PHYSICS

BOOKS - ICSE

HEAT TRANSFER

Exercise Objective Type Questions

1. Fill in the blank spaces by choosing the correct words from the list given below: List: contracts, heating, expand, linear, inflated

The increase in length of an iron rod on heating is called _____expansion.

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2. Fill in the blank spaces by choosing the correct words from the list given below: List: contracts, heating, expand, linear, inflated

When ice is placed in a thick glass tumbler it cracks, because the inner surface of glass _____ more than the outer surface.

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3. Fill in the blank spaces by choosing the correct words from the list given below: List: contracts, heating, expand, linear, inflated

The electric transmission wires _____ and sag during summer.

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4. Fill in the blank spaces by choosing the correct words from the list given below: List: contracts, heating, expand, linear, inflated

A partially inflated balloon is placed near burning wood. After some time the balloon gets _____ due to the expansion of air in it.

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5. Fill in the blank spaces by choosing the correct words from the list given below: List: contracts, heating, expand, linear, inflated

A straight bimetallic strip on _____ bends.

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6. Statements given below are incorrect. Write the correct statements.

When a flat sheet of copper is heated the increase in its area is called cubical expansion.

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7. Statements given below are incorrect. Write the correct statements.

A bimetallic strip expands equally on heating and does not bend.

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8. Statements given below are incorrect. Write the correct statements.

An iron rim of a slightly smaller diameter than a wooden wheel is cooled so that it easily slips over wooden wheel.

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9. Statements given below are incorrect. Write the correct statements.

Small gaps are provided between the railway lines to provide for easy transportation and laying of railway lines.

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10. Statements given below are incorrect. Write the correct statements.

New electric wires for power transmission are

fixed tightly, if laid during summer. This prevents wires from snapping in winter.

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Exercise Objective Type Questions True False

1. A bimetallic strip is based on the principle that different metals have different thermal expansions for the same rise in temperature.

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2. While laying concrete slabs on the floor tiny gaps are left so as to provide for the cubical expansion.

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3. A thick glass tumbler does not crack, when boiling hot tea is poured in it.

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4. Different liquids have same value of cubical expansion.

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5. All gases on heating have same value of cubical expansion.

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Exercise Objective Type Questions Tick ✓ The Most Appropriate Answer

1. A thick glass tumbler cracks when boiling hot water is poured into it because :

A. glass is a bad conductor of heat

B. inner surface of glass expands more than outer surface

C. outer surface of glass expands more than inner surface

D. both (a) and (b).

Answer:

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2. A bimetallic strip of brass and iron is straight at room temperature. When this bimetallic strip is heated it bends, such that:

A. iron takes the outer surface of bend

B. brass takes the outer surface of bend

C. the bimetallic strip does not bend

D. none of these

Answer:

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3. Small gaps are left between railway lines because :

A. we cannot have rails of very long length.

B. it allows for expansion of rails during summer

C. it allows for contraction of rails during summer

D. both (b) and (c)

Answer:

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4. Iron tyres are mounted on the wooden wheels of a tonga. Initially the diameter of the iron tyre is:

A. slightly more than the wooden wheel

B. slightly less than the wooden wheel

C. of same diameter as wooden wheel

D. none of these

Answer:

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5. A bimetallic strip is used in:

A. pressure cooker

B. automatic fire alarm

C. ceiling fan

D. flash light

Answer:

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Exercise Objective Type Questions Match The Column

1. Match the statements in Column A, with those in Column B .

Column A	Column B
1. Expansion produced in matter due to the absorption of heat energy.	(a) Cubical expansion
2. Increase in the length of a solid only on the absorption of heat energy.	(b) Bimetallic strip
3. A flat and straight strip of metal made by riveting two flat and straight strips of brass and iron respectively.	(c) Linear expansion
4. Increase in the area of a solid only on the absorption of heat energy.	(d) Thermal expansion
5. Increase in the volume of a substance on the absorption of heat energy	(e) Superficial expansion

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Exercise Study Questions

1. Define boiling and evaporation. State difference between boiling and evaporation.

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2. Define the Thermal expansion.

