

How water melts, boils and freezes

Grade 6 science (Year 7 · Class 6) · Worksheet

Name: _____ Date: _____ Class: _____

These problems practise naming changes of state, reading heating and cooling graphs, and explaining why temperatures stay constant while water melts or boils. Some use simple calculations with rates and times. They suit NGSS Grade 6, Year 7 and Class 6 students.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-4

Problem 1 Name the change (easy)

Name the change of state in each situation.

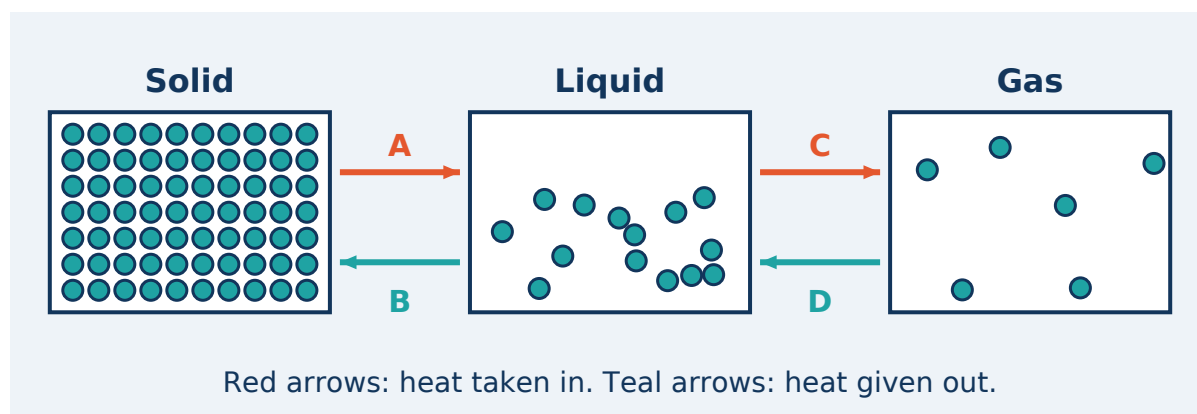
1. An ice lolly drips on a hot afternoon in Pune.
2. A puddle on the road in Lagos disappears after the rain stops.
3. A bathroom mirror becomes covered in tiny droplets.
4. Water in a freezer tray becomes solid.
5. Water bubbles in a pan on the stove.

Problem 2 Key temperatures (easy)

State the temperature, in °C, for each.

1. The melting point of pure ice.
2. The freezing point of pure water.
3. The boiling point of pure water at sea level.
4. The temperature at which steam condenses at sea level.

Problem 3 Labelling a state diagram (easy)



Arrows A to D.

1. Name the change of state shown by arrow A.

2. Name the change shown by arrow B.
3. Name the change shown by arrow D.
4. State which arrows show heat being taken in.

Problem 4 Heat in or heat out (easy)

State whether heat is taken in or given out during each change.

1. Melting.
2. Freezing.
3. Boiling.
4. Condensation.

Problem 5 An ice cube in a cup (easy)

Chiamaka puts a 50 g ice cube in a cup on a hot day in Lagos. All the ice melts.

1. Name the change of state.
2. State the mass of the water in the cup.
3. State whether the water particles have been made or destroyed.

Problem 6 Completing sentences (easy)

Choose from: evaporation, boiling, surface, bubbles, 100 °C.

