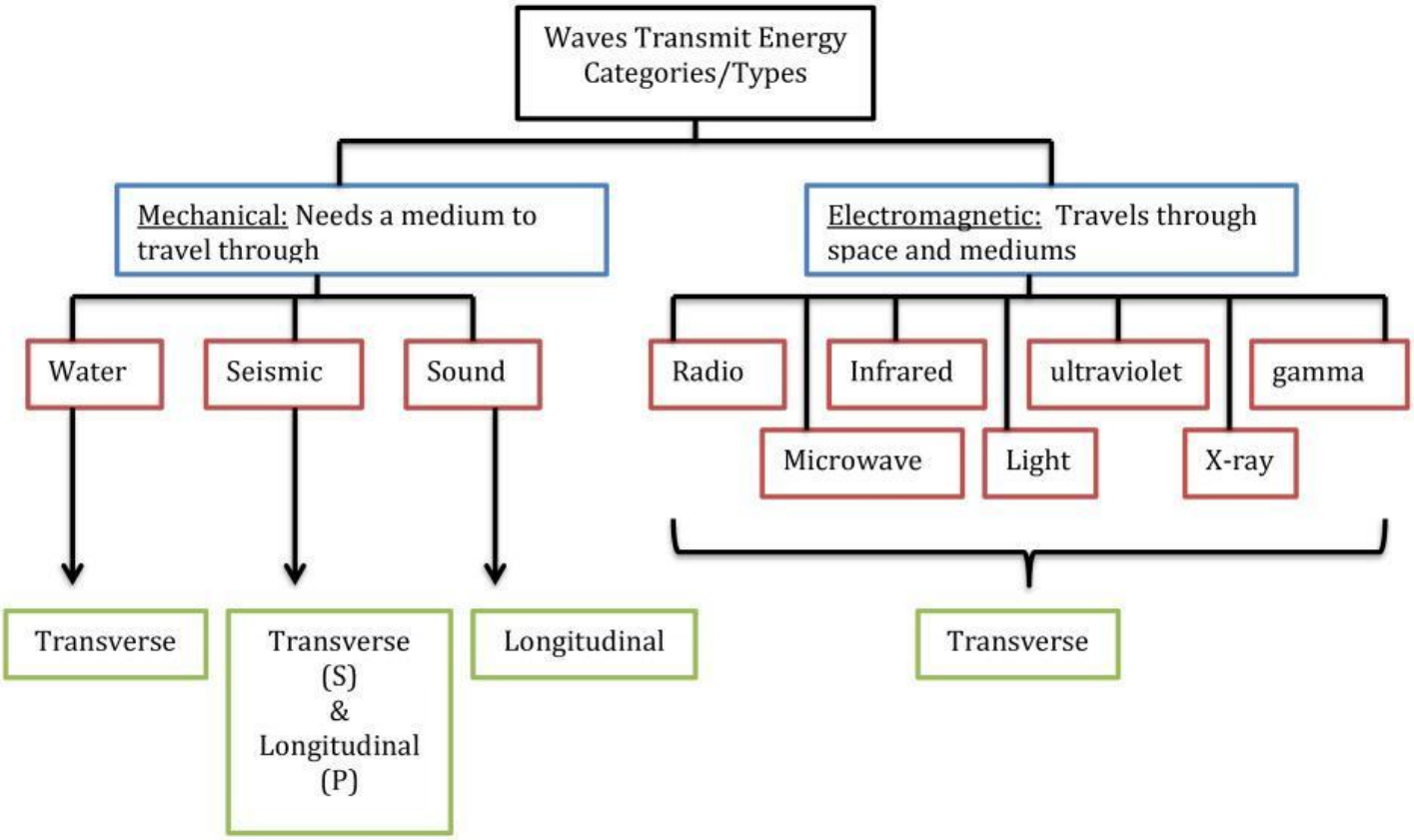
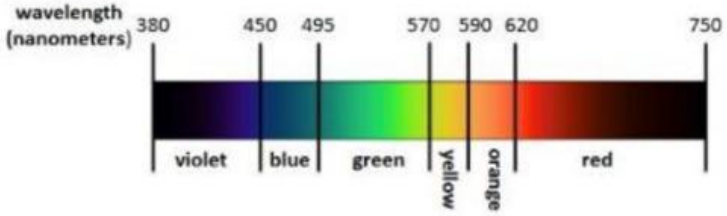
8.PS4.1 Mechanical and Electromagnetic waves



1. The diagram below shows the range of wavelengths that make up each color of visible light. The wavelengths are shown in nanometers. There are one billion nanometers in one meter.



