

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

Graph has two perpendicular lines intersecting at the point which is called origin. The horizontal line is called X-axis and vertical line is called Y-axis.

6. **Give same examples in which force acts on an objects?**

Ans: 1) When we pull a string to tighten up the Knot.

2). When we push accelerator of the moving car.

3). When we kick a ball to throw it in goal.

4). Gravitational force is acting down words.

5). Walking on the ground.

6). By applying brake, we slow down the car.

7). **Define contact force with examples.**

Ans: A force that acts only when there is physical contact between two bodies'!

Kicking the foot ball, Opening of a parachute, air resistance, friction, normal reaction force etc.

8). **What is Non-contact Force?**

Ans: Non-contact force is a type of force that acts on the object, without any physical contact with it. For examples gravitational force, magnetic force, between magnets and electrostatics force between charge etc.

9). **Define the 3rd law of motion.**

Ans: Every action has equal but opposite reaction

10) **What do you mean by Bouncing back of ball?**

Ans: When you throw the ball against the wall, the force that ball applies on the wall is action. After striking the wall, ball came back to you due to force exerted by wall on the ball is reaction.

11). **Briefly define the propulsion of rocket.**

Ans: When a rocket is fired, hot gases move out with action force and rocket moves forward due to reaction force.

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WAVES AND ENERGY

Questions and Activities

A. **MCQs (Choose the correct option)**

1. **Hertz (Hz) is the unit of:**

- a. Mass b. Energy
- c. Loudness d. Frequency

Ans: d. Frequency

2. **To hear echo, minimum distance between sound source and obstacle should be:**

- a. 71 m b. 17 m
- c. 17 cm d. 0.17 m

Ans: c. 17 m

3. **Which of the following is a longitudinal wave?**

- a. X-rays
- b. Waves on stretched rope

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

- c. P-seismic waves
d. S-seismic waves
Ans: c. P-seismic waves
4. Which has highest pitch of sound?
a. Lion roar b. Whistling sound
c. Train horn d. Traffic noise
Ans: b. Whistling sound
5. If a wave has three crests and three troughs then what is its frequency?
a. 3 Hz b. 1 Hz
c. 5 Hz d. 6 Hz
Ans: b. 1 Hz
6. Sound waves cannot pass through:
a. Solids b. Liquids
c. Gases d. Vacuum
Ans: d. Vacuum
7. Which of the following animal has the lowest pitch of sound?
a. Sparrow b. Dog
c. Cat d. Mosquito
Ans: d. Mosquito
8. If frequency of sound is doubled but amplitude of this sound wave is kept constant, then
a. loudness and pitch both increase.
b. loudness and pitch both decrease.
c. loudness increase and pitch remains same.
d. loudness remains same and pitch increases.
Ans: a. loudness and pitch both increase
9. Which of following is a longitudinal wave?
a. Sound wave
b. Water waves on surface of ocean

- c. Light d. String wave
Ans: Sound wave
10. Product of frequency and time period of a wave is:
a. 1 b. $\frac{1}{T}$
c. $\frac{1}{f}$ d. 0
Ans: a. 1
- B. True and False (correct the statement if it is False)
1. In waves, matter is also transported along with energy.
Ans: False. In waves, matter is not transported along with energy.
2. Sound is a form of energy that travels through a medium as transverse wave.
Ans: False. Sound is a form of energy that travels through a medium as longitudinal wave.
3. High pitch sound means grave sound.
Ans: False. Low pitch sound means grave sound.
4. If you are standing near a loudspeaker then you hear sound waves of large amplitude.
Ans: True.
5. Red light has greater speed in air than speed of sound in steel.
Ans: True
- C. Short questions.
1. Give at least two differences between mechanical waves and electromagnetic waves.
Ans: 1. Mechanical waves can only travel through a medium.

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

2. They cannot pass through vacuum.

1. Electromagnetic waves can pass through vacuum as well as through medium.

2. All these waves travel with the speed of light in vacuum.

2. **Differentiate between transverse waves and longitudinal waves. Give at least one similarity and one difference.**

Ans: **Difference.**

Transverse wave. The medium is moving perpendicular to the direction of wave. In longitudinal wave, the medium moves in the same direction of the wave.

Similarity

Both waves are mechanical waves. Both transport energy without transporting matter.