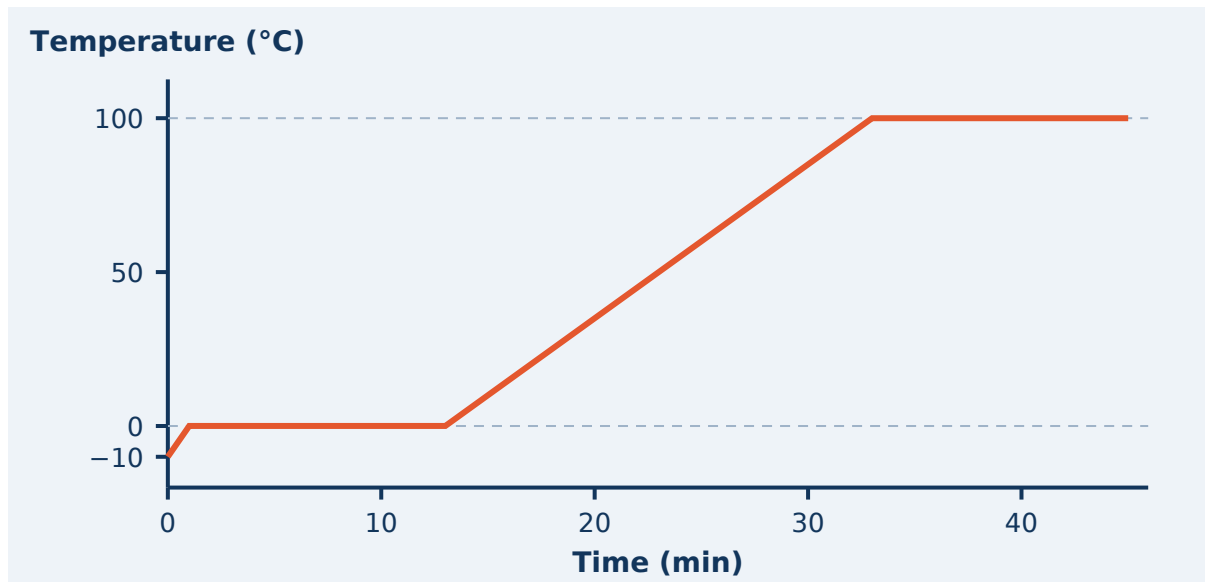
1. ... happens at the ... of a liquid.
2. ... forms ... throughout the liquid.
3. Pure water boils at ...

Problem 7 Warming water (easy)

Mei in Singapore heats water from 22 °C to 100 °C in a kettle.

1. Calculate the temperature rise.
2. State what happens to the thermometer reading while the water is boiling.

Problem 8 Reading a heating curve (medium)



Wanjiru heats ice in Nairobi.

1. State the starting temperature.
2. Calculate how long the temperature stays at 0 °C.
3. Calculate the rate at which the liquid water warms, in °C/min.
4. Explain why the line is flat between 33 min and 45 min.

Problem 9 Evaporation or boiling? (medium)

Write E for evaporation or B for boiling.

1. Happens only at one particular temperature.
2. Happens at the surface only.
3. Bubbles form inside the liquid.
4. Washing dries on a line in the sun.
5. Happens slowly on a cool day.

Problem 10 Drying laundry (medium)

Aarav hangs wet shirts on a balcony in Pune. They dry fastest on a hot, windy day when the shirts are spread out.

1. Name the change of state.
2. Give three reasons why drying is faster on that day.
3. Explain why the water does not need to reach 100 °C.

Problem 11 Freezing data (medium)

Diego in Texas puts a cup of water in a freezer and records its temperature.

Time (min)	0	10	20	30	40	50	60
Temperature (°C)	20	11	3	0	0	0	-4

1. State the freezing point shown by the data.

2. Calculate the average cooling rate during the first 20 min.
3. Explain why the temperature stays at 0 °C between 30 min and 50 min.

Problem 12 A misty mirror (medium)

After a hot shower, Emma in Leeds sees that her bathroom mirror is covered in tiny droplets.

1. Name the change of state.
2. Explain where the water came from.
3. Explain why the droplets form on the mirror.

Problem 13 Spot the errors (medium)

Bilal writes: "Steam is the white cloud above a kettle. Water can only evaporate at 100 °C."

1. Identify the first error and correct it.
2. Identify the second error and correct it.

Problem 14 Conservation of mass (medium)

Kofi in Accra melts 250 g of ice. Then he boils the water until 40 g of it has turned to vapour.