Which shade of visible light is caused by a light wave with the shortest wavelength?

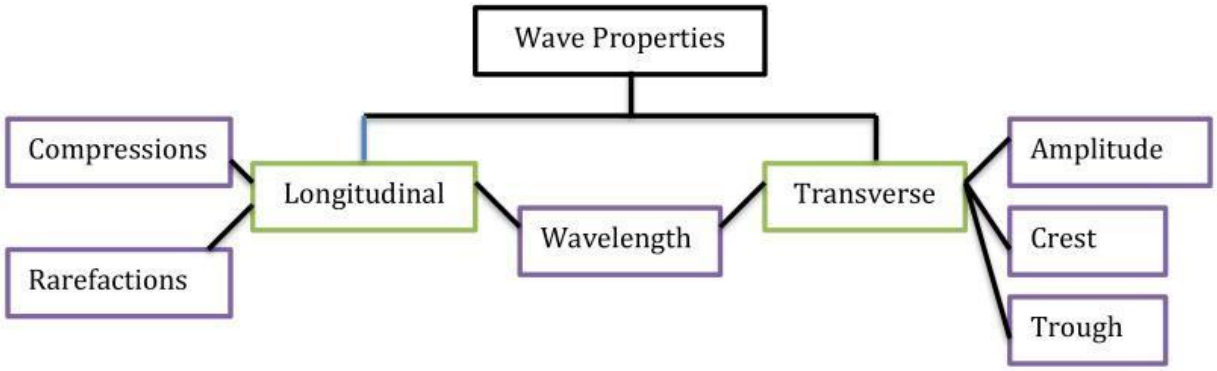
a. Violet
b. Red
c. Orange
d. Yellow

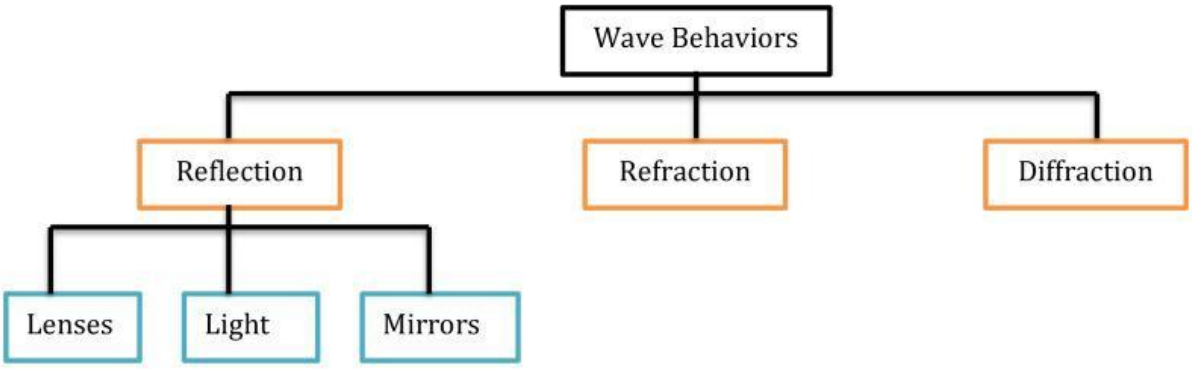
2. With the help of their science teacher, Kaden and Mariam made a machine that can move a slinky back and forth. This motion creates a fast-moving wave in the slinky. The image below is a model of a wave that is generated by the machine. The frequency of the wave modeled in the image is 4 Hz.

