Physics

1. Blotting paper absorbs ink. Why ?

The blotting paper is porous and has a number of capillaries of very fine pores. When a portion of the blotting paper is brought in contact with the ink, it enters the capillaries due to the surface tension.

2. Why does carbon dioxide is used in extinguishing fire?

Carbon dioxide being heavier than oxygen acts as fire extinguisher by cutting off its oxygen supply to a burning object.

3. Why do the stars twinkle ?

Stars appear to twinkle because its light travels through different layers of space of varying densities. As a result the light from the stars bends and makes them appear to blink on and off.

4. Why is it not possible to see the stars in the day light ?

The blazing light of the sun during daytime prevents the less intense light of the stars from being seen distinctly.

5. Why does the ice float on water while it sinks in alcohol?

The specific gravity of ice is less than that of water but the same is more than that of alcohol, hence ice floats on water but sinks in alcohol.

6. Why is mercury used in thermometer ?

Mercury is the only metal which is in liquid state even at the ordinary room temperature. Also, it uniformly expands when heated and does not stick to the walls of thermometer. Its high boiling point and low freezing point is the main reason for using it in ordinary thermometers.

7. How can bats fly in the dark avoiding obstacles?

The ultrasonic waves produced by bats during flying are reflected back when they hit the obstacles. Hence, bats can find their path without any difficulty.

8. Why does water pipe often burst in cold countries?

In winter, the water in the pipes freezes. On freezing into ice the water increases in volume, which results in bursting of water pipes.

9. Why is cooking quicker in pressure cooker ?

In a pressure cooker, boiling point of water is raised by increasing pressure with steam. Food gets high temperature and so cooking becomes quicker.

10. We bring our hands close to mouth while shouting to somebody at a distance. Why?

By bringing the hands close to our mouth, the sound energy is not allowed to spread in all directions, rather being made unidirectional (i.e. directed in a particular direction). Hence the sound produced becomes louder.

11. Why do we lean forward while climbing a hill ?

Leaning forward enables us to keep the line passing through the centre of gravity vertically downward, within our feet, and thus the equilibrium is kept stable.

12. Why are lightning conductors fixed at the top of high buildings ?

When an electric discharge takes place from the cloud, the lightning conductor provides it an easy conducting path to the earth without damaging the building.

13. Why does a parachute must have a hole ?

A hole in the centre of parachute is made to avoid oscillation of the parachute while descending owing to the changing currents of wind. The hole allows the air to run out of the parachute regularly.

14. How does a flute produce different sound notes?

A flute produces different sound notes because air particles passing through it are vibrated with different frequencies with the closing and opening of the holes.

15. Why do we use a fuse in an electric circuit?

A fuse is used in an electric circuit because when excess current flows through the circuit the fuse melts and breaks the circuit and prevents the damage to any of the electrical goods used.

16. What causes wind ?

Winds are caused by the unequal heating of the earth's surface and rotation of earth.

17. Why does a drop of liquid assume a spherical shape ?

A drop of liquid assumes a spherical shape due to surface tension. A sphere has the least surface area for a given volume.

18. What is a breeder reactor ?

A breeder reactor is such a reactor which produces more fissionable material than it burns.

19. What does a moderator do in a nuclear reactor?

The number of nuclei split by the impact of neutrons is regulated by a moderator in a nuclear reactor.

20. Why is a small space left at the joint between the two rails?

To permit the expansion of rails due to heat generated by friction of the moving train in summer.

21. A glass tumbler is filled to the brim with water and a piece of ice is floating on it. As the ice melts, will the water overflow or not? Give reason for your answer?

Level of water remains unchanged because the volume of water produced by the melting of ice is exactly the same as that of the piece of ice. On melting, the water will be equal to the volume of water displaced by the ice.

22. When a moving train slows down quickly, will a passenger tend to fall backward or forward? Explain why?

The passenger will tend to fall forward because the lower portion of his body which is in contact with the seat will come to rest quickly whereas the upper portion of the body continues to be in a state of motion. Hence, the person is thrown forward, due to inertia.

23. Explain why it takes more time to cook meat and vegetables at hill stations?

At higher altitudes, the atmospheric pressure is low as compared to that in the plains and, therefore water boils below 100°C. Hence sufficient heat is not supplied for cooking the meat and vegetables at hill stations.

24. When we drink soft drinks through a straw, why does the liquid go up into our mouth?

When a person sucks air from the straw, the pressure of the air inside the straw is reduced as compared to the atmospheric pressure acting on the surface of the liquid. Therefore, the soft drink rushes up into the straw and to the mouth.

