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| 1. | Energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ quantity.  (Scalar / Vector) |
| 2. | Friction converts mechanical energy into \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy. |
| 3. | Heat engine converts heat energy into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy. |
| 4. | Temperature is \_\_\_\_\_\_\_\_\_\_\_\_ quantity.  (Scalar / Vector) |
| 5. | Liquids and gases usually suffer change in volume only. It is true or false |
| 6. | In liquid both liquid and container expand.  (True / False) |
| 7. | In gases both gas and container expand.  (True / False) |
| 8. | Out of solid, liquid and gas which one is expand more? |
| 9. | Why an electric wire get heated when current passes through it. |
| 10. | When we touch a cold body we fell cold why it is so. |
| 11. | The degree of hotness and coldness is called\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (heat/energy/temperature) |
| 12. | 1cal = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Joule.  (4.21 / 4.18 / 4.33) |
| 13. | Which type of Energy possess by a moving particle \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?  (kinetic energy / potential energy / heat energy) |
| 14. | When some quantity of heat is supplied to a body, then it internal kinetic energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (increases / decreases / unchanged) |
| 15. | When some quantity of heat is removed to a body, then it internal kinetic energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (increases / decreases / unchanged) |
| 16. | If internal kinetic energy of a body increases then temperature will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (increases / decreases / unchanged) |
| 17. | What is the direction of heat flow?  (higher temperature to colder temperature / colder temperature to higher temperature) |
| 18. | If we touch colder body then why we feel cold. Explain? And also mention the direction of heat flow. |
| 19. | If internal kinetic energy of a body decreases then temperature will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (increases / decreases / unchanged) |
| 20. | Which quantity determines the direction of heat flow?  (potential energy / temperature / calorie) |
| 21. | Write the S.I unit of heat. |
| 22. | 1J = \_\_\_\_\_\_\_\_ erg. |
| 23. | The amount of heat contained in a body depends on \_\_\_\_\_\_\_\_ , \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_. |
| 24. | A solid expand in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ direction.  (one / all / two) |
| 25. | Liquid expand much more than solid.  (True / False) |
| 26. | Write three demonstration of Thermal expansion in solid. |
| 27. | Solid contract on cooling.  (True / False) |
| 28. | Write one demonstration and some points on cubical expansion in gases. |
| 29. | If the kinetic energy of the molecules increases then mean distance between the molecules also\_\_\_\_\_\_\_\_.  (increases / decreases) |
| 30. | On cooling the substance, the mean distance between the molecules \_\_\_\_\_\_\_\_\_\_\_\_\_. Which results in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of length, area and volume of the substance?  (increases / decreases and expand / contract) |
| 31. | Write the three types of expansion of solids. |
| 32. | When Linear Expansion will increases what will increases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (Length / Area / Volume) |
| 33. | When Cubical Expansion will increases what will increases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (Length / Area / Volume) |
| 34. | When Area Expansion will increases what will increases \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (Length / Area / Volume) |
| 35. | The coefficient of linear expansion is depends on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (length / temperature / material) |
| 36. | Write the unit of coefficient of linear expansion\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (oC / per 0C / m) |
| 37. | Write the relation of . |
| 38. | If 0C-1 then are \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| 39. | What do you understand by *invar*? |
| 40. | What is happening in Loosening a glass stopper or a metal screw cap? |
| 41. | Why we are using roller at one end in bridge? |
| 42. | To avoid the loss or gain in time of a pendulum what we have to do? |
| 43. | How much the temperature of a brass rod ( 0C-1) be increased so as to increase its length by 1%? |
| 44. | Joints in metal pipes get loose in summer. Why? |
| 45. | Explain the hot glass chimney often cracks when a drop of water falls on it. |
| 46. | Why there is a real and apparent expansion in liquid. |
| 47. | Write the relationship between the real and apparent expansions of a liquid. |
| 48. | Write the relation between density, mass and volume.  ( ) |
| 49. | When we heat a body its volume will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and density will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  (decreases / increases) |
| 50. | Why there is different of level of different liquid in flasks when placed in hot water bath? |
| 51. | Two rods A and B of the same material, but of lengths 1m and 2m respectively are heated from 00C to 1000C. The rod A elongates more than B. Also give reason?  (True / False) |
| 52. | A solid rod A and a hollow rod B, of same material and same lengths are heated to the same rise in temperature. The solid rod A expands more than the hollow rod B. Also give reason?  (True / False) |
| 53. | How much will a bar of aluminum, 100cm long, expand when heated from 200C to 1000C? Cofficient of linear expansion of aluminum, is 0.0000250C-1 |
| 54. | State two applications of thermal expansion. |
| 55. | A glass contain water expand first rather than liquid? |
| 56. | Write the relationship between real and apparent expansion of liquids? Also draw the diagram. |
| 57. | Write the relation between density, mass and volume. |
| 58. | Minimum volume of water at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_0C. |
| 59. | Maximum density of water at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_0C. |
| 60. | A hollow glass sphere which flats in cold water at 40C, sinks when the water is heated above 40C. |
| 61. | Draw the graph between density and temperature. |
| 62. | Draw the graph between volume and temperature. |
| 63. | Liquid is filled in a flask up to a certain point. When the flask is heated, the level of the liquid  (a) Immediately starts increasing (b) Initially falls and then rises  (c) Rises abruptly (d) Falls abruptly |
| 64. | In cold countries, water pipes sometimes burst, because  (a) Pipe contracts (b) Water expands on freezing  (c) When water freezes, pressure increases(d) When water freezes, it takes heat from pipes |
| 65. | At what temperature the centigrade (Celsius) and Fahrenheit, readings are the same **]**  (a) – 40° (b) + 40° (c) 36.6°(d) – 37° |
| 66. | Water does not freeze at the bottom of the lakes in winter because  (a) Ice is a good conductor of heat (b) Ice reflects heat and light  (c) Of anomalous expansion of water between 4°*C* to 0°*C* (d) Nothing can be said |
| 67. | Two spheres of same size are made of the same material but one is solid and the other is hollow. They are heated to the same temperature  (a) Both spheres expand equally (b)The solid sphere expands more  (c) The hollow sphere expands more(d) Data is insufficient to arrive at a conclusion |
| 68. | A bimetallic strip is made up of two metals with different *α*  (a) On heating, it bends towards the metal with high *α* (b) On heating, it bends towards the metal with low *α*  (c) On cooling, it bends towards the metal with high *α*(d) On cooling, it bends towards the metal with low *α* |

