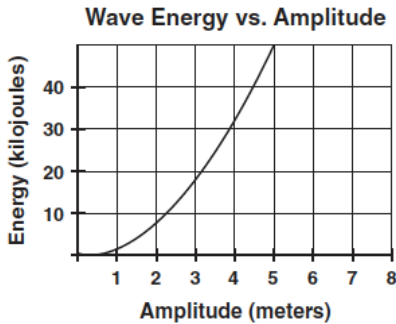


CALIFORNIA STATE QUESTIONS:

1. A sound wave is produced in a metal cylinder by striking one end. Which of the following occurs as the wave travels along the cylinder?

- A Its amplitude increases.
- B Its frequency increases.
- C It transfers matter.
- D It transfers energy.

The graph depicts the relationship between wave energy and wave amplitude.



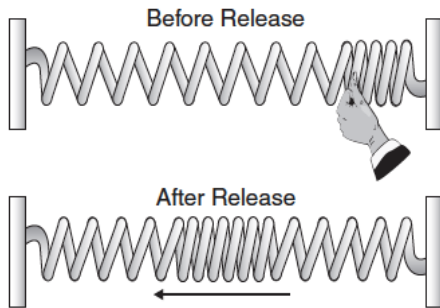
How is the energy of the wave affected if the amplitude of the wave increases from 2 meters to 4 meters?

- A It is halved.
- B It is doubled.
- C It is quadrupled.
- D It remains the same.

3. A radio station transmits to a receiving antenna. The radio wave sent is a (circle all that apply)

- A sound wave.
- B torsional wave.
- C longitudinal wave.
- D transverse wave.
- E. mechanical wave

4. A stretched spring attached to two fixed points is compressed on one end and released, as shown.



The resulting wave travels back and forth between the two fixed ends of the spring until it comes to a stop. This mechanical wave is an example of a

- A transverse wave.
- B longitudinal wave.
- C superpositioned wave.
- D refracted wave.

5. One end of a horizontal string is caused to oscillate vertically while the other end is attached to a fixed object. The wave that travels along the string is an example of

- A an electromagnetic wave.
- B a transverse wave.
- C a microwave.
- D a longitudinal wave.

6. A sound wave traveling through a solid material has a frequency of 500 hertz. The wavelength of the sound wave is 2 meters. What is the speed of sound in the material?

- A 250 m/s
- B 500 m/s
- C 1000 m/s
- D 250,000 m/s

7. A tuning fork is used to produce sound waves with a frequency of 440 hertz. The waves travel through the air at 344 m/s. What is the wavelength of the sound waves?

- A 0.15 m/s
- B 0.39 m/s
- C 0.78 m/s
- D 1.28 m/s

8. A student shakes the end of a rope with a frequency of 1.5 Hz, causing waves with a wavelength of 0.8 m to travel along the rope. What is the velocity of the waves?

- A 1.9 m/s
- B 1.6 m/s
- C 1.2 m/s
- D 0.53 m/s

9. What is the wavelength of a 264-Hz sound wave when the speed of sound is 345 m/s ?

- A 0.77 m
- B 1.31 m
- C 6.09 m
- D 9.11 m

10. Astronauts on the Moon would *not* be able to hear a landslide because

- A the lunar dust deadens sounds.
- B intensive sunlight destroys sound waves.
- C the magnetic field of the Moon is too weak to carry sound.
- D air molecules on the Moon are too far apart to carry sound.

11. Sound waves cannot carry energy through

- A water.
- B air.
- C a mirror.
- D a vacuum.

12. Where does visible light fall on the electromagnetic spectrum?

- A between x-rays and gamma rays
- B between short-wave radio and television
- C between infrared and ultraviolet
- D between microwaves and infrared

13. In a vacuum, radio waves, visible light, and x-rays all have the same

- A wavelength.
- B speed.
- C frequency.
- D energy.

14. Objects appear different in size and shape in a container of water due to

- A refraction of the light waves.
- B interference of the water and light waves.
- C polarization of the light waves.
- D diffraction of the light waves.

15. An engineer in a moving train blows the train's horn. The train is moving away from a person standing on the ground. Compared to the frequency of the sound that the engineer hears, the person standing on the ground hears a sound with

- A the same wavelength.
- B more variation in tone.
- C greater amplitude.
- D a lower frequency.

