

FIRST TERM EXAMINATION

SCIENCE

(Class:- IX)

Solution

(Diversity in living organisms, Force and laws of Motion, Sound, Matter in our surroundings)

SECTION-A

(20 × 1 = 20)

1. (b) FUNGI
2. (b) Ferns
3. Pteridophytes are also called as vascular cryptogams
4. The binomial nomenclature is made up of two words a generic name and a specific name.
5. A sea anemone belongs to the phylum Coelenterate.
6. (c) mass of the object.
7. (b) backward
8. (d) the earth attract it.
9. Assertion is false as newton third law can act even body is stationary. Consider an example of rope pulling.

Reason

According to Newton third law For every action there is a reaction pair which acts on all forces so reason is true.

10 (d)

12. (c)

13. Velocity of sound in vacuum is Zero

- 14. Loudness of a note increases with the increase in the amplitude vibration.
- 15. (a)
- 16. (a)
- 17. (a)
- 18. (c)
- 18. Nitrogen and Hydrogen Mixture (a gaseous mixture)
- 19. Soda water can be separated by reducing the pressure.
- 20. (b)

Section – B

15x3 = 45

21. (a) The heat energy which is now being supplied is used up to bring a change in physical state only. It is known as latent heat of fusion.

(b)

Evaporation	Boiling
Evaporation is a normal process that occurs when the liquid form changes into the gaseous form; while causing an increase in the pressure or temperature.	Boiling is an unnatural process where the liquid gets heated up and vaporized due to continuous heating of the liquid.
Evaporation usually occurs on the surface of the liquid being heated up.	Boiling usually occurs on the entire mass of the liquid that gets heated up.
Bubbling effect is not visible in evaporation.	Bubbling effect is visible during the process of boiling.

The process of evaporation is usually slower and more carried out when compared to boiling.

The process of boiling is usually much quicker and the process happens quite rapidly as well.

22. (a) Since, the mass of B is more, inertia of B will be more.

Momentum is $p = mv$

Thus, for A, $p_A = m \times 2V = 2mV$

And, for B, $p_B = 2m \times V = 2mV$

Thus, momentum for both is same.

(b) The rate of change in momentum is equal to the force

F is directly proportional to mv

$$F = \frac{mv - mu}{t}$$

$$= m(v - u)$$

$$= ma$$

23. The subgroup of kingdom plantae which is called the amphibian of plant kingdom is Bryophyta.

Features of Bryophyta:-

1. They live both on land and water.
2. They are non-vascular plants.
3. Their body is partially differentiated.

24. **Rigidity:** The property of substances being stiff and resistive towards stress.

Compressibility: The property of substance which shows how much the volume of a substance can be reduced by the application of force.

Diffusion : The movement of atoms or molecules from an area of higher concentration to an area of lower concentration. Atoms and small molecules can move across a cell membrane by diffusion.

25. (a) On a hot day, when our body temperature tends to rise too much, our sweat glands give out moisture (sweat) on our skin. When this sweat evaporates, it takes the latent heat of vaporisation from our body hence making our body cool.

(b) Gases have a negligible intermolecular force of attraction between the particles of gas. The random motion of particles in all the directions is experienced in the vessel. Hence, the gas fills completely the vessel in which it is kept.

(c) When ice placed at zero degree Celsius, latent heat absorbed by the ice is greater than the same heat absorbed by the water at same point of temperature that is zero degree Celsius.

26. (a) The non-metal which is liquid is bromine at room temperature.

(b) Diamond is the natural hardest non metal known.

(c) The non-metal which is conductor of electricity is graphite.

27.

Angiosperms	Gymnosperms
A seed is produced by flowering plants and is enclosed within an ovary	A seed is produced by non-flowering plants and are unenclosed or naked.
The lifecycle of these plants are seasonal	These plants are evergreen
Has triploid tissue	Has haploid tissue
Leaves are flat in shape	Leaves are scalelike and

	needle-like in shape
Hardwood type	Softwood type
Reproduction rely on animals	Reproduction rely on wind
Reproductive system present in flowers (unisexual or bisexual)	Reproductive system present in cones and are unisexual

28 (a) A sound is heard only if the body vibrates with a frequency more than 20 Hz and less than 20,000 Hz. The pendulum oscillates with a frequency less than 20 Hz. Hence, no sound is heard.

(b) Speed of sound, $v = 339 \text{ m s}^{-1}$

Wavelength of sound, $= 1.5 \text{ cm} = 0.015 \text{ m}$

Speed of sound = Wavelength \times Frequency

Frequency = Speed of sound/Wavelength

Frequency = $339/0.015$

= 22600 Hz.