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3. Define the Linear expansion.

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4. Define the Superficial expansion.

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5. Define the Cubical expansion.

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6. Why do the liquids and gases have no linear or superficial expansion?

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7. Describe an experiment to prove that solids expands on heating and contract on cooling.

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8. What is a bimetallic strip? Why does a bimetallic strip of brass and iron bend on heating?

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9. How is bimetallic strip used in fire alarm?

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10. Why are gaps left in between rails, while laying a railway line? Explain.

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11. Why are electric transmission lines kept slightly loose, when they are laid in summer? Explain.

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12. Why is the concrete floor made in small slabs, rather than a single block? Explain.

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13. Why are iron bridges mounted on steel rollers? Explain.

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14. Why is a small gap left behind the walls while mounting a girder for roofing? Explain.

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15. Why does a thick glass tumbler crack when boiling hot water is poured into it? Explain.

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16. Why does a pyrex glass not crack when boiling hot tea is poured into it? Explain.

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17. Why is the diameter of an iron tyre kept slightly smaller than the wooden wheel on which this tyre is to be mounted? Explain.

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18. What is a rivet? How are two metal plates joined by a rivet?

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Theme Assignment Objective Type Questions Fill In The Blank

1. During the process of _____ temperature remains constant. (boiling/evaporation)

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2. The increase in area of a solid when heated, is called_____ expansion. (linear/superficial)

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3. Brass expands _____ than iron. (more/less)

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Theme Assignment True Or False

1. The process of boiling needs an external source of heat energy.

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2. Equal lengths of different solids expand by same amount when heated equally.

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3. The length of rivet is slightly smaller than the thickness of metal plates.

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Theme Assignment Tick ✓ The Most Appropriate Answer

1. Which of the following processes does not need any constant temperature for its continuation?

A. Boiling

B. Vaporisation

C. Evaporation

D. None of these

Answer:

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2. The increase in length of a solid when heated, is called

A. linear expansion

B. superficial expansion

C. cubical expansion

D. none of these

Answer:

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3. When a brass-invar bimetallic strip is heated, unequal expansion bends the strip, such that brass takes

A. inner edge

B. outer edge

C. either (a) or (b)

D. none of these

Answer:

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4. The gaseous form of a liquid which occurs below the boiling point of a liquid is called

A. gas

B. vapour

C. either (a) or (b)

D. none of these

Answer:

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5. Which of the following liquids does expand maximum on heating?

A. Water

B. Kerosene oil

C. Coconut oil

D. None of these

Answer:

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Theme Assignment

1. Statements given below are incorrect. Write the correct statements.

In evaporation gaseous state is formed from all parts of the liquid.

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2. Statements given below are incorrect. Write the correct statements.

When telephone wires are laid in summer, they are kept tight to prevent from sagging down.

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3. Statements given below are incorrect. Write the correct statements.

Gases expand in area on heating.

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4. Define boiling and evaporation properly.

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5. State difference between boiling and evaporation.

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6. What do you mean by thermal expansion? Define three kinds of thermal expansion.

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7. Mention at least four real world applications of thermal expansion of solids.

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8. What is a bimetallic strip?

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9. Draw a neat diagram to show how bimetallic strip is used in a fire alarm system.

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10. Why does a thick glass tumbler crack when boiling hot milk is poured into it? Explain.

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11. Why does a pyrex glass not crack when boiling hot tea is poured into it? Explain.

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Questions Name The Following

1. Energy in transit

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2. Three methods in which transfer of heat can be done

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3. Two methods by which liquid can change into vapour


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4. Name two factors that affect evaporation.


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5. Measure of average KE of all molecules in a substance


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Questions Write T For True And F For False Correct The False Statements

1. Thermal expansion is least in the case of gases and most in the case of solids.

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2. If the coefficient of linear expansion of a material is high, the material will expand more for each degree rise in temperature

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3. When water is cooled from $4^{\circ}C$ to $0^{\circ}C$ its volume decreases.

