
1. One outcome of every energy transformation is
   a. Heat is generated.
   b. Matter is destroyed.
   c. Nuclear energy is created.
   d. Work is avoided at all costs.

2. In a Newton’s Cradle, what would happen if two balls were swung in from the right?
   a. Three balls would swing out the left.
   b. Two balls would swing out the left.
   c. One ball would swing out the right.
   d. The balls would completely stop.

3. An LED light bulb converts only about 20% of the electricity it uses into thermal energy. What happens to the other 80%?
   a. 80% is converted to nuclear energy through the process of fusion.
   b. 80% is converted to chemical energy through photosynthesis.
   c. 80% is converted to electromagnetic energy in the form of light.
   d. 80% is converted to mechanical energy in the form of micro switches.

4. Which of the following choices involves a conversion of gravitational energy into electrical energy?
   a. Chernobyl Nuclear Power Plant.
   b. Wind turning a wind turbine.
   c. A coal burning power plant.
   d. The Tallulah Gorge Dam in North Georgia.
5. What type of energy transformation is represented by the picture to the right?
   a. Chemical to electrical.
   b. Chemical to mechanical.
   c. Electrical to electromagnetic.
   d. Electrical to chemo luminescent.

6. What type of energy transformation takes place in a car stereo speaker?
   a. Electrical to sound to thermal.
   b. Mechanical to sound to electrical.
   c. Electrical to mechanical to sound.
   d. Thermal to sound to mechanical.

Standard S8P2b. Explain the relationship between potential and kinetic energy.

7. A coconut in a tree has mostly ________________ energy.
   a. Potential.
   b. Kinetic.
   c. Thermonuclear.
   d. Nonrenewable.

8. When does a rocket have the most kinetic energy?
   a. At top speed as it exits Earth’s gravity well.
   b. Sitting on the launch pad awaiting its launch window.
   c. Awaiting transport to the launch pad on the crawler.
   d. Lying awake at night dreaming of the day it will finally make it into orbit.

9. Which of the following substances has the most kinetic energy?
   a. Red Bull energy drink.
   b. Carbon dioxide in the atmosphere.
   c. That big rock over there.
   d. A portion of the Sun’s corona.
e. **Standard S8P2c. Compare and contrast the different forms of energy.**

10. A star with the rather dull name of R136a1 is the largest star ever discovered. It is roughly 300 times larger than our own Sun. This star generates its energy by
   a. Splitting one large atom into two smaller atoms.
   b. Fusing two small atoms into one large atom.
   c. Rubbing its hands together really quickly.
   d. Bouncing atoms off one another at high speed.

11. Which of the following is a form of chemical energy?
   a. Rainbows.
   b. A wind up watch.
   c. Fried gator tail.
   d. An atomic bomb.

12. Which of the following is a renewable resource?
   a. Ethanol.
   b. Coal.
   c. Petroleum.
   d. Helium.

13. What type of energy is generated when electrons vibrate?
   a. Nuclear.
   b. Chemical.
   c. Mechanical.
   d. Electromagnetic.
Standard S8P2d. Describe how heat can be transferred through conduction, convection, or radiation.

14. The Trade Winds are wind currents flowing from the poles to the Equator. What causes these winds?
   a. Conduction
   b. Convection
   c. Radiation
   d. Collaboration

15. Little Jeremiah decided to try walking on hot coals to prove his manhood. He wound up with severe burns on his feet. Why?
   a. Conduction
   b. Convection
   c. Radiation
   d. Declaration

16. The picture to the right represents which type of energy transfer?
   a. Conduction
   b. Convection
   c. Radiation
   d. Rationalization

17. How does the Earth get warmed by the Sun?
   a. Capitulation
   b. Convection
   c. Conduction
   d. Radiation
Standard S8P4a. Identify the characteristics of electromagnetic and mechanical waves.

18. Why would you not be able to hear Mr. Woodfin scream in Outer Space?
   a. Outer Space is a vacuum.
   b. No radio waves in outer space.
   c. No transverse waves in space.
   d. He couldn’t get mad enough to scream in space.

19. Which type of wave travels by traveling from one particle to another?
   a. Electromagnetic
   b. Mechanical
   c. Microwaves
   d. Pageant waves

20. Electromagnetic waves are created when
   a. A thrust fault slips.
   b. An electron vibrates.
   c. A medium is disturbed.
   d. When you wish upon a star.

