PHYSICS

BOOKS - TARGET PUBLICATION

MEASUREMENT AND EFFECTS OF HEAT

Exercise

1. Fill in the blanks :

The temperature of hot object is ..... Than

that of the cold object .

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2. Fill in the blanks :

One calories is equivalent to ..... joule .

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3. Fill in the blanks :

Our sense of object being hot or cold is .....

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4. Fill in the blanks :

A thermometer is used to measure .....

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5. Fill in the blanks :

The heat contained in a substance is the measure of the ..... kinetic energy of atoms in the substance .

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6. Fill in the blanks :

Temperature is the measure of the ..... kinetic energy of the atoms of a substance .

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7. Fill in the blanks :

Freezing point of water is ..... in Fahrenheit scale of temperature measurement .

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8. Fill in the blanks :

When a hot object is kept in contact with cold object , the hot object ..... The heat .

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9. Fill in the blanks :

The apparatus used to measure heat is called a .....

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10. Fill in the blanks :

In formula , A_2 = A_1 (1+ sigma /_\ T) , sigma represents .....

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11. Select the appropriate options and complete the following paragraph :

(heat,energy,decreasing, thermometer , increasing , potential, kinetic, atoms, thermal)

Heat is a form of ..... Which flows from object at high temperature to the object at low

temperature . Temperature of an object is measure of hotness and coldness of that object . it also is a measure of average ..... energy of atoms in the object . but the temperature cannot be measured accurately by just touching the object . hence , to measure temperature ..... is used . when a hot object is placed in contact with cold object , they exchange ..... . the average kinetic energy of atoms of cold objects goes on ..... . in this way , both the objects attain the same temperature when kept in contact .

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12. Choose the correct alternative :

The heat received from the earth is called .....

A. thermal energy

B. geothermal energy

C. chemical energy

D. green energy

Answer: A

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13. Choose the correct alternative :

Which of the following effects of heat does a mercury thermometer work on ?

A. Expansion of gases

B. change of state

C. expansion of liquids

D. anomalous behaviour

Answer: A::D

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14. Choose the correct alternative :

A special type of thermometer used to measure the temperature of a day is termed as .....

A. clinical thermometer

B. laboratory thermometer

C. digital thermometer

D. maximum - minimum thermometer

Answer: A

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15. MCQs based on practicals/project :

The body temperature of healthy person is about

A. 32 ^{0}F

B. 212 ^{0}C

C. 37 ^{0}C

D. 72 ^{0}F

Answer: C

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16. MCQs based on practicals/project :

When same amount of heat is given to two identical blocks made of aluminium and copper , whose temperature will be more after 10 minutes of heating ? (Consider the two blocks have same initial temperature) .

A. aluminium block

B. copper block

C. both willattain same temperature

D. it will depend on the atmospheric pressure

Answer: B::C

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17. MCQs based on practicals/project :

Using calorimeter it is possible to determine

A. specific heat of an object

B. heat content of an object

C. temperature of an object

D. all of these

Answer: A::B::C::D

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18. MCQs based on practicals/project :

A thermometer containing alcohol is dipped in a liquid . The initial volume of the alcohol was

5ml . When the liquid is heated the alcohol rises to a certain height in the thermometer and its volume increases to 5.25 mL . by how much amount is the temperature of the liquid changed during the process ?

A. 500 ^{0}C

B. 50 ^{0}C

C. 25 ^{0}C

D. 150 ^{0}C

Answer: C

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19. Name the following :

The biggest source of heat for the earth .

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20. Answer the following question :

Name the following :

The element with which the fuels react when they are burnt producing heat energy .

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21. Name the following :

The scale of measurement of temperature used in scientific experiments

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22. Name the following :

Thermometer used to measure the temperature pf boiling water

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23. Name the following :

hysical quantity remaining unchanged when gas is heated in container having fixed piston

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24. Right or wrong . If wrong , write the correct sentence :

Heat flows from an object at higher temperature to an object at lower temperature .

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25. Right or wrong . If wrong , write the correct sentence :

Objects contract on heating .

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26. Right or wrong . If wrong , write the correct sentence :

Joule is the unit of heat .

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27. Right or wrong . If wrong , write the correct sentence :

In the process of nuclear fusion , helium nuclei fuse together to form hydrogen nuclei .

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28. Right or wrong . If wrong , write the correct sentence :

A large amount of heat is present in air around us .