WAVE CHARACTERISTICS

16.
Identify the types of waves

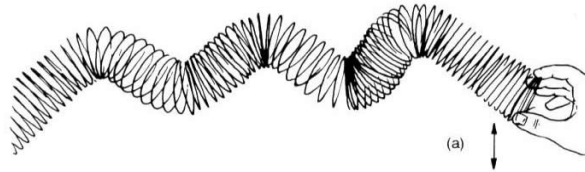
A: _____

the vibrational displacement occurs in a direction _____ to the motion of a wave.



B: _____

the vibrational displacement occurs in a direction _____ to the motion of a wave.



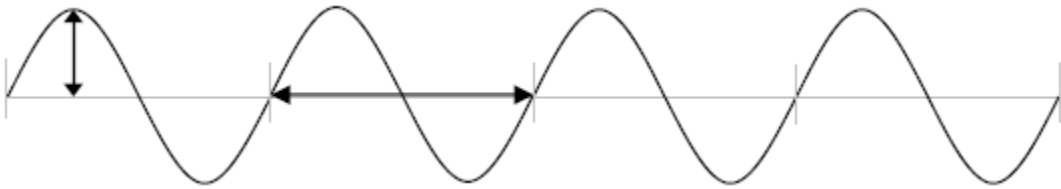
17.

Match the correct terms to their definitions:

PULSE:	___	a. the length of a single pulse.
FREQUENCY:	___	b. the maximum amount a disturbance is from a wave's rest position.
AMPLITUDE:	___	c. a single disturbance in a media that moves along in a wave.
WAVELENGTH:	___	d. the rate at which wave pulses pass a point. # of waves that pass a point in a given amount of time

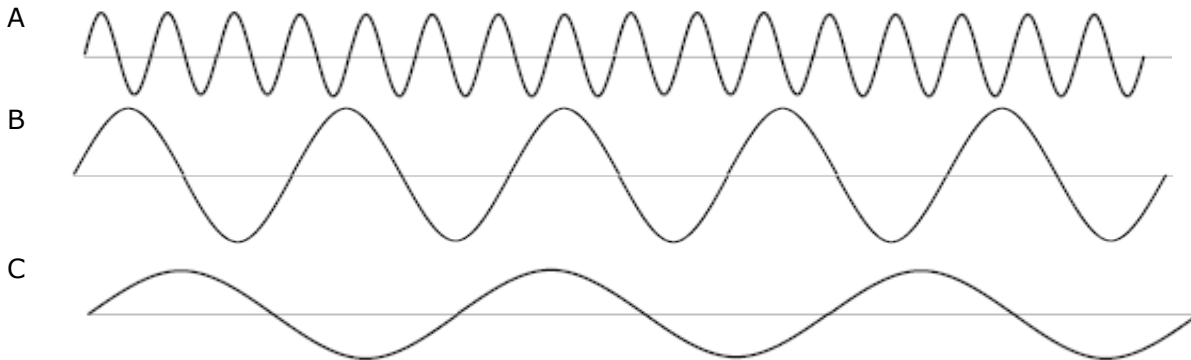
18.

Label the above terms on the diagram below



19. Identify the primary condition that determines the speed of a wave: The _____.

20.



If all three waves are in the same medium, which has the highest frequency? ___

Which has the least amount of energy? ___

Match the letters above to infrared waves (___) radio waves (___) and visible light (___)

Which is traveling the fastest?

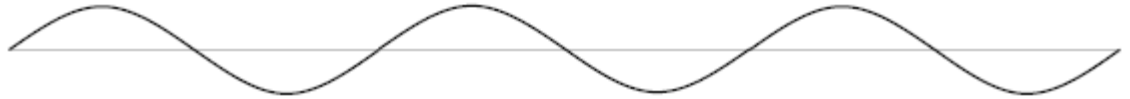
21. Compared with solar radiation, terrestrial radiation has a _____ wavelength.

22. What is another name for terrestrial radiation? _____

23. In a florist's green house, _____ waves can penetrate the green house glass but _____ waves cannot

24. The Earth's atmosphere is similar to a greenhouse. If the atmosphere were to contain excess amounts of water vapor and carbon dioxide, the air would be opaque to _____ waves.

25. Identify the speed of waves equation: _____ The wave train occurred in 10 sec



Show your work. Calculate:

a) How many waves are there in this wave train? _____

b) Wavelength _____ cm c) Amplitude _____ cm d) frequency _____ Hz e.) speed _____ cm/s

f) What is the period?

