What does the energy do during a phase change?

Materials needed:

- Hot Plate
- goggles
- 600 ml beaker
- Thermometer (using Celsius today!)
- 200 ml of ice

Safety Rules:

1. Assume hot plates are hot
2. Goggles on when heating your beaker.
3. Only glass goes on hot plate

First Aid for BURNS

1 Cool
with running water

Cool burned area with cool running water for up to 20 minutes, or until pain is less severe. Take off any jewelries and clothing that could be in the way. Do not attempt to peel any clothing that is tuck to the wound as this could cause the skin to tear. If running water is not available, use a damp cloth, wet towel, sponge or immerse in water. May drink analgesics for pain.

Minor burns with only redness and no blisters, can be treated wit topical burn ointment or spray.



- Do not use ice or ice water, which can cause tissue damage
- Do not apply butter, oil, toothpaste, lotion, ointment on any burn, because infection may occur and complicate the injury.

2 Cover
the burn

Cover the burn with sterile material to protect from infection. Use a clean dry dressing or plastic cling film, wrap to cover the burn



- Do not use adhesive or fully dressings.
- Do not break blisters or remove peeled skin

3 Call
Emergency assistant

For deep or extensive burns of any size, send the patient immediately to hospital for further medical treatment.



Procedure:

Add constant heat to 200 ml of ice.

Record the temperature every 30 seconds for 20 minutes.

Make a note of when all the ice has melted (in data table).

Make a note of when your water begins to boil - constant rolling boil (on data table).

Time	Temperature (C)
0 (initial - starting)	
:30	
1:00	
1:30	
2:00	
2:30	
3:00	
3:30	
4:00	
4:30	
5:00	

Time	Temperature (C)
5:30	
6:00	
6:30	
7:00	
7:30	
8:00	
8:30	
9:00	
9:30	
10:00	
10:30	

Time	Temperature (C)
11:00	
11:30	
12:00	
12:30	
13:00	
13:30	
14:00	
14:30	
15:00	
15:30	
16:00	

Time	Temperature (C)
16:30	
17:00	
17:30	
18:00	
18:30	
19:00	
19:30	
20:00	

Student roles:

1: Take the temperature

2: Timer

3: Data keeper, make certain you write it down, and EVERYONE writes it down.

4: Materials manager, safety monitor.

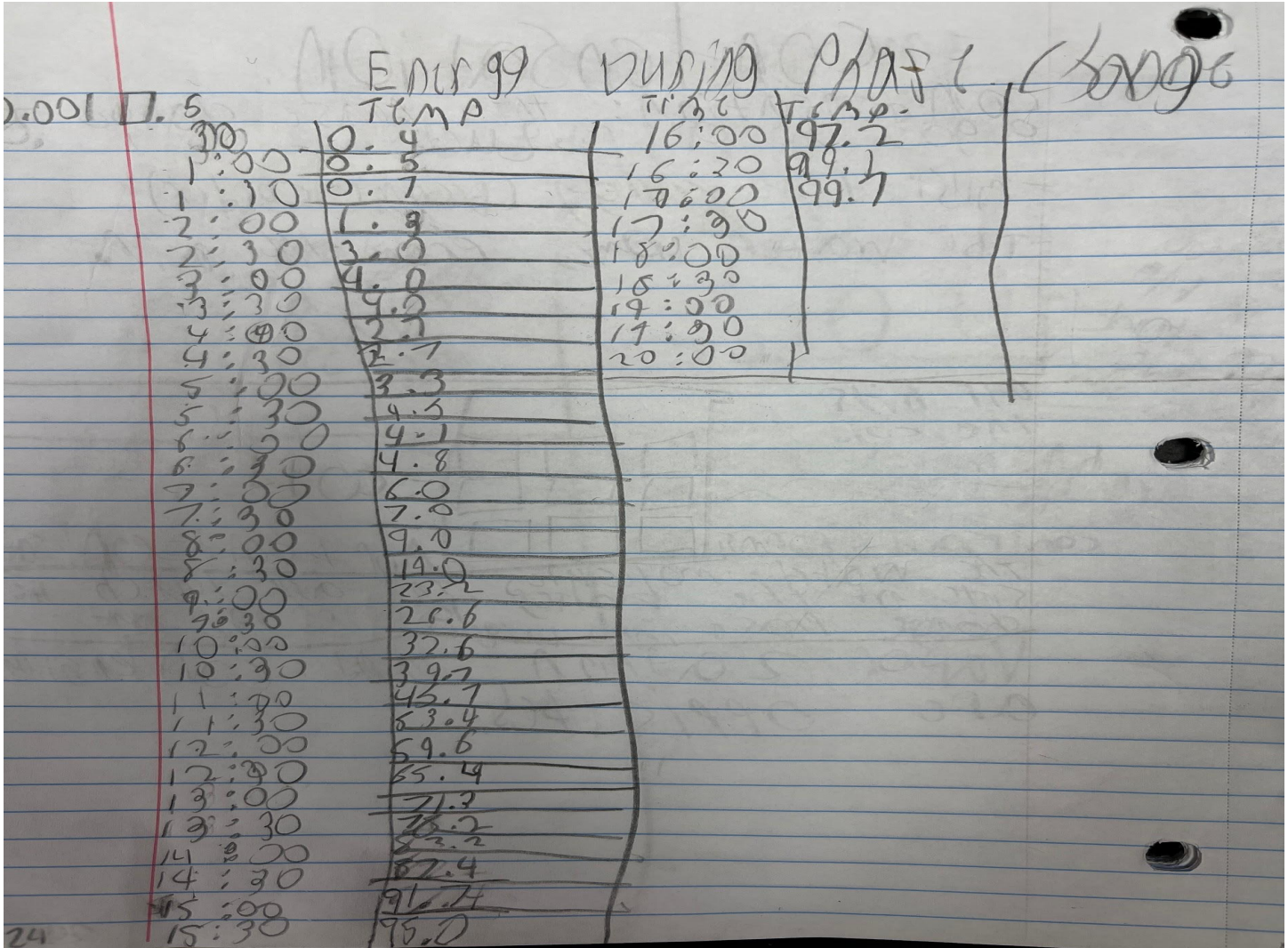
Graphing!!!

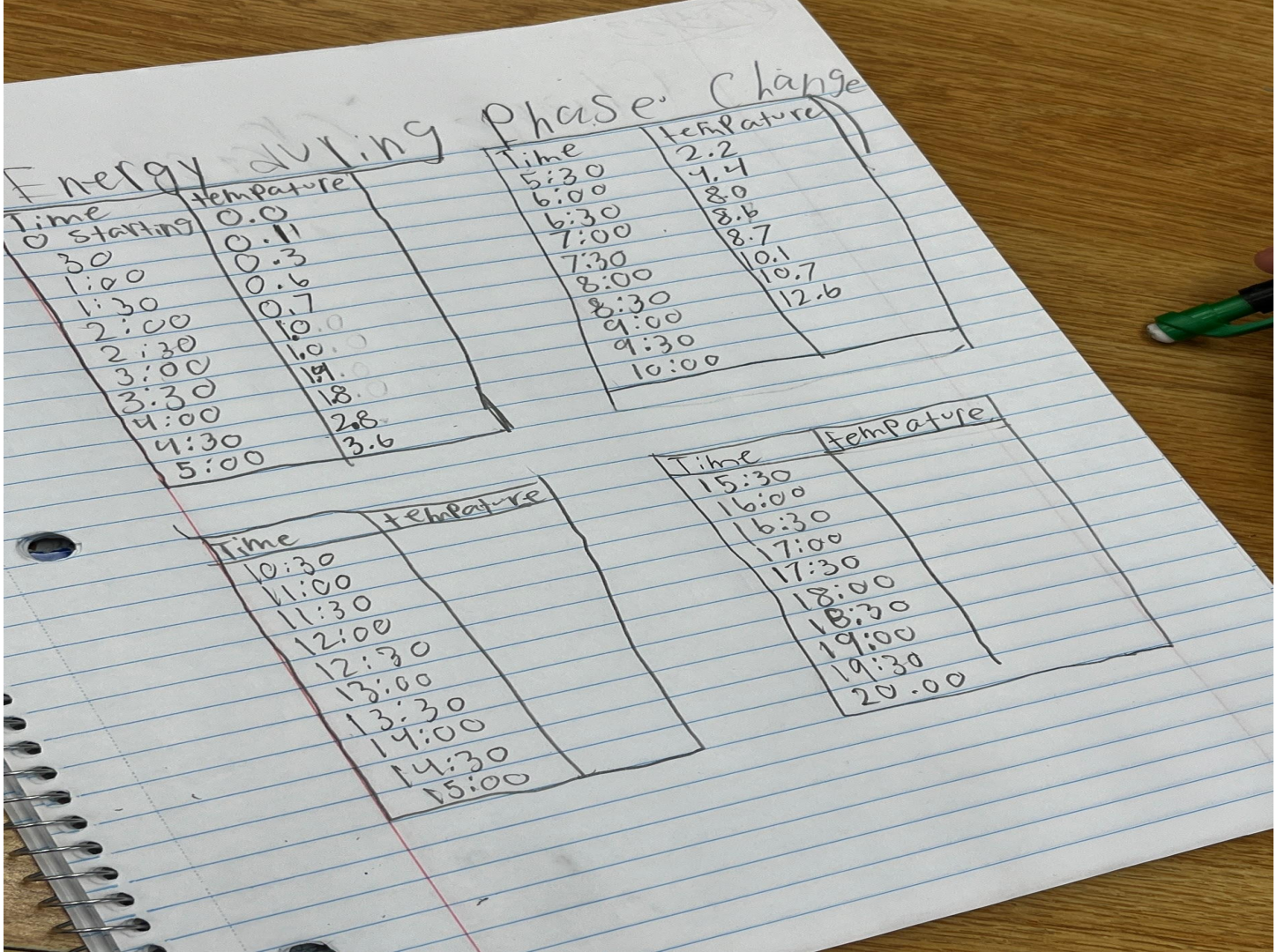
Page 24 data table

Graph paper

Pencil

Colored Pencils


ENDS 99 DURING PART 1 CHANGE
TEMP
TIME
TEMP
0.001 0.5
30 0.4
1:00 0.5
1:10 0.7
2:00 1.9
2:30 3.0
3:00 4.0
3:30 4.2
4:00 2.7
4:30 2.1
5:00 3.3
5:30 4.5
6:00 4.1
6:30 4.8
7:00 6.0
7:30 7.0
8:00 9.0
8:30 14.0
9:00 23.2
9:30 26.6
10:00 32.6
10:30 39.7
11:00 45.7
11:30 53.4
12:00 59.6
12:30 65.4
13:00 71.7
13:30 78.2
14:00 82.4
14:30 91.4
15:00 95.0
15:30
16:00 97.2
16:20 99.1
16:00 99.7
17:30
18:00
18:30
19:00
19:30
20:00
24



Energy during Phase Change

Time	Temperature
0 starting	0.0
30	0.11
1:00	0.3
1:30	0.6
2:00	0.7
2:30	1.0
3:00	1.0
3:30	1.9
4:00	1.8
4:30	2.8
5:00	3.6

Time	Temperature
5:30	2.2
6:00	4.4
6:30	8.0
7:00	8.6
7:30	8.7
8:00	10.1
8:30	10.7
9:00	12.6
9:30	
10:00	

Time	Temperature
10:30	
11:00	
11:30	
12:00	
12:30	
13:00	
13:30	
14:00	
14:30	
15:00	

Time	Temperature
15:30	
16:00	
16:30	
17:00	
17:30	
18:00	
18:30	
19:00	
19:30	
20.00	