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29. Right or wrong . If wrong , write the correct sentence :

The temperature of a substance is measured in joule .

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30. Right or wrong . If wrong , write the correct sentence :

The average kinetic energy of atoms in a hot object is less than the aerage kinetic energy of atoms in a cold object .

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31. Right or wrong . If wrong , write the correct sentence :

Atoms of a solid are free .

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32. Right or wrong . If wrong , write the correct sentence :

Solids possess all the three types of expansion coefficients .

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33. Right or wrong . If wrong , write the correct sentence :

In summer , the length of metal bridges can increase due to expansion .

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34. Right or wrong . If wrong , write the correct sentence :

Density of gas decreases on heating at constant volume .

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35. Odd one out :

Geysers , hot springs , volcano , waterfall

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36. Odd one out :

Clinical thermometer , maximum - minimum thermometer , digital thermometer , laboratory thermometer .

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37. Odd one out :

water , alcohol , mercury , chloroform

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38. Complete the analogy :

Heat content : total kinetic energy of atoms ::

Temperature : .....

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39. Complete the analogy :

Clinical thermometer : 35 ^{0}C to 42 ^{0}C :: laboratory thermometer .....

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40. Complete the analogy :

Heat : joule :: specific heat : .....

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41. Complete the analogy :

Thermometer : temperature :: calorimeter : .....

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42. Complete the analogy :

Liquids : volumetric expansion coefficient :: gases : .....

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43. Match the following :

Whom should I pair with :

	Group 'A'		Group 'B'
i.	Temperature of a healthy human body	a.	296 K
ii.	Boiling point of water	b.	98.6 °F
iii.	Room temperature	c.	0 °C
iv.	Freezing point of water	d.	212 °F

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44. Answer the following :

Nishigandha kept a vessel containing all the ingredients for making tea in a solar cooker .

Shivani kept a similar vessel on a stove . Whose tea will be ready first and why ?

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45. Answer the following :

On one sunny day , jack decides to go to market for buying vegetables while samantha decides to take a nap in air conditioned room . After , a while when jack returns home , both of them sit in a non - A/C room . What

difference would jack and samantha feel ? why ?

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46. Answer the following :

Explain the need for thermometer .

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47. Answer the following :

How is the motion of atoms in gases and

solids affected by temperature ? Represent with neat diagrams .

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48. Answer the following :

Give the relation between different scales of temperature measurement .

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49. Answer the following :

Describe a clinical thermometer . How does it differ from the thermometer used in laboratory ?

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50. Answer the following :

What we can say that the two objects kept in contact have acquired equal temperature ?

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51. Answer the following :

Write a short note on specific heat of a substance .

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52. Answer the following :

Explain the construction of a calorimeter . Draw the necessary figure .

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53. Answer the following :

What is linear expansions of solid ?

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54. Answer the following :

Obtain a formula for coefficient of linear expansion .

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55. Answer the following :

Explain with the help of formulae the expansion coefficients of liquid and gas .

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56. Answer the following :

Which use of the expansion of liquids in daily life do you know ?

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57. Give reasons :

Why does your mother put folded cloth strips soaked in cold water on your forehead when you have high fever ?

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58. Give reasons :

Why is the calorimeter made of copper ?

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59. Give reasons :

Why is mercury preferred over water in making thermometers even though both of them have similar coefficient of volume expansion ?

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60. Give reasons :

Why is alcohol used instead of mercury in thermometers these days ?

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61. Give reasons :

Explain why rails have gaps at specific distances .

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62. Distinguish between :

What is the difference between heat and temperature ? What are their units ?

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63. Distinguish between:

What is the difference between heat and temperature?

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64. Distinguish between :

Linear expansion and volumetric expansion

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65. Distinguish between :

Areal expansion and volumetric expansion

Watch Video Solution

66. Distinguish between :

Volumetric expansion of liquids and volumetric expansion of gases .

