1 to point 4?
3. Refer to the diagram above. Between which two points is the wavelength the longest?
4. Refer to the diagram above. How does the wavelength change from point 1 to point 3?
5. Refer to the diagram above. Between which two points is the wave frequency the highest?

   Energy is defined as the ability to do work, or the ability to cause change.

6. Read the definition of energy given above. What type of energy is produced during the fusion process which takes place inside the Sun?
7. Which answer choice represents a vector?
8. This picture best illustrates ...



9. Which nuclear process involves splitting an atom?
10. A ball rolls off a desk at 10 m/s that is one meter tall. How far from the base of the desk does the ball land?

11. The chart shows how the weight of objects which weigh 75 pounds and 2000 pounds on Earth would differ on various solar system bodies. How much stronger would the gravitational attraction be for an object on Saturn than it would be on Earth?

Comparison of Weight on Solar System Bodies					
Weight on Earth (lbs)	**Weight on the Moon (lbs)**	**Weight on Venus (lbs)**	**Weight on Mars (lbs)**	**Weight on Jupiter (lbs)**	**Weight on Saturn (lbs)**
75	12.5	67.5	28.5	190.5	87.0
2000	333.3	1800.0	760.0	5080.0	2320.0

12. Colleen has a cordless telephone that allows her to roam freely about her office while talking. The radio signal from the phone operates with a wavelength of 0.0062 kilometers (km). Electromagnetic waves travel at 300,000 kilometers per second (km/s). Find the frequency, in hertz (Hz), at which the telephone operates. Round to the nearest whole number.

13. A ball rolls off a desk at 10 m/s that is one meter tall. How long does it take the ball to hit the ground?

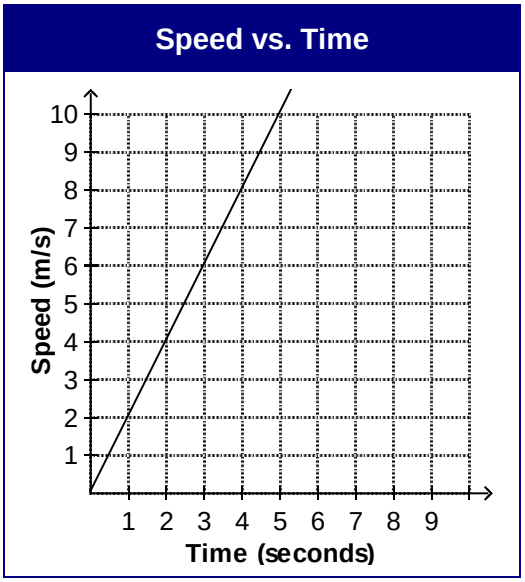
14. A bullet is fired from the barrel of a gun at the same time that a bullet is dropped from the height of the barrel of the gun. Which one hits the ground first?

Rita is interested in finding out what brand of dry cell battery will power a motor longest before becoming depleted. She purchases the same size batteries in several different brands, making sure that their expiration dates are the same. She builds an oval track and measures its length. She puts a AA battery into a toy train, and allows it to run on the track. Rita counts the number of times the train goes around the track before stopping and records this number. She then repeats this process using a different brand of battery.

15. Read the information above. What is the independent variable in this experiment?

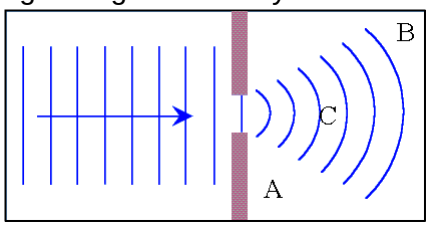
16. Tyla throws a ball that weighs 44 Newtons (N) up into the air. The ball travels at a speed of 7 meters per second (m/s) and reaches its maximum height at 5 meters (m). At what height is the potential energy of the ball equal to the kinetic energy of the ball? Round to the nearest hundredth if necessary.

17. Missy is pulling a 100 kilogram (kg) wagon with a constant applied force. The graph of the wagon's speed versus time is shown below. What is the net horizontal force that Missy is pulling with?



18. Which nuclear process involves combining atoms to form a larger atom?

19. This picture illustrates a sound wave passing through a doorway. At which location would a person hear the sound first, location A, B, or C?



Visible light occurs along a continuum of wavelengths. The table below shows the wavelength, in nanometers, of four colors of visible light.

Wavelength of Colors of Visible Light in a Vacuum		
Color		**Wavelength (nanometers)**
Red		700
Orange-Yellow		600
Green-Blue		500
Violet		400

20. Refer to the table above. Which color shown has the highest frequency?

21. Refer to the table above. Which color shown has the longest wavelength?

22. What scientific tool can be used to measure the average kinetic energy of the molecules of a substance?

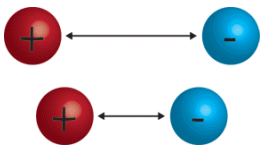
23. A roller coaster starts at the top of a hill at rest. It reaches the bottom in 3.8 seconds and the length of the track is 25 meters. What is the final velocity of the cart?