10/12

Energy during Phase Change

Time	Temp (C)
0	0.0
:30	0.7
1:00	1.8
1:30	2.0
2:00	2.5
2:30	6.0
3:00	12.1
3:30	9.1
4:00	8.0
4:30	11.2
5:00	8.0
5:30	16.0
6:00	12.4
6:30	15.9
7:00	17.7
7:30	23.4
8:00	26.7
8:30	31.3
9:00	37.6
9:30	45.0
10:00	53.0
10:30	60.0
11:00	66.4
11:30	73.6
12:00	
12:30	
13:00	
13:30	
14:00	
14:30	

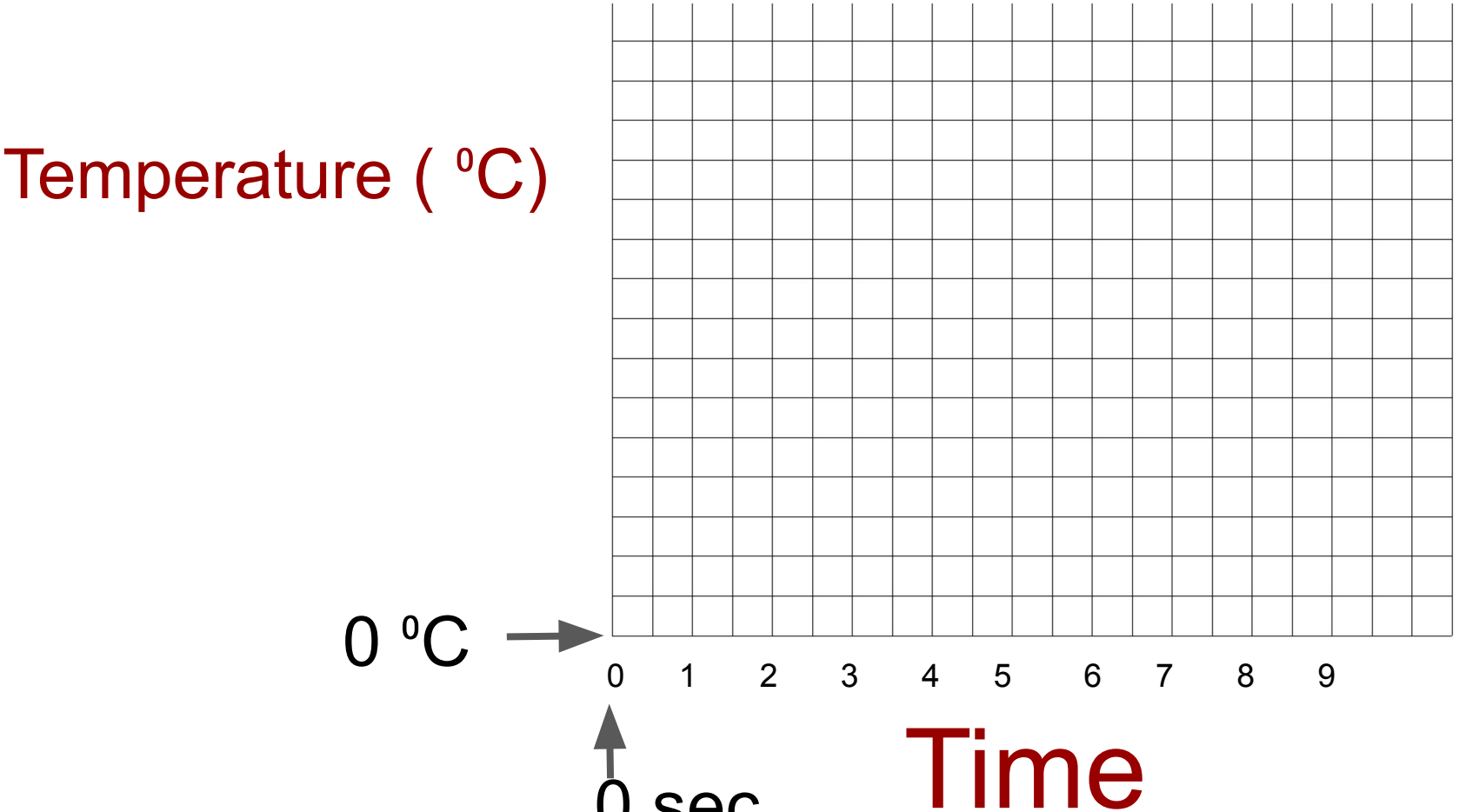
ice melted

Time	Temp (C)
15:00	
15:30	
16:00	
16:30	
17:00	
17:30	
18:00	
18:30	
19:00	
19:30	
20:00	

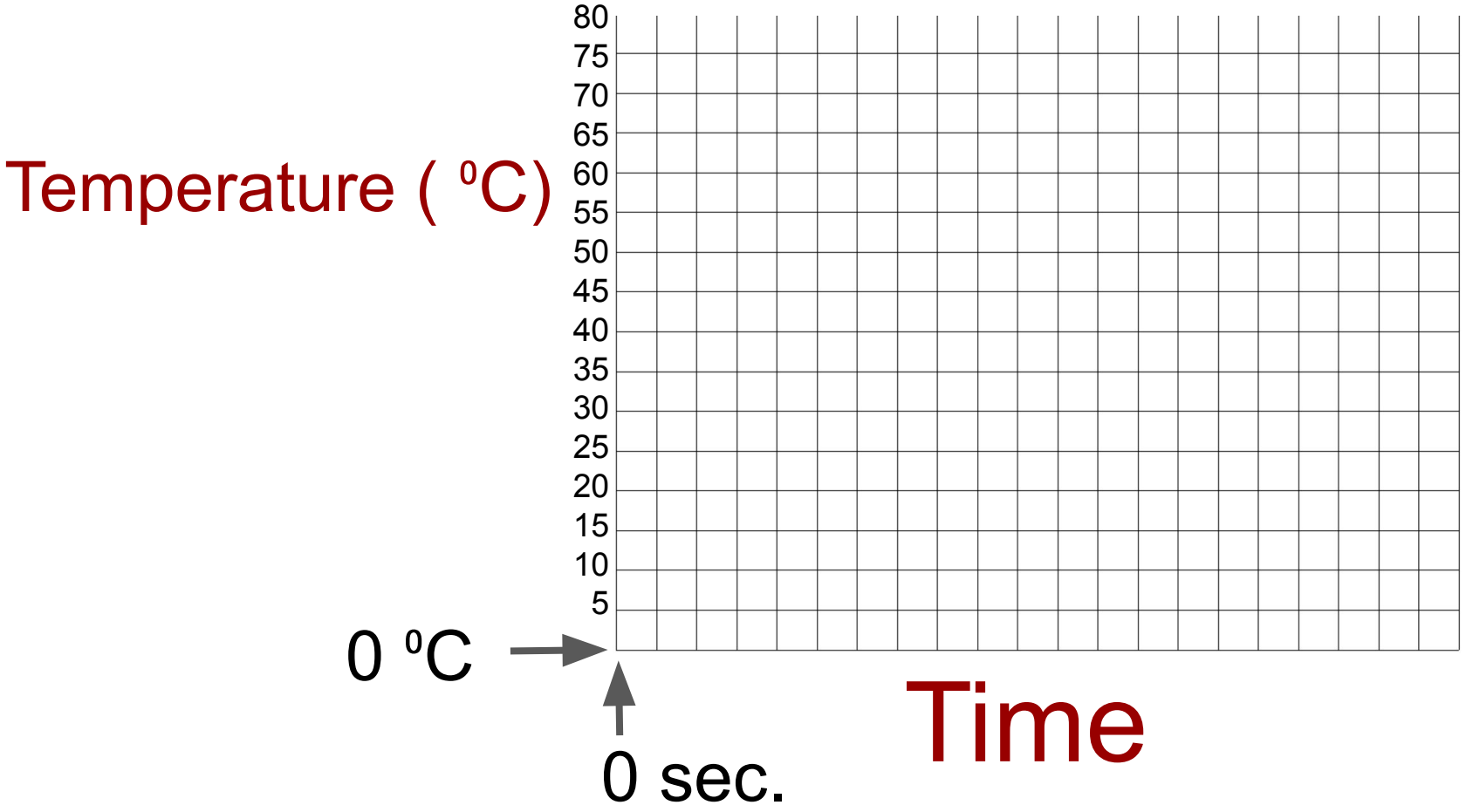
Energy During Phase Change

Time	Temp	Time	Temp	Time	temp
0 Intial	0.4	7.30	8.6	14.30 Starting	75.6
0.30	0.4	8.00	10.00	15.00	79.4
1.00	0.6	8.30	15.6	15.30	84.4
1.30	0.9	9.00	15.5	16.00	28.6
2.00	2.7	9.30	22.4	X	
2.30	3.6	10.00	24.6	16.30	97.7
3.00	3.8	10.30	29.4	17.00	94.6
3.30	6.0	11.00	33.8	17.30 Boiling	98.2
4.00	6.0	11.30 Ice gone	40.7	18.00	99.4
4.30	8.0	12.00	46.1	18.30	100
5.00	6.6	12.30	52.6	19.00	
5.30	4.3	13.00	58.4	19.30	
6.00	5.0	13.30	64.0	20.00	
6.30	7.1	14.00 Stirred	69.5		
24 7.00	4.6				

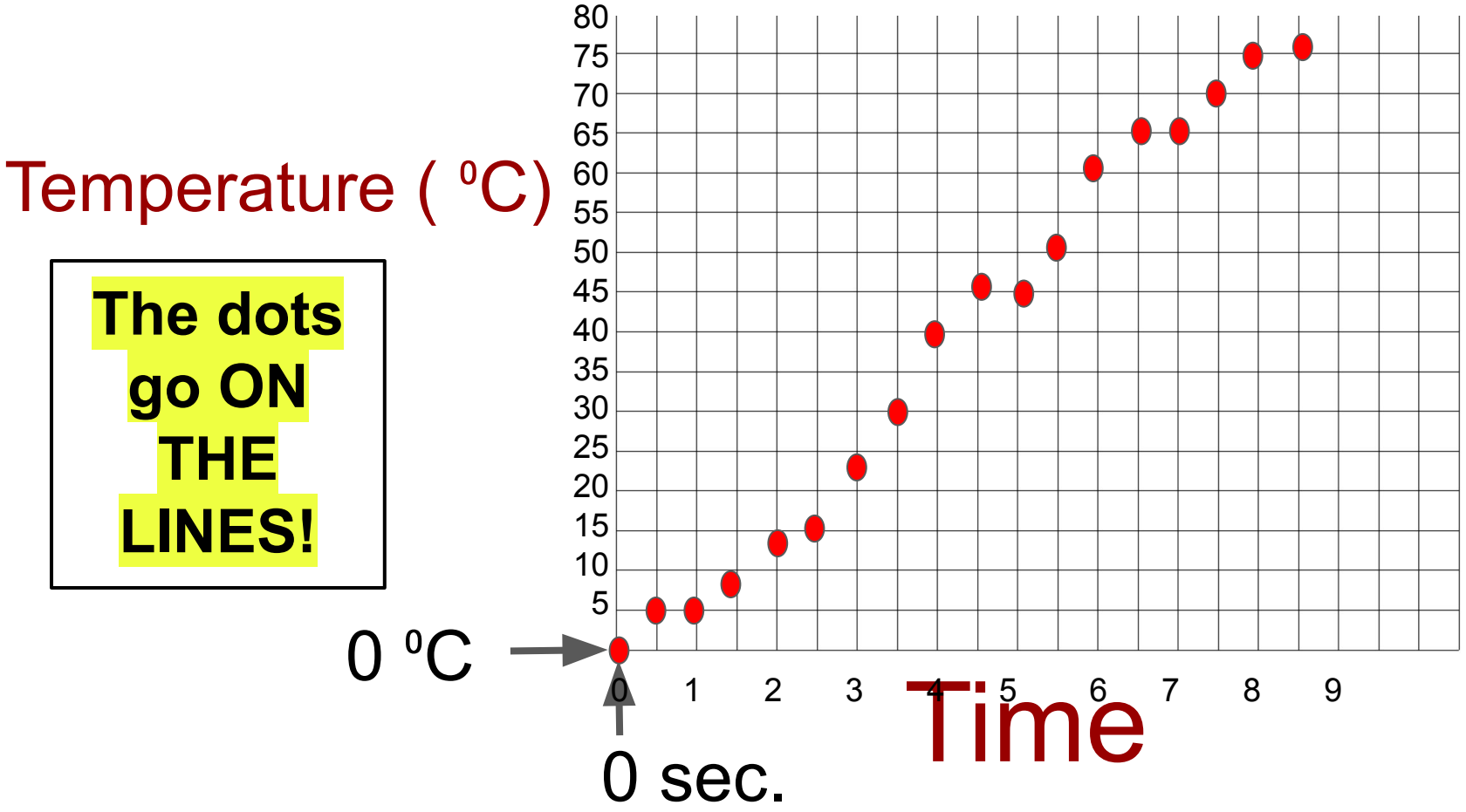
Graph your data:

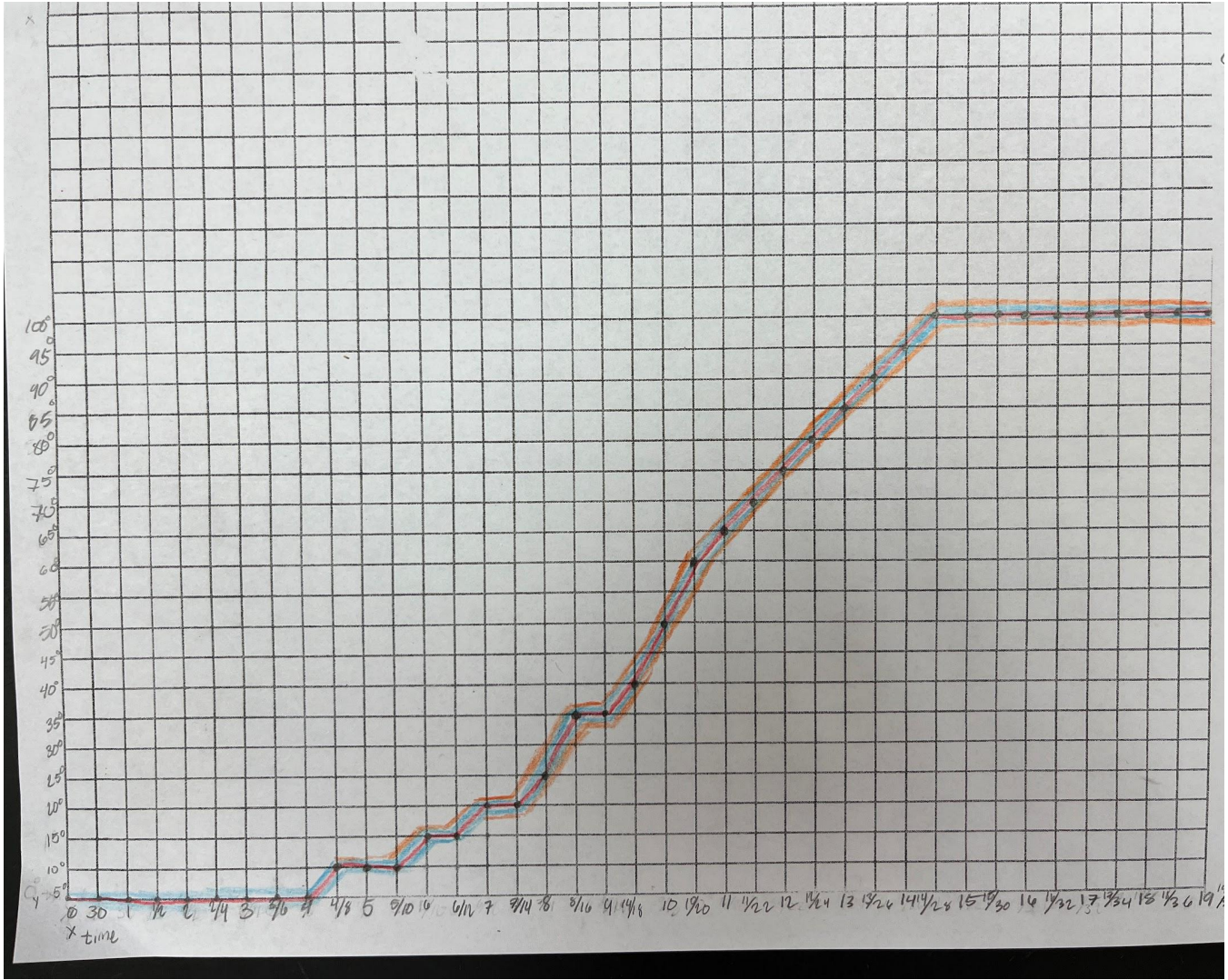


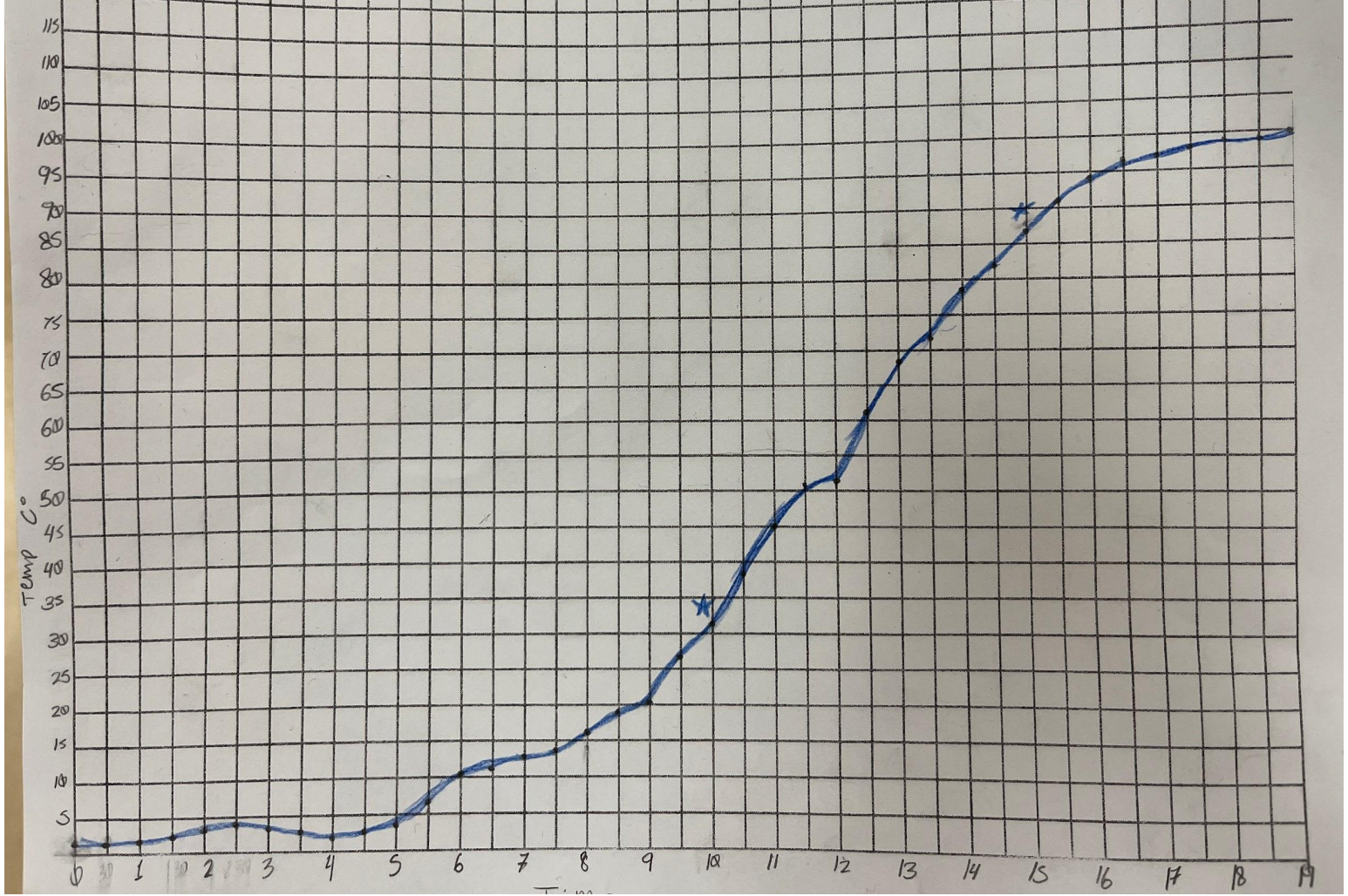
Graph your data:

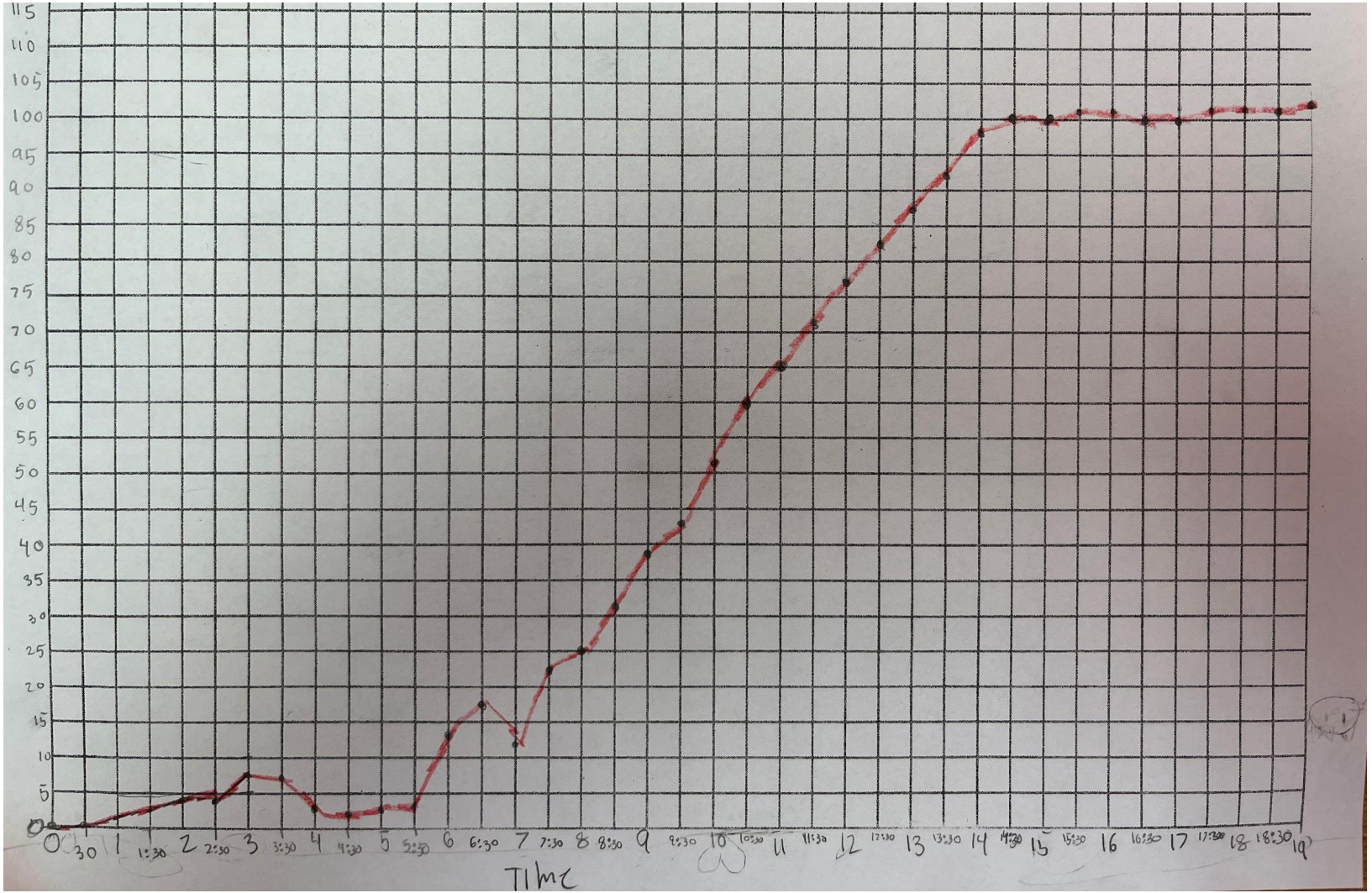


Graph your data:




100°
95°
90°
85°
80°
75°
70°
65°
60°
55°
50°
45°
40°
35°
30°
25°
20°
15°
10°
5°
0
30
1
1/2
2
4/4
3
3/6
4
4/8
5
5/10
6
6/12
7
7/14
8
8/16
9
9/18
10
10/20
11
11/22
12
12/24
13
13/26
14
14/28
15
15/30
16
16/32
17
17/34
18
18/36
19
X time

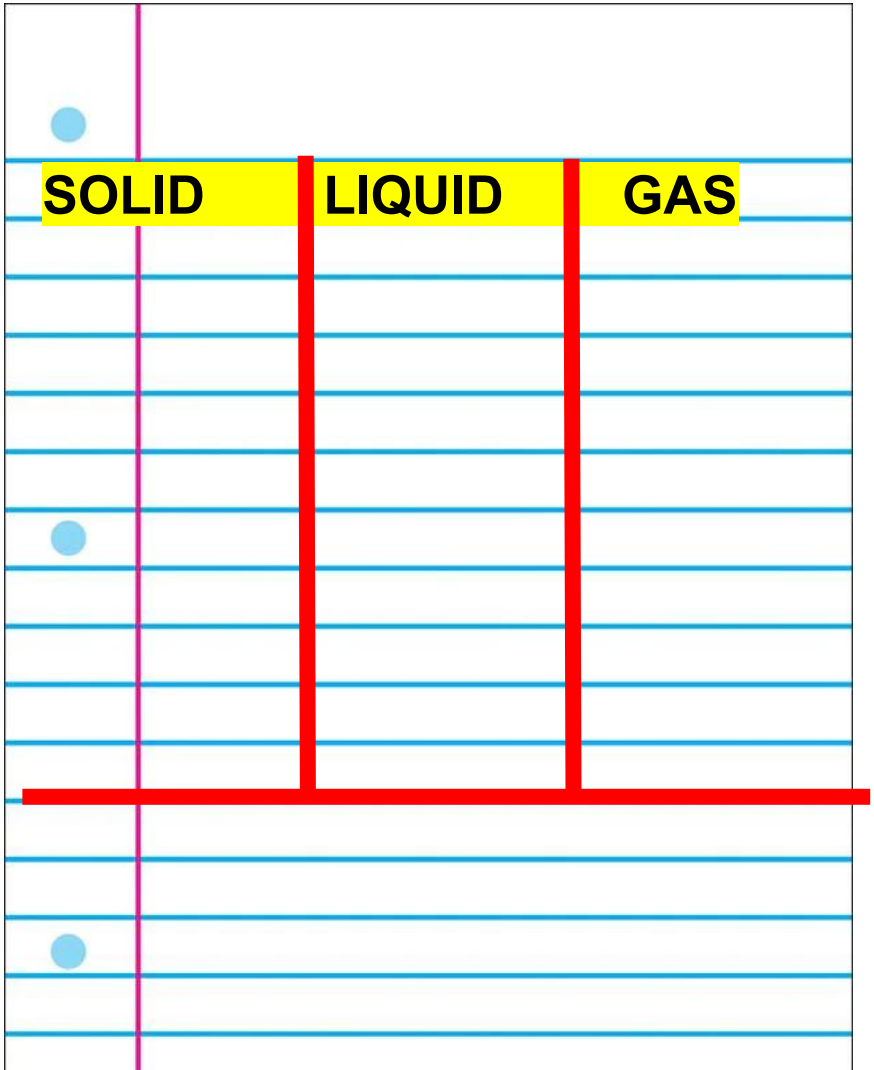

Temp C°
115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19


115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 30 1 1:30 2 2:30 3 3:30 4 4:30 5 5:30 6 6:30 7 7:30 8 8:30 9 9:30 10 10:30 11 11:30 12 12:30 13 13:30 14 14:30 15 15:30 16 16:30 17 17:30 18 18:30 19
Time

For a phase change to occur, what must be added or taken away?

Energy (heat or electricity)

What does the energy do during a phase change?


SOLID
LIQUID
GAS

We are going to watch a short video:

As you watch, write down in your notes:

A diagram of the phase of matter (drawing of the particles)

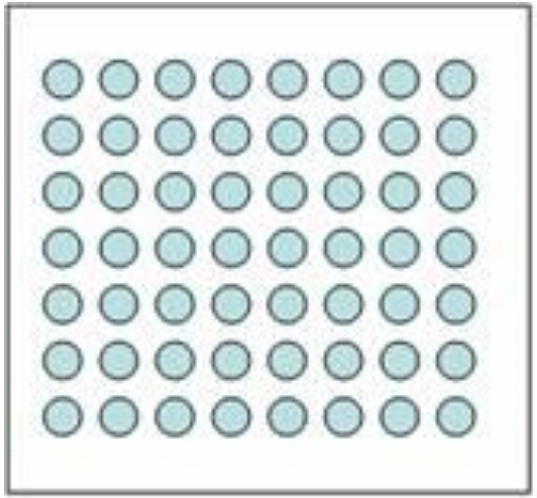
Describe the force of attraction of the bonds between particles

Describe the shape of the phase

Describe the volume of the phase

Describe the movement of the particles


SOLID
STATES
OF
MATTER
LIQUID
GAS



Solid

- Particles packed closely, often rigidly bonded to one another
- Definite shape
- Defiinite volume

We are going to watch a short video:

As you watch, write down in your notes:

A diagram of the phase of matter (drawing of the particles)

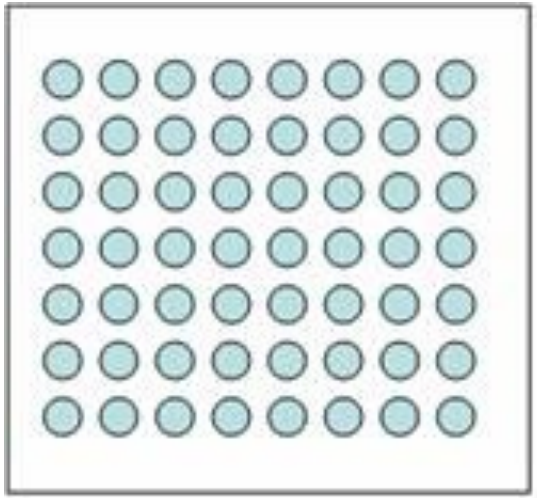
Describe the force of attraction of the bonds between particles

Describe the shape of the phase

Describe the volume of the phase

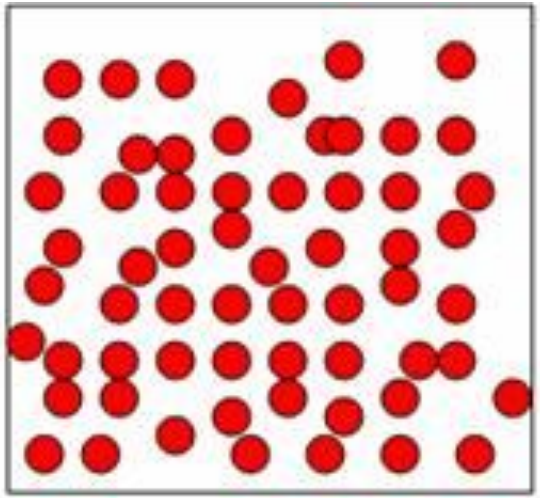
Describe the movement of the particles


SOLID
STATES
OF
MATTER
LIQUID
GAS



Solid

- Particles packed closely, often rigidly bonded to one another
- Definite shape
- Defiinite volume



Liquid

- Particles closely packed, but able to flow
- Indefinite shape
- Defiinite volume

We are going to watch a short video:

As you watch, write down in your notes:

A diagram of the phase of matter (drawing of the particles)

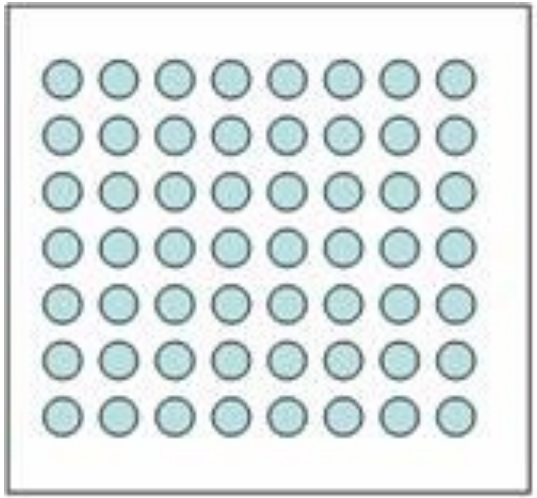
Describe the force of attraction of the bonds between particles

Describe the shape of the phase

Describe the volume of the phase

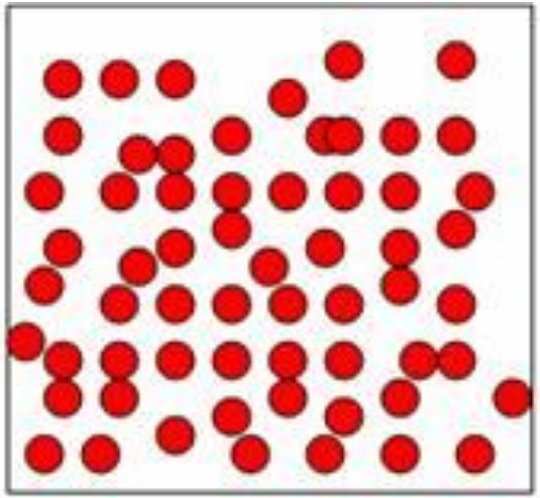
Describe the movement of the particles


SOLID
STATES
OF
MATTER
LIQUID
GAS



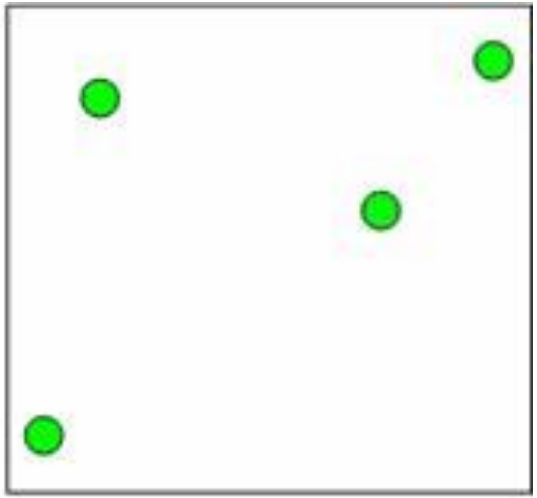
Solid

- Particles packed closely, often rigidly bonded to one another
- Definite shape
- Defiinite volume