The frequency range of audible sound for humans lies between 20 Hz to 20,000 Hz. Since the frequency of the given sound is more than 20,000 Hz, it is not audible

29. (a) Ascaris and Wuchereria.

30. The velocity of the body of mass m changes from u to v after applying force in time t .

So the initial momentum is , $P_{\text{initial}} = mu$

Final Momentum is $P_{\text{final}} = mv$

Change in momentum = $P_{\text{final}} - P_{\text{initial}} = mv - mu = m(v - u)$

Now the rate of change of momentum

$$= (P_{\text{final}} - P_{\text{initial}}) / t = m(v - u) / t$$

31. (a) Hermaphrodites are the creatures that have both male and female reproductive organs.

Example: earthworms, snails

(b) The tape worm belongs to Platyhelminthes. The Star fish belongs to the phylum Echinodermata. Jellyfish belongs to cnideria. Octopus belongs to Mollusca

32. The minimum distance (d) for the distinct echo to be heard (say at 22°C) is 17.2 m (as $2d = vt = 344 \times 0.1 = 34.4 \text{ m}$). On a hotter day, the temperature increases and the speed of sound in air also increases. For example, at 40°C , speed of sound, i.e. $v = 356 \text{ m/s}$ and as such $2d = 356 \times 0.1 = 35.6 \text{ m}$ or $d = 17.8 \text{ m}$. Thus, if the distance of the reflecting surface and the source of sound remains the same (i.e., 17.2 m), no echo is heard on the hotter day as the minimum distance now required is 17.8 m.

33. (a) The waves in which the particles of medium oscillate to and fro from their mean position in the direction of propagation of waves are called longitudinal waves.

Examples:

Sound waves in air.

The waves which travel along the spring (or slinky) when it is pushed and pulled at one end.

(b) Wavelength = $1 \text{ cm} = 0.01 \text{ m}$

Velocity = 330 m/s

Frequency = $\text{Velocity} / \text{Wavelength} = 330 / 0.01 = 33000 \text{ Hz}$

$33000 > 20000$

Therefore, frequency of this wave is an ultrasound which can't be heard by a normal human being.

34. Athletes have to run the heats and they rest their foot on a solid supports before start so that during the start of the race the athlete pushes the support with lot of force and this support gives

him equal and opposite push to start the race and get a good start to compete for the race.

35. (a) The person standing in train has the velocity of train. when the ball is thrown , the ball also has the velocity of train. In an ideal situation, when there is no air resistance, there will be no velocity nor acceleration to change the horizontal velocity of the ball which is same as that of train and hence, same as that of person. Hence, the ball will always cover equal horizontal distance to the horizontal distance covered by person.

(b) As the mass is a measure of inertia the ball of same shape and size, having more mass than other balls will have highest inertia. Since , the steel has greatest density and greatest mass therefore it has highest inertia.

Section – C

7x5 = 35

36. (i) According to law of conservation of momentum

When two or more bodies acts upon each other their total momentum remains constant provided no external forces are acting

When this law is applied for a collision between two bodies, the total momentum of the colliding bodies before collision is equal to the total momentum after collision.

We can apply this law for a collision between two vehicles. This law is applicable for all types of collisions.

Consider two particles say A and B of mass m_1 and m_2 collide with each other and forces acting on these particles are only the ones they exert on each other.

Let u_1 and v_1 be the initial and final velocities of particle A and similarly, u_2 and v_2 for particle B. Let the two particles be in contact for a time t . So, Change in momentum of A = $m_1 (v_1 - u_1)$ Change in momentum of B = $m_2 (v_2 - u_2)$

During the collision, let A impart an average force equal to F_{BA} on B and let B exert an average F_{AB} on A. We know that from third law of motion $F_{BA} = -F_{AB}$ (4)

$$F_{BA} = m_2 \times a_2 = \frac{m_2(v_2 - u_2)}{t}$$

$$F_{AB} = m_1 \times a_1 = \frac{m_1(v_1 - u_1)}{t}$$

Putting above two in equation 4 we get

$$\frac{m_2(v_2 - u_2)}{t} = - \frac{m_1(v_1 - u_1)}{t}$$

Here,

canceling t on both sides and rearranging the equation we get

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2 \quad (5)$$

Now, $m_1u_1 + m_2u_2$ represents the total momentum of particles A and B before collision

and $m_1v_1 + m_2v_2$ represents the total momentum of particles after collision. This means that

Total momentum before collision = total momentum after collision

Equation 5

which $m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$, is known as the law of conservation of momentum.

