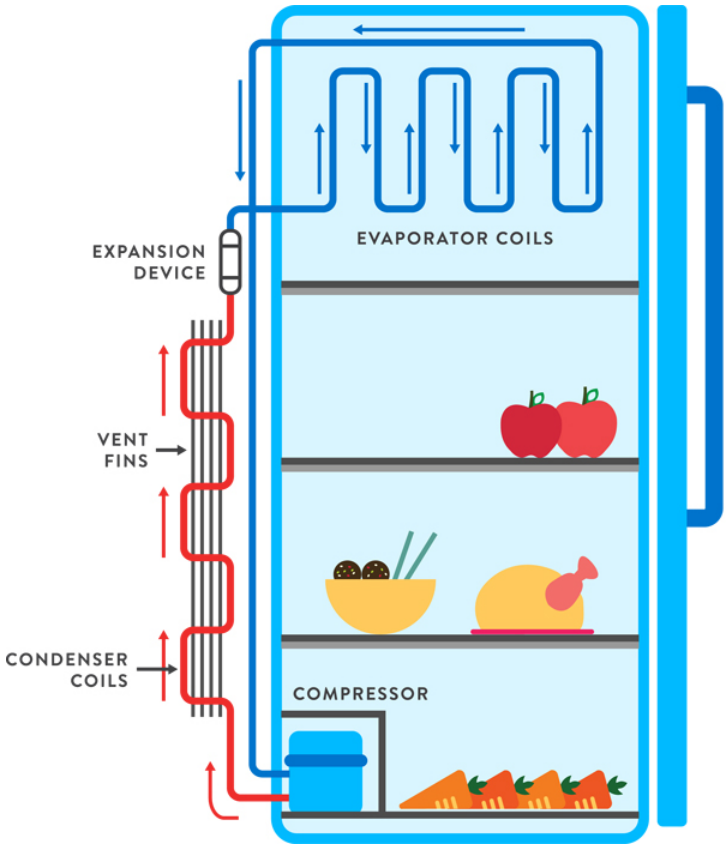
Temperature and Thermometer

Thermal Physics

Instructor: Ben Huang

Where do we apply thermal physics?



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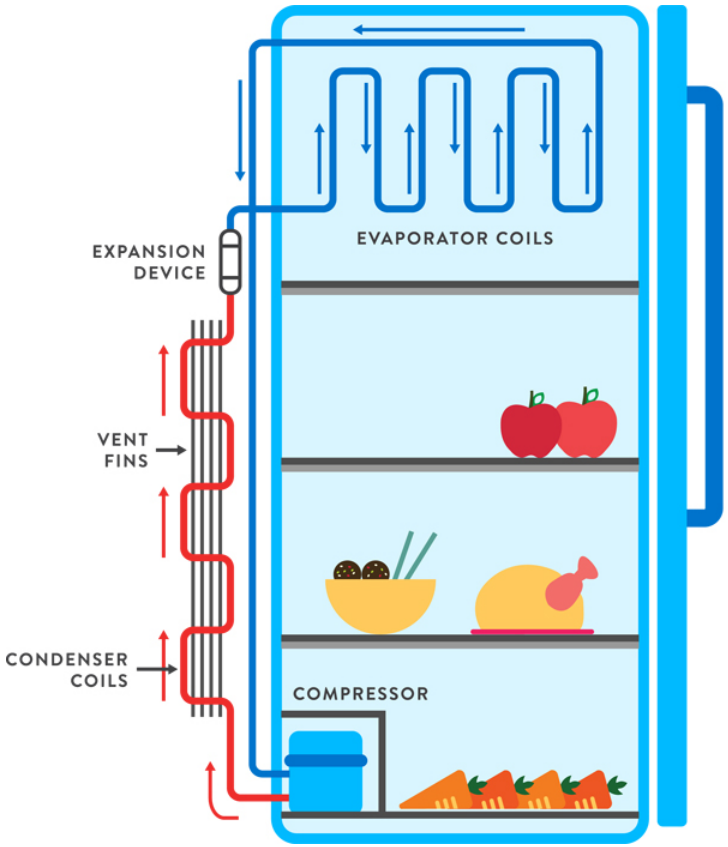