Liquid

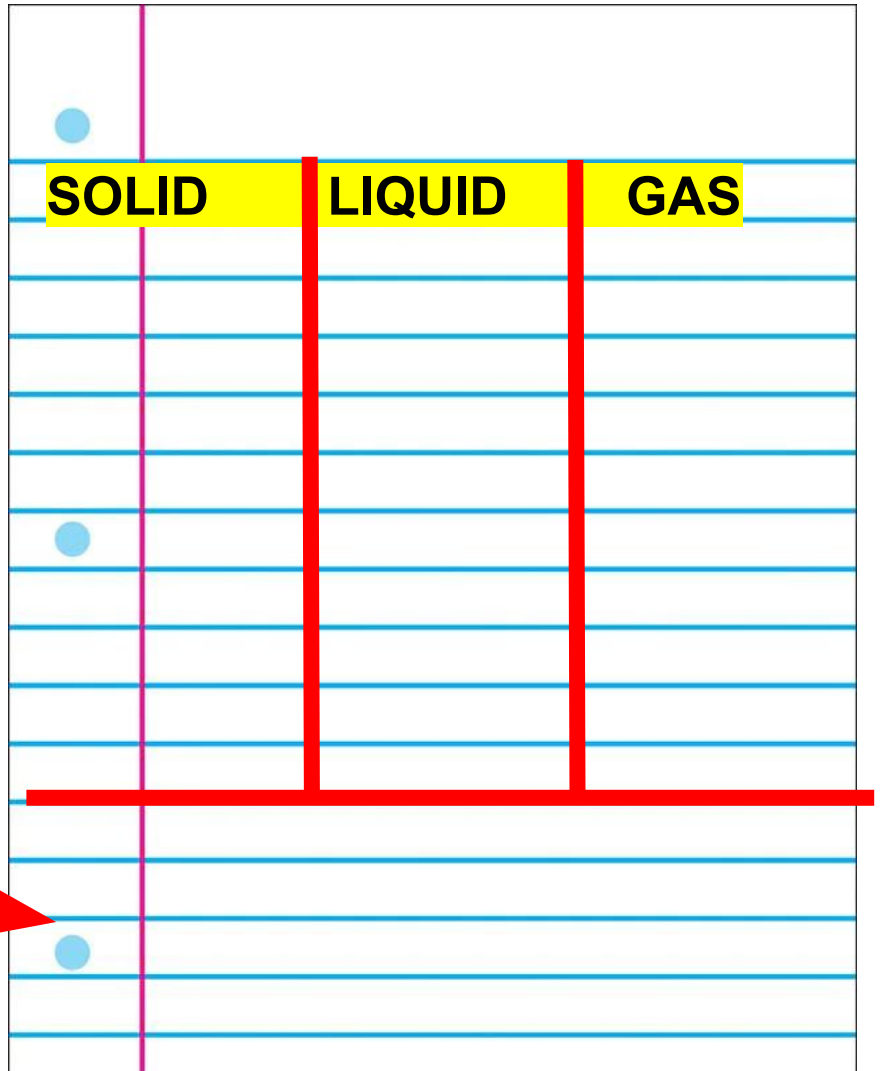
- Particles closely packed, but able to flow
- Indefinite shape
- Defiinite volume

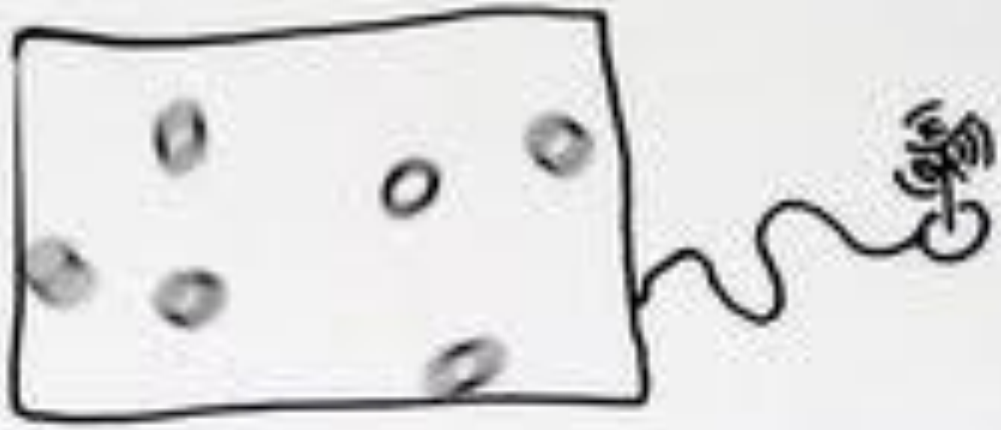


Gas

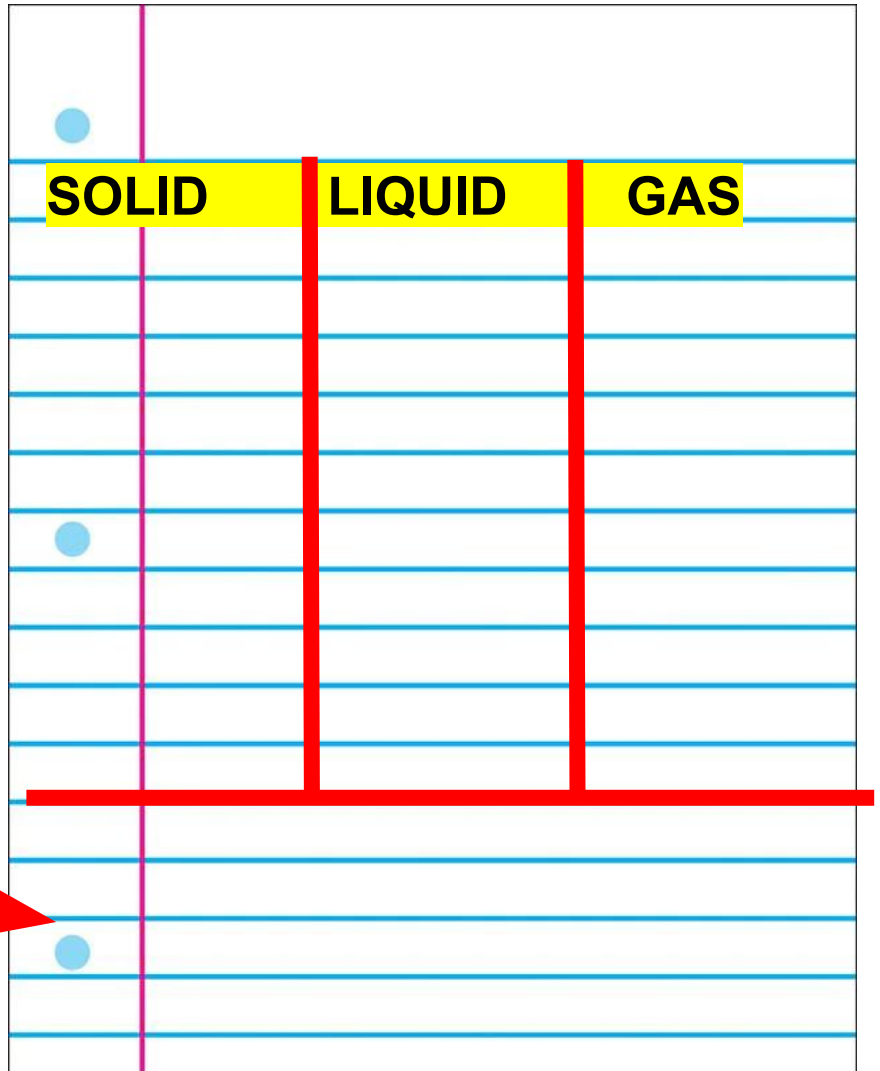
- Particles far apart, able to shoot about freely
- Indefinite shape
- Indefiinite volume

Explain what happens to the movement of the particles as heat energy is added.