3. **Why do we not hear sound caused by explosions on the sun?**

Ans: Sound is a mechanical wave that require material medium to travel. But there is vacuum between Sun and earth. Therefore, sound is not heard on earth due to explosions on the sun.

4. **Define the following terms: crest, trough, rarefaction and compression.**

Ans: **Crest.** It is the position of transverse waves above the mean position.

Trough. It is the position of transverse waves below the means position.

Rarefaction. The portion of longitudinal wave in which particles of the medium are spread out is called rarefaction.

Compression. The portion of the longitudinal wave in which particles of the medium are close to each other is called compression.

5. **If 100 waves (or cycles) of water are passing through a point in the river in 20 seconds, calculate frequency and time period of these waves.**

Ans Sol. Frequency = $\frac{\text{No. of waves}}{\text{Time taken}}$

$$f = \frac{100}{20} = 5\text{Hz.}$$

Time period (T) = $\frac{\text{Time taken}}{\text{No of waves}} = \frac{t}{n}$

$$\frac{20}{100} = \frac{1}{5} = 0.2\text{sec.}$$

6. **Waves are produced in stretched string continuously. A crest passes through a point on it in 1.5 seconds, what is frequency of waves?**

Ans: **SO/**

$$F = \frac{1}{T} = \frac{1}{1.5} \times 10^2 = \frac{2}{3}$$

$$= 0.66\text{ Hz} \quad \text{Ans}$$

7. **How can a body produce sound? Explain briefly.**

Ans: Sound is produced when an object vibrates, creating a pressure wave. This pressure wave causes particles in the surrounding medium (air, water,

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

or solid) to have vibrational motion. As the particle vibrates, they move nearby particles, transmitting the sound further through the medium.

8. What is pitch of sound? How is it related with the frequency of sound?

Ans: The pitch of sound is determined by the frequency of vibration of the sound waves that produce them. A high frequency (e.g. 880 Hz) is seen as a high pitch while a low frequency (e.g. 55 Hz) is regarded as a low pitch. Low frequency sounds include a bass drum, thunder, and a man's deep voice.

9. What is loudness of sound? Name the factors on which loudness of sound depends.

Ans: Loudness Of Sound

"The property of sound which helps us to distinguish between a soft sound and a louder sound is called loudness of sound."

Factors Affecting loudness of Sound

1. Amplitude of the wave.
2. Surface area of sound source
3. Distance from sound source
4. Sensitivity of Ear.

10. A mobile phone is vibrating in your hand and another mobile is vibrating on a table. Which will be producing louder sound and why?

Ans: A mobile phone will produce louder sound. Which is in my

hand? Because it is closer than that of a table.

11. How can you hear echo?

Ans: "Echo is repetition of sound due to reflection of sound waves from a hard surface." The minimum distance between the speaker and the reflecting surface should be at least 17 meters, then the time gap between the reflected sound and the original sound will be equal to 0.1 second. As a result, we will be able to hear an echo.

12. In a cricket ground, a batsman hits a four in a test match. You notice that the hitting sound of the bat is heard slightly after you see the bat actually hitting the ball. Why is it so?

Ans: We see the bat hitting the ball first and then hear the sound because light travels faster than the sound.

D. Long questions

1. Define the following terms for wave; crest, trough, compression, rarefaction, wavelength, amplitude

Ans: WAVE: is a disturbance in a medium that causes particles of the medium to vibrate.

CREST: It is the portion of transverse waves above the mean position.

TROUGH: It is the portion of transverse waves below the mean position.

COMPRESSION: It is the region of longitudinal waves of low

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

volume, high density and having high pressure. OR

The portion of longitudinal wave in which particles of the medium are close to each other

RAREFACTION: It is the region of longitudinal waves of large volume, low density and having low pressure. OR

The portion of longitudinal wave in which particles of the medium are spread out.

WAVELENGTH: Length of one wave (or cycle) is its wavelength. It can be defined as. "It is the distance between two consecutive crests or two consecutive troughs". Its SI unit of wavelength is meter (m).