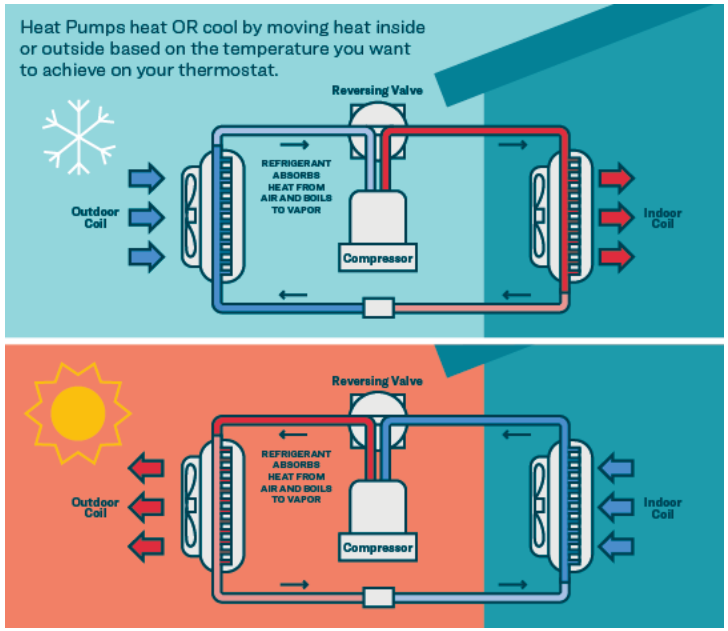

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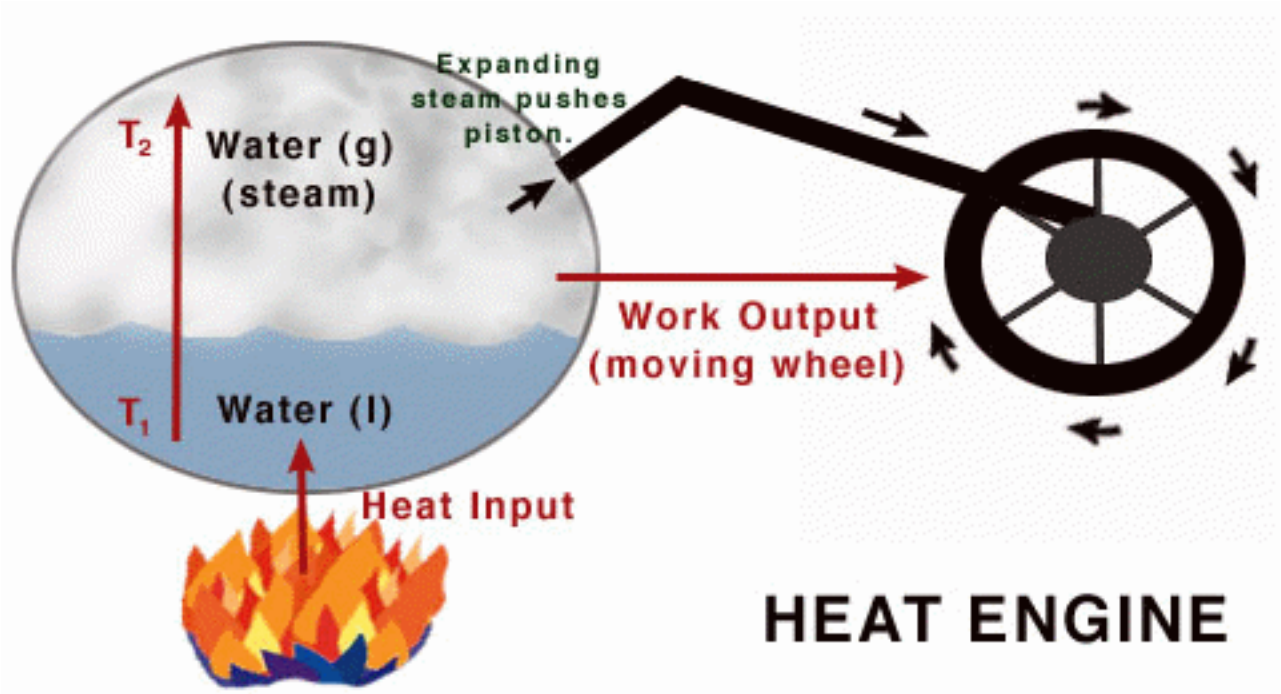