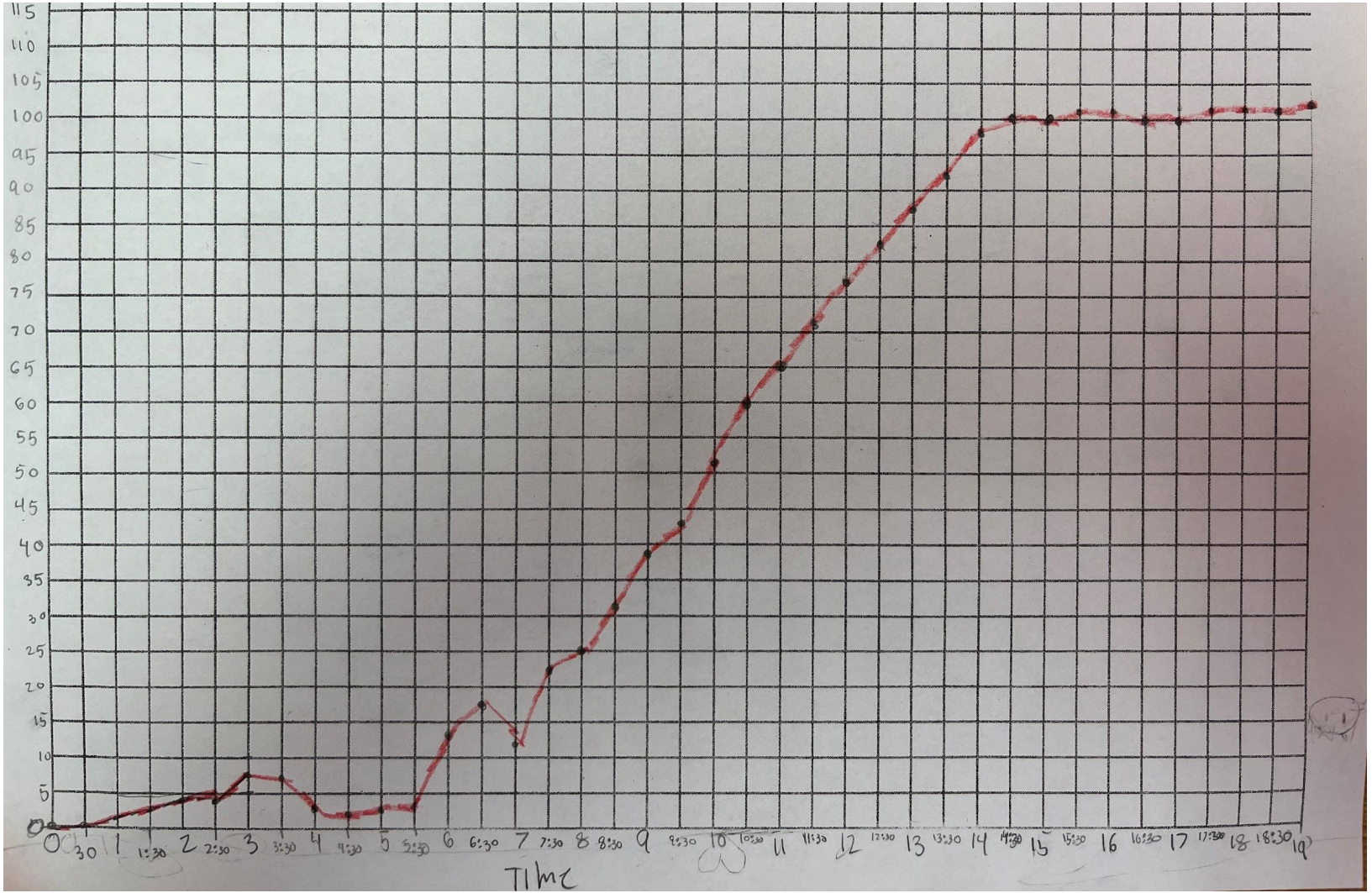


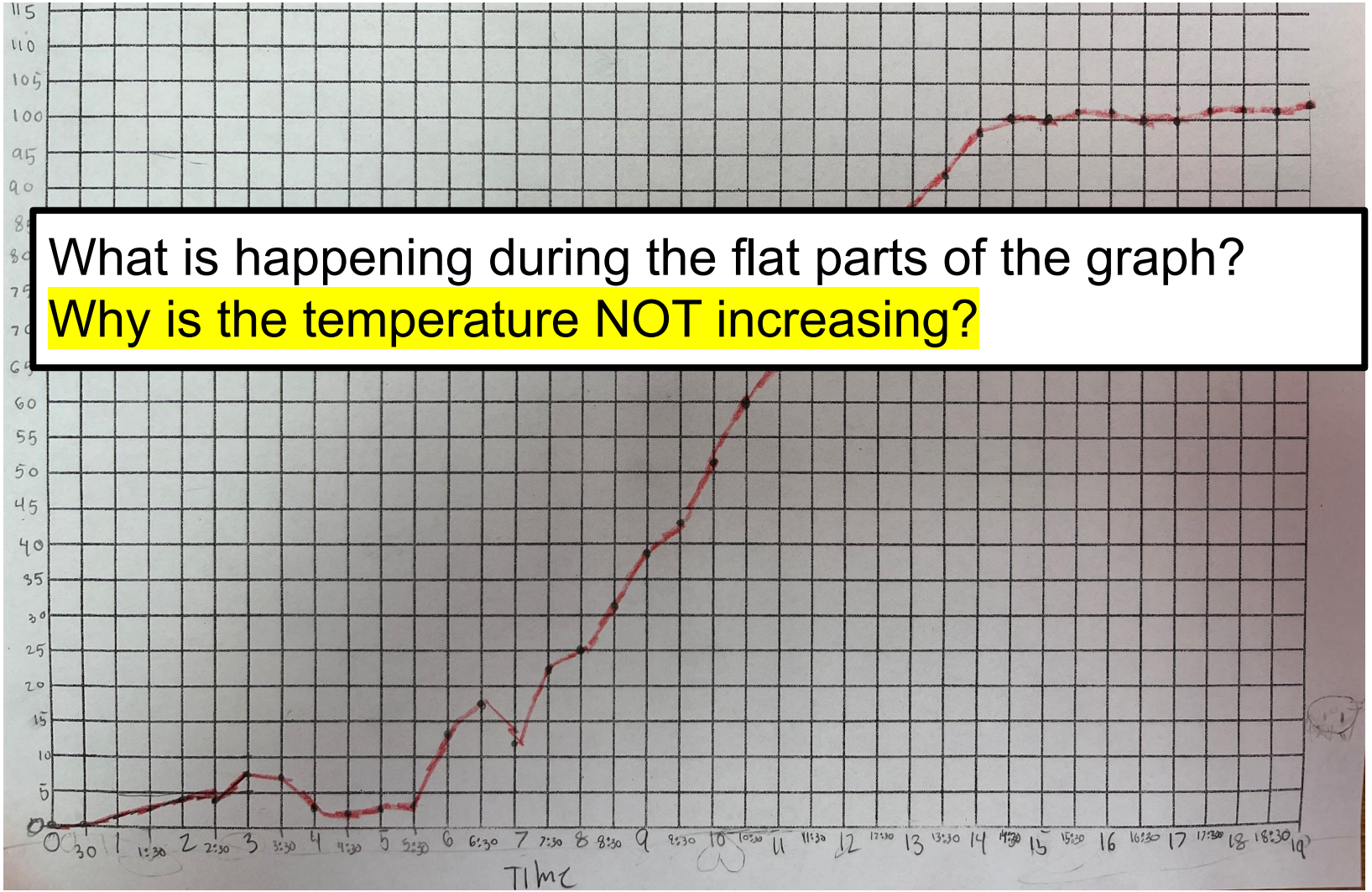


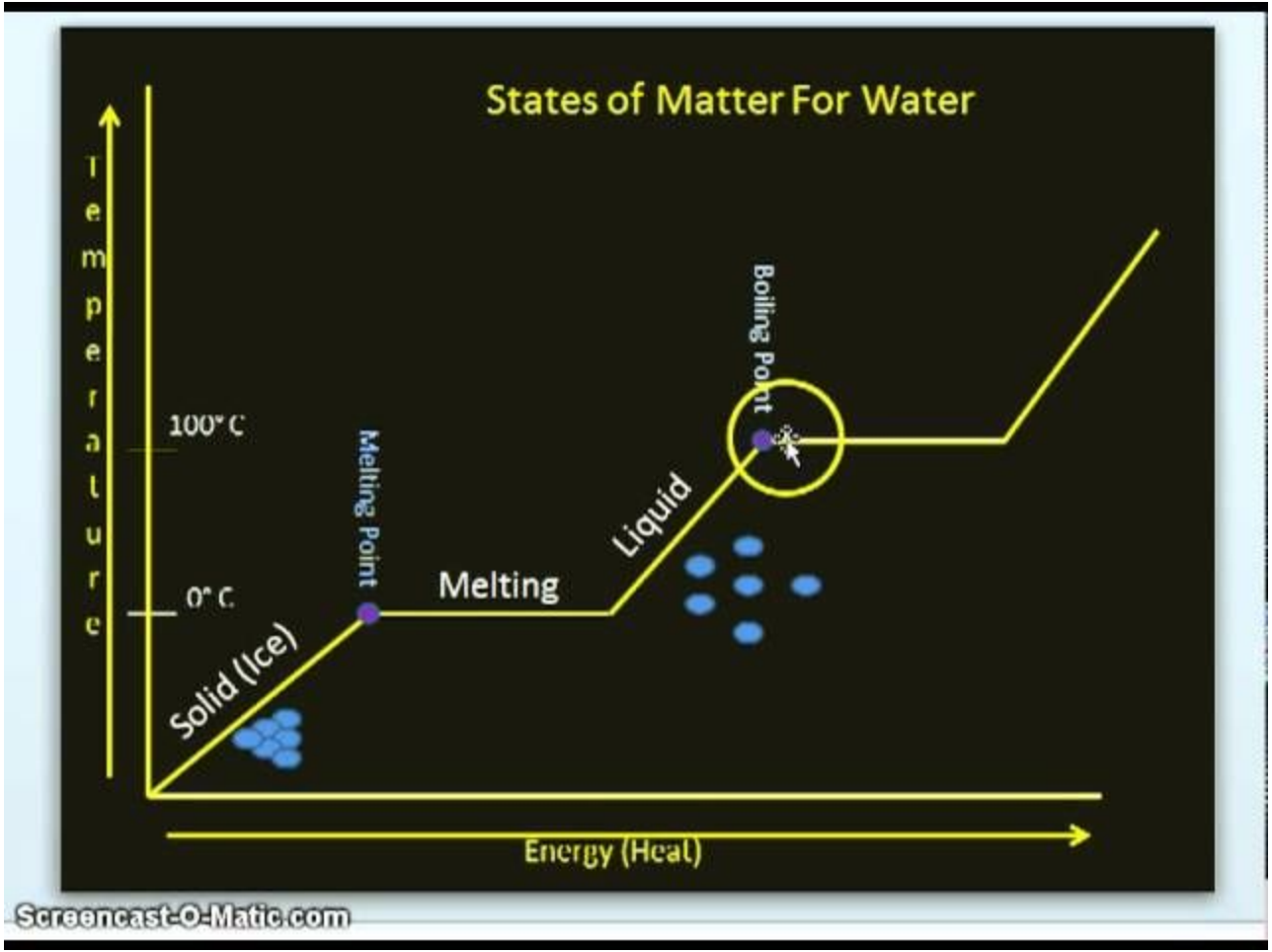
Explain what happens to the movement of the particles as heat energy is added.