25. Explain why the moisture (water droplets) gathers on the outer side of a glass tumbler containing ice-cold water?

The water vapour present in air gets cooled and appear as droplets of water on coming in contact with the cold surface of the glass tumbler.

26. Why does a metal seen colder in winter and hotter in summer compared with a

piece of wood?

Metals absorb and transmit heat more rapidly than wood.

27. A thick glass tumbler often cracks when a very hot liquid is poured in it. Why?

The inner surface of the thick glass tumbler coming in contact with the hot liquid expands more in comparison to the outer surface which is relatively at a lower temperature. The uneven expansion of inner and outer surface may produce cracks.

28. How does a rainbow form? Explain the phenomenon.

After rain, some clouds continue to linger in the sky and they contain water droplets. Water droplets act like prisms. Sun's rays falling on water droplets suffer dispersion and produce a spectrum. The different colours are viewed in the form of a rainbow.

29. What causes the rumbling sound of thunder?

Air is heated instantly when an electrical charge of lightning passes through it. The heat causes the molecules of air to expand in all the directions. As the molecules seek more room, they collide violently with layers of cool air, and set up a great air wave that has the sound of thunder.

30. Why are mornings and evenings less warm than noon?

In the mornings and evenings, the rays of the sun falling on earth are slanting and their distance is more. The earth gets heated up only slightly. At noon, the rays of the sun falling on the earth are nearly vertical and the distance is also less, with the result that the earth gets heated up considerably. Hence mornings and evenings are less warm than noon.

31. The sky appears blue. Give reason.

Violet and blue light have short wavelength and are scattered more than red light waves. While red light goes almost straight through the atmosphere, blue and violet are sca-ttered by particles in the atmosphere. Thus we see a blue sky.

32. What is the difference between a planet and a star?

Stars are selfluminous celestial bodies and they have a system of their own. Planets, on the other hand, are bodies which revolve around a star and shine by the reflected light of the stars.

33. What is the difference between supersonic and ultrasonic sounds?

Sounds of frequency higher than 20,000 Hz are known as ultrasonic and are inaudible. The speed greater than the speed of sound is referred to as supersonic.

34. Copper wire cannot be used as a heating element in electric heaters. Why?

Copper has less melting point and if we use it in electric heater it cannot withstand high temperature.

35. What would happen if the force of gravity were to disappear suddenly ?

In the absence of gravitational force, all living objects on the earth will be practically in a floating condition. They will be thrown away because of the centrifugal force caused by the rotation of earth. After a certain time the whole earth will disintegrate.

36. Radio reception improves slightly during the night. Why?

During day time due to sunlight the radio broadcasting is affected to a certain extend. Due to the absence of sun during night radio reception improves slightly.

37. We perspire on a hot day. why?

Human body is physiologically conditioned to maintain in form the temperature. When the heat produced in the body becomes excessive and not dissipated properly, the sweat glands inside the body are stimulated to secrete sweat. Therefore, we perspire on a hot day.

38. The gun kicks back when a bullet is fired. Why?

According to Newton's third law of motion, to every action, there is an equal and opposite reaction. So the gun kicks back when a bullet is fired.

39. Why does a person have to run in the direction of the train for some distance after getting down a moving train?

The velocity of the person's body is equal to that of the train. As soon as he gets down on the platform his feet become stationary while the upper part of his body, due to inertia of motion, tends to move forward and thus he falls forward. To avoid this, after getting down a moving train the person has to run in the direction of train for some distance.

40. Why does a bucket full of water when rotated at a high speed not spill out the water?

When a bucket full of water is rotated at a high speed, water from the bucket does not fall out because contrifugal foce becomes more than the centripetal force, forcing water towards the bottom of the bucket.

41. While taking a turn, a cyclist bends on one side. Why?

While taking a turn a cyclist bends on one side so that he exerts a part of his weight on the inside of the turn. This provides him the necessary centripetal force and keeps him stable.

42. Why do the front wheels of a motor car usually lean slightly outward?

The front wheels of a motor car lean slightly forward to allow for difference in angles, when turning round the corner, to give the car greater stability.

43. Why are curved railways tracks banked?

The outer part of a railway track near the bend or a curve is generally raised, i.e., the outer track of the bend is slightly higher than the inner. This is known as banking of the rail or tracks. When a fast moving train takes a curved path, it tends to move away tangentially off the track. In order to prevent this, the curved tracks are banked on the outside to produce the necessary centripetal force required to keep the train moving in a curved path. If there is no banking of the track, this centripetal force that is obtained from the friction between the rim of the wheels and rails, which is generally small, may cause the train to jump off the rails.