AMPLITUDE: It is the maximum displacement of vibrating particles of the medium from mean position when a wave is passing through it

2. **Show that frequency and time period of waves are inverse of each other.**

Ans: We know that

Frequency =

$$= \frac{\text{Number of waves passing through a point}}{\text{Time taken by waves to pass through a point}}$$

$$= \frac{n}{t} \text{ and}$$

Time = Period =

$$= \frac{\text{time taken by waves to pass through the point}}{\text{Number of waves passing through the point}} = \frac{t}{n}$$

Multiply both equation

$$\text{Frequency of waves (f) X Time period (T) =}$$

$$\left(\frac{n}{t}\right) \left(\frac{t}{n}\right) \rightarrow f \times T = 1$$

Frequency of a wave and its time period are inverse of each other.

$$\rightarrow f = \frac{1}{T} \text{ OR } T = \frac{1}{f}$$

3. **What is pitch of sound? On what factors it depends?**

Ans: **Definition:** "Pitch of sound tells us how shrill or grave sound is". In other word we can also say that pitch of sound is the property of sound that helps us to distinguish between sounds of different frequencies pitch of the sound depends upon its frequency. As the pitch of the sound is directly proportional to frequency low frequency sound are said to have low pitch whereas sound of high frequency are said to have the high pitch.

4. **What is loudness of sound? On what factors it depends?**

Ans: **Loudness of sound:** "It is the sensation produced by sound on our ears." OR
"The property of sound which help us to distinguish between a soft sound and a louder sound is called loudness of sound."

Factor Affecting loudness of sound:

1. **Amplitude of the wave:**

Ans: Loudness of sound is related with the amplitude of the wave. Louder sound has greater amplitude and soft sound has small amplitude. So, loudness of sound is directly proportional to amplitude of the wave. Loudness of sound is Amplitude of wave.

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

2. Surface Area of Sound Source:

If the sound source has larger surface to vibrate, it produces louder sound.

3. Distance from sound source:

If a listener is standing near a sound source, he/she will hear louder sound than the person standing at far off place.

4. Sensitivity of Ear:

Loudness of sound also depends upon condition of ear. Usually old people cannot listen to soft voices.

E. Structure questions

1. Waves are produced in water pool. A graph is plotted between instantaneous displacement of particles of the medium and time as shown.



a. How many crests and troughs are there?

Ans: There are 4 crests and three trough.

b. What is amplitude of the wave?

Ans: Amplitude of the wave is 2 second.

c. What are displacements of particles of the wave at time 4 seconds and 11 seconds?

Ans: At time 4 second the displacement is 5 cm and at 11 second displacement is 13 cm.

d. How many waves are there?

Ans: There are 4 waves.

e. What is time period of the wave?

Ans: $T = \frac{t}{n} = \frac{12}{3} = 4 \text{ second.}$

f. What is frequency of the waves?

Ans: $f = \frac{n}{t} = \frac{3}{12} = \frac{1}{4} \text{ Hz.}$

g. If there are 3.5 waves in distance of 7 meters then find the wavelength for these waves?

Ans:

Numbers of wave = 3.5

Total distance = 7m

To find

Wavelength λ = ?

Sol:

$$\begin{aligned} \text{Wavelength} &= \frac{\text{Total distance}}{\text{no of waves}} \\ &= \frac{7}{3.5} \\ \lambda &= 2 \text{ meter} \end{aligned}$$

2. Consider the diagrams, one end of each ruler is made fixed by placing under heavy books and their other ends are free to vibrate. When the free end of each ruler is plucked with same force then:



a. Which ruler will produce louder sound? And why?

Ans: Shorter distance (20 cm) ruler will produce louder sound.

b. Which ruler will produce sound of high pitch?

Ans: Shorter distance (20 cm) will produce sound of high pitch.

3. Draw the wave form/ graphs to differentiate between the situations given below:

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

i. you talking to a friend & you shouting during the football match.

Ans: red color show shouting
Blue color show talking

ii. Whistle sound & male voice of same loudness.

Ans: red color show whistle sound
Blue color show male voice

F. Project Work

Take a small piece of card stock, place small nails at varying distances apart, and connect them with rubber bands. These bands should be arranged so that they produce notes ranging from low to high pitch.

Ans: practical work.

Stop And Check

1. One crest and one trough forms one wave or cycle can you tell how many waves are there is

Ans: There are three waves in fig 9.6.

2. One rarefaction and one compression form one longitudinal wave. Can you tell

that how many waves are there in the figure?

Ans: There are 49 waves in the figure.

A. MCQs (Choose the correct option)

1. Colours in the Bubble is due to waves.

- a. water b. sound
c. light d. air

Ans: c. light

2. It transverse waves particles of the medium vibrate ----to direction of wave travel.

- a. to and fro b. parallel
c. perpendicular d. Adjacent

Ans: c. perpendicular

3. ----waves do not require material medium to travel.

