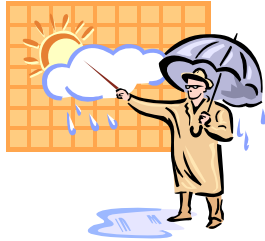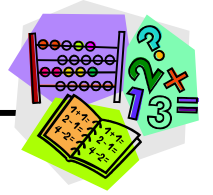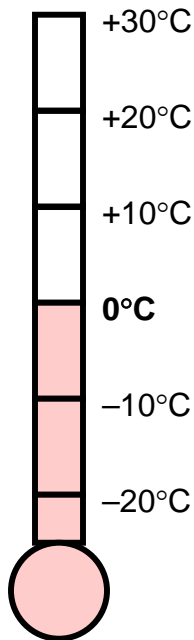# Temperature

People talk about weather and weather conditions daily. Temperature, precipitation, UV index and amount of sunshine are important to the way we dress, what we do and even how we feel!

Temperature is commonly measured in Canada using the **Celsius scale**. The unit of measurement is degree Celsius (°C).

Normal room temperature is around 20°C.
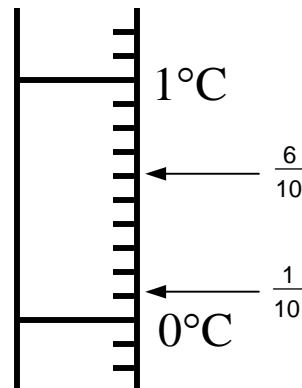
The boiling point of water is 100°C.

Healthy body temperature is 37°C.

Thermometers are used to measure the temperatures of air, liquids and human bodies.

Each degree has a value of 1 and is divided into tenths, just like metric lengths.
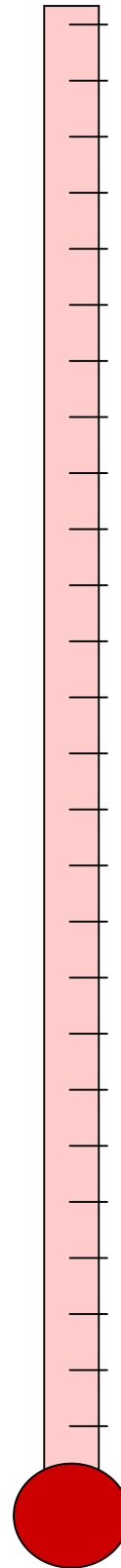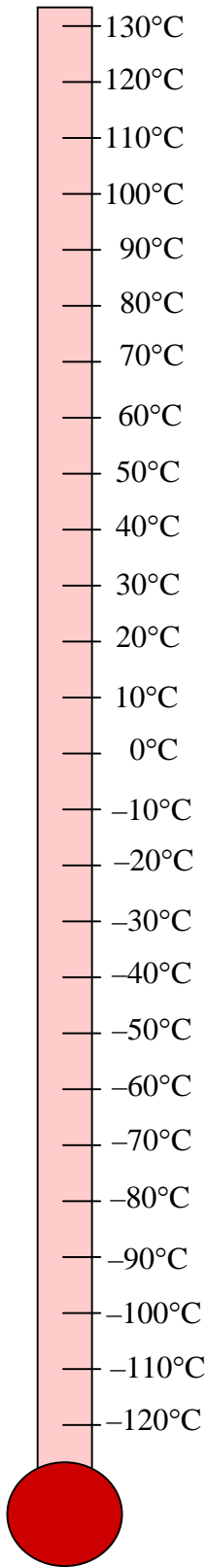
$\frac{6}{10}$

$\frac{1}{10}$

Practice: Temperatures on a Thermometer

1. Use experimentation, reference materials or other sources of information to fill in the temperatures in the chart below. Use the last two rows to take interesting temperatures of your own.

Condition	Temperature (°C)
Freezing temperature of water	
Boiling point of water	
Normal body temperature	
Normal room temperature	
Armpit temperature	
Hands before rubbing them together	
Hands after rubbing them together for 10 seconds	

2. Label and identify the temperatures from the table above on printed copy of the thermometer on the next page.

130°C

120°C

110°C

100°C

90°C

80°C

70°C

60°C

50°C

40°C

30°C

20°C

10°C

0°C

−10°C

−20°C

−30°C

−40°C

−50°C

−60°C

−70°C

−80°C

−90°C

−100°C

−110°C

−120°C

3. For each of the following, work with classmates to estimate, then measure each temperature using a thermometer.

Situation/Condition	Estimated Temperature (°C)	Actual Temperature (°C)
Glass of warm water		
Outside temperature		
Glass of ice water		
Room temperature		

4. Estimate the following temperatures on your own, then compare estimations with one or two of your classmates and be prepared to support or alter your estimations.

Situation/Condition	Estimated Temperature (°C)
Cool day	
Warm bath	
Refrigerator	
Ice cream	
Freezer	
Very cold day	
Hot tub	
Cold drink	

Converting Celsius and Fahrenheit Temperatures

Temperature is commonly measured in Canada using the **Celsius scale**. The unit of measurement is degree Celsius (°C).

