Hint 1

Explain the task to each other again in your own words. State what you understood the task to be and what is still unclear to you.

Hint 1

Explain the task to each other again in your own words. State what you understood the task to be and what is still unclear to you.

Answer 1:

We’re supposed to use the phase diagram of water to explain how a pressure cooker works and why it is especially advantageous at higher altitudes.

Answer 1:

We’re supposed to use the phase diagram of water to explain how a pressure cooker works and why it is especially advantageous at higher altitudes.

© Siemens Stiftung 2017. Content licensed under CC BY-SA 4.0 international

Hint 2

Write down what you know about how a pressure cooker works.

Hint 2

Write down what you know about how a pressure cooker works.

Answer 2:

A little water is added. Then the cover is sealed and the pot is heated. Overpressure soon builds up in the pot; you can tell by the valve that goes up.

Answer 2:

A little water is added. Then the cover is sealed and the pot is heated. Overpressure soon builds up in the pot; you can tell by the valve that goes up.

© Siemens Stiftung 2017. Content licensed under CC BY-SA 4.0 international

Hint 3

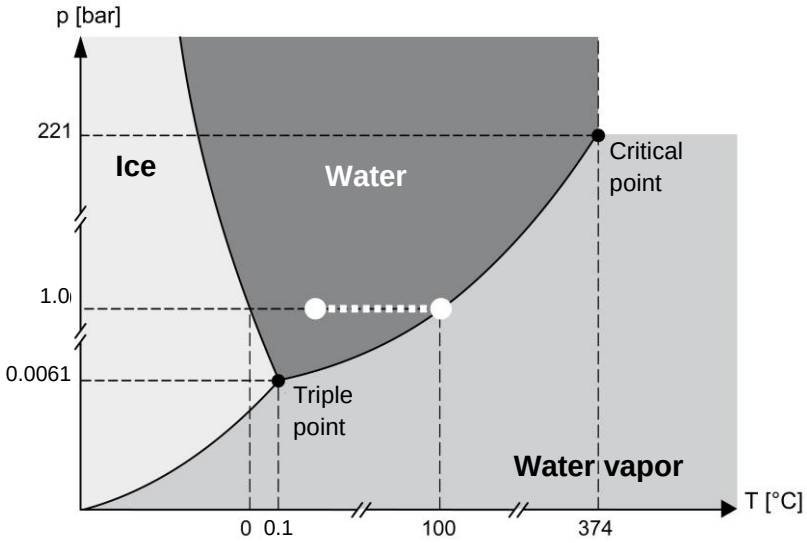
Now refer to the phase diagram of water and draw in what happens until the water starts to boil at 100 °C. Begin at room temperature and normal pressure.

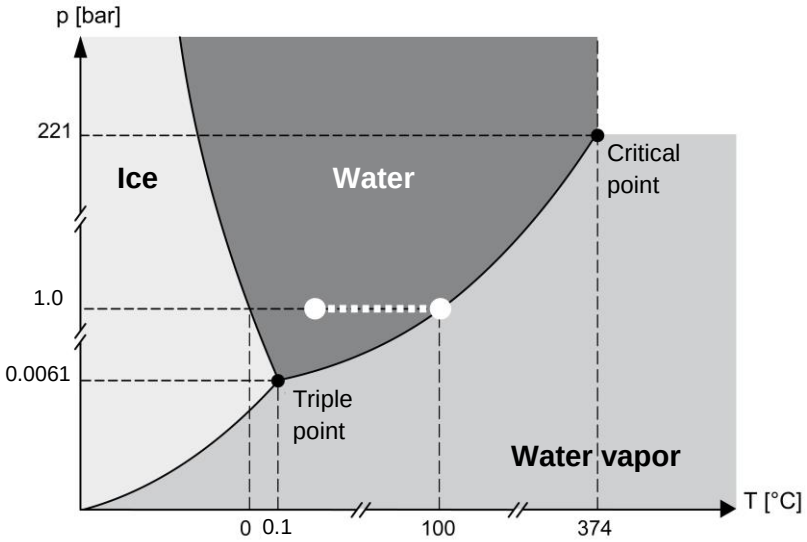
What happens after that if even more energy is added?

Hint 3

Now refer to the phase diagram of water and draw in what happens until the water starts to boil at 100 °C. Begin at room temperature and normal pressure.