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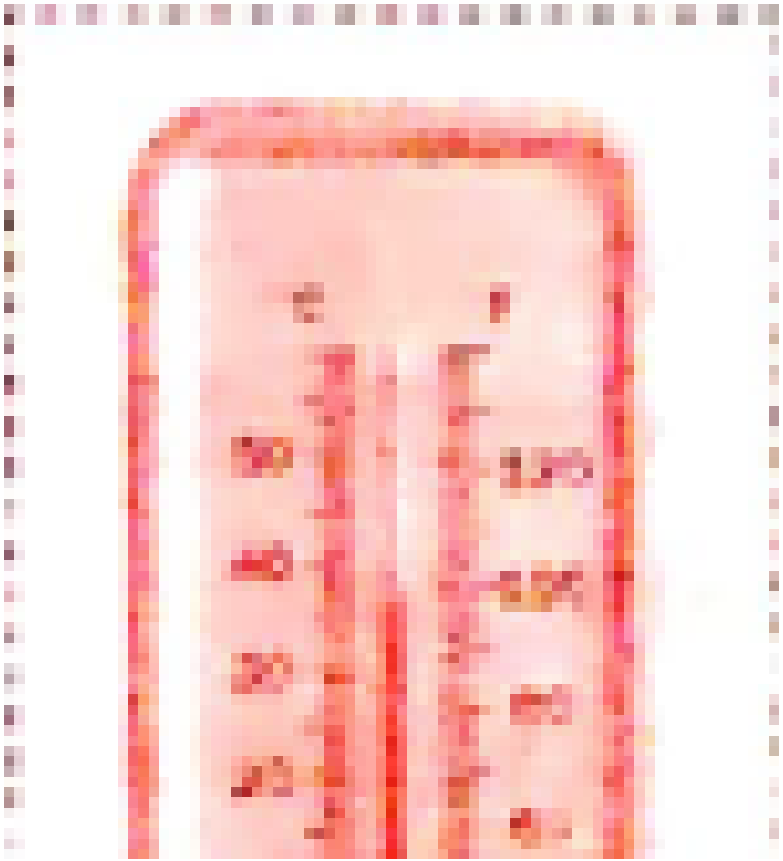
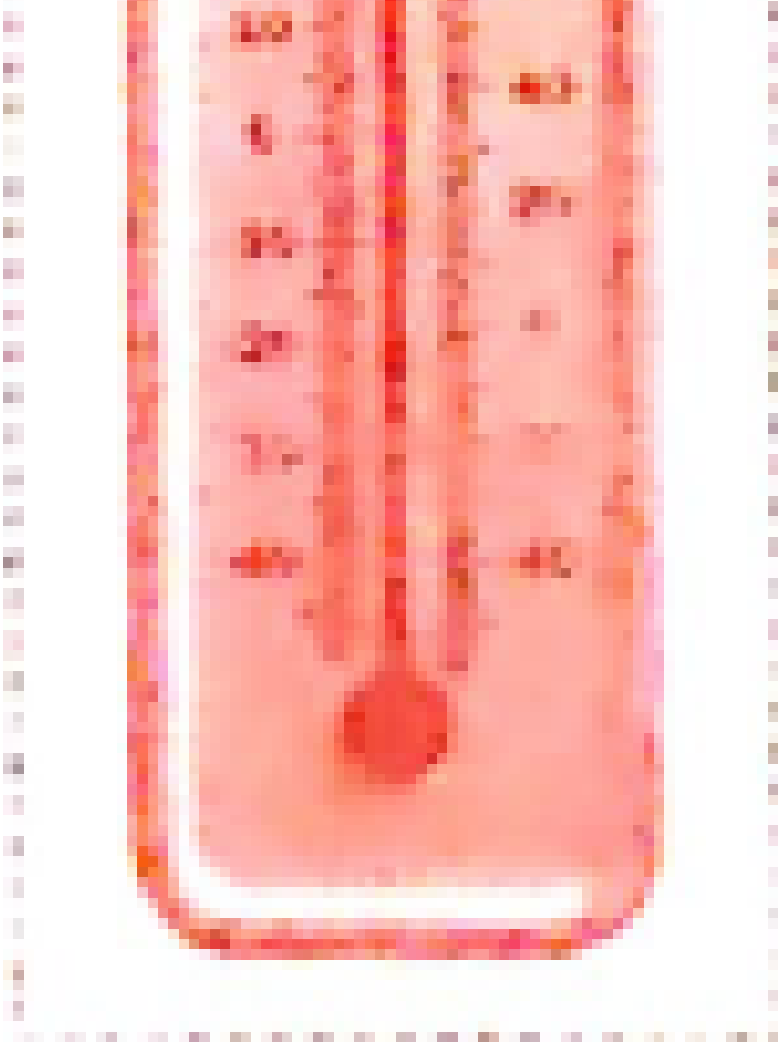
67. Questions based on diagram :

Observe the following figure and answer the questions :

Which effect of heat does the above instrument work on ?:





