INTRODUCTION

Temperatures are measured on several different *scales*. For everyday purposes, the U.S. uses the Fahrenheit scale, while most of the rest of the world uses the Celsius scale. Scientists often use the Kelvin scale. This report provides simple formulas for translation between temperature scales, and lists important temperature values on the different scales.

ANALYSIS

The temperature scales are determined by their values for the freezing and boiling point of water:

	Farenheit (*F*)	Celsius (*C*)	Kelvin (*K*)
Freezing	**32**	**0**	**273**
Boiling	**212**	**100**	**373**
Difference: Boiling - Freezing	**180**	**100**	**100**

The Difference values show that 1 degree change in the Celsius (or Kelvin) scale is the same as 1.8 degree difference in the Fahrenheit scale. Since $F = 32$ when $C = 0$, then

(1) $F = 1.8C + 32$ or $F = \frac{9}{5}C + 32$

Similar analysis leads to these formulas:

(2) $C = \frac{F-32}{1.8}$ *or* $C = \frac{5}{9}F + \frac{160}{9}$

(3) $K = C + 273$

The *slope* in equation (1) is 1.8, and this shows that for every 1-degree change in Celsius temperature, there is a 1.8-degree change in Fahrenheit. The slope in equation (2) shows that for every 1-degree change on the Fahrenheit scale, there is a corresponding change of 5/9 = 0.56 degree on the Celsius scale.

The temperature that has the same value on both Celsius and Farenheit scales is -40 degrees. To find this, set $C = F$, leading to $C = \frac{9}{5}C + 32$, whose solution is $C = -40$.

RESULTS

This chart illustrates the relationship between Celsius and Fahrenheit scales, and shows some key temperatures on both scales