24. Two electrically charged, hollow aluminum spheres of the same mass and size are pictured below with the indicated charges. If both are on a hard, flat table in close proximity to each other what is the **most probable** result?

Sphere 1
Positive Charge of 5

Sphere 2
Negative Charge of 1

25. Two unlike electrically charged particles are located a certain distance away from each other. If the distance between the two is reduced by half, what will happen to the forces between the two particles?

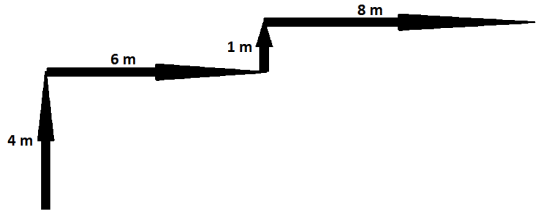


26. A 50 kg child wishes to balance on seesaw with a child larger child. If the smaller child sits 5 m from the pivot, and the larger one sits 2 m from the pivot, how much does the larger child weigh?

27. The table below shows information about the four fundamental forces in our universe. Of the four fundamental forces, which is the **weakest**?

The Four Forces of Nature			
Force	**Interacts Between**	**Strength (Newtons)[1]**	**Effective Range (m)**
Gravitational	All mass-energy	10^{-34}	Unlimited
Weak	All material particles	10^{-2}	$\approx 10^{-17}$
Electromagnetic	Electromagnetic charges	10^{2}	Unlimited
Strong	Many subnuclear particles (protons, neutrons, etc.)	10^{4}	$\approx 10^{-15}$
[1] Strengths (in Newtons) are for two protons separated, center-to-center, by 2×10^{-15} meters			

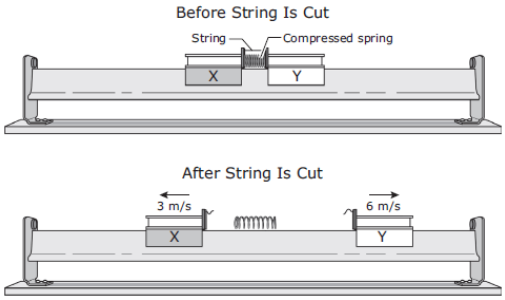
Marissa walks from her house 4 meters north, then she turns and walks 6 meters east, turns north and walks another meter then turns east and walks 8 more meters.



28. Based on the information provided and the picture above, calculate the magnitude of the displacement.

29. Compare the gravitational attraction between the objects in A and B below. The mass of all four objects shown is the same.

30. The first diagram shows two gliders, X and Y, on a nearly frictionless air track. A spring is compressed between the two gliders. The gliders are tied together tightly by a piece of string.The second diagram shows what happens to the gliders when the string is cut.



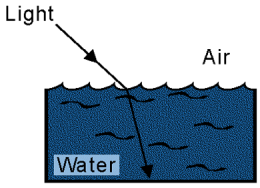
Which of the following quantities is the same for both gliders while the spring is pushing them apart?

Multiple Choice

Identify the choice that best completes the statement or answers the question.

____ 1. Which statement about electromagnetic radiation is **false**?
a. As electromagnetic radiation increases in frequency, its energy increases.
b. Visible light falls between gamma and X rays on the electromagnetic spectrum.
c. Radio waves are a form of electromagnetic radiation.
d. All electromagnetic radiation travels at the same speed in a vacuum.

Use the diagram below to answer the following questions.



____ 2. Refer to the diagram above. If you put a pencil into the water and looked at it from the side, what might you see?
a. The pencil would look smaller below the water line.
b. The pencil would look the same below the water line as it does in the air.
c. The pencil would appear bent or even split into two pieces at the water line.
d. The pencil would disappear below the water line.

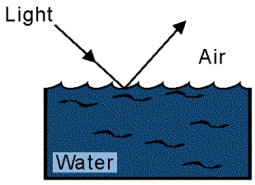
____ 3. Refer to the diagram above. How does the speed of light change as it enters the water?
a. It increases.
b. It decreases.
c. It does not change.
d. It initially decreases, then increases.

____ 4. Refer to the diagram above. Which term BEST defines what is happening here?
a. diffraction
b. refraction
c. compaction
d. reflection

____ 5. Refer to the diagram above. Which of the following BEST describes what is happening here?
a. Light is bent as it moves from air to water.
b. Light is bouncing off of the water's surface.
c. Light is being scattered as it travels through the water.
d. Light cannot enter the water from the air.

____ 6. Refer to the diagram above. What causes the phenomenon shown here?
a. Waves always bounce off when they try to enter a denser material.
b. Waves slow and bend as they pass into a denser medium.
c. Waves slow and bend as they pass into a less dense medium.
d. Waves increase in speed as they pass into a denser medium.

Use the diagram below to answer the following questions.