26. What is the wavelength of a sound wave with a frequency of 50 Hz? (Speed of sound is 342 m/s)

27. A sound wave in a steel rail has a frequency of 620 Hz and a wavelength of 10.5 m. What is the speed of sound in steel?

28. Why do sounds get louder or resonate?

29. Determine the frequency of a microwave 6.0 cm in length. (A microwave is an electromagnetic wave. It travels through space at a speed of 3.0×10^8 m/s)

30. An ocean wave has an amplitude of 2.5 m. Weather conditions suddenly change such that the wave has an amplitude of 5.0 m. The amount of energy transported by the wave is _____.

a. halved b. doubled c. quadrupled d. remains the same

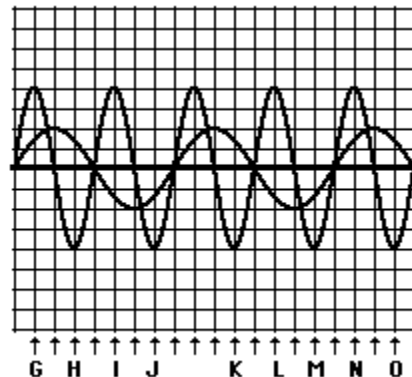
31. Identify the letters for Constructive or Destructive Interference

G: _____ K: _____

H: _____ L: _____

I: _____ M: _____

J: _____ N: _____



If these were two sound waves, at which letter would the sound be the loudest? J or K? _____

What about the quietest? J or K? _____

32. _____ require a material medium to travel (air, water, ropes). These waves are divided into three different types.

_____ :cause the medium to move perpendicular to the direction of the wave.

_____ cause the medium to move parallel to the direction of the wave.

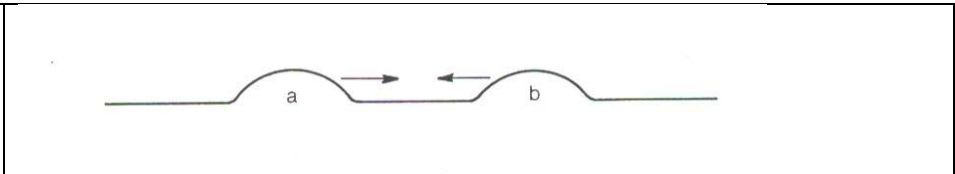
_____ :both transverse waves and longitudinal waves mixed in one medium.

SOUND WAVES

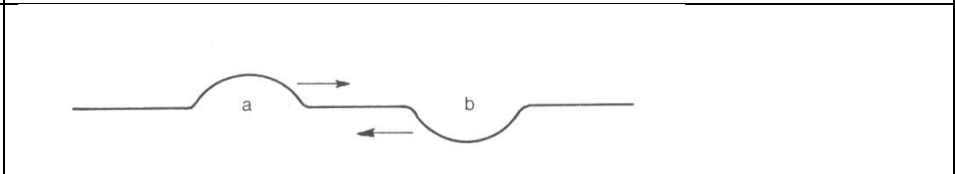
33. In the Speed of Sound lab, two different frequencies were used. 258 Hz and 512 Hz, both of which moved at ~358 m/s. The known speed of sound for 0°C is 332 m/s. What relationship can you infer about temperature and speed of sound waves? .

34. Identify the type of wave interaction as Constructive or Destructive

A: If these were sound waves describe what you would hear when a and b occur simultaneously



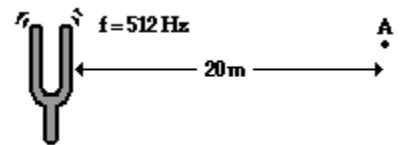
B: If these were sound waves describe what you would hear when a and b occur simultaneously



35. Sound is a _____ wave
Speed depends on the properties of the _____ in which it propagates
Give an example that illustrates this point.

36. A sound wave traveling through a solid material has a frequency of 500 hertz. The wavelength of the sound wave is 2 meters. What is the speed of sound in the material?

