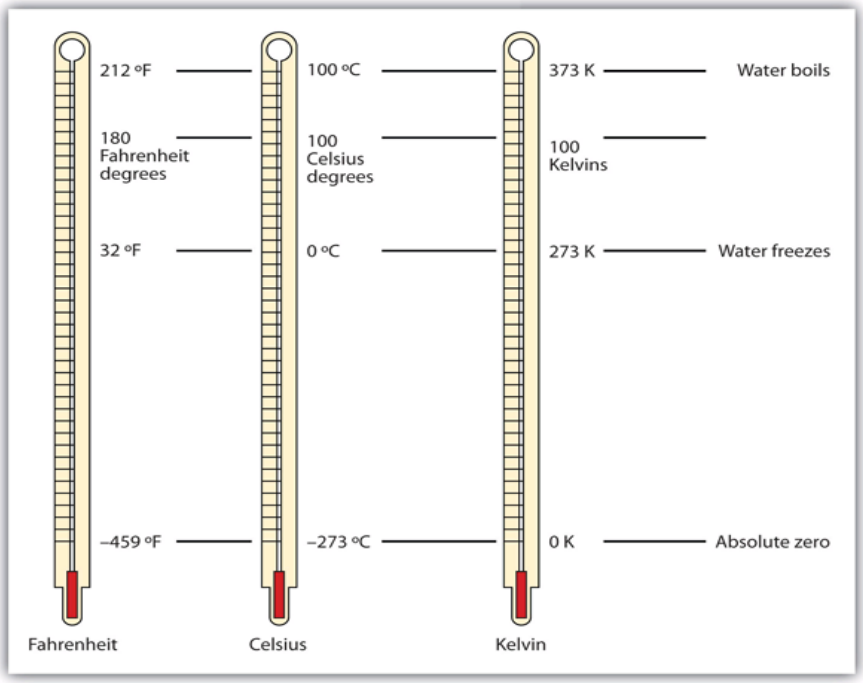
Measuring Thermal Energy

There are three scales that we use for measuring the temperature of matter. The first widely used scale was proposed by a German scientist Daniel Gabriel Fahrenheit in the year 1724 (almost 300 years ago). His scale was used by many scientists and is still used in some countries including Bahamas, Belize and the United States. Canada still uses it, but most younger Canadians now only know the Celsius scale that was proposed by the Swedish Scientist Anders Celsius in 1744. His Scale proposed a scale that uses the most common substance on earth – Water. The state changes of water were used to calibrate the scale with 0 being the freezing point of water and 100 being the boiling point of water. This gap was divided into 100 degrees. The most scientific scale used is the Kelvin Scale (proposed by Lord Kelvin in 1848), uses the same intervals as the Celsius scale but has the Zero as the ABSOLUTE ZERO which is the point in which all particles in matter stop having any energy and no longer vibrate. This is -273.15° C.



Most calculators or Apps now have conversions from one scale to the other but the actual conversion is calculated by the following:

	from Celsius	to Celsius
Fahrenheit	[°F] = [°C] × ⁹⁄₅ + 32	[°C] = ([°F] − 32) × ⁵⁄₉
Kelvin	[K] = [°C] + 273.15	[°C] = [K] − 273.15

Questions:

How many years ago was the Fahrenheit scale proposed?

Almost 300 years ago!

Who Proposed the Fahrenheit scale?

Daniel Gabriel Fahrenheit

From what country was the second scientist from who proposed the Celsius scale?

Sweden

What pure substance did Anders Celsius use to make up his scale?

Water

Why do you think he chose this substance?

Plentiful, easy to make it pure and easily recognized in three states of matter.

Why do you think that he used 100 divisions between the two points in his scale?

100 is a good number 10 too little and 1000 too many. Decimal system is best.

Why is the Kelvin scale the most scientific?

It is tied to the behaviour of matter (vibration) – explains that all matter has energy.

What is Absolute Zero?

ABSOLUTE ZERO which is the point in which all particles in matter stop having any energy and no longer vibrate. This is -273.15° C.

Does each scale have a zero? Explain.

Yes. Relatively arbitrary for Fahrenheit, related to freezing of water for Censius and no thermal energy for Kelvin.

Which scale do you like the best and why?

Answers will vary

Approximately, what is the average body temperature for humans?

36.5°C or 98°F or 309.65K (273.15 + 36.5)

What is the average room temperature?

21°C or 70°F 294.15K (273.15 + 21)

Make the calculation of what 30°C would be in °F.

30 x 9 ÷ 5 + 32 = 86 ∴ It would be 86°F

Make the calculation of the temperature of Liquid Nitrogen in °C if it is -320 °F.

-320 – 32 x 5 ÷ 9 = -195.555 ∴ It would be about -195.6 °C