21. Which is an excellent example of a transverse wave?
   a. A radio playing Lil Wayne loudly.
   b. Carving a gnarly tube at Waikiki.
   c. Fans doing “The Wave” at a ball game.
   d. People swaying back and forth as they sing kumbaya.
22. Which type of wave does the picture below represent?
   a. Transverse
   b. Compressional
   c. Seismic
   d. Royal parade

23. The picture to the right represents
   a. Absorption
   b. Diffraction
   c. Reflection
   d. Refraction

24. The reason that everyone in the classroom can hear when Mr. Woodfin gives one of his boring lectures about some Science stuff is
   a. Refraction
   b. Reflection
   c. Diffraction
   d. Absorption
25. Which wave behavior is represented in the picture to the right?
   a. Absorption
   b. Diffraction
   c. Reflection
   d. Refraction

Standard S8P4c. Explain how the human eye sees objects and color in terms of wavelengths.

26. Which color shirt will absorb the most light?
   a. Black
   b. Canary Yellow
   c. Chartreuse
   d. White

27. Which color on the light spectrum is between violet and blue?
   a. Indigo
   b. Green
   c. Yellow
   d. Ultraviolet

Standard S8P4d. Describe how the behavior of waves is affected by medium.

28. Why do you often see a jet airplane before you hear it?
   a. Light travels faster in air than sound.
   b. Sound travels slower than jet airplanes.
   c. Jet airplanes exist only in fiction.
   d. Jet airplanes don’t produce sound until they are past you.
29. Sound will ______________ when it goes from a solid to a gas.
   a. Dance a Jig.
   b. Slow down.
   c. Speed up.
   d. Stay the same speed.

30. X-rays will ______________ when they go from a gas to a solid.
   a. Slow down.
   b. Speed up.
   c. Stay the same speed.
   d. Vanish like a thief in the night.

**Standard S8P4e. Relate the properties of sound to everyday experiences.**

31. Scientists have found that blind people can use the same method as bats to find their way around. What is this method called?
   a. Pump up the volume
   b. Sound diffraction
   c. Echolocation
   d. Microburst transmission

32. When you turn up the volume of your iPod so you don’t have to hear that person next to you go on and on about stuff you don’t really care about, you are
   a. Increasing the music’s amplitude.
   b. Decreasing the music’s amplitude.
   c. Increasing the music’s pitch.
   d. Making the music echo across the ages.
33. What sound phenomenon is represented in the picture below?
   a. The Coriolis Effect
   b. The Butterfly Effect
   c. The Doppler Effect
   d. The Greenhouse Effect

Standard S8P4f. Diagram the parts of the wave and explain how the parts are affected by changes in amplitude and pitch.

34. You are trying to imitate a person with a very deep voice. This requires you to decrease the pitch of your voice. How does this affect the wavelength of the sound waves you produce?
   a. It would increase the wavelength.
   b. It would decrease the wavelength.
   c. It would not affect the wavelength.
   d. It would jiggle the wavelength back and forth.
35. Which of the following diagrams has the highest pitch?

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<tbody>
<tr>
<td>a.</td>
<td><img src="image1.png" alt="Waveform a" /></td>
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<tr>
<td>b.</td>
<td><img src="image2.png" alt="Waveform b" /></td>
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<tr>
<td>c.</td>
<td><img src="image3.png" alt="Waveform c" /></td>
</tr>
<tr>
<td>d.</td>
<td><img src="image4.png" alt="Waveform d" /></td>
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36. Which of the following instruments would produce the sound with the shortest wavelength?
   a. Tuba
   b. Timpani Drum
   c. Triangle
   d. Bass Guitar
37. Which letter represents a trough?

38. Which letter represents amplitude?

39. Which letter represents a wavelength?

40. Which letter represents a crest?
Answers and Explanations

1. Choice A. This is a recall question. Students should have this in their notes.
2. Choice B. The Law of Conservation states energy cannot be created or destroyed so what goes in must come out.
3. Choice C. Any light bulb converts electricity into light (electromagnetic energy) and thermal energy.
4. Choice D. The Tallulah Gorge Dam (and any hydroelectric dam) uses gravity to pull water from up high in the reservoir down through the dam to spin a turbine which turns a magnet in a coil of wire generating electricity.
5. Choice A. Batteries convert chemical energy to electrical energy.
6. Choice C. All speakers take the electrical signal from the radio and change it into the mechanical motion of the speaker which moves up and down which vibrates the air molecules around it which is what we describe as sound.
7. Choice A. Potential energy is stored energy or energy of position. In this case, the coconut is high in a tree giving it energy of position or potential energy.
8. Choice A. Kinetic energy is the energy of motion. The faster something goes, the more kinetic energy it has. The rocket is moving fastest as it escapes Earth’s gravity.
9. Choice D. The kinetic theory of matter describes the movement of particles in the different states of matter. Solids have very little particle motion and would therefore have the most potential energy (least kinetic) while plasmas would have the most kinetic energy (least potential) because the particles in plasma are moving extremely fast. The Sun is plasma.
10. Choice B. All stars generate energy through fusion which is the combining of two or more atoms into one. Fission is when one atom breaks down into two smaller ones and occurs here on Earth. We use fission in nuclear power plants.
11. Choice C. Food is a form of chemical energy. While some individuals would question whether or not gator is eatable, it is the food in this choice and therefore chemical energy.
12. Choice A. Ethanol can be created through the fermentation of plant material. We can grow plants rather rapidly making it the renewable resource.