What happens after that if even more energy is added?





Answer 3:

When the water is heated to 100 °C, it begins to boil.

If more energy is added, more steam forms and the pressure increases.

Answer 3:

When the water is heated to 100 °C, it begins to boil.

If more energy is added, more steam forms and the pressure increases.

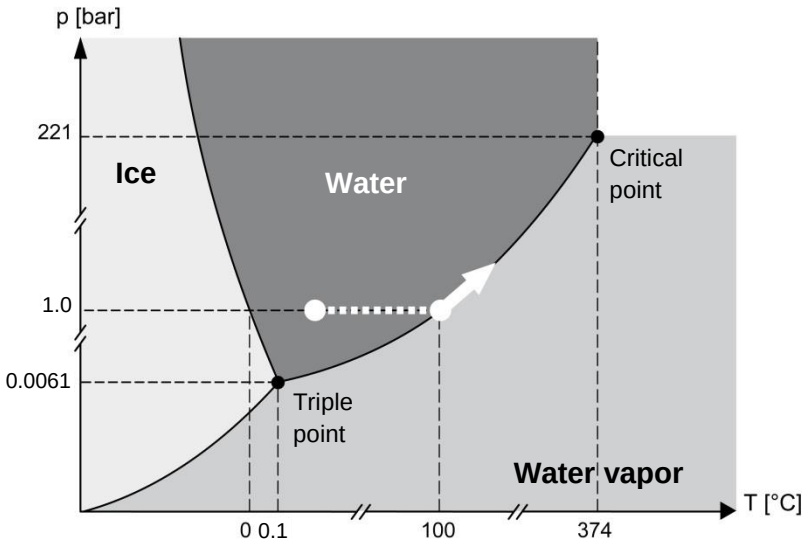
© Siemens Stiftung 2017. Content licensed under CC BY-SA 4.0 international

Hint 4

Trace the path on the phase diagram for what you think happens next and explain your reasons.

Hint 4

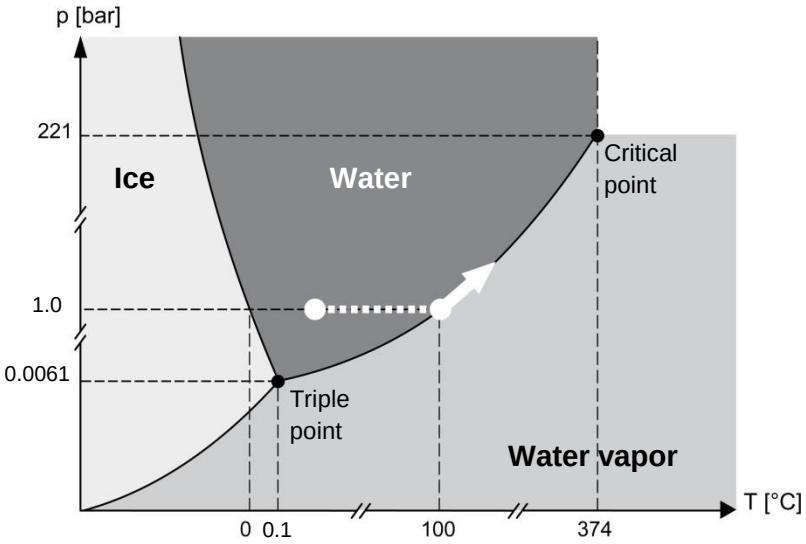
Trace the path on the phase diagram for what you think happens next and explain your reasons.



Answer 4:

When the pressure increases, the temperature must also increase.

As long as liquid water and steam are present together, the path must run along the border between the two phases.



Answer 4:

When the pressure increases, the temperature must also increase.

As long as liquid water and steam are present together, the path must run along the border between the two phases.

© Siemens Stiftung 2017. Content licensed under CC BY-SA 4.0 international

Hint 5

Now you must also find out why a pressure cooker could be useful high up in the mountains.

To do so, look again at the phase diagram.