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4. The observed expansion of liquid is called apparent expansion of liquid, and is less than the actual expansion.

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5. Mercury has a small coefficient of volume expansion.

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Exercises Section I Name The Following

1. The energy that is transferred from a body at a higher temperature to a body at a lower temperature

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2. The change of state from liquid to gas that takes place at the surface of a liquid

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3. The rapid change of state from liquid to vapour at a particular temperature

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4. The tendency of matter to change in shape, area, and volume in response to a change in temperature

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5. The expansion when solid expands in two dimension

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6. Increase in length/(Initial length x rise in temperature)

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7. Unit of coefficient of linear expansion

Watch Video Solution

8. Cooling of water from $4^{\circ}C$ to $0^{\circ}C$ results in volume expansion

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9. The observed expansion of liquid

Watch Video Solution

10. An alloy which has a very low value of coefficient of expansion

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Exercises Section I Choose The Correct Option

1. Temperature is a measure of .....

A. KE of all the molecules

B. Average KE of all the molecules

C. PE of all the molecules

D. Internal energy of all molecules

Answer:

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2. When you compare a cup of water at $100^{\circ} C$ and a bucket of water at $100^{\circ} C$, you observe that .....

A. water in the cup has more PE

B. water in the bucket has more average KE

C. water in the cup has more average KE

D. both have the same average KE

Answer:

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3. The rate of evaporation does not depend on .....

A. area of the exposed surface

B. temperature of surroundings and liquid

C. nature of liquid

D. original volume of the liquid

Answer:

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4. The boiling point can change with .....

A. type of liquid

B. atmospheric pressure

C. impurity

D. All of these

Answer:

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5. The increase in length of rod when it is heated does not depend on the

A. original length of the rod

B. rise in temperature

C. nature of the material

D. initial temperature

Answer:

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6. Two metal sheets X and Y (made of the same metal), having area $1m^2$ and $2m^2$ are heated from $0^\circ C$ to $100^\circ C$. Which of the following statements is correct?

A. Both X and Y will expand the same

B. X will expand more than Y

C. Y will expand more than X

D. Both will not expand

Answer:

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7. Two copper rods, A and B, each 2 m long, are heated. A is heated from $30^\circ C$ to $50^\circ C$ and the B is heated from $40^\circ C$ to $55^\circ C$. Which one will elongate more?

A. Both A and B elongate by same amount

B. A will elongate more than B

C. B will elongate more than A

D. Can't say which one

Answer:

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Exercises Section I Write T For True And F For False Correct The False Statements

1. Escape of the more energetic molecules from the surface of a liquid decreases the average temperature of the molecules that are left behind.

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2. Rate of evaporation is the same for every liquid.

3. Boiling takes place throughout a liquid and not just at the surface.

4. When a solid expands in two dimensions, it is called cubical expansion.

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5. A bimetallic strip consists of two strips of different metals joined together that expand at same rates as they are heated.

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6. A dentist uses filling material that has different rate of expansion as that of the enamel.

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7. The rate of expansion for the same liquid differs greatly in different temperature ranges.

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Exercises Section I Choose The Correct Option To Fill In The Blanks

1. Matter contains ..... (heat/internal energy) in the form of molecular kinetic energy and potential energy

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2. Change in internal PE of a substance ..... (change its state/ change its temperature).

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3. ..... (Less/More) the amount of water present in the atmosphere, less will be the rate of evaporation.

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4. The energy needed for a water molecule to change into vapour by boiling and evaporation is ..... (different/same).

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5. Impurities in water will ..... (increase/decrease) its boiling point.

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6. Liquids and gases can only show ..... (volume expansion/superficial expansion).

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7. Coefficient of superficial expansion is ..... (twice/thrice) the coefficient of linear expansion.

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8. Different liquids have .....(same/different) rates of expansion.

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Exercises Section Ii Give Reason For The Following

1. Water in a cup and a kettle can have the same temperature, even though their quantities are different

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2. Water in a cup can have a higher temperature than a bucket of water, although cup has less amount of water.

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3. Higher the initial temperature of the liquid, more is the rate of evaporation of liquid.