- a. Electromagnetic
b. longitudinal
c. Transverse
d. S—waves

Ans: a. Electromagnetic

4. In SI units, of waves length is _____.

- a. cm b. m
c. km d. m.m

Ans: b. m (meter)

5. Amplitude of the wave measures the _____carried by a wave.

- a. light b. sound
c. energy d. heat

Ans: c. energy

6. Shrill sound has greater_____.

- a. Amplitude b. wavelength
c. low pitch d. frequency

Ans: d. frequency

7. Which bar will produce a higher pitch sound in Xylophone?

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

- a. Smaller length bar
b. longer length bar
c. Medium length bar
d. None of them

Ans: a. Smaller length bar

8. A hearing aid is a small _____ device.

- a. Mechanical b. chemical
c. electronic d. physical

Ans: c. electronic

9. Measure of displacement of wave from its rest position is _____ of wave.

- a. wavelength b. frequency
c. amplitude d. speed

Ans: c. amplitude

10. If three compressions pass through a certain point in one second, the frequency of sound wave is _____ hertz.

- a. 0 b. 1
c. 2 d. 3

Ans: d. 3

11. Human cannot detect sound waves having frequency _____ hertz.

- a. 100 b. 1000
c. 10,000 d. 50,000

Ans: d. 50,000

12. Which of the following colour has the highest frequency.

- a. red b. yellow
c. green d. blue

Ans: d. blue

13. In electromagnetic spectrum which region has the lowest frequency?

- a. X-rays b. ultraviolet
c. visible d. infrared

Ans: d. infrared

14. The time gap between the reflected sound and the original sound will be equal to _____ second.

- a. 0.1 b. 0.01
c. 1 c. 1.1

Ans: a. 0.1

15. speed of light is _____ km/s.

- a. 100,000 b. 200,000
c. 300,000 d. 400,000

Ans: c. 300,000

More Short Questions.

1. Define wave, vibratory Motion.

Ans: "Waves is a disturbance or vibration in a medium which transfers energy from one place to another place without transferring the matter."

Vibratory Motion: It is to and fro motion of a body about its mean position.

2. What are P-waves and S-waves?

Ans: Earth quakes generates both transverse and longitudinal waves. Since the longitudinal waves travel faster through Earth and reach seismographs (Earth quake detectors) first, they are called primary or P-waves. Transverse waves travel much slower are called secondary or S-waves.

3. How you define Electromagnetic waves?

Ans: Electromagnetic waves like light do not require material medium to travel. It these waves instead of medium particles, electric and

GENERAL SCIENCE NOTES FOR 7TH CLASS (FOR ISLAMABAD)

magnetic fields vibrate perpendicular to wave travel just the particles in transverse waves Therefore, electromagnetic waves are transverse waves.

4. What is the purpose of hearing aid device?

Ans: A hearing aid is a small electronic device that you wear in or behind your ear. It makes some sounds louder so that a person with hearing loss can listen, communicate and participate more fully in daily activity A hearing aid device can help people hear more in both quiet and noisy situations.

5. Name the some electromagnetic waves.

Ans: Light, Microwaves, infrared, X-rays, Ultraviolet rays and Radio waves.

6. Light reaches us earlier than the thundering sound. Why?

Ans: During lightening in the sky both light and sound are produced at the same time but light reaches us earlier than thundering sound because light is faster than sound.

7. What is Echo?

Ans: Echo is repetition of sound due to reflection of sound waves from a hard surface back to speaker.

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10

HEAT AND TEMPERATURE

Questions and Activities

A. MCQs (Choose the correct option)

1. "J" is the symbol for unit joule, it is the unit of:

- a. Temperature b. Heat
c. Power d. Voltage

Ans: b. Heat

2. If your class room temperature is 27°C, what is its value in kelvin scale?

- a. 27 K b. 373 K
c. 300 K d. 246 K

Ans: c. 300 K

3. Which of the following is the best conductor?

- a. Wood b. Water
c. Metal d. Plastic

Ans: c. Metal

4. Which temperature of the followings is representing melting point of ice?

- a. 0K b. 32°C
c. 273K d. 0°F

Ans: c. 273K

5. Mercury thermometer is used to measure temperature of a body. Which process is used in it?

- a. Convection b. Radiation
c. Thermal expansion
d. Insulation

Ans: c. Thermal expansion