13. Choice D. The “electro-“part of electromagnetic comes from electron. Electrons move up and down (vibrate) while a magnetic field is generated at a 90 degree angle to the electron motion.

14. Choice B. The wind and deep ocean currents are due to hot air rising or moving towards the poles while the cooler moves towards the equator.

15. Choice A. His feet came in contact with the coals. Energy transfer through contact is conduction.

16. Choice A. The rod is in contact with the flame and the person’s hand is in contact with the rod, the energy transfer that happens through contact is conduction.

17. Choice D. Space is a near vacuum. The only type of energy transfer that can happen due to the near lack of matter is radiation as radiation transfers energy through space.

18. Choice A. Sound is a mechanical wave. Mechanical waves require matter in order to transfer energy. Space is a near vacuum which means there is very little matter or that the matter is spread so far apart it might as well not exist. No matter = no mechanical waves. This was demonstrated in class using a bell, a bell jar and a vacuum pump.

19. Choice B. Mechanical waves travel via the particles in matter “bumping” one another. Electromagnetic waves travel through the space between particles of matter.


21. Choice C. In transverse waves the particles (in this case people) move up and down while the energy of the wave moves to the right or the left. This was an example used in class to describe transverse waves. In longitudinal waves, the particles and energy move in the same direction. Sound waves are the example of longitudinal waves from class.

22. Choice A. See Number 21.

23. Choice D. Refraction is the bending of waves as they go from one medium to another. In this case, light is going from air into water and bending
slightly giving the appearance that the fish is in a slightly different location than it actually is.

24. Choice C. Diffraction is the spreading out of waves as they go through an opening (in this case Mr. Woodfin’s mouth). Diffraction is why we can hear around corners as well.

25. Choice C. Reflection is the “bouncing” of waves off a surface.

26. Choice A. We see color because of the light waves that are reflected to our eye. Light is the reflection of all wavelengths of light. Black is the absorption of all wavelengths of light (none is reflected to our eye giving the appearance that there is no color or nothing there).

27. Choice A. Students were introduced to ROYGBIV to learn the order of the wavelengths of light from longest to shortest. R = red O = orange Y = yellow G = green B = blue I = indigo V = violet

28. Choice A. Light travels at close to 128,000 miles per second. Sound travels (at sea level) about 760 miles per hour. This is why you see lightning before you hear thunder even though they happen at the exact same time.

29. Choice B. Sound waves are mechanical waves which means they move through matter. The closer the particles are to one another, the faster sound can go. The particles in a solid are really close together while the particles in a gas a spread far apart. So, sound can travel faster in a solid than in a gas. If sound moves from the solid to a gas it will slow down.

30. Choice A. X-rays are electromagnetic waves which travel in the spaces between particles of matter. The more opens space there is, the faster they can go with a vacuum with its lack of matter being the medium they can travel fastest. A gas has lots of space between particles (meaning faster movement for electromagnetic waves) while a solid has very little space between its particles (meaning the wave has to slow down to “squeeze through.”) So, any electromagnetic wave (including x-rays) would slow down going from a gas to a solid.

31. Choice C. An echo is a reflection of sound waves. Bats, dolphins and submarines use echolocation for guidance.
32. Choice A. Amplitude affects the intensity of the wave. For sound that means volume, for light that means brightness. Increase the amplitude, increase the intensity.

33. Choice C. The only “Effect” we’ve discussed in class is the Doppler Effect so this should be a no-brainer for students.

34. Choice A. Increase pitch (or frequency) = decrease in wavelength.
    Decrease pitch (or frequency) = increase in wavelength.


36. Choice C. In general, the smaller the instrument is, the higher the pitch the sound it makes. The larger the instrument is, the lower the pitch that it makes.

#37-40 is all just memorizing the parts of a wave diagram.

37. D
38. A
39. C
40. B