37. The time required for the sound waves ($v = 340 \text{ m/s}$) to travel from the tuning fork to point A is _____ .



38. Speed of sound lab. What happened to the sound of the tuning fork when resonance occurred?

39. Draw 3 diagrams of you and the sound of a fire-truck remaining the same, getting quieter and getting louder. In each situation describe why you hear these different volumes

40. In the above problem, does the speed of sound change as the truck moves?

41. As frequency increases, wavelength _____ and energy _____

ELECTROMAGNETIC SPECTRUM

42. Describe the relationships between energy and the EM Spectrum

43. Which color of visible light has the most energy?

Explain:

44. When using a spectrometer to look at the overhead fluorescent lights, 5 bars of light were visible (violet, teal, bright green, orange and red) Explain what the spectrometer did to create these bright colored lines.

45. Explain how different bars of light appear in the bright line spectrum:

46. How can we use bright line spectra to determine the elements in stars.

47. Describe the color of a comet as seen during its approach to Earth and then its departure.

48. What are the most abundant elements in the universe?

49. Explain Red Shift:

50. Give 3 pieces of evidence that the universe is expanding.

51. Microwave radiation was created during the Big Bang, on the EM spectrum how much energy is contained in these waves?

MORE WAVE PROBLEMS

If the velocity of a radio wave is 300 000 000 m/s (light speed) and its wavelength is 3.108 m, what is the frequency of the wave? (Remember Hz)

What is a period?

Give an example:

What is the equation for finding the period? _____

What is meant by frequency?

What unit is used to measure frequency? _____

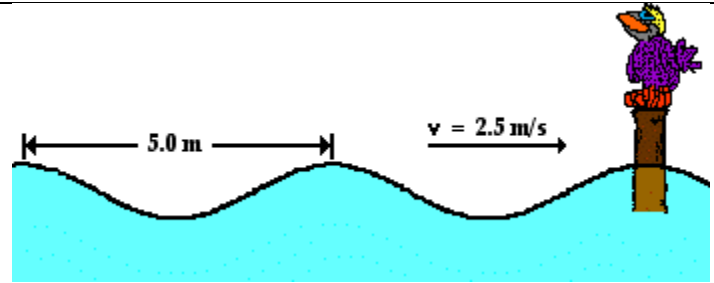
Give an example.

As the wavelength of a wave in a uniform medium increases, its speed will _____.

As the wavelength of a wave in a uniform medium increases, its frequency will _____

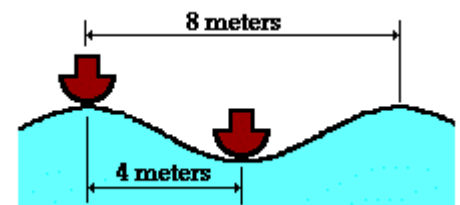
Doubling the frequency of a wave source doubles the speed of the waves. **TRUE** or **FALSE**?

The water waves below are traveling along the surface of the ocean at a speed of 2.5 m/s and splashing periodically against Wilbert's perch. Each adjacent crest is 5 meters apart. The crests splash Wilbert's feet upon reaching his perch. How much time passes between each successive drenching? Answer and explain using complete sentences.

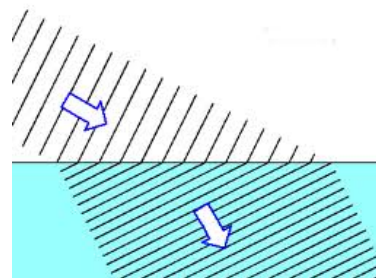
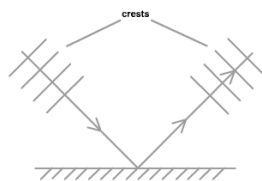
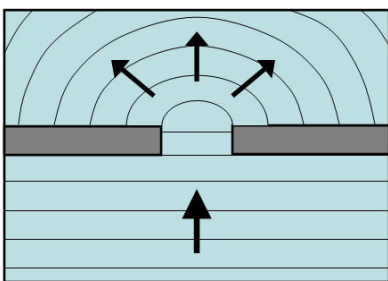


Mac and Tosh stand 8 meters apart and demonstrate the motion of a transverse wave on a snakey. The wave can be described as having a vertical distance of 32 cm from a trough to a crest, a frequency of 2.4 Hz, and a horizontal distance of 48 cm from a crest to the nearest trough. Determine the amplitude, period, and wavelength and speed of such a wave.

Two boats are anchored 4 meters apart. They bob up and down, returning to the same up position every 3 seconds. When one is up the other is down. There are never any wave crests between the boats. Calculate the speed of the waves.



Match the term for waves interactions below to the figures: Reflection, Refraction and Diffraction



Explain why a pool toy at the bottom of the pool appears farther away than it actually is.