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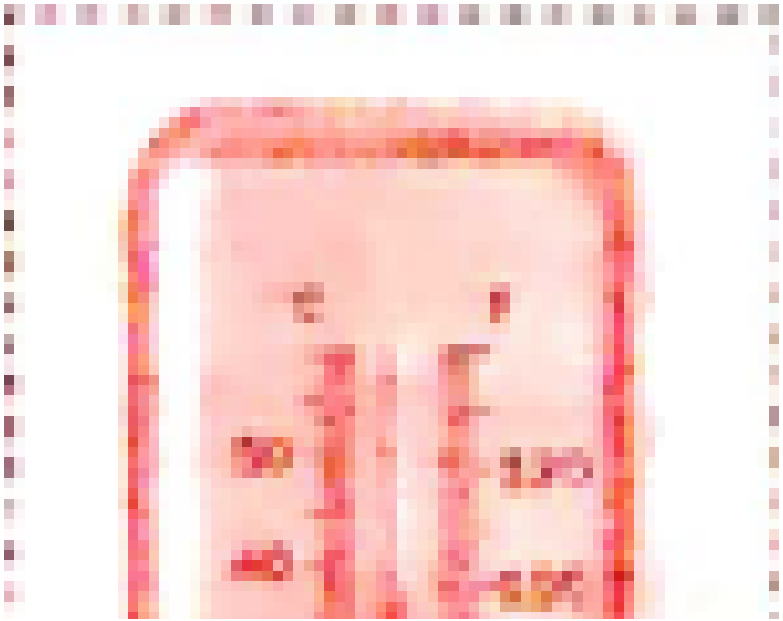
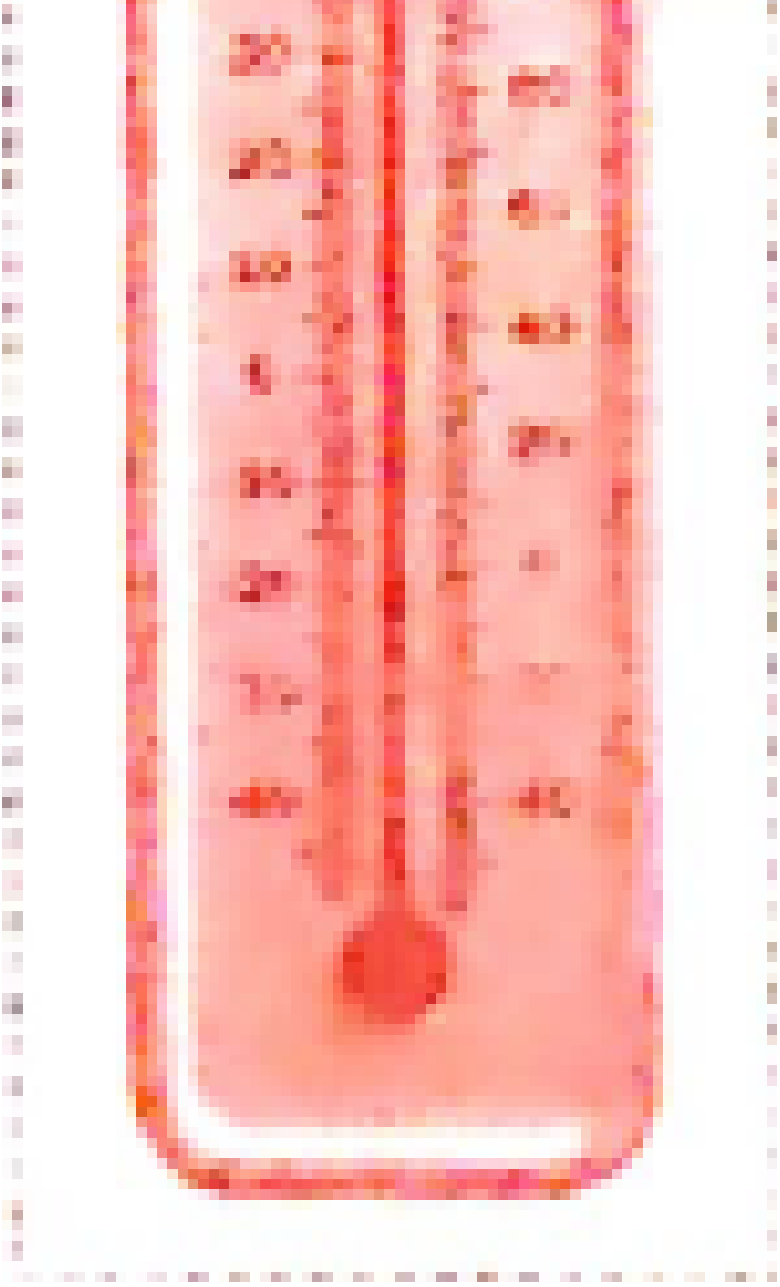
68. Questions based on diagram :