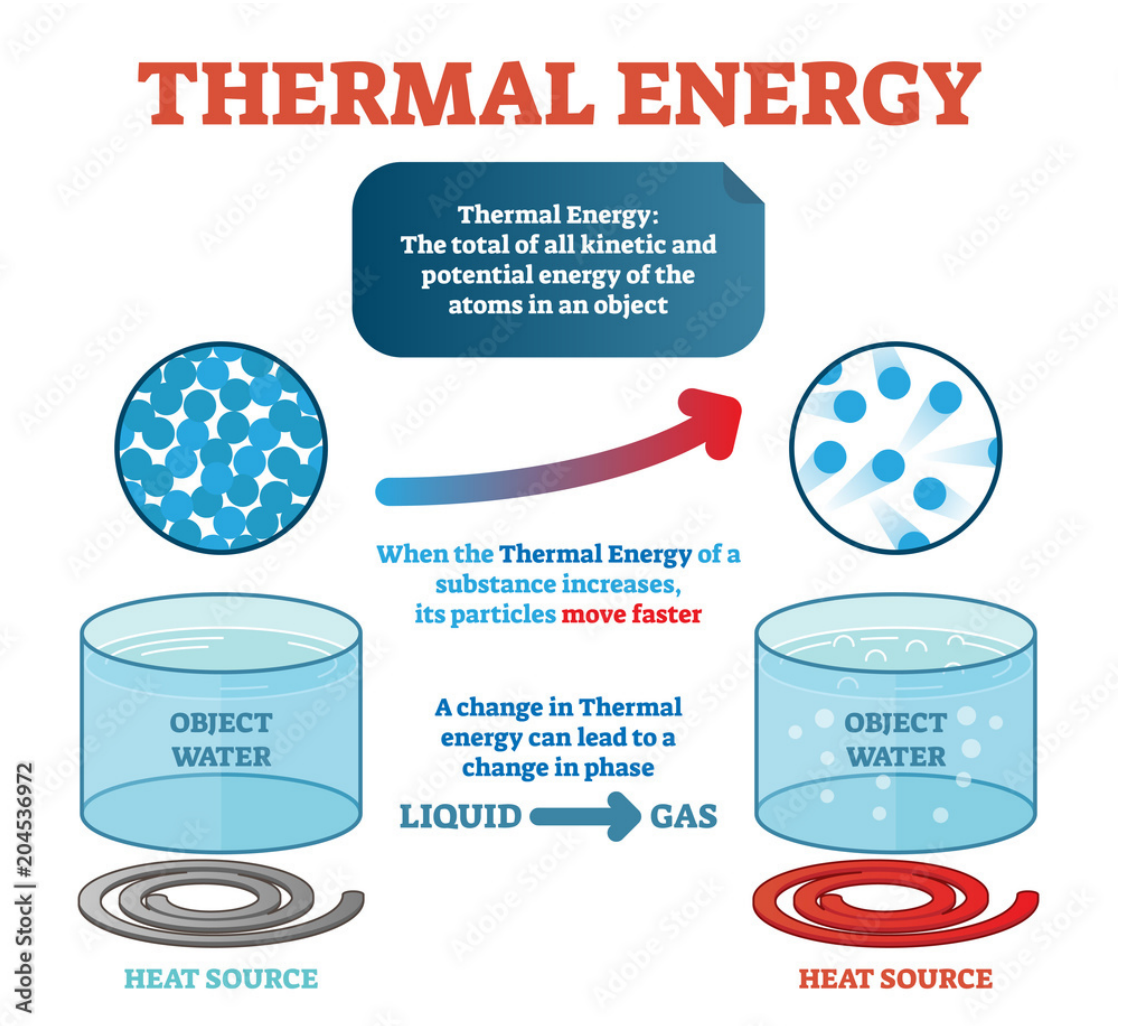


Thermal Energy



Temperature

What is temperature?