44. Why does a man lean forward while climbing a hill?

A man leans forward so as to keep himself in stable equilibrium due to which he increases the base of the support so that the vertical line passing through the centre of gravity may fall with the base.

45. Why does a driver speed up his vehicle when he moves up a hill?

While moving up a hill, the force of gravity pulls the vehicle.

46. Explain why passengers in a boat are not allowed to stand?

This is done so that the centre of gravity of the boat is not raised and the boat does not topple over due to unstable equilibrium.

47. Why does a cricket player lower his hands while catching a ball to stop it?

If a cricket player stops a fast moving cricket ball suddenly, then the change in the velocity of the ball from high value to zero value will be abrupt. Due to this the acceleration of the ball will be large. And due to large acceleration of the ball, the player will have to apply a large force to stop it.

48. When a man jumps out of a boat to the bank of the river, the boat moves backwards. Why?

This is due to the fact that to step out of the boat, the man presses the boat with his foot in the backward direction. This push of the man on the boat is the action (force). The boat exerts an equal force on the man in the forward direction which enables him to move forward. This force exerted by the boat on the man is reaction (force). Since the boat is floating on water and is not fixed, it moves backwards due to the action force exerted by man.

49. Why is cooking quicker in a pressure cooker?

The boiling point of water depends upon the pressure on its surface. Steam produced inside the cooker builds up pressure thereby raising the boiling point of water, which results in quick cooking.

50. Why does an electric bulb make a bang when it is broken?

There is a vacuum inside the electric bulb. When the bulb is broken air rushes in at great speed from all sides to fill the vacuum. The rushing of air produces a noise, generally reffered to as 'bang'.

51. Why is snow white?

Snow is colourless being made up of tiny transparent crystals, each of six sides, though varying in form. It is the rays of light reflected at the various surfaces of these crystals, together with enclosed particles of air that gives the snow its appearance of whiteness.

52. Why does a needle sink in water while an iron ship floats on it?

According to the law the floatation, a body floats in a liquid when the weight of the whole body is equal to the weight of the liquid displaced by the immersed portion of the body. A needle or solid ball sinks in water because the weight of water displaced by it is less than the weight of the needle or steel ball. An iron ship is so shaped that it can displace a large volume of water. The weight of the water displaced by the immersed portion of the ship is equal to the ship. Hence it floats.

53. Why is it more difficult to breathe on mountains than on plains?

With increase in altitude the pressure of air goes on decreasing. The oxygen content in the air is also reduced considerably. Thus it is difficult to breathe on the mountains because the pressure of air outside is less as compared to the pressure of air inside the lungs.

54. Why can we see ourselves in the mirror?

We can see ourselves in a mirror because the rays of light from our faces strike against the surface of the glass and are reflected back as they cannot pass through the impenetrable metal with which the back of the glass is covered.

55. Why do clouds in the evening usually look red?

This is due to the dispersion of white light. Seven colours and the deviation from the original path is different for different colours. The light falling on clouds in the evening is not white but a fraction of it has the red wavelength. Hence the clouds look red.

56. Why does moon appear larger than the stars even when it is known that it is much smaller in size?

Moon looks larger than other stars because it is nearer to us than the other stars. Moon is only 2,40,000 miles away from the earth whereas stars are billions of miles away from the earth.

57. Why is water in an open pond cool even on a burning hot day?

This is so because a considerable amount of heat is taken away from the water in the form of latent heat through evaporation from the large surface area of the pond.

58. Why does water get colled on evaporation?

Some heat energy is utilised during process of evaporation. This energy is taken from the water itself thus producing a lowering of temperature in the water. Hence, water gets cooled on evaporation.

59. Why does ice not melt readily when salt is sprinkled over it?

When salt is spinkled over ice, some of it dissolves. As dissolution of the salt is accompanied by absorption of heat, the temperature of the system falls below 0 ^{0}C. Hence, ice does not melt readily.

60. Why do we perspire before rains?

Just before the rain falls the atmosphere gets saturated with water vapour. The perspiration extuded by us therefore, does not evoporate quickly but appears on the surface of the skin. Hence, we feel the perspiration at that time.

61. Why does a ship rise up as it enters the sea from a river?

The density of a sea water is more as compared to river water. Due to this the upthrust produced by sea water on the ship is greater than by the river water. The upthrust pushes the ship upwards.