Observe the following figure and answer the questions :

Consedering the reading shown on the instrument in ^{0}F , determines its exact value in ^{0}C usig the relationship between Fahrenheit and celcius scale . :





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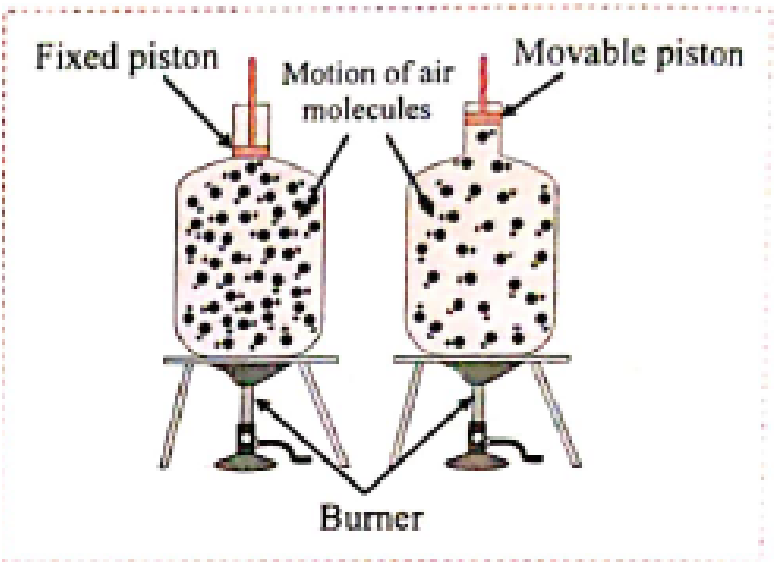
69. Questions based on diagram :

Observe the given figure and find out answers to the questions :

Using the formula density = mass/volume , explain what will be the effect of heat on the gas kept in a closed bottle .:



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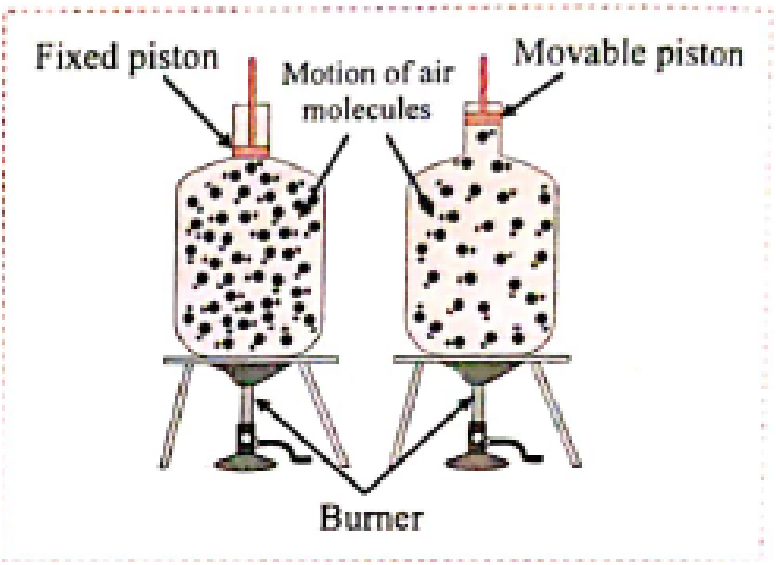
70. Questions based on diagram :

Observe the given figure and find out answers to the questions :

If the bolltle is not closed but has a movable piston attached to its open end (see the figure) , what will be the effect of heating the

gas in the bottle ?:



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71. Questions based on Paragraph :

Seemas and shobha's mother asked both of them to take out 3 packs of 0.5 L of milk (all at

same temperature) kept in refigerator and boil it . Seema took 1 l of milk in vessel A and shobha took rest of the milk in vessel B of same size as that of A . both the vessels are made up of same material and kept on the flame of equal intensity :

Milk in which vessels will boil first ?

