



PHYSICS

BOOKS - MAXIMUM PUBLICATION

THERMAL PROPERTIES OF MATTER

Exercise

1. Derive the following relation:

$$\alpha_a = 2\alpha_l$$



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2. Derive the following relation:

$$\alpha_v = 3\alpha_l$$



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3. Cooking is difficult at high altitude. Why?



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4. Vapour pressure is an important property of liquids. pressure cooker is used for cooking food at higher altitudes. Give reason.



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5. You might have observed the bubbles of steam coming from bottom of vessel when water is heated. These bubbles disappear as it reaches top of liquid just before boiling and

they reach the surface at the time of boiling. Explain the reason.



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6. Conduction is the mode of transfer of heat in solids. "Burns produced by steam is severe than that produced by boiling water" Why?



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7. Some cooking pots have copper coating on its bottom.Why?



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8. Explain the reason for sea breeze.



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9. The utensils for cooking purpose are blackened at the bottom.Why?



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10. In which of the following processes, convection does not take place primarily? (a) Sea and land breeze (b) Boiling of water (c) Warming of glass of bulb due to filament (d) Heating air around a furnace.

A. Sea and land breeze

B. Boiling of water

C. Warming of glass of bulb due to filament

D. Heating air around a furnace.

Answer: C



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11. $\frac{W}{mK}$ is a unit of,

- A. Stefan's constant
- B. Wien's constant
- C. Cooling's constant
- D. Thermal conductivity

Answer: D



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12. For measuring temperatures in the range of $2000^{\circ}C$, we should employ,

- A. Gas thermometer
- B. Platinum-resistance thermometer
- C. Barometer
- D. Total radiation Pyrometer

Answer: D



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13. There is a hole in metal disc. What happens to the size of the metal disc if the metal disc is heated?



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14. Which has more specific heat capacity, water and sand?



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15. Two solid sphere of the same material have the same radius but one is hollow while the other is solid. Both spheres are heated to same temperature, then,

- A. The solid sphere expands more
- B. The hollow sphere expands more
- C. Expansion is same for both.

D. Nothing can be solid about their relative expansion, of their masses are not given.

Answer: C



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16. The sprinkling of water reduces slightly the temperature of a closed room because,

A. Temperature of water is less than that of the room.

B. Specific heat of water is high.

C. Water has large latent heat of vaporisation.

D. Water is a bad conductor of heat.

Answer: C



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17. Why specific heat of gas at constant pressure (C_p) is greater than specific heat at constant volume?



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18. A body is heated. But there is no change in its temperature. Is it possible?



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19. A small space is left between two rails on railway track. Why?



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20. Tea gets cooled,when sugar is added to it.Why?



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21. Ice covered in gunny bag does not melt for a long time.Why?



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22. Why two layers of cloth of equal thickness provide warmer covering than a single layer of cloth of double the thickness?



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23. On winter nights, we feel warmer, when clouds cover the sky than the sky is clear. Why?



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24. Two bodies at different temperature T_1K and T_2K are brought in contact with each other.

Is the resultant temperature be necessarily

$$\frac{T_1 + T_2}{2} \text{? If not, why?}$$



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25. Two bodies at different temperature T_1K and T_2K are brought in contact with each other.

Should the resultant temperature in between T_1 and T_2 only? If not, Why?



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26. What is meant by Temperature?



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27. A patient is admitted to hospital. The temperature of the patient is measured by the nurse and is found to be $97.6^\circ F$.

Convert the temperature ($97.6^{\circ}F$) into Centigrade.



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28. Why iron rims are heated red hot before being put on the cart wheels?



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29. How woolen clothes help us in winter against cold?



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30. A copper block of mass 2.5kg is heated in a furnace to a temperature of 500°C and then placed on a large ice block. What is the maximum amount of ice that can melt? (Specific heat of copper = $0.39\text{Jg}^{-1}\text{K}^{-1}$, latent heat of fusion of water = 335Jg^{-1}).



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31. Two accidents are happened. The first one with water at $100^{\circ}C$ and the second one with steam at $100^{\circ}C$. Which is dangerous burn due to water at $100^{\circ}C$, and burn due to steam at $100^{\circ}C$. Why?