1. State the mass of water just after melting.
2. Calculate the mass of liquid water left after boiling.
3. Explain what happened to the missing 40 g.

Problem 15 Melting rate (medium)

An ice lolly has a mass of 60 g and melts at a steady 4 g/min in the sun.

1. Calculate how long it takes to melt completely.
2. Calculate the mass still solid after 6 min.
3. Predict whether the time would be shorter or longer in the shade.

Problem 16 Kettle timing (hard)

Emma's kettle raises the temperature of the water by 20 °C each minute. She fills it with water at 15 °C.

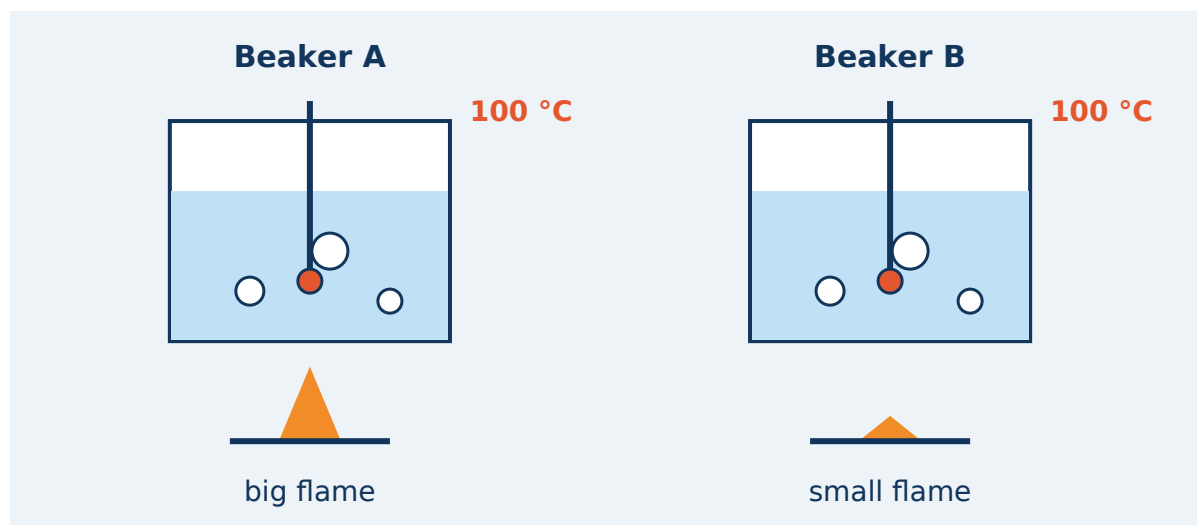
1. Calculate the time to reach 100 °C in minutes.
2. Convert your answer to minutes and seconds.
3. Explain why the temperature stops rising after that, even though the kettle is still on.

Problem 17 Cooling curve of steam (hard)

Steam at 130 °C is cooled steadily until it becomes ice at –20 °C.

1. List the stages in order, naming the state at each.
2. State the temperatures at which the graph is flat.
3. Describe how the particles change during the flat section at 100 °C.

Problem 18 Two flames (hard)



Two beakers boiling at different rates.

Beaker A loses 120 g of water in 10 min, and beaker B loses 60 g in 10 min. Both are boiling.

1. Calculate the rate of mass loss for each beaker.
2. State the temperature of the water in each beaker.
3. Explain why a bigger flame does not make the water hotter.

Problem 19 Plan an evaporation test (hard)

Lina wants to find out how temperature affects the evaporation of water.

1. State the independent variable and the dependent variable.
2. List three variables to keep the same.
3. Describe how you would measure the evaporation.
4. Predict the result.

Problem 20 Cooling by evaporation (hard)

Mei steps out of a swimming pool in Singapore and feels cold, even though the air is warm.

1. Name the change of state that is happening to the water on her skin.
2. Explain, using particles, why her skin feels cooler.
3. Predict whether she would feel colder on a windy day, and explain.