

# Temperature Scales and Conversions Name \_\_\_\_\_

The two temperature scales most often used in the world today to record daily outdoor temperatures are the Fahrenheit temperature scale (used chiefly in the United States) and the Celsius temperature scale (used almost everywhere else).

Two benchmark temperatures on these scales are the boiling point and freezing point of water. On the Fahrenheit scale, the boiling point is 212 degrees, the freezing point 32 degrees. On the Celsius scale, the boiling point is 100 degrees, the freezing point 0 degrees (a little easier to remember).

From these two data points, it is easy to see that as the Fahrenheit scale changes 180 total degrees between freezing and boiling, while the Celsius scale changes only 100 degrees. By reducing both numbers (divide both by 20), it can be said that for every 9 degrees change in the Fahrenheit scale, the Celsius scale changes 5 degrees. From this observation, a conversion formula can be designed:

To convert from Celsius to Fahrenheit, the following formula is used:

$$F = (C \times 9/5) + 32 \text{ (what do you think the 32 represents?)}$$

To find a formula that converts from Fahrenheit to Celsius all that has to be done is to take the above formula and, using algebra techniques, solve for C.

$$F = (C \times 9/5) + 32 \text{ (first, subtract 32 from both sides of the equation)}$$

$$F - 32 = C \times 9/5 \text{ (now, multiply both sides of the equation by } 5/9)$$

$$(F - 32) \times 5/9 = C$$

And, you have your formula. So, to convert from Fahrenheit to Celsius, the following formula is used:

$$C = (F - 32) \times 5/9$$

Now, try out your formulas by completing the table below. Round off to the nearest whole degree.

Celsius	Fahrenheit
0	-
-	40
16	-
-	75
30	-
-	98.6
-40	-
-	0

To estimate:

  

$$\frac{^{\circ}F - 30}{2} = ^{\circ}C$$
  

$$(^{\circ}C \times 2) + 30 = ^{\circ}F$$

Discussion Questions: Based on the table above, answer the following:

- 1) At what temperature (in degrees Celsius) would it have to be outside before you wore a winter coat? Why?
- 2) At what temperature (in degrees Celsius) would you want it to be outside before you went swimming? Why?
- 3) If it is 20 degrees Celsius outside, how would you describe the temperature - Hot, warm, cool, or cold? Why?

# Estimate the approximate temperature and then calculate the actual temperature

## Converting Fahrenheit and Celsius

- |                    |       |       |
|--------------------|-------|-------|
| 1) $106^{\circ}$ F | _____ | _____ |
| 2) $45^{\circ}$ C  | _____ | _____ |
| 3) $39^{\circ}$ C  | _____ | _____ |
| 4) $9^{\circ}$ C   | _____ | _____ |
| 5) $108^{\circ}$ F | _____ | _____ |
| 6) $15^{\circ}$ C  | _____ | _____ |
| 7) $47^{\circ}$ C  | _____ | _____ |
| 8) $97^{\circ}$ F  | _____ | _____ |
| 9) $75^{\circ}$ F  | _____ | _____ |
| 10) $2^{\circ}$ C  | _____ | _____ |

**Estimate**

**Calculate  
(Show your work)**