Thus we conclude that when two particles are subjected only to their mutual interactions, the sum of the momentums of the bodies remains constant in time or we can say the total momentum of the two particles does not change because of the any mutual interactions between them.

$$(ii) \quad m = 5\text{kg}, u = 30\text{m/s}, t = 5\text{s}, v = 40$$

$$= M(v-u)$$

$$= 5(10) = 50\text{kgm/s}$$

$$a = (v-u)/t = 10/5 = 2\text{m/s}^2$$

$$F = ma = 5 \times 2 = 10\text{N}$$

$$\text{Rate of change of momentum} = 10\text{ N}$$

$$\text{Acceleration of the body} = 2\text{ m/s}^2$$

$$\text{Force on the body} = 10\text{ N}$$

37. (a) When metal reacts with nitric acid (HNO₃), hydrogen gas is not evolved. This is because HNO₃ is a strong oxidising agent. It oxidises H₂ produced to water and is itself reduced to any of the oxides of nitrogen (N₂O, NO or NO₂). For example,

$$3\text{Cu}(s) + 8\text{HNO}_3(aq) \longrightarrow 3\text{Cu}(\text{NO}_3)_2(aq) + 2\text{NO}(g) + 4\text{H}_2\text{O}(l)$$

(b) Silver tarnishes from the interaction with sulphides in the air. First the tarnish will take on a golden hue and eventually it will turn the piece black. This is a natural process. Higher sulphide levels are associated with humidity and air pollution. So without reacting with oxygen it tarnishes

(c) Sodium metal cannot be obtained by the electrolysis of their aqueous solutions because the metal deposited at the cathode reacts at once with water to form metal hydroxide and hydrogen gas.

Thus at the cathode, metals are not liberated or deposited instead hydrogen gas is obtained.

(d) Al metal reacts with dilute HCl slowly in the beginning due to the presence of a tough protective layer of aluminium oxide on its surface.

38. (a) The full form of SONAR is SOund Navigation and Ranging. The SONAR method is also called echo ranging. It is a device that utilizes ultrasonic waves to estimate and measure the distance, direction and speed of objects underwater.

(b) Principle of SONAR:

It uses echoes in to determine the sea-depth and locating the presence of objects underwater.

Working of SONAR:

It consists of a transmitter and a detector and is installed in a ship or a boat.

The transmitter in SONAR produces and transmits powerful ultrasonic waves.

The ultrasonic waves travel through the water and after striking the target the beam is reflected from the seabed and is received by an under-water detector (mounted on the ship).

The detector then converts the waves into electrical signals which are properly interpreted.

The time interval between transmission and reception of the signal is also noted.

Applications of SONAR Technology

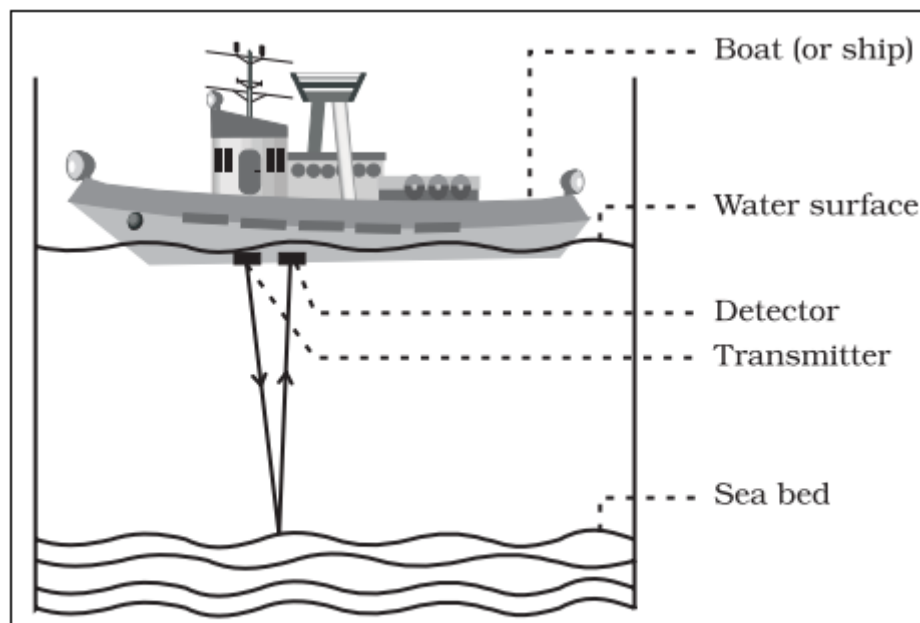
The basic use of sonar technology is to estimate the depth, range, and direction of arrival of objects. Following are the various different applications of sonar technology:

Special sonars are used in ships and submarines for underwater communications.

