LESSON MAKER PRO

Temperature Across Scales

Convert temperatures and compare what they mean.

HIGH SCHOOL · PHS.8

PHS.8 "Students will demonstrate an understanding of temperature scales, heat, and thermal energy transfer. Compare and contrast temperature scales by converting between Celsius, Fahrenheit, and Kelvin..."

NAME _____ DATE _____

THREE SCALES, ONE TEMPERATURE

To convert Celsius to Fahrenheit, use °F = (9/5 × °C) + 32. To convert Fahrenheit to Celsius, use °C = (°F − 32) × 5/9. To convert between Celsius and Kelvin, use K = °C + 273.15 or °C = K − 273.15.

WORKED EXAMPLE

Convert 25°C to Fahrenheit and Kelvin.

1. Multiply for Fahrenheit: 9/5 × 25 = 45.
2. Add 32: 45 + 32 = 77°F.
3. Add 273.15 for Kelvin: 25 + 273.15 = 298.15 K.

Answer: 77°F and 298.15 K

PRACTICE 6 problems

1 Convert 10°C to Fahrenheit.

ANSWER _____

2 Convert 86°F to Celsius.

ANSWER _____

3 Convert −10°C to Kelvin.

ANSWER _____

4 Convert 293.15 K to Celsius.

ANSWER _____

5 Convert 5°C to both Fahrenheit and Kelvin.

ANSWER _____

_____

6 Convert 104°F to Kelvin.

ANSWER _____

APPLY IT Show your work

1 Your phone warns that its battery is too hot above 45°C. It reads 122°F. Convert the reading to Celsius. Is it above the warning temperature? If so, by how much?

WORK SPACE

ANSWER _____

2 A weather app shows an outdoor temperature of −4°C before school. Convert it to Fahrenheit and Kelvin.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A laptop battery is 113°F, and the air around it is 316.15 K. Convert both temperatures to Celsius. Which way will thermal energy transfer between the battery and the air? Explain using the temperature difference.

WORK SPACE AND ANSWER

Temperature Across Scales

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Convert 10°C to Fahrenheit.	**50°F**
2	Convert 86°F to Celsius.	**30°C**
3	Convert −10°C to Kelvin.	**263.15 K**
4	Convert 293.15 K to Celsius.	**20°C**
5	Convert 5°C to both Fahrenheit and Kelvin.	**41°F and 278.15 K**
6	Convert 104°F to Kelvin.	**313.15 K**

PART 2 · APPLY IT

1. **50°C; yes, by 5°C.** (122 − 32) × 5/9 = 50°C. This is 5°C above 45°C.
2. **24.8°F and 269.15 K** 9/5 × (−4) + 32 = 24.8°F. Add 273.15 to −4 to get 269.15 K.

CHALLENGE

The battery is 45°C, and the air is 43°C. Thermal energy transfers from the warmer battery to the cooler air because the battery is 2°C warmer.

Require units with each conversion. For the challenge, accept any explanation that identifies the battery as warmer by 2°C and shows thermal energy transferring to the air.