____ 7. Refer to the diagram above. If the light reflected from the water's surface entered your eye, what would you see?
a. the bottom of the container holding the water
b. the ground
c. the sky
d. the surface of the water

____ 8. Refer to the diagram above. Which of the following describes what is happening here?
a. Light is traveling in a straight line through the water.
b. Light is being scattered as it travels through the water.
c. Light is being bent as it travels through the water.
d. Light is bouncing off of the water's surface.

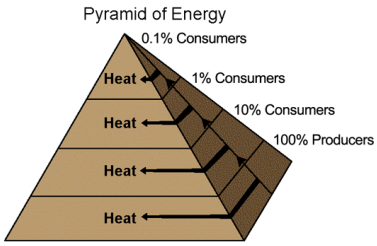
____ 9. Refer to the diagram above. The light beam that bounces off of the water's surface is called the ____ beam.
a. incident
b. diffracted
c. refracted
d. reflected

An oceanographer is collecting data over a two-week period to determine how wave height is affected by wind speed.

____ 10. Refer to the information above. Which of these factors should be held constant in the experiment?
a. average wind velocity during measuring period
b. average wave height
c. weather conditions during the measuring period
d. specific locations at which wind speed is measured

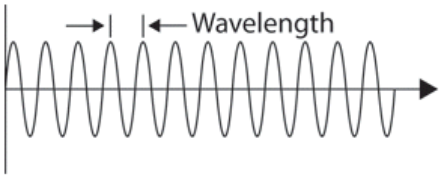
____ 11. Refer to the information above. What data would be **least** important to record during measuring periods in this experiment?
a. complete list of all marine life seen in the area
b. time of day measurements are taken
c. average wind velocity
d. average wave height

____ 12. The diagram shows a pyramid of energy, with producers at the bottom and higher-order consumers occupying successively higher levels. As energy is transferred from producers to first-order, second-order, and higher-order consumers, a large amount of energy is converted to thermal energy and given off as heat. Which statement is **true**?



a. The amount of useful energy increases at each successively higher level in the pyramid.
b. More useful energy is available to higher-order consumers than to first-order consumers.
c. The amount of useful energy is no different at different levels of the pyramid.
d. Less useful energy is available to higher-order consumers than to first-order consumers.

____ 13. Which of these types of electromagnetic radiation has the shortest wavelength and carries the greatest amount of energy?



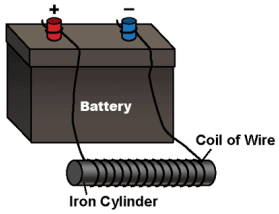
a. infrared
b. microwave
c. visible
d. X ray

Imagine you are carrying a package. You loosen your grip on the package, causing the package to fall to the floor.

____ 14. Refer to the scenario above. Why does the package fall to the floor rather than staying close to your hand?
a. There is a gravitational attraction between you and the package.
b. The mass of your hand is greater than the mass of Earth.
c. The mass of Earth is greater than the mass of your hand.
d. No gravitational force is exerted on the package.

____ 15. Which of these changes increases the total degree of disorder, or entropy, of the system described?
a. The top layer of moist soil freezes during a cold period.
b. Condensation occurs on a cold mirror in a warm, humid bathroom.
c. Evaporation occurs from a pond's surface.
d. The surface of a pond freezes during winter months.

Use the diagram below to answer the following questions.



____ 16. Refer to the diagram above. What is generated by the moving electric current?
a. visible light
b. gravitational force
c. an effort force
d. a magnetic field

Objects can have kinetic energy, potential energy, or both. Energy can be in the form of motion. Energy can also be stored by objects in various ways, including position, chemical bonds, or physical state.

____ 17. Refer to the information above. Which statement is **true**?
a. An object's mass has no effect on its potential energy.
b. Kinetic energy is converted to potential energy as a stationary object begins to move.
c. A stretched rubber band stores no energy.
d. Potential energy is converted to kinetic energy as a stationary object begins to move.

____ 18. Refer to the information above. What type of energy found in food is important for organisms?
a. chemical potential energy
b. elastic potential energy
c. kinetic energy
d. gravitational potential energy

Rita is interested in finding out what brand of dry cell battery will power a motor longest before becoming depleted. She purchases the same size batteries in several different brands, making sure that their expiration dates are the same. She builds an oval track and measures its length. She puts a AA battery into a toy train, and allows it to run on the track. Rita counts the number of times the train goes around the track before stopping and records this number. She then repeats this process using a different brand of battery.

____ 19. Read the information above. Which of these is NOT a possible hypothesis in this experiment?
a. The dry cell battery brand used affects the number of train trips around the track.
b. There is a relationship between track length and dry cell battery brand used.
c. There is no relationship between battery brand and number of trips around the track.
d. Brand X battery will cause the train to go around the track more times than Brand Y.

According to the law of gravitation, any two objects which have mass will have a gravitational attraction for each other.

____ 20. Consider the information above. When you are bouncing on a trampoline, why don't you notice the effects of the gravitational attraction between yourself and the Sun?
a. The Sun has no gravitational attraction for objects on Earth.
b. The Sun has a very small mass.
c. You are much closer to the Earth than you are to the Sun.
d. The Sun is not composed of matter.