Temperature

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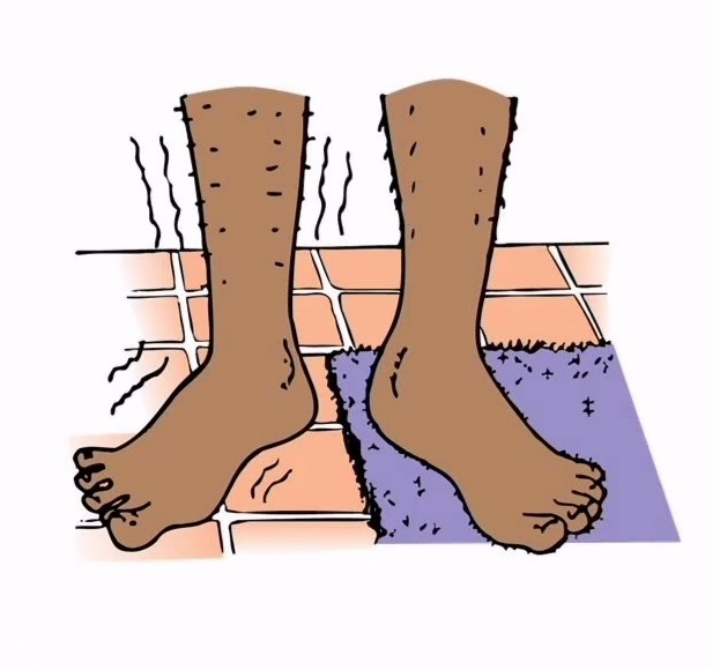
Mental Experiments:

1. How do you feel?



Temperature

What is temperature?
Mental Experiments:

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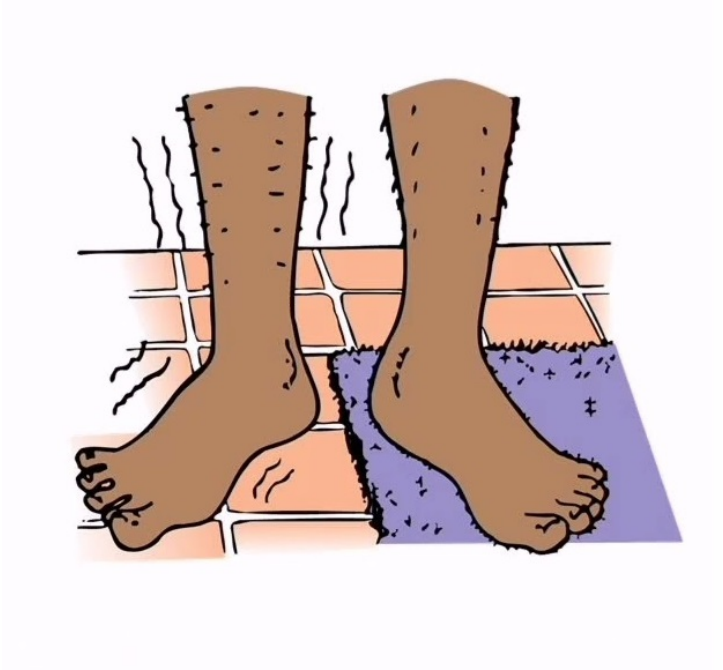

Temperature

What is temperature?
Mental Experiments:

2. Which one will boil quicker?

Temperature

What is temperature?
Mental Experiments:

3. What will happen to the water?

Temperature

In summary:

> Temperature is the property that determines whether or not energy will transfer between two objects when they are in thermal contact.

Temperature

In summary:

Temperature is the property that determines whether or not energy will transfer between two objects when they are in thermal contact.

For a single object, the higher its temperature is, the more thermal energy it has.

Temperature Scales: Celsius, Fahrenheit, and Kelvin

What is the ice point and the steam point of water at atmospheric pressure?