Extra Points:

1. Thermocouple converts heat energy into electrical energy, resistor converts electrical energy into heat energy. Friction converts mechanical energy into heat energy. Heat engine converts heat energy into mechanical energy.
2. Generally, the temperature of a body rises when heat is supplied to it. However the following two situations are also found to exist.

(i) When heat is supplied to a body either at its melting point or boiling point, the temperature of the body does not change. In this situation, heat supplied to the body is used up in changing its state.

(ii) When the liquid in a thermos flask is vigorously shaken or gas in a cylinder is suddenly compressed, the temperature of liquid or gas gets raised even without supplying heat. In this situation, work done on the system becomes a source of heat energy.

1. Temperature is defined as the degree of hotness or coldness of a body. The natural flow of heat is from higher temperature to lower temperature.
2. Two bodies are said to be in thermal equilibrium with each other, when no heat flows from one body to the other. That is when both the bodies are at the same temperature.

Temperature ∝ kinetic energy

1. Temperature of the core of the sun is 107 *K* while that of its surface is 6000 *K*.
2. Thermal expansion is minimum in case of solids but maximum in case of gases because intermolecular force is maximum in solids but minimum in gases.
3. Solids can expand in one dimension (linear expansion), two dimension (superficial expansion) and three dimension (volume expansion) while liquids and gases usually suffers change in volume only.
4. Most substances expand when they are heated, *i.e.*, volume of a given mass of a substance increases on heating, so the density should decrease .
5. **Effect of temperature on Upthrust:**  with rise in temperature thrust also decreases and apparent weight of body increases. apparent weight of the body *Wapp* = Actual weight – Thrust
6. At 4°*C*, density of water is maximum while its specific volume is minimum.
7. **Practical application**

(i) When rails are laid down on the ground, space is left between the ends of two rails.

(ii) The transmission cable are not tightly fixed to the poles.

(iii) Pendulum of wall clock and balance wheel of wrist watch are made of invar (an alloy which have very low value of coefficient of expansion).

(iv) Test tubes, beakers and crucibles are made of pyrex-glass or silica because they have very low value of coefficient of linear expansion.

(v) The iron rim to be put on a cart wheel is always of slightly smaller diameter than that of wheel.

(vi) A glass stopper jammed in the neck of a glass bottle can be taken out by warming the neck of the bottle.

1. **Bi-metallic strip :** Two strips of equal lengths but of different materials (different coefficient of linear expansion) when join together, it is called “bi-metallic strip”, and can be used in thermostat to break or make electrical contact. This strip has the characteristic property of bending on heating due to unequal linear expansion of the two metal. The strip will bend with metal of greater *α* on outer side *i.e.* convex side.

Steel

Brass

Room temperature

Higher temperature

High temperature

Bimetallic strip

Room temperature