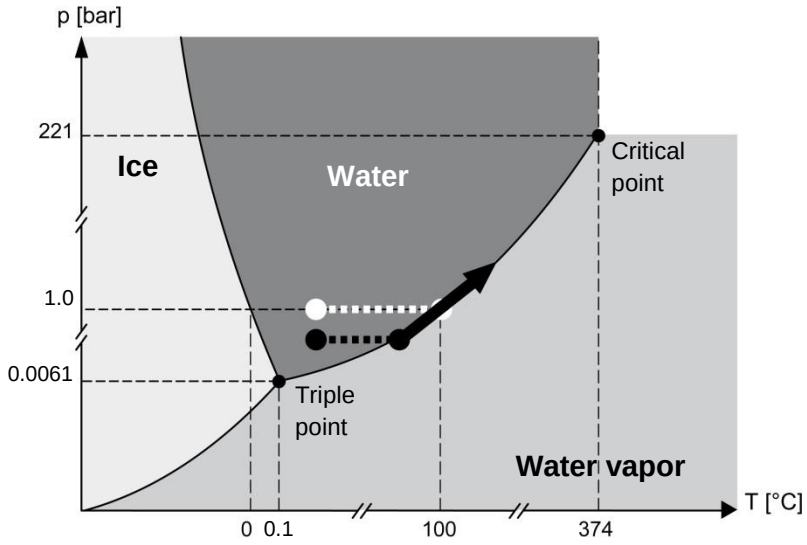
Where are you on the diagram when you are at an altitude of 2,000 m?

Hint 5

Now you must also find out why a pressure cooker could be useful high up in the mountains.

To do so, look again at the phase diagram.

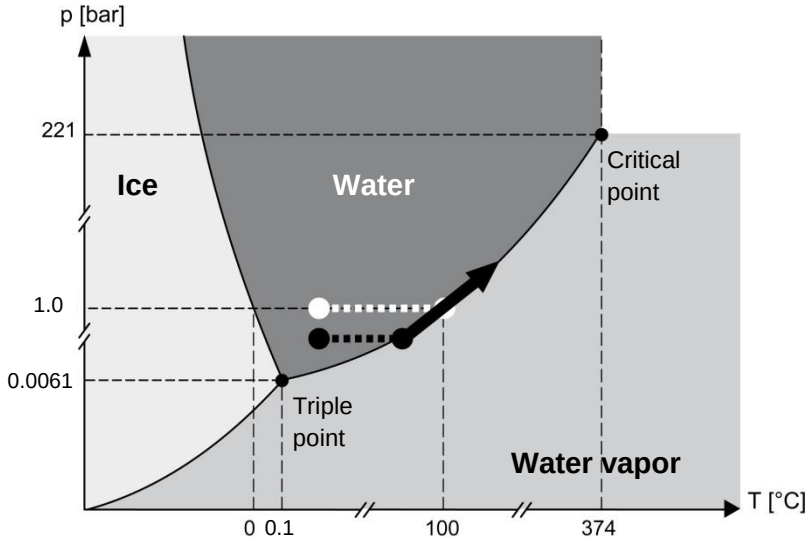
Where are you on the diagram when you are at an altitude of 2,000 m?



Answer 5:

The air pressure is lower at an altitude of 2,000 m than at sea level. That's why water already begins to boil at a temperature below 100 °C. Cooking potatoes, for example, then takes longer because they are boiling at a lower temperature.

The lower external pressure doesn't matter in the pressure cooker. The temperature in the pot is above 100 °C, and cooking takes less time.



Answer 5:

The air pressure is lower at an altitude of 2,000 m than at sea level. That's why water already begins to boil at a temperature below 100 °C. Cooking potatoes, for example, then takes longer because they are boiling at a lower temperature.

The lower external pressure doesn't matter in the pressure cooker. The temperature in the pot is above 100 °C, and cooking takes less time.

Hilfe 6

Now you have all the information you need to answer the question of how a pressure cooker works and why the class really should take it along to the hut.

Hilfe 6

Now you have all the information you need to answer the question of how a pressure cooker works and why the class really should take it along to the hut.

Answer 6:

In a pressure cooker, the boiling point of water increases to over 100 °C due to the increased pressure, which is why cooking goes faster.

At high altitudes, cooking takes longer in a normal pot because the boiling temperature of water falls below 100 °C. Therefore a pressure cooker is especially advantageous at high altitudes.

Answer 6:

In a pressure cooker, the boiling point of water increases to over 100 °C due to the increased pressure, which is why cooking goes faster.

At high altitudes, cooking takes longer in a normal pot because the boiling temperature of water falls below 100 °C. Therefore a pressure cooker is especially advantageous at high altitudes.