What is the speed of the wave?

a. 1.25 m/s
b. 24 m/s
c. 0.75 m/s
d. 12 m/s

8.PS4.2 Sound waves





3. Two sound waves (wave X and wave Y) are moving through a medium at the same speed. If wave X has a greater frequency than wave Y, then wave X
   a. Has a greater amplitude

b. Has a longer wavelength
c. Has a lower amplitude
d. Has a shorter wavelength

4. .A shiny, smooth piece of black plastic and an identical piece of white plastic are exposed to visible light and sound waves. Which of the following is true about the different colors of plastic?

a. The white piece of plastic will reflect sound waves better than the black piece of plastic , but both pieces of plastic will reflect the same amount of visible light.
b. The white piece of plastic and the black piece of plastic will reflect both visible light and sound waves equally well.
c. The white piece of plastic will reflect both visible light and sound waves better than the black piece of plastic.
d. The white piece of plastic will reflect more visible light than the black piece of plastic, but both pieces of plastic will reflect sound waves in the same way.

5. Sam is standing in an empty auditorium. He yells and hears his voice echo. What is happening to the sound to cause this echo?

a. distribution of the sound waves through the auditorium
b. reflection of sound waves off the walls
c. absorption of the sound waves by his voice
d. transmission of the sound waves within his ears

8.PS4.3 Digital and Analog Signals

Analog Signals	Digital Signals
Analog signal is continuous and time varying.	Digital signal have two or more states and in binary form.
Troubleshooting of analog signals are difficult.	Troubleshooting of digital signals are easy.
An analog signal is usually in the form of sine wave.	An digital signal is usually in the form of square wave.
Easily affected by the noise.	These are stable and less prone to noise.
Analog signals use continous values to represent the data.	Digital signals use discrete values to represent the data.
Accuracy of the analog signals may be affected by noise.	Accuracy of the digital signals are immune from the noise.
Analog signals may be affected during data transmission.	Digital signals are not affacted during data transmission.
Analog signal use more power.	Digital signal use less power.
Examples: Temperature, Pressure, Flow measurements, etc.	Examples: Valve Feedback, Motor Start, Trip, etc.
Components like resistors, Capacitors, Inductors, Diodes are used in analog circuits.	Components like transistors, logic gates, and microcontrollers are used in Digital circuits.

6. A student has a remote control for a television. The student points the remote at the television and presses a button on the remote labeled Volume. A small red light flashes on the front of the remote. The student observes that the sound from the television becomes lower.

   Which statement best describes how the remote control communicates with the television to change the volume of the sound?

   a. The remote control sends microwaves toward the television that are absorbed by the front of the television.
   b. The remote control sends low-energy infrared radiation to a light detector on the front of the television.
   c. The remote control sends radio waves in many directions, which bounce off the walls of the room toward the front of the television.
   d. The remote control sends sound waves in many directions, which bounce off the walls of the room toward a vibration detector on the front of the television.

8.PS2.3 Newton's First Law of Motion (Inertia)

Newton's First Law of Motion = An object at rest will stay at rest unless acted on by an unbalanced force. An object in motion will stay in motion at the same speed and in the same direction unless acted on by an unbalanced force. Inertia = an object's tendency to resist a change in motion.

7. A teacher leaves a coffee mug on top of a car, as shown in the diagram below.

The teacher drives the car in a straight line and then stops suddenly. What happens to the coffee mug when the car stops?

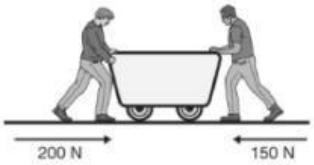
   a. The mug moves forward.
   b. The mug moves backward.
   c. The mug moves side to side.
   d. The mug stays in the same position.

8. A performer pulls a tablecloth out from under a complete set of dinnerware as shown in the illustration below.

Which of the following best explains the performer's success at leaving all the dinnerware on the table?

a. The inertia of the dinnerware
b. The large mass of the tablecloth
c. The placement of the dinnerware
d. The rough material of the tablecloth

9. Two students are pushing a cart as shown below. (8.PS2.2)



The cart will move as if it were acted on by a single force with the magnitude of

a. 50 N
b. 150 N
c. 200 N
d. 350 N

8. PS2.1 MAGNETIC FIELD:

- The magnetic field is the zone wherein the force of magnetism works around a magnetic substance or a circulating electric charge.
- The magnetic impact on moving electric charges, electric currents, and magnetic materials is described by a magnetic field, which is a vector field. A moving charge experiences a force perpendicular to both its speed and the magnetic field in a magnetic field.