Medical imaging for the detection of cysts and cancer cells are done using sonar and this method is known as sonogram.

It is used for the detection of enemy vessels and torpedo by the military.

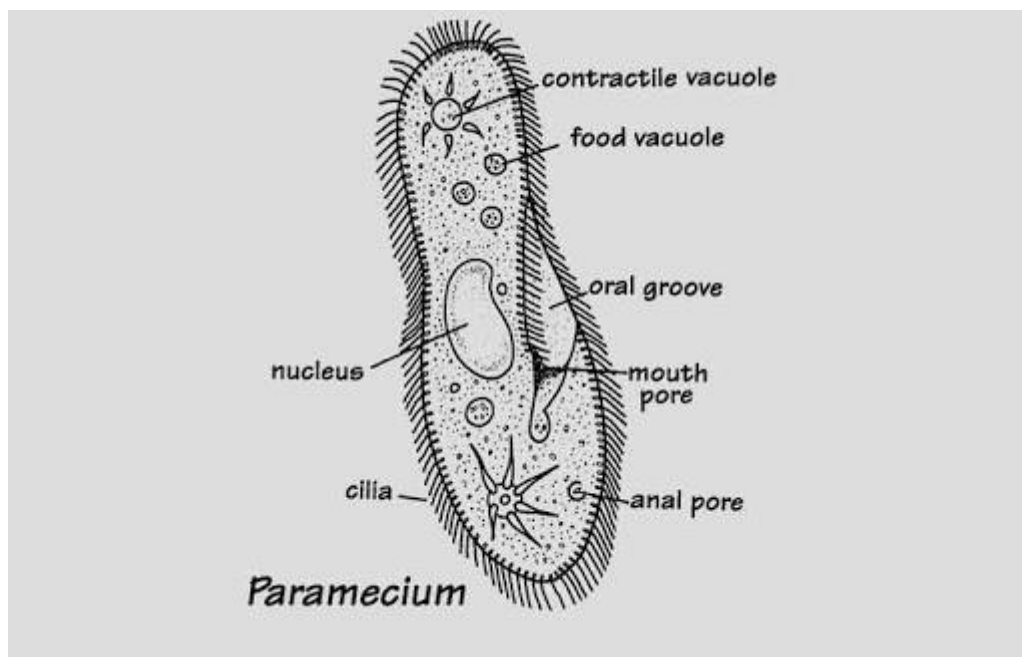
Sonar also finds application in inspecting pipelines that carry oil and gas for detecting possible damages.



Ultrasound sent by the transmitter and received by the detector.

39. (a) Two characteristic features of vertebrates are as follows:
- (i) Presence of an internal skeleton.
 - (ii) Triploblastic, coelomic and segmented body.
- (b) (i) Echidna and Platypus are considered mammals because they have mammary glands to nourish their young ones.
- (ii) Birds have modified forelimbs to reduce body weight for flight. Crocodiles are reptiles because they are cold-blooded, lay eggs and have scales on their body.

40.



(b) Paramecium belongs to kingdom Protista

41. (i) Pitch: It is that characteristic of sound which helps to distinguish between a shrill and a hoarse sound. Pitch of a sound is the sensation which depends upon frequency.
- (ii) Loudness : It is the characteristic of sound which helps to distinguish between a loud sound and a faint sound. A loud sound has a large energy associated with it.
- (iii) Quality or Timbre : It is the characteristic of a sound which helps us to trace source i.e., whether it is from Tabla or Guitar. It is this characteristic of sound by which we can recognise a friend only from his voice.

(b) Here, $v = 342 \text{ m s}^{-1}$,

$t = 3\text{s}$,

$d = ?$

We know that $d = vt/2 = 342 \times 3/2 = 513 \text{ m}$

42. (a) Diffusion:

The movement of gases (like carbon dioxide and oxygen) from a region of high concentration to a region of low concentration through a semi permeable membrane is known as diffusion. Thus, diffusion plays an important role in gaseous exchange between the cells as well as the cell and its external environment.

Activity:

When you put food colouring in cold water, it takes longer for the molecules to mix with the water. Since at high temperature the molecules possess more kinetic energy, the rate of their motion increases and diffusion occurs faster.

(b) LPG and oxygen are two gases which are supplied in compressed form in homes and hospitals.

LPG-Liquefied petroleum gas

CNG-compressed natural gas are supplied to hospitals in cylinders.