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32. When a fluid is heated, the particle rises up. Name the phenomonon behind it.



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33. When a fluid is heated, the particle rises up. Explain the formation of land breeze and sea breeze.



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34. A 10kW drilling machine is used to drill a bore in a small aluminium block of mass 8.0kg . How much is the rise in temperature of the block in 2.5 minutes, assuming 50% of power is used up in heating the machine itself

or lost to the surroundings? Specific heat of aluminium = $0.19 J g^{-1} K^{-1}$



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35. A brass boiler has a base area of $0.15 m^2$ and thickness $1.0 cm$. It boils water at the rate of $6.0 k \frac{g}{min}$ when placed on a gas stove. Estimate the temperature of the part of the flame in contact with the boiler. Thermal conductivity of brass = $109 J s^{-1} m^{-1} K^{-1}$, Heat of vaporisation of water = $2256 \times 10^3 J kg^{-1}$.



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36. Explain why a brass tumbler feels much colder than a wooden tray on a chilly day.



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37. Which among the following possess the highest specific heat Capacity? (a)Water (b)silver (c)Copper (d)Steel

A. Water

B. silver

C. Copper

D. Steal

Answer:



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38. You are in a restaurant waiting for your friend and you ordered coffee. It has arrived. Do you add sugar in your friend's coffee and

then wait for him or do you add sugar after he arrives?



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39. Read the statement given in a book "All thermal conductors are electrical conductors also" .Do you agree with this statement?



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40. Absolute zero is the minimum temperature that can be reached by a system. Explain why temperature below absolute zero is not possible



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41. Sitha prepares tea for her brother. After preparing tea, the temperature of the tea was 80°C . She kept it for 5 minutes and gave to her brother when the temperature reached 50°C .

If the surrounding temperature is 20°C , calculate the time it takes to cool from 60°C to 30°C .



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42. Temperature is the degree of hotness' of the body. Temperature of normal human body is 98.6°F What is the corresponding temperature shown in the Celcius scale?



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43. Secfic heat capacity of water is $4186 \frac{J}{KgK}$
scecific heat.What do you understend by the
term, specific heat?



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44. A brass tumbler feels much colder than a
wooden tray on a chilly day. Why?



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45. A brass boiler has a base area of 0.15m^2 and thickness 1.0cm . It boils water at the rate of $6.0\text{k}\frac{\text{g}}{\text{min}}$ when placed on a gas stove. Estimate the temperature of the part of the flame in contact with the boiler. Thermal conductivity of brass $=109\text{Js}^{-1}\text{m}^{-1}\text{K}^{-1}$, Heat of vaporisation of water $=2256 \times 10^3\text{Jkg}^{-1}$.



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46. Heat from the sun reaches earth through vacuum. Name the mode of heat transfer in the above case



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47. Heat from the sun reaches earth through vacuum. Name the mode of heat transfer in the above case



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48. Aquatic animals are protected in cold countries as ice is formed on the surface of river. How?



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49. There are three distinct modes of heat transfer. The main mode of transmission of heat by which the sun heats the surface of the earth is:

A. Conduction

B. Convection

C. Radiation

D. None of these

Answer: C



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50. Explain the reason for sea breeze.



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51. The coefficient of thermal expansion in solids are mainly (i) Coefficient of Linear Expansion (α) (ii) Coefficient of superficial Expansion (β) (iii) Coefficient of cubical expansion (γ). What is the ratio of (α), β and (γ).



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52. Invar is used for making pendulum of clocks. Why?



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53. Choose the correct answer from the brackets: (98°F) = _____K (a) 36.7 (b) 40 (c) 309.7 (d) 391

A. 36.7

B. 40

C. 309.7

D. 391

Answer: C



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54. A steel beam of length $5m$ is kept at a temperature of $(deg20C)$. On a hot day the temperature rises to $(deg40C)$. What is the change in its length due to thermal expansion.

Coefficient of linear expansion of steel is

$$\left(1.2 \times \frac{10^{-5}}{degC} \right)$$



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55. Triple point of water is $deg0.01C$ Express this temperature in Kelvin scale.



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56. How does sea breeze occur ?Explain.



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