62. Why is it difficult to walk on a icy surface?

We are able to walk due to the foce of friction. On an icy surface the force of friction is negligible, hence it is difficult to walk on it.

63. Utensils are generally made of aluminium. Why?

Aluminium is a good conductor of heat and its specific heat is quite high, therefore it absorbs more heat than any other metal. Moreover, it is not costly, hence utensils are generally made of aluminium.

64. Why is steel more elastic than rubber?

Steel is more elastic than rubber because strain produced in steel is less than that in rubber when same force is applied to both of them.

65. Why is a dam so designed that its thickness gradually increased from top to bottom?

Lateral pressure increases with depth. It is zero at the top and maximum at the bottom. Because of this a dam has more thickness at the bottom than at the top.

66. Why is mirage formed in a hot desert?

A mirage is formed owing to total internal reflection. To the observer at a distance, the reflected image of the object appears behind the reflecting surface, as if the object were in front of it. In actual practice, it is just an illusion.

67. A rocket can go into space but a jet cannot why?

Jet engine is a gas turbine which produces a steam of hot gas enabling an aircraft to be propelled through the air by reaction of propulsion, while the rocket is a projectile driven by reaction of propulsion which contains its own propellants. A rocket unlike a jet is, therefore, independent of the earth's atmosphere and is used in space.

68. Why are the passengers advised to empty the ink of their fountain pen before an aerial flight?

The density as well as pressure of air goes on decreasing with altitude. When a filled pen is taken to a higher altitude, it leaks because the pressure of air acting on the ink inside the pen is greater than the pressure of air outside.

69. What keeps a glider up in the air?

A glider filled with air occupies a large volume and therefore, experience an upthrust of air which is much greater than its weight. This upthrust causes it to rise according to law of floatation.

70. Why does the oil rise through the wick of a lamp?

The wick may be considered to have a number of capillaries of very fine pores because of the air space between its fibres. When a portion of this wick is brought in contact with oil, the latter rises in the former because of capillary action and is absorbed into or trasmitted to its other portions.

71. Why is it unwise to wear a black dress on a hot dry day?

White clothes (and surfaces) being good reflectors and bad absorbers of heat radiation, absorb very little heat and relect a greater part of it and therefore, give comfort in summer when people need less heat. Contrary to this black clothes and surfaces absorb all the heat radiations, therefore it is advisable not to wear black dress on a hot day.

72. Explain why a highly pumped bicycle tyre left in the heat, bursts?

The temperature of the pumped up tyre rises and consequently the air inside it expands which causes the tyre to burst as the tyre cannot expand any more and the pressure of the air inside the tyre becomes greater than the breaking force acting on it.

73. Why do some pendulum clocks, which keep correct time in winter go slow in summer?

In summer the length of pendulum of a clock increases which in turn increases the duration of the oscillation of the pendulum and thereby makes the clock lose time.

74. Why is one's breath visible in cold weather but not in hot weather?

In cold weather, the water vapour

contained in the exhaled breath condenses and white fume like air becomes visible.

75. Why is electric light filament made of tungsten ?

Because tungsten has a high resistance. Hence, when electric current flows through the filament, enormous heat is produced due to its high resistance and the filament glows.

76. Why is the flash of lightning seen before the sound of thunder is heard?

The velocity of light is much greater than that of the sound. Therefore flash of lightning is seen before the sound of thunder is heard.

77. Why is water from a hand pump warm in winter and cold in summer ?

This is due to the fact that upper layer of earth's crust is exposed to the atmosphere and is therefore at a lower temperature in winter. Water, which is underground, is comparatively at a higher temperature. In summer the conditions are reversed.

78. Why does the housewife blacken the bottom of the 'degchi* used in the kitchen ?

The blackened surface absorbs more heat as compared to the polished surface. That is why the housewife blackens the bottom of the 'degchi' used in the kitchen.

79. Ice wrapped in a blanket does not melt away quickly. Why ?

Woollen blanket is a bad conductor of heat. It does not allow the external heat rays to enter. Therefore, ice does not melt for a considerable length of time.

80. Why a petrol fire cannot be extinguished by pouring water on it ?

Water, being heavier, slips down and petrol rises to the surface and continues to burn as before. Hence, water cannot be used for extinguishing petrol fire.

81. Why is it hotter in cloud covered night than in a clear night ?

Because clouds prevent the heat radiated out by the earth from escaping into the sky. As this heat remains trapped in the atmosphere the cloudy nights become warmer in comparison to clear nights.