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4. When you have fever, keeping a piece of linen cloth dipped in water on your forehead helps reduce temperature.

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5. During boiling, the temperature remains constant. Why?

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6. We use the alloy invar in pendulum clocks.

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7. Bridges, roads, and railway lines are made in sections separated by rubber strips or gaps. Why?

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8. We use bimetallic strips as thermostat switch.

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Exercises Section Ii Distinguish Between The Following

1. Distinguish between Boiling and evaporation

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2. Coefficient of linear and coefficient of superficial expansion

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3. Superficial expansion and volume expansion

Watch Video Solution

4. Apparent and actual expansion of liquids

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Exercises Section Ii Short Answer Questions

1. Define heat and work.

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2. How will you explain temperature using kinetic theory?

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3. Name six factors which affect the rate of evaporation.

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4. What do you mean by coefficient of superficial expansion?

5. Name the factors affecting the volume expansion of a liquid.

6. What is the relationship between coefficient of cubical expansion and coefficient of linear expansion?

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7. What is anomalous expansion of water?

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8. What do you mean by bimetallic strip and where is it used?

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Exercises Section Ii Long Answer Questions

1. Explain internal kinetic and potential energies of molecules.

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2. Describe how evaporation takes place.

3. Give reason

Evaporation causes cooling.

4. Explain the working of a refrigerator.

5. What do you mean by anomalous expansion of water?

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6. List four examples of thermal expansion in daily life.

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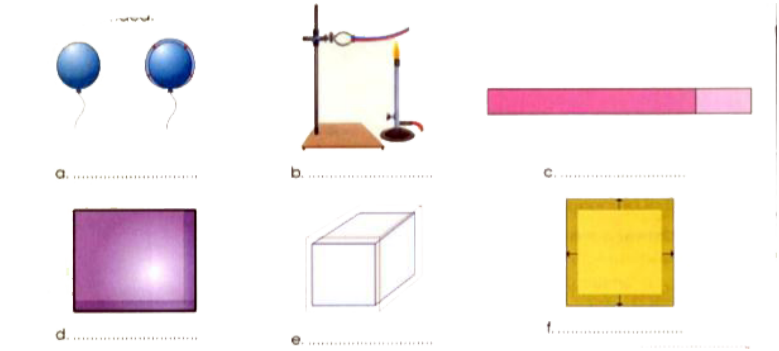
Picture Study

1. What kind of expansion is taking place in the figures given here ? Write your answers in the space provided ?



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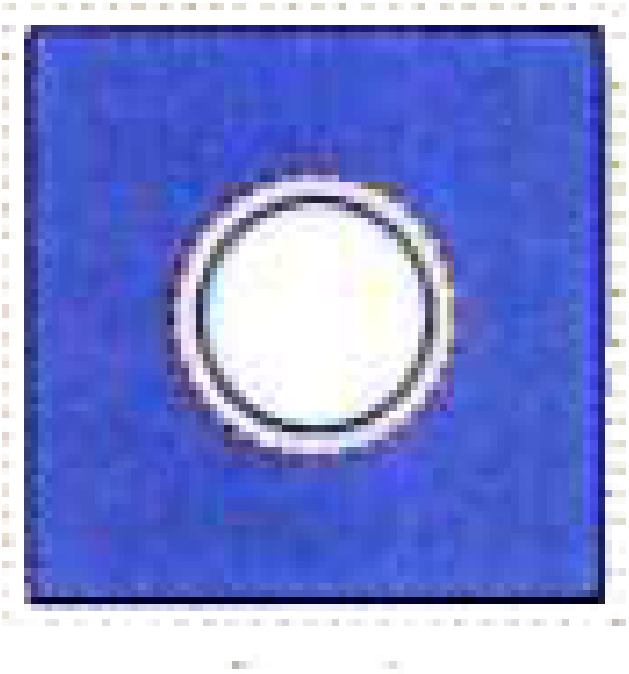
2. In Figure C, there is a circular hole in the tin sheet. When the sheet is heated, will the hole

also expand?



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