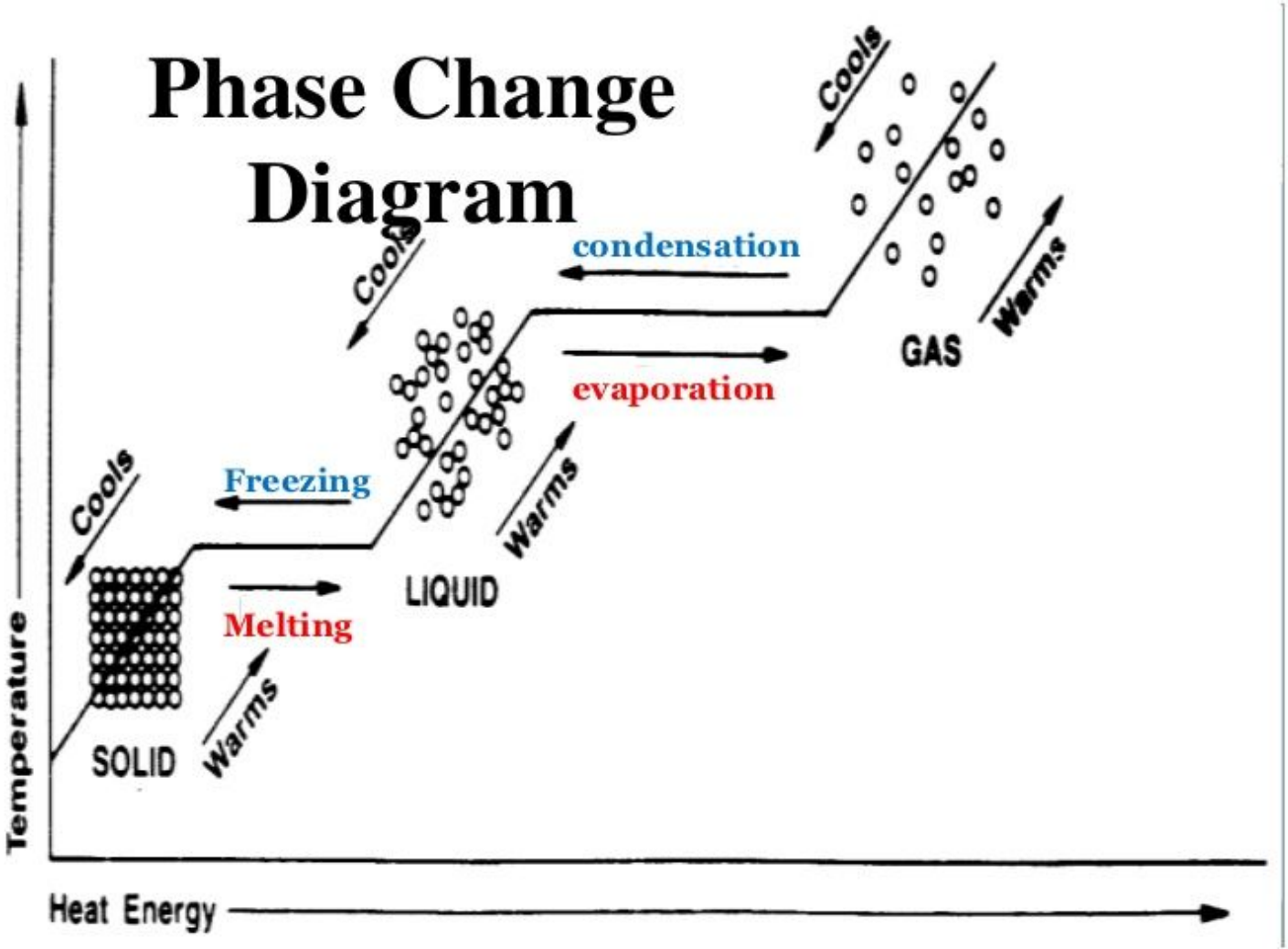


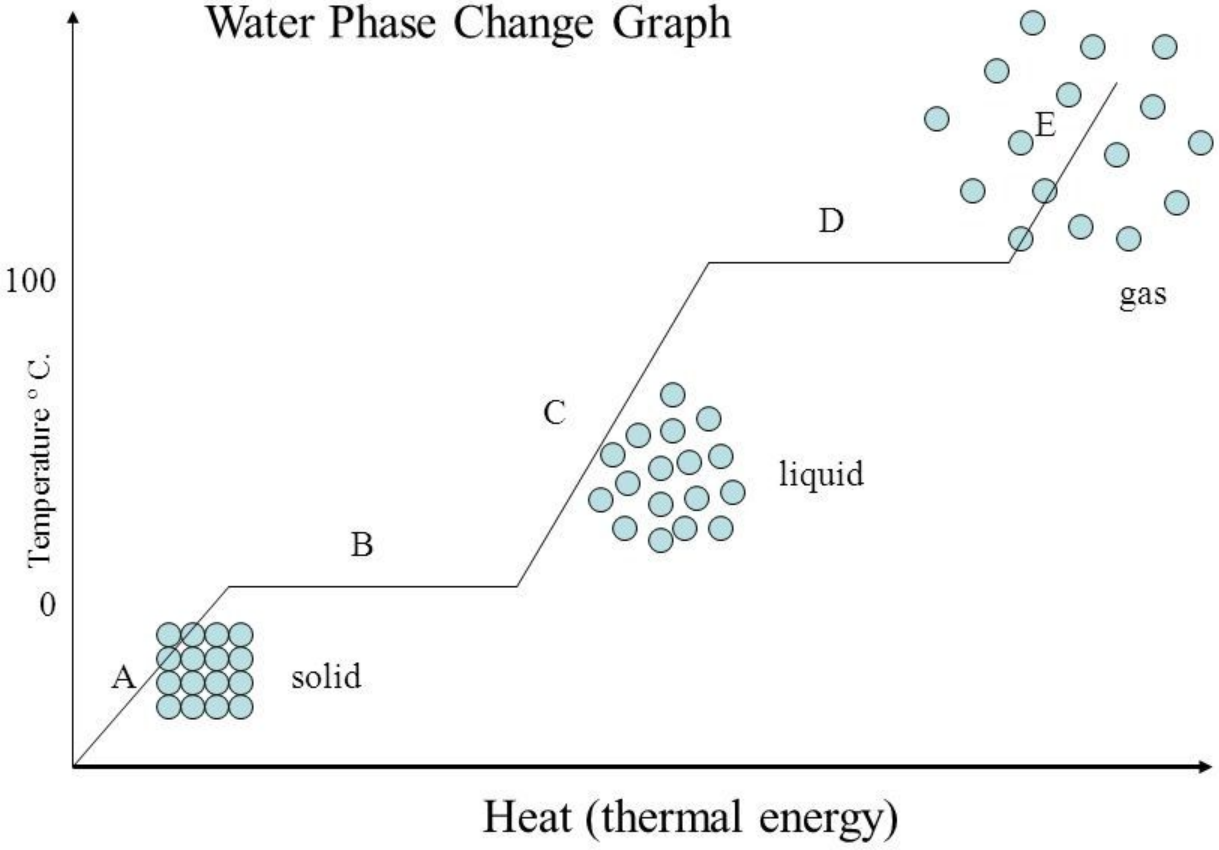
Let’s look at your graphs.


115
110
105
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
0 30 1 1:30 2 2:30 3 3:30 4 4:30 5 5:30 6 6:30 7 7:30 8 8:30 9 9:30 10 10:30 11 11:30 12 12:30 13 13:30 14 14:30 15 15:30 16 16:30 17 17:30 18 18:30 19
Time

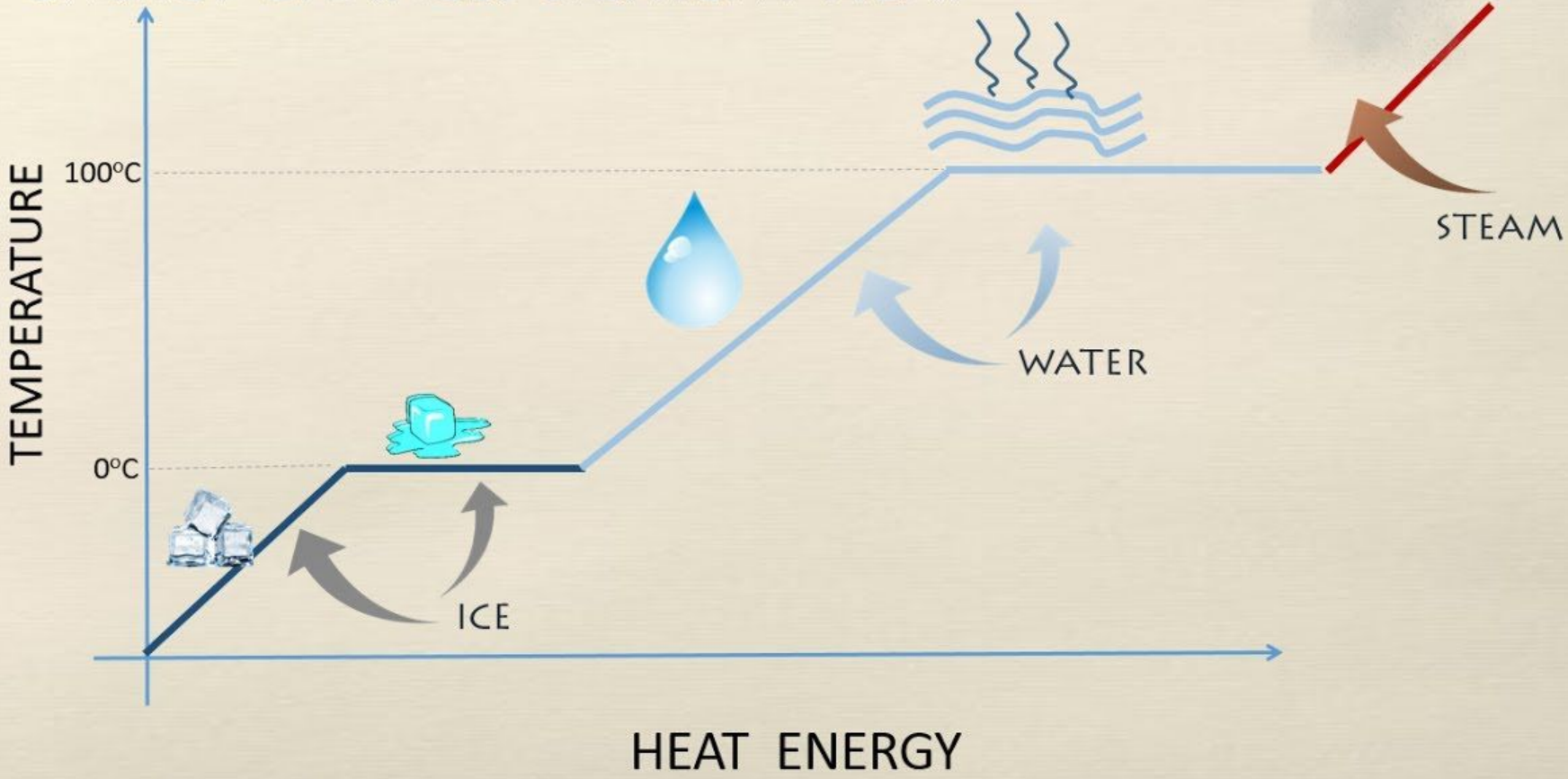

What is happening during the flat parts of the graph?
Why is the temperature NOT increasing?
Time

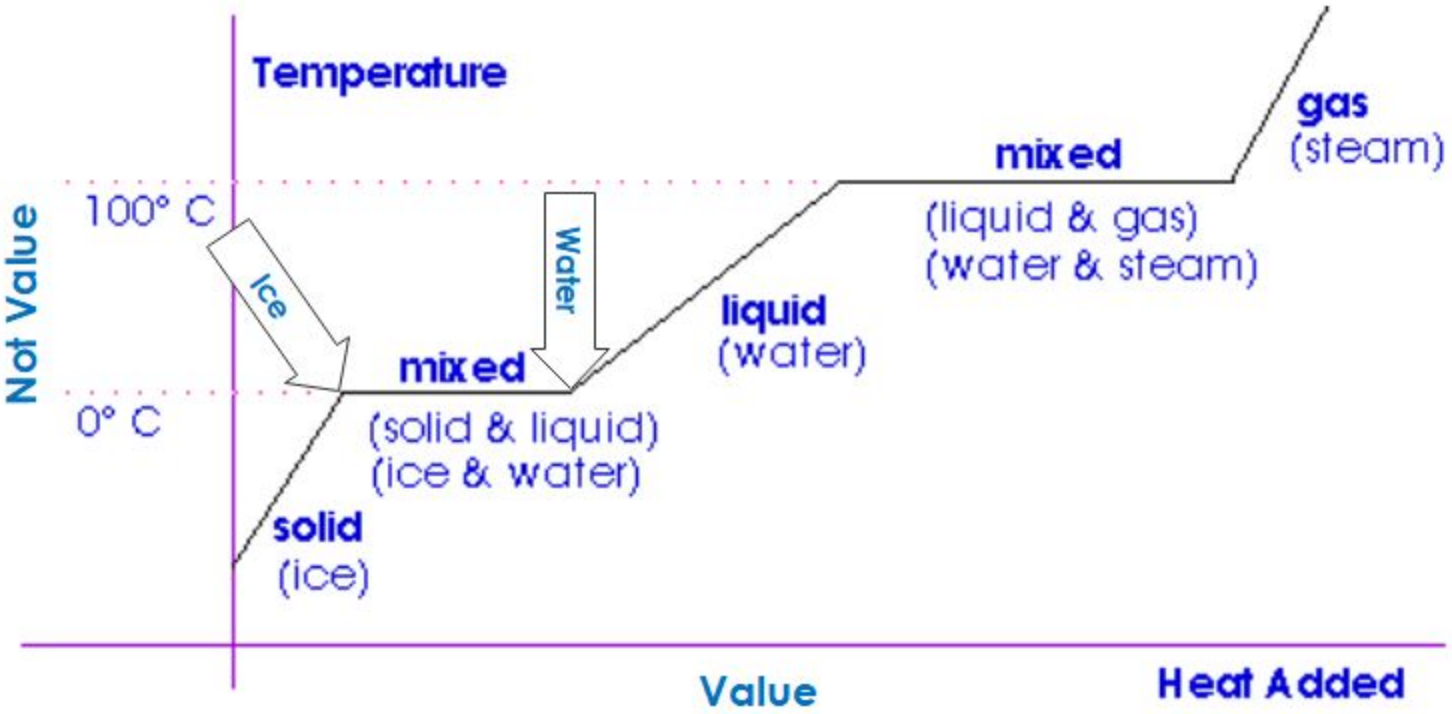

States of Matter For Water
Temperature
100° C
0° C
Melting Point
Boiling Point
Solid (Ice)
Melting
Liquid
Energy (Heat)
Screencast-O-Matic.com


Phase Change Diagram
Cools
condensation
Cools
Warms
GAS
evaporation
Cools
Freezing
Warms
LIQUID
Melting
Warms
SOLID
Temperature
Heat Energy