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72. Questions based on Paragraph :

Seemas and shobha's mother asked both of

them to take out 3 packs of 0.5 L of milk (all at same temperature) kept in refigerator and boil it . Seema took 1 l of milk in vessel A and shobha took rest of the milk in vessel B of same size as that of A . both the vessels are made up of same material and kept on the flame of equal intensity :

Why is there a difference in the time taken to boil the milk in two vessels ?

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73. Questions based on Paragraph :

Seemas and shobha's mother asked both of them to take out 3 packs of 0.5 L of milk (all at same temperature) kept in refigerator and boil it . Seema took 1 l of milk in vessel A and shobha took rest of the milk in vessel B of same size as that of A . both the vessels are made up of same material and kept on the flame of equal intensity :

Who exactly happens when the milk is heated ?

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74. Questions based on Paragraph :

Seemas and shobha's mother asked both of them to take out 3 packs of 0.5 L of milk (all at same temperature) kept in refigerator and boil it . Seema took 1 l of milk in vessel A and shobha took rest of the milk in vessel B of same size as that of A . both the vessels are made up of same material and kept on the flame of equal intensity :

After boiling , what can you say about the

temperatures and heat content of the milk in both vessels ? why ?

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75. Solve the following problems :

How much heat will be neded to raise the temperature of 1.5 kg of water from 15 ^{0}C to 45 ^{0}C ? Give the answer in calories as well as in joule .

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76. Solve the following problems :

If the temperature of water changes by 10 ^{0}C on giving 300 cal of heat , what is the mass of water ?

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77. Solve the following problems :

20 g of water is given 2090 j of heat . Determine the change in the temperature of water .

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78. Which of the following temperature will read the same value on celsius and Fahrenheit scales.

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79. Solve the following problems :

What must be the temperature in Fahrenheit so that it will be twice ita value in Celcius ?

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80. Solve the following problems :

How much will the temperature of 68 ^{0}F be in Celsius and kelvin ?

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81. Solve the following problems :

If boiling point of oxygen is considered to be 90.15 K , what will be its value in Fahrenheit ?

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82. Solve the following problems :

What will be the amount of heat in joules required to increase temperature of 120g of aluminium block from 22 ^{0}C to 52 ^{0}C ? (specific heat of aluminium = 0.21 cal/g ^{0}C) .

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83. Solve the following problems :

Two substances A and B have specific heats c and 2c respectively . If A and B are given Q and

4Q amounts of heat respectively , the change in their temperatures is the same . If the mass of A is m , what is the mass of B ?

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84. Solve the following problems :

When a substance having mass of 3 kg receives 600 cal of heat , its temperature increases by 10 ^{0}C . What is the specific heat of the substance ?

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85. Solve the following problems :

When a substance having mass of 3 kg receives 600 cal of heat , its temperature increases by 10 ^{0}C to 70 ^{0}C . What is the specific heat of the substance ?

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86. Solve the following problems :

Suppose the masses of the calorimeter , the water in it and the hot object made up of

copper which is put in the calorimeter are the same . The initaial temperature of the calorimeter and water is 30 ^{0}C and that of the hot object is 60 ^{0}C . the specific heats of copper and water are 0.09 cal/g ^{0}C and 1 cal/g ^{0}C respectively . what will be the final temperature of water ?

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87. Solve the following problems :

A iron block at temperature 80 ^{0}C is dipped in

water inside the calorimeter at temperature 25 ^{0}C . If mass of the block is 500 g and that of water is 266 g . What will be the final temperature attained by all the three ?

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88. Solve the following problems :

What will be the increase in length of a steel rod of length 0.5 m , when its temperature is increased by 60 ^{0}C ? The coefficient of linear expansion of steel is 0.000013 (1/^{0}C) .

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89. Solve the following problems :

A bridge is made from 20 m long iron rods . At temperature 18 ^{0}C , the distance between two rods is 0.4 cm . Up to what temperature will the bridge be in good shape ?

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90. Solve the following problems :

At 15 ^{0}C the height of Effel tower is 324 m . If it

is made of iron , what will be the increase in length in cm , at 30 ^{0}C ? [λ_iron = 11.5 x 10^-6 (1/ ^{0}C)]

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91. Solve the following problems :

The length of the great belt bridge in denmark is 18 km . This length increases by 4.7 m in summer . Considering that the bridge is made up of steel , what is the change in temperature occuring in denmark during summer ? [

Coefficient of linear expansion for steel(λ_steel) = 11.5 x 10^5 (1/ ^{0}C)

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92. Solve the following problems :

A silver square sheet of length 10 cm is heated from temperature 20 ^{0}C to 70 ^{0}C . If the change in ita area is 0.18 cm^2 , then find the coefficient of areal expansion of silver .

