Tasks in waves:

1. A transverse wave is transporting energy from east to west. The particles of the medium will move\_\_\_\_\_.

a. east to west only

b. both eastward and westward

c. north to south only

d. both northward and southward

Answer: **D**

The particles would be moving back and forth in a direction perpendicular to energy transport. The waves are moving westward, so the particles move northward and southward.

2.A wave is transporting energy from left to right. The particles of the medium are moving back and forth in a leftward and rightward direction. This type of wave is known as a \_\_\_\_.

|  |  |
| --- | --- |
| a. mechanical | b. electromagnetic |
| c. transverse | d. longitudinal |

Answer: **D**

The particles are moving parallel to the direction that the wave is moving. This must be a longitudinal wave.

3. Describe how the fans in a stadium must move in order to produce a longitudinal stadium wave.

Answer:

The fans will need to sway side to side. Thus, as the wave travels around the stadium they would be moving parallel to its direction of motion. If they rise up and sit down, then they would be creating a transverse wave.

4. A sound wave is a mechanical wave, not an electromagnetic wave. This means that

a. particles of the medium move perpendicular to the direction of energy transport.

b. a sound wave transports its energy through a vacuum.

c. particles of the medium regularly and repeatedly oscillate about their rest position.

d. a medium is required in order for sound waves to transport energy.

Answer: **D**

Mechanical waves require a medium in order to transport energy. Sound, like any mechanical wave, cannot travel through a vacuum.

5. A science fiction film depicts inhabitants of one spaceship (in outer space) hearing the sound of a nearby spaceship as it zooms past at high speeds. Critique the physics of this film.

Answer:

This is an example of faulty physics in film. Sound is a mechanical wave and could never be transmitted through the vacuum of outer space.

6. If you strike a horizontal rod vertically from above, what can be said about the waves created in the rod?

a. The particles vibrate horizontally along the direction of the rod.

b. The particles vibrate vertically, perpendicular to the direction of the rod.

c. The particles vibrate in circles, perpendicular to the direction of the rod.

d. The particles travel along the rod from the point of impact to its end.

Answer: **B**

The particles vibrate in the direction of the source which creates the initial disturbance. Since the hammer was moving vertically, the particles will also vibrate vertically.

7. Which of the following is not a characteristic of mechanical waves?

a. They consist of disturbances or oscillations of a medium.

b. They transport energy.

c. They travel in a direction that is at right angles to the direction of the particles of the medium.

d. They are created by a vibrating source.

Answer: **C**

The characteristic described in statement c is a property of all transverse waves, but not necessarily of all mechanical waves. A mechanical wave can also be longitudinal.

8. The sonar device on a fishing boat uses underwater sound to locate fish. Would you expect sonar to be a longitudinal or a transverse wave?

Answer: **Longitudinal**

Only longitudinal waves are capable of traveling through fluids such as water. When a transverse wave tries to propagate through water, the particles of the medium slip past each other and so prevent the movement of the wave.