Another scale used to measure temperature is the **Fahrenheit scale**. The United States and some countries in Europe measure temperatures in degrees Fahrenheit (°F).

°Fahrenheit	°Celsius
96	35.5
95	35
91.5	33
69	20.5
60	15.5
55.5	13
50	10
32	0
28.5	–2
5	–15

Converting from Celsius to Fahrenheit

To **convert** from Celsius to Fahrenheit, use the following formula:
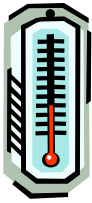
$$°F = \frac{9}{5} \times \underline{\quad}°C + 32$$

To **estimate** a temperature in °F when given a temperature in °C:

Take the temperature in °C, multiply by 2 and add 20.

Example ▷ If the temperature is 20°C, what is the temperature in °F?

Exactly

$$°F = \frac{9}{5} \times 20°C + 32$$

$$= 36 \quad + \quad 32$$

$$= 68°F$$

Approximately

$$°F = 20°C \times 2 + 20$$

$$= 40 + 20$$

$$= 60°F$$

Converting from Fahrenheit to Celsius

To **convert** from Fahrenheit to Celsius, use the following formula:

$$°C = \frac{5}{9}\left(\underline{\quad}°F - 32\right)$$

To **estimate** a temperature in °C when given a temperature in °F:

Take the temperature in °F, divide by 2 and subtract 15.

Example ▷ 85°F would be how many °C?

Exactly

$$°C = \frac{5}{9}\left(85°F - 32\right)$$

$$= \frac{5}{9}\left(53\right)$$

$$= 29.4°C$$

Approximately

$$°C = 85°F \div 2 - 15$$

$$= 42.5 - 15$$

$$= 27.5\ °C$$

Practice: Converting Temperatures

1.　　Use a variety of strategies to estimate the following temperatures.

a)　30°C　=　☐　°F

b)　80°F　=　☐　°C

c)　25°C　=　☐　°F

d)　65°F　=　☐　°C

e)　0°C　=　☐　°F

f)　70°F　=　☐　°C

g)　12°C　=　☐　°F

h)　92°F　=　☐　°C

2. Amandeep is investigating tropical locations to plan a winter vacation. He is experiencing some difficulties because his sources identify average temperatures using the Fahrenheit scale. Help Amandeep convert each temperature to Celsius.

Cuba	68°F
Jamaica	78°F
Hawaii	74°F
Greece	70°F
Australia	66°F
England	56°F

3. Brendon left London, where the temperature was 21°C, and arrived in Florida, where the temperature was 70°F. Which location had the warmer temperature?

Think About …

How do you and your family use temperature at **home**? Do you use degrees Fahrenheit or Celsius? How is temperature use in the **workplace**? Think of examples of how temperature is important to chefs, welders, pet store clerks, factory workers and millwrights.

Temperature Changes

A thermometer or a number line can be used to help determine changes in temperature.

Example A) In the morning, the temperature outside was 5°C. By late afternoon, the temperature was 20°C. How many degrees did the temperature increase during the day?

25

20 ← Final temperature
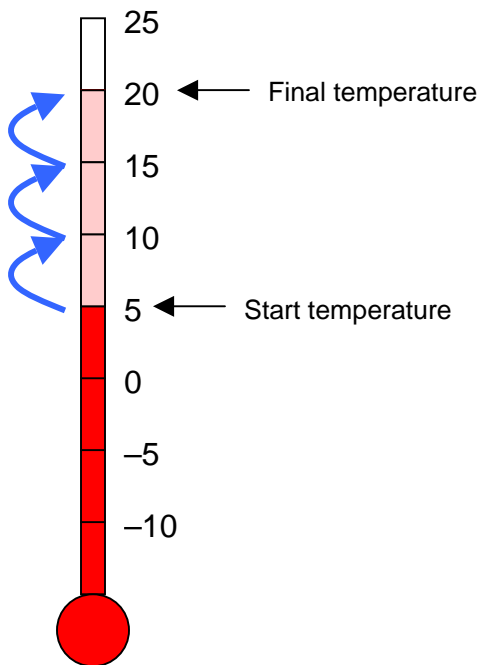
5°C   to   20°C   =   15

15

The temperature change is +15°C

10

5 ← Start temperature

Temperature change is a **positive number** if the temperature increases.

0

−5

−10

−20   −15   −10   −5   0   5   10   15   20   25
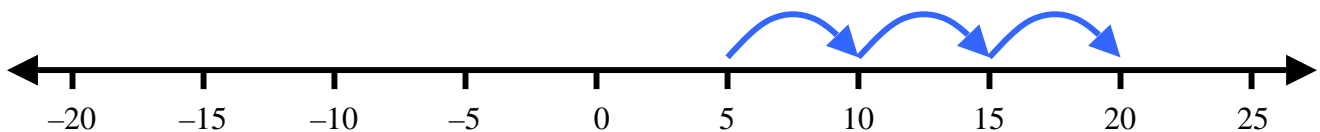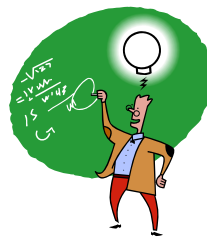
Hint: Temperature changes are just like adding and subtracting integers. Think back to the hot air balloon examples in Adding Integers and Subtracting Integers.