	Celsius	Fahrenheit
ice point		
steam point		

Temperature Scales: Celsius, Fahrenheit, and Kelvin

What is the ice point and the steam point of water at atmospheric pressure?

	Celsius	Fahrenheit
ice point		$32^\circ F$
steam point		$212^\circ F$

Temperature Scales: Celsius, Fahrenheit, and Kelvin

What is the ice point and the steam point of water at atmospheric pressure?

	Celsius	Fahrenheit
ice point	$0^\circ C$	$32^\circ F$
steam point	$100^\circ C$	$212^\circ F$

Temperature Scales: Celsius, Fahrenheit, and Kelvin

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	Celsius	Fahrenheit
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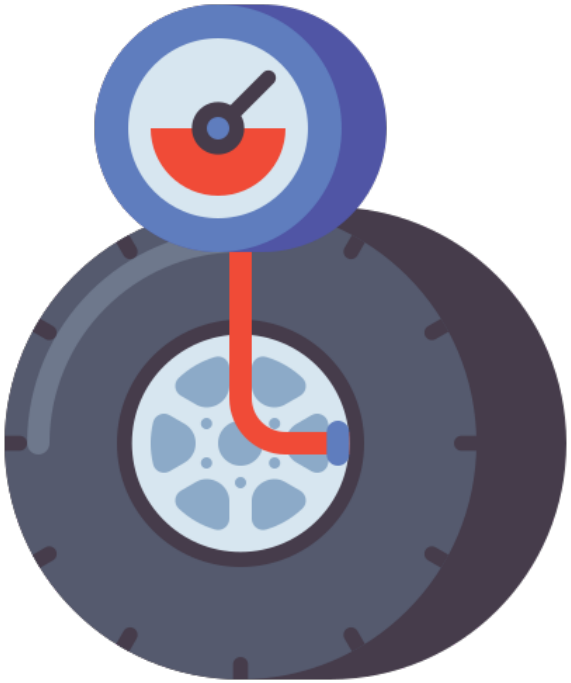
Exercise. Convert the following temperatures to their values on the Fahrenheit scale: (a) the sublimation point of dry ice, $-78.5^\circ C$; (b) human body temperature, $37.0^\circ C$.

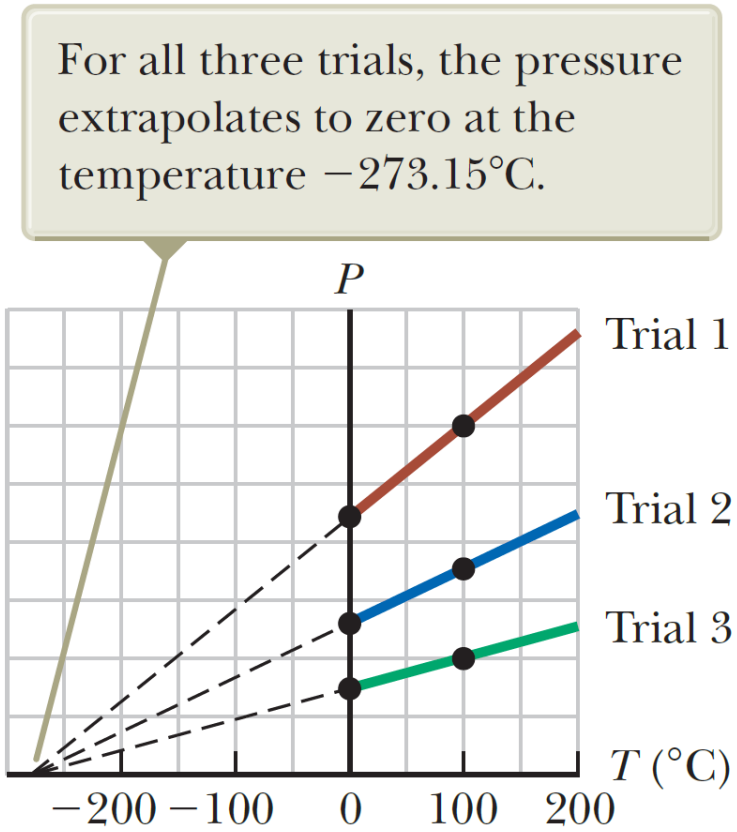
Temperature Scales: Celsius, Fahrenheit, and Kelvin