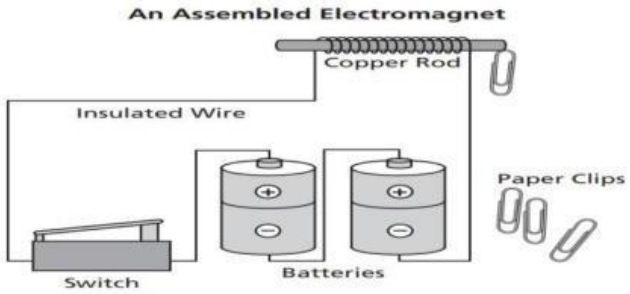
ELECTROMAGNET:

- An electromagnet is a magnet whose magnetic field is generated by a current flow.
- Wire wrapped into a coil is used to make electromagnets.
- A current flowing through the wire produces a magnetic field focused in the aperture, which serves as the coil's core.
- When the electricity is switched off, the magnetic field vanishes.
- The wire loops are frequently twisted around a magnetic core formed of a ferromagnetic or ferrimagnetic substance such as iron that focuses the magnetic flux and produces a stronger magnet.

CONCLUSION:

- Electromagnets are magnets whose magnetic field is generated by a current flow.
- A magnet is an item or substance that generates a magnetic field.
- The magnetic field is the zone wherein the force of magnetism works around a magnetic substance or a circulating electric charge.

10.A student made an electromagnet out of common objects.



Which change would weaken the electromagnet? (8.PS2.1)

A. Replace the copper rod with an iron nail.
B. Remove some of the wire loops around the copper rod.
C. Connect another battery between the switch and the copper rod.
D. Use larger paper clips

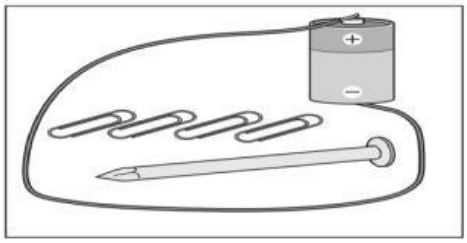
Questions 11-12 refer to the passage(s) and image(s) shown. (8.PS2.1)

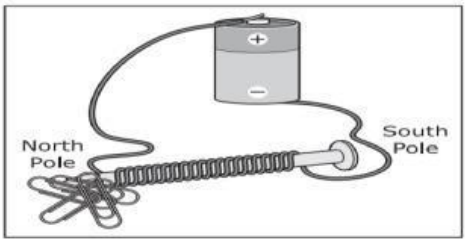
Magnets and Motors – Part 1

A student read in a science magazine that magnets can be made by using an iron nail, copper wire, and a battery. These magnets are called "electromagnets" because they use electricity to generate their magnetic effect. The magnetic force of these magnets can be tested according to their ability to pick up metal paper clips.

The student read that motors and electromagnets use the same basic principle to operate. The student conducted two investigations to see how these electromagnets work.

In the first investigation, the student made an electromagnet and then performed some tests. The materials that were used are listed.





The student performed two tests. In the first test, the student taped the ends of the wire to the battery. Several paper clips were moved close to the nail and the student recorded how many paper clips the nail picked up. In the second test, the wire was wrapped around the nail 20 times. The results are shown in the table.

Electromagnet Investigation #1

Test	Coils Around Nail	Number of Paper Clips Picked Up
#1	0	0
#2	20	4

In the second investigation, the student added more coils to determine if the magnetic force increased with the number of coils wrapped around the nail. The data for the second investigation are shown.

Electromagnet Investigation #2

Test	Coils Around Nail	Number of Paper Clips Picked Up
#1	40	8
#2	50	10
#3	60	12

The student has other ideas for making the electromagnet stronger aside from wrapping more coils around the nail.

11. Based on the information given, which part of Investigation #2 is <u>most likely</u> the independent variable? (8.PS2.1)

A. the type of wire
B. the number of coils
C. the size of the battery
D. the strength of the magnet

12. Which phenomenon is <u>most likely</u> being tested during Investigation #1? (8.PS2.1)

A. An iron nail is a natural magnet.
B. An iron nail has to be used to create an electromagnet.
C. A small battery has stored magnetism that can be used to attract paper clips.
D. Wire wrapped around an iron nail attached to the poles of a battery will produce a magnetic force.