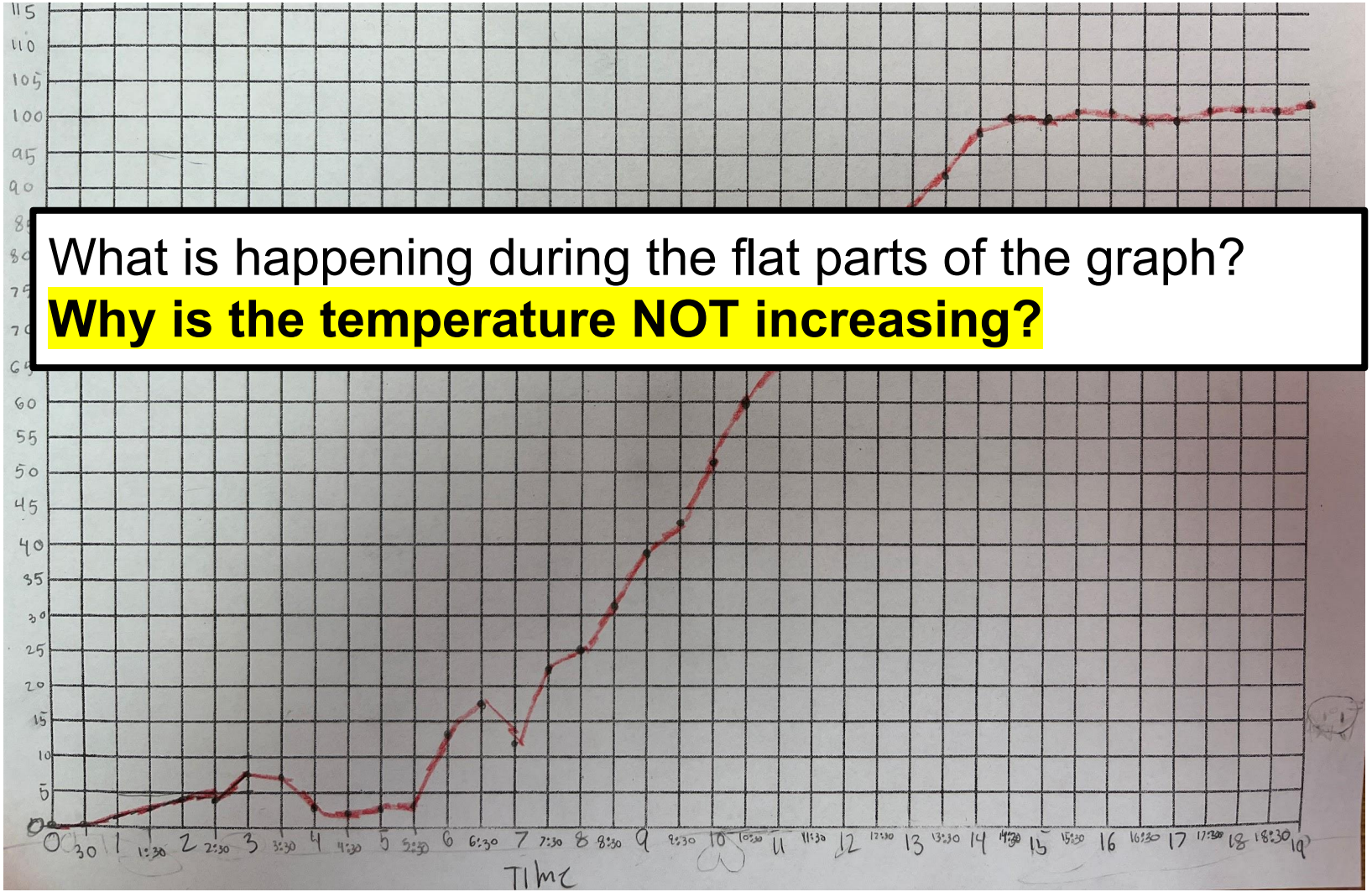

Water Phase Change Graph
Temperature ° C.
100
0
A
solid
B
C
liquid
D
E
gas
Heat (thermal energy)

Phase Change –
Energy Changes & Latent Heat




Temperature
Not Value
100° C
0° C
Ice
Water
mixed
(solid & liquid)
(ice & water)
solid
(ice)
liquid
(water)
mixed
(liquid & gas)
(water & steam)
gas
(steam)
Value
Heat Added

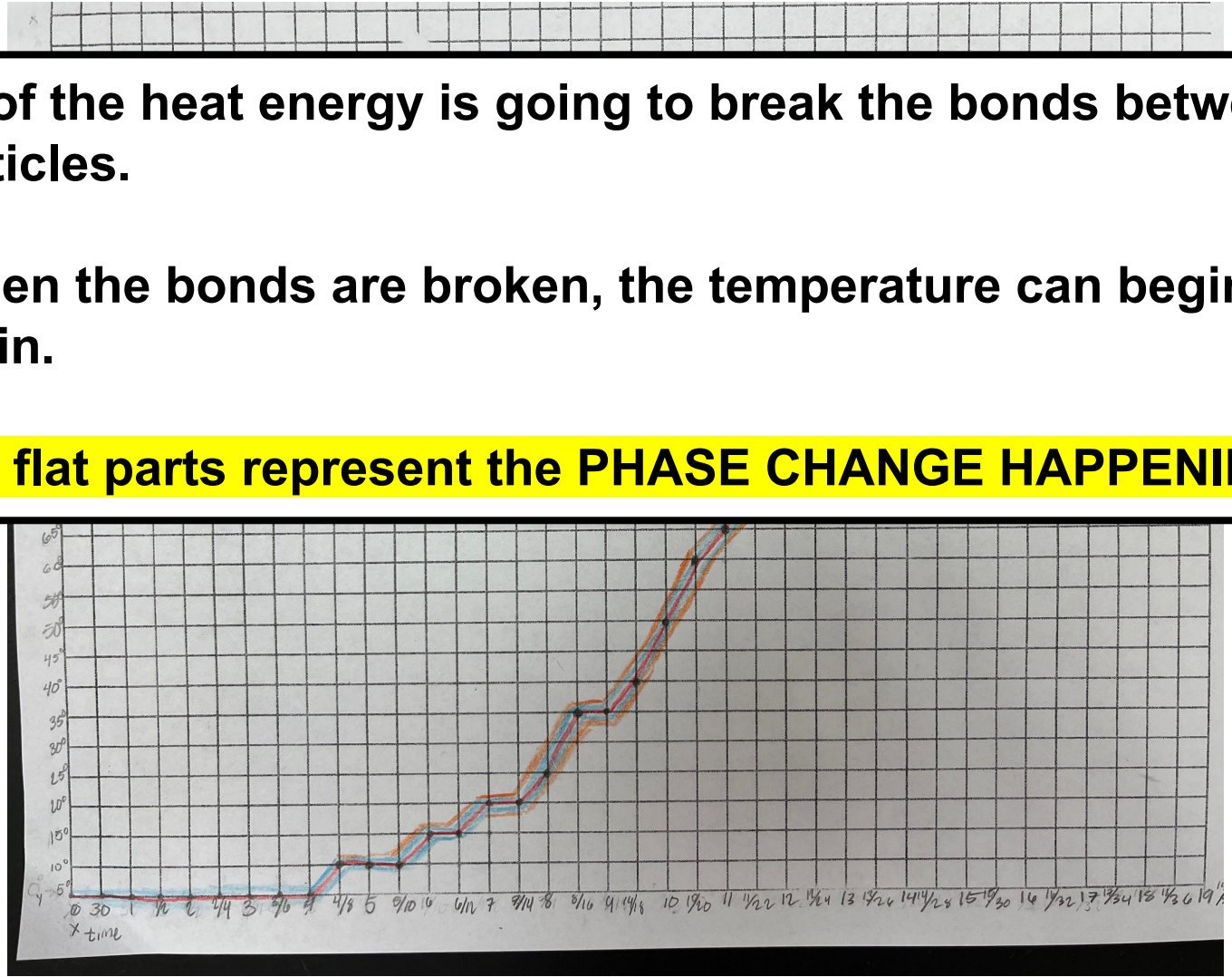



What is happening during the flat parts of the graph?
Why is the temperature NOT increasing?
Time

All of the heat energy is going to break the bonds between the particles.

When the bonds are broken, the temperature can begin to rise again.

The flat parts represent the PHASE CHANGE HAPPENING.



Fold your graph in half, use a glue stick, and glue your graph onto page #25.

Then, add to your table of contents.

Use the title “Phase Change Diagram”

Your group decides:

Best fit of data onto graph

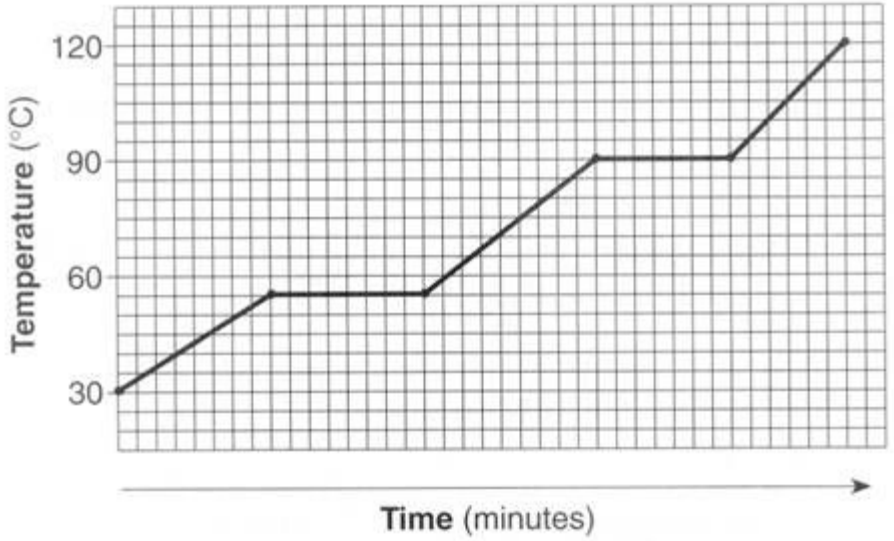
Cover the whole paper

The particle theory of matter:

All matter is made of small particles called atoms

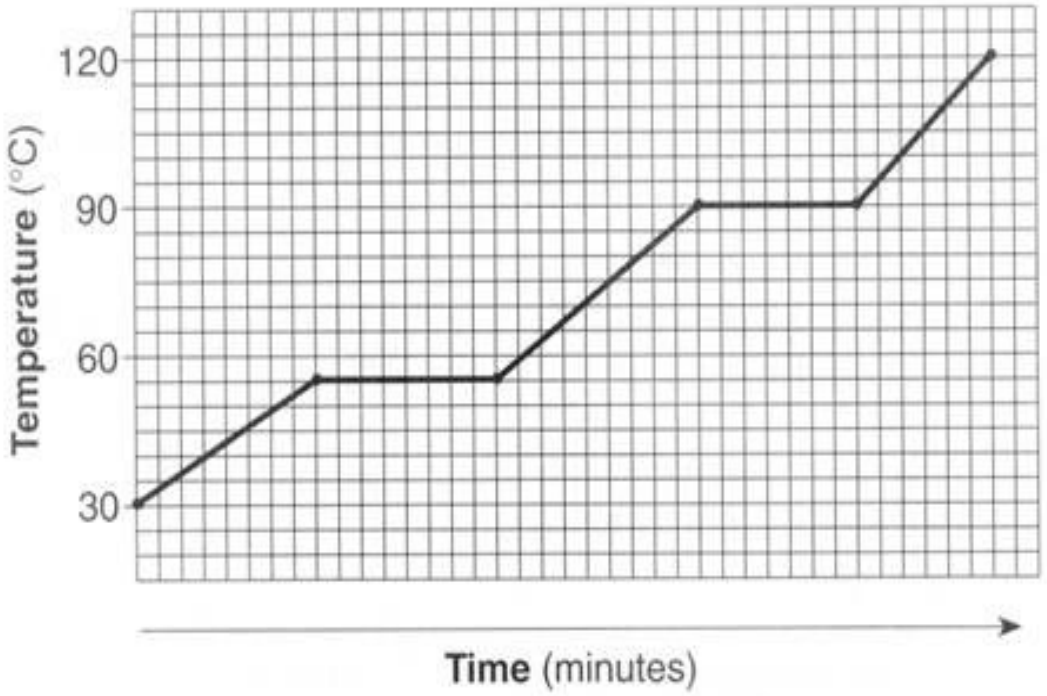
Look at your graph:

What is happening to the ice or water when the line is slanted?



Look at your graph:

What is happening to the ice or the water when the line of your graph is slanted?



phase change graph



