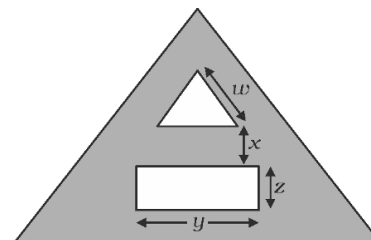


Date Planned : __ / __ / __	Daily Tutorial Sheet - 2	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	Level - 1	Exact Duration : _____
Topics covered : Thermal Expansion		

16. A triangular plate has two cavities, one triangle and other rectangle. The plate is heated :

(A) x increases, wzy decreases
 (B) $xwzy$ all increase
 (C) w, z, y increase, x decreases
 (D) information is not sufficient



17. A brass rod and a lead rod each 80 cm long at 0°C are clamped together at one end with their free ends coinciding. The separation of free ends of the rods if the system is placed in a steam bath is :
 ($\alpha_{\text{brass}} = 18 \times 10^{-6} / ^\circ\text{C}$ and $\alpha_{\text{lead}} = 28 \times 10^{-6} / ^\circ\text{C}$)

(A) 0.2 mm (B) 0.8 mm (C) 1.4 mm (D) 1.6 mm

18. An iron rod of length 50 cm is joined at an end to an aluminum rod of length 100 cm. All measurements refer to 20°C . The coefficients of linear expansion of iron and aluminum are $12 \times 10^{-6} / ^\circ\text{C}$ and $24 \times 10^{-6} / ^\circ\text{C}$, respectively. The average coefficient of expansion of composite system is :

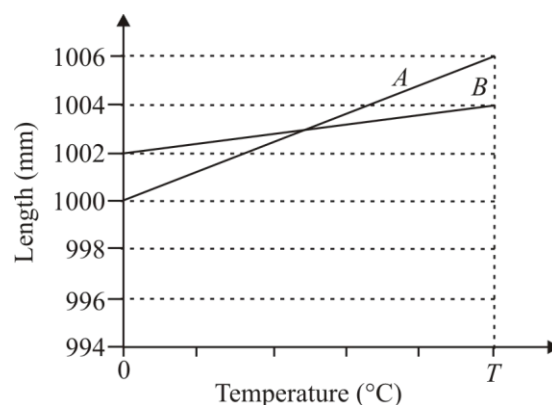
(A) $36 \times 10^{-6} / ^\circ\text{C}$ (B) $12 \times 10^{-6} / ^\circ\text{C}$ (C) $20 \times 10^{-6} / ^\circ\text{C}$ (D) $48 \times 10^{-6} / ^\circ\text{C}$

19. A rod of length 20 cm made of metal A expands by 0.075 when its temperature is raised from 0°C to 100°C . Another rod of a different metal B having the same length expands by 0.045 cm for the same change in temperature. A third rod of the same length is composed of two parts, one of metal A and other of metal B. This rod expands by 0.065 cm for the same change in temperature. The portion made of metal A has the length :

(A) 13.33 cm (B) 10 cm (C) 15 cm (D) 18 cm

20. The variation of lengths of two metal rods A and B with change in temperature is shown in figure. The coefficient of linear expansion α_A for the metal A and the temperature T will be : (Given $\alpha_B = 9 \times 10^{-6} / ^\circ\text{C}$)

(A) $\alpha_A = 3 \times 10^{-6} / ^\circ\text{C}$, 500°C
 (B) $\alpha_A = 3 \times 10^{-6} / ^\circ\text{C}$, 222.22°C
 (C) $\alpha_A = 27 \times 10^{-6} / ^\circ\text{C}$, 500°C
 (D) $\alpha_A = 27 \times 10^{-6} / ^\circ\text{C}$, 222.22°C



21. A clock with a metal pendulum beating seconds keeps correct time at 0°C . If it loses 12.5 s a day at 25°C , then coefficient of linear expansion of metal of pendulum is :

(A) $\frac{1}{86400} / ^\circ\text{C}$ (B) $\frac{1}{43200} / ^\circ\text{C}$ (C) $\frac{1}{14400} / ^\circ\text{C}$ (D) $\frac{1}{28800} / ^\circ\text{C}$

22. If a bimetallic strip is heated it will :
 (A) bend towards the metal with lower thermal expansion coefficient
 (B) bend towards the metal with higher thermal expansion coefficient
 (C) twist itself into a helix
 (D) have no bending
23. A uniform brass disc of radius r and mass m is set into spinning with angular speed ω_0 about an axis passing through centre of disc and perpendicular to the plane of disc. If its temperature increases from $\theta_1^\circ\text{C}$ to $\theta_2^\circ\text{C}$ without disturbing the disc, what will be its new angular speed? (The coefficient of linear expansion of brass is α)
 (A) $\omega_0[1 + 2\alpha(\theta_2 - \theta_1)]$ (B) $\omega_0[1 + \alpha(\theta_2 - \theta_1)]$
 (C) $\frac{\omega_0}{[1 + 2\alpha(\theta_2 - \theta_1)]}$ (D) None of these
24. A thin copper wire of length L increase in length by 1% when heated from temperature T_1 to T_2 . What is the percentage change in area when a thin copper plate having dimensions $2L \times L$ is heated from T_1 to T_2 ? 
 (A) 1% (B) 2% (C) 3% (D) 4%
25. A horizontal tube, open at both ends, contains a column of liquid. The length of this liquid column does not change with temperature. The coefficient of volume expansion of the liquid is γ and the coefficient of linear expansion of the material of the tube is α . Choose the correct option. 
 (A) $\gamma = \alpha$ (B) $\gamma = 2\alpha$ (C) $\gamma = 3\alpha$ (D) $\gamma = 0$
26. A glass tube of length 133 cm and of uniform cross-section must be filled with mercury so that the volume of the tube unoccupied by mercury remains the same at all temperatures. If cubical coefficients for glass and mercury are respectively $0.000026/^\circ\text{C}$, and $0.000182/^\circ\text{C}$ then the length of mercury column is : 
 (A) 19 cm (B) 133 cm (C) 7 cm (D) None of these
27. The coefficient of apparent expansion of a liquid in a copper vessel is C and in a silver vessel S . the coefficient of volume expansion of copper is γ_C . What is the coefficient of linear expansion of silver?
 (A) $(C + \gamma_C + S) / 3$ (B) $(C - \gamma_C + S) / 3$ (C) $(C + \gamma_C - S) / 3$ (D) $(C - \gamma_C - S) / 3$
28. A vessel is partly filled with a liquid. Coefficients of cubical expansion of material of the vessel and liquid are γ_V and γ_L , respectively. If the system is heated, then volume unoccupied by the liquid will necessarily : 
 (A) Remain unchanged if $\gamma_V = \gamma_L$ (B) Increase if $\gamma_V = \gamma_L$
 (C) Decrease if $\gamma_V = \gamma_L$ (D) None of the above
29. Two rods, one hollow and the other solid, made of the same material have the same length of 20 cm and radius of 2 cm. When their temperature is increased through the same amount of 50°C , their expansion ratio $E_h : E_s$ will be :
 (A) 1 : 8 (B) 1 : 4 (C) 1 : 1 (D) 1 : 2
30. An aluminium sphere is dipped into water. Which of the following is true ?
 (A) Buoyancy will be less in water at 0°C than that in water at 4°C
 (B) Buoyancy will be more in water at 0°C than that in water at 4°C
 (C) Buoyancy in water at 0°C will be same as that in water at 4°C
 (D) Buoyancy may be more or less in water at 4°C depending on the radius of the sphere