B) On another day, the afternoon temperature was 20°C. By evening, the temperature decreased to 2°C. What is the change in temperature?

25

20 ←——— Start temperature

20°C to 2°C = 18

The temperature change is −18°C

15

10

5

0 ←——— Final temperature

Temperature change is a **negative** number if the temperature decreases.

−5

−10
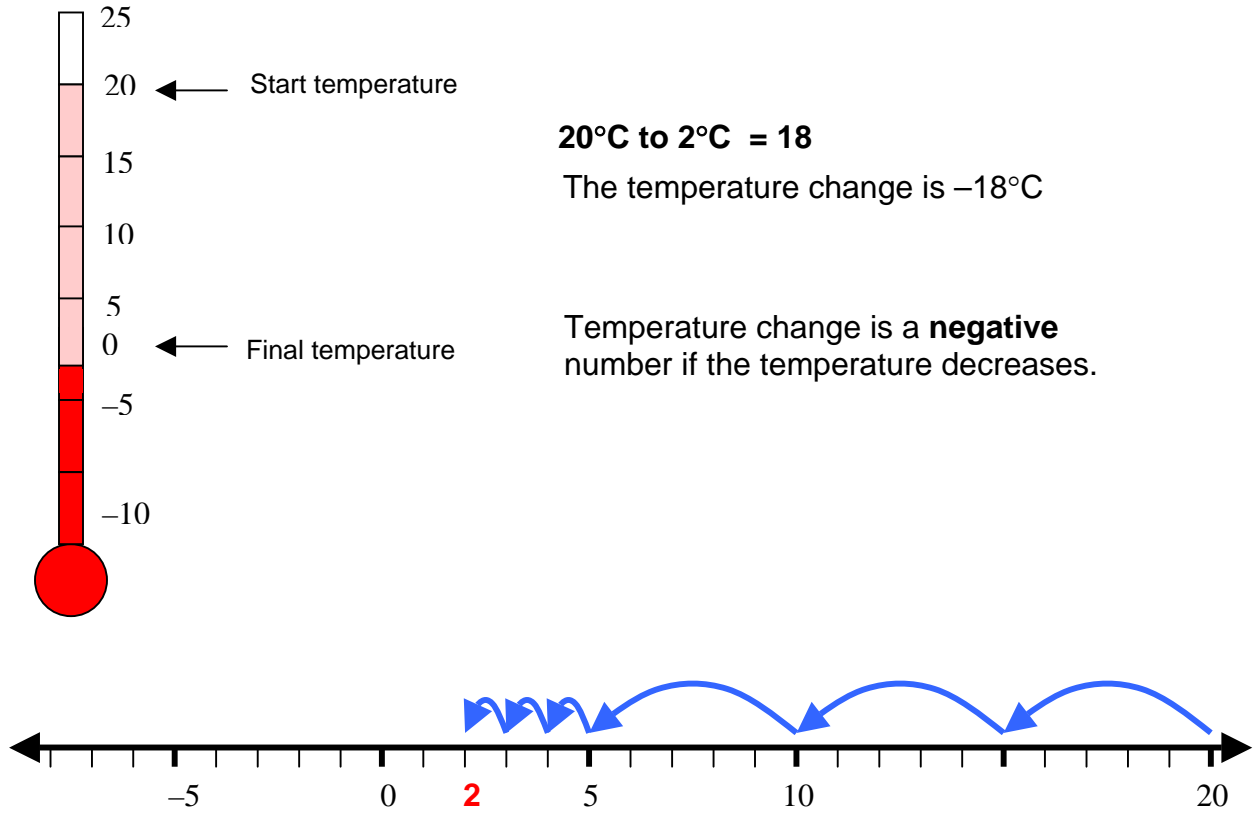
Practice: Calculating Temperature Changes

1. A storm was blowing across southern Alberta. At 2:00 p.m., the temperature was 26°C. An hour later, it had dropped by 7°C. At 4:30 p.m., the temperature rose by 5°C. Two hours later, the temperature dropped another 2°C. What was the temperature at 6:30 p.m.?

2. Daniel and Missy wanted to examine world temperature changes. They found the daily low and high temperatures for one day at various locations around the world. Use the data they collected below to calculate the temperature change at each location.

   Use a thermometer or number line to indicate the following temperature changes.

Location	Temperatures	Temperature Change
1	5°C	to 25°C
2	–5°C	to 18°C
3	–10°C	to –30°C
4	8°C	to –1°C
5	0°C	to –28°C

Remember:

   + indicates an increase in temperature
   –   indicates a decrease in temperature.

3. Examine the temperature changes above to answer the following questions.

   a) Which location had the:
   • greatest temperature change?
   • smallest temperature change?

   b) Using sentences, explain where you would like to live (locations 1 through 5) and give reasons for your choice.