Pressure v.s. Temperature



Temperature Scales: Celsius, Fahrenheit, and Kelvin

The Kelvin Scale



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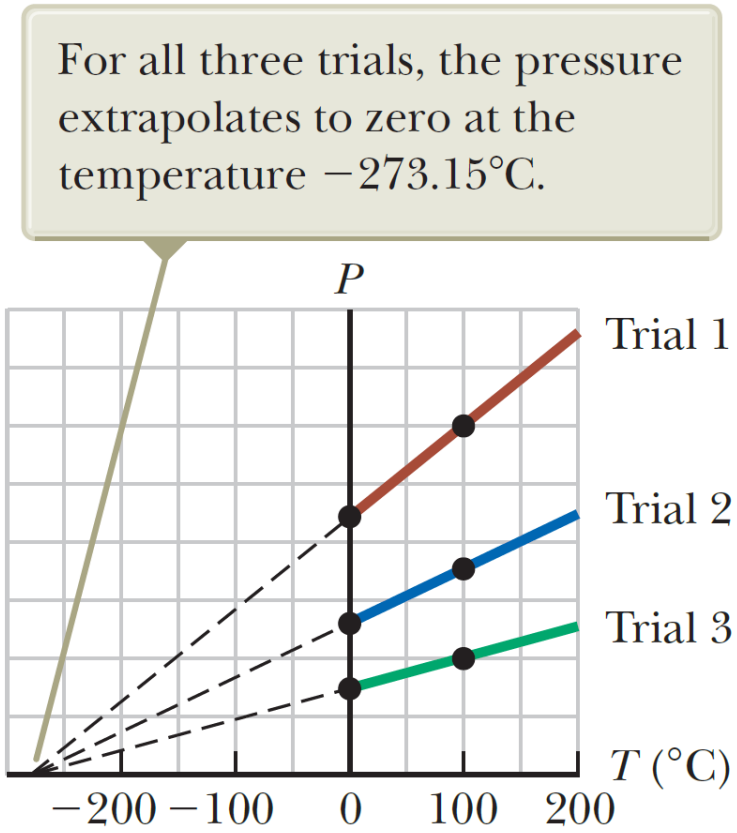
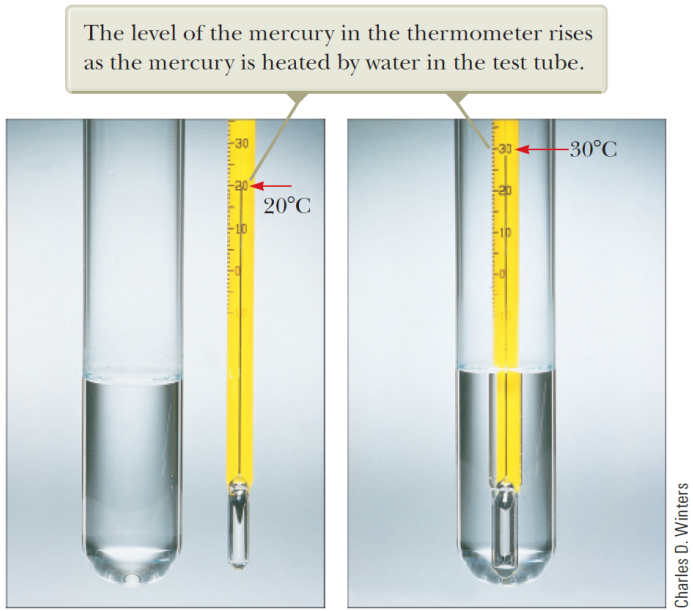


$$Kelvin = Celsius + 273.15$$

Temperature Scales: Celsius, Fahrenheit, and Kelvin

Examine the following report, extrapolate the temperature when the pressure is zero, and express the result in Kelvin scale.
Report: Pressure-Volume-Temperature Data for Oxygen

Thermometer



Thermometer