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93. Solve the following problems :

Half litre of bottle completely filled with chloroform is kept in a room . When the bottle is heated till its temperature increases by 40 ^0C ., how much volume of chloroform will overflow from the bottle ? [Assume the bottles does not expand on heating , β_chloroform = 1.3 x 10^-3 (1/ ^0C)] .

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94. Practice problems :

Boiling point of certain metal is found to be 4010 ^{0}F . Find its value in kelvin scale .

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95. Practice problems :

What must be the temperature in Fahrenheit so that it will be thrice its value in celsius ?

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96. Practice problems :

Increase in the length of a steel rod is 0.06 cm . When its temperature is increased by 70 ^0C . Find its initial length . [codfficient of linear expansion of steel = 1.3 x 10^-5 (1/ ^0C)] .

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97. Practice problems :

When 15 cal of heat is supplied to a gold coin of mass 5 g , what will be the rise in

temperature of the coin ? (specific heat of gold = 0.03 cal/g ^{0}C)

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98. Practice problems :

A substance is heated from 15 ^{0}C to 18 ^{0}C by providing heat of 270 cal . If mass of the substance is 3 kg , then determine the specific heat of the substance .

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99. Practice problems :

Amount of heat required to raise the temperature of water of mass m kg from 10 ^{0}C to 60 ^{0}C , is 35000 cal . Determine the value of m .

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100. Practice problems :

Find the temperature at which its value in Fahrenheit will be nearly equal to its value in Kelvin .

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101. Practice problems :

A 1 L bottle half-filled with a hydrogen gas is heated at constant pressure such that , its temperature changes by 20 ^{0}C . What will be the volume of the hudrogen gas in the bottle after heating ?

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102. Practice problems :

Substances P and Q having specific heats in the ratio 2:3 and masses in ratio 1:2 are taken in two identical beakers . When the beakers are supplied equal amount of heat , temperature of the substance P increses by 60 ^{0}C . determine the change in the temperature for substance Q .

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103. Practice problems :

A railway track is made from 25 m long iron rods . At temperature 20 ^{0}C , the distance between two rods is 0.46 cm . Up to what temperature the tracks will be in proper condition to carry the trains ? [λ_iron = 11.5 x 10^-6 (1/ ^{0}C)]

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104. Which sources do we get heat from ?

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105. How is heat transferred ?

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106. Which effects of heat do you know ?

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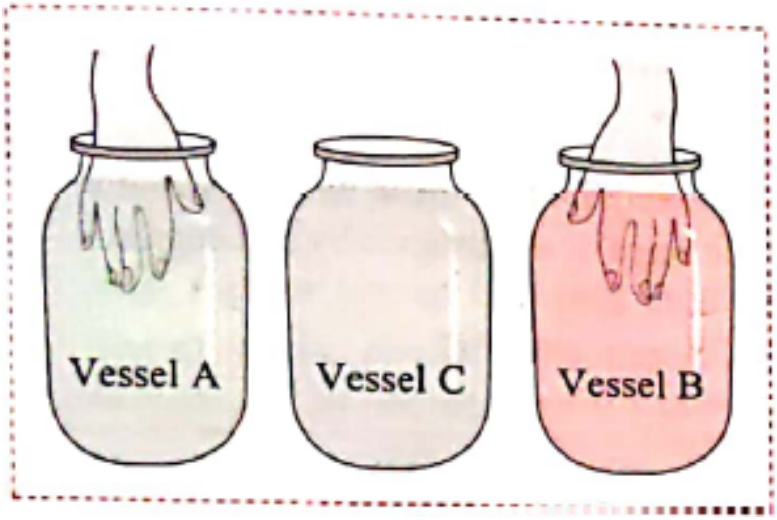
107. Take three similar vessels . Let us call them A,B and C (see figure below)

Fill A with hot water and B with cold water . Put some water from A and B in C .

Dip you right hand in A and left hand in B , and keep them immersed for 2 to 3 minutes .

Now dip both the hands in C .:

What do you feel ?:



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108. Take three similar vessels . Let us call them A,B and C (see figure below)

Fill A with hot water and B with cold water .