82. Why are metal tyres of cart wheels fitted when hot ?

Metal tyre is heated strongly. On heating, tyre expands and the circumference of the tyre becomes slightly bigger than the wooden wheel. This .permits the easy slipping of the tyre on wooden wheel. Then, cold water is poured over the metal tyre and it shrinks in size. Therefore, its circumference fits the wheel well and holds on tightly.

83. How does the thermos flask keep the liquid hot for a long time ?

Thermos flask is a double walled bottle with a vacuum between the walls. Because of this the loss or gain of heat through conduction, convection and radiation is reduced to a minimum.

84. Why does glass crack whon heated whereas metal does not ?

Glass is a poor conductor of heat. On heating, the heat is transmitted quickly which results in unequal expansion of the inner and outer surface of glass because of which it sometimes cracks . On the other hand, metal is a good conductor of heat. Therefore, when heated, the heat is transmitted quickly and uniformly in all directions. The expansion produced is uniform and, therefore, cracking does not take place.

85. Why does steam cause more severe burn than boiling water ?

The amount of heat (latent heat) possessed by steam is much greater than the amount of heat possessed by water at the same temperature. Therefore, steam causes more severe burn than boiling water.

86. Why does a dark blue suit appear black when viewed in candle light ?

Candle light is deficient in blue colour whereas it has yellow colour in excess. When yellow light falls on the blue suit, blue colour is absorbed by it and, therefore, the appearance of the suit is black.

87. Why is it difficult to thread a needle with only one eye?

It is difficult to estimate the relative distance between the thread and the walls of the hole of the needle with one eye. The thread, therefore, passes not through the needle but in front or behind the hole of needle. But, with the help of both the eyes, the relative distance between the two is judged. Hence, it becomes easy to thread the needle using both the eyes.

88. Why does the kettle sing ?

Heating of water in a kettle makes the gas which is dissolved in the water and is in continuity with the bottom, escape. The layer of water above these gases obstructs their escape. This obsti uction makes resonance which is usually called the singing of the kettle.

89. Why is water-added alcohol applied on the forehead of a person having high fever ?

Alcohol being volatile, evaporates as soon as it is placed on the forehead of a person suffering from fever. During this evaporation, the heat is taken from the body of the sick person whose temperature then falls.

90. Why is earthing desirable for electrical appliances ?

Earthing helps the carrent move into the earth in the evert of short-circuit, without giving a shock to the user.

91. Why do we hear better in water than on land?

This is so because velocity of sound is greater in water than in air. Due to moisture, density of the medium decreases, hence velocity of sound increases.

92. Why is a coiled coil-filament used in a bulb?

The efficiency of the filament is increased by making a coil-filament coiled. Also a coiled coil-filament occupies a much smaller space so the loss of heat by convection is minimised.

93. Why are the taller structures in a locality most likely to be struck by lightning ?

When charged clouds are passing over, opposite charges are being induced on them thus attracting the charges of those clouds. The taller building is nearer to the clouds so, there is greater possibility for the lightning discharge to take place between the building and the cloud.

94. Why is rainbow seen after rain ?

After the rain some clouds continue to linger in the sky which contain water droplets. These water droplets act like prisms and sun's rays falling on water droplets suffer dispersion and produce a spectrum. Hence, rainbow is seen.

95. Why is it easier to pull a bucket of water from a well with the help of a fixed pulley than pulling it directly ?

While pulling a bucket of water directly upward, a man has to apply his muscular force in upward direction. The fixed pulley changes the direction of force to be applied in the downward direction which is a more convenient direction.

96. Why does a balloon rise in the air ?

A balloon filled with air (gas) occupies larger volume and, therefore experiences greater upthrust of the air Which is much greater than its weight. This upthrust causes it to rise up according to the law of floatation.

97. Why is it easier to lift a heavy stone under water than in air ?

This is so because there is an apparent loss of weight of the stone when immersed in water due to upthrust according to the Archimedes principle.

98. Whyare concrete roads made of rectangular blocks ?

In summer concrete roads get heated up and expand in area which may cause the cracking of the road. When the rectangular blocks of a concrete road get heated they squeeze out the molten coaltar lying in the gaps between them and thereby save the possible cracking of the road.

99. Why is a fuse used in the electrical circuits?

A fuse is used as a safety measure in the electrical circuit. A fuse is a wire of low melting point. When a heavy current passes through it, the metal gets heated up and melts, thus breaking the circuit.