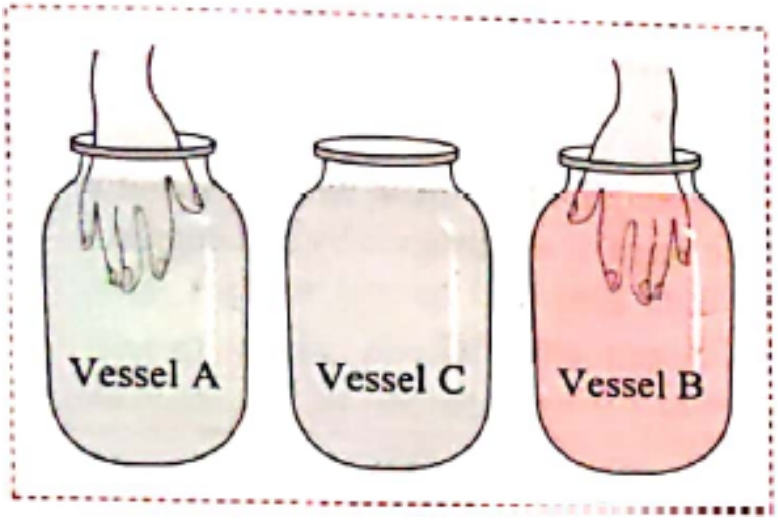
Put some water from A and B in C .

Dip you right hand in A and left hand in B , and

keep them immersed for 2 to 3 minutes .

Now dip both the hands in C .:

What is the reason for this ? think about it .:



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109. What are potential and kinetic energies ?

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110. Take two steel vessels A and B of the same size .

Fill some water in A and double that amount in B . Make sure that the water in both vessels are at the same temperature .

Raise the temperatures of water in both vessels by 10 c using a spirit lamp . did it take the same time time to increase the temperature in the two vessels ?

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111. Collect information about bimetallic strips and discuss in your class how a fire alarm is made using it .

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112. Answer the following question :

Match the values of temperature in ^{0}C given in column I to corresponding values of

temperature in ^{0}F in column II . :

	Column I		Column II
a.	0 °C	1.	273.15 °F
b.	100 °C	2.	32 °F
		3.	212 °F

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113. Answer the following question :

Fill in the blanks :

A large amount of heat is generated due to the nuclear ..... Taking place at the sentre of the sun .

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114. Answer the following question :

Name the following :

The element with which the fuels react when they are burnt producing heat energy .

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115. Answer the following question :

Complete the given analogy :

clinical thermometer : ..... :: laboratory thermometer : 40 ^{0}C to 110 ^{0}C .

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116. Answer the following question :

State right or wrong . If wrong , write the correct sentence :

The expansion coefficient is the change in length of a rod of unit length when its temperature is increased by one degree .

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117. Answer the following :

An aluminium sheet of area 0.1 m^2 , initially at temperature 30 ^{0}C is heated such that it reaches the temperature of 70 ^{0}C . If the coefficient of areal expansion of aluminium is 46.2 x 10^-6 (1/^{0}C) , find the change in area of the sheet .

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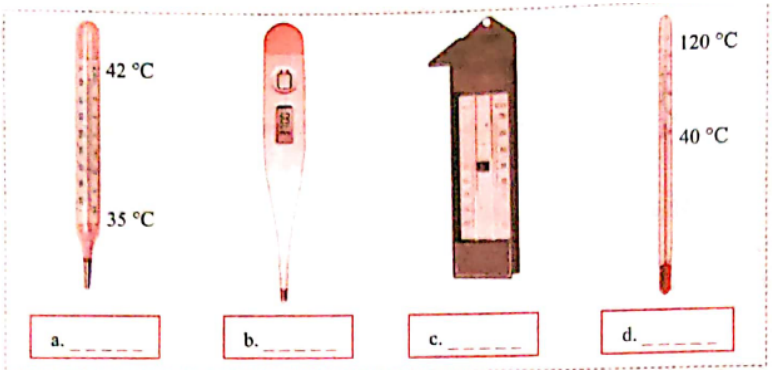
118. Answer the following :

Write the types of thermometers shown in the figures :



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119. Answer the following :

Give reasons :

Thermometers these days use alcohol instead of mercury .

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120. Answer the following :

Complete the following table :

Melting point of	°C	K	°F
Iron	_____	1811.15	_____

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121. Answer the following :

Prepare a concept chart explaining any five sources of heat .

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