Temperature Conversions

Grade 7 – 9 · Celsius, Fahrenheit and kelvin

Name: Date: Score: / 26

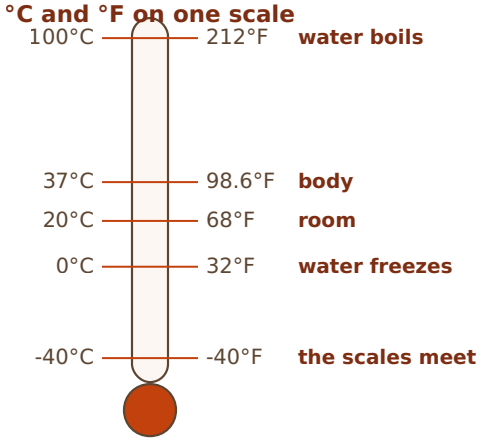
The odd one out

Every other conversion on these worksheets is a scaling. A kilometre is a thousand metres, so you multiply by a thousand and you are done.

Temperature is different, because the scales do not agree on where zero is. Celsius puts zero at the freezing point of water; Fahrenheit puts it 32 degrees lower. So converting needs both a stretch and a shift, which is where the **+32** comes from.

Kelvin is the easy one. A kelvin is exactly the same size as a Celsius degree, so only the zero moves: **K = °C + 273.15**, with no multiplying. Kelvin takes no degree sign and never goes negative, because its zero is the coldest temperature there is.

°C and °F on one scale



Worth memorising: the two scales cross at −40°.

The formulas

- **°F = °C × 9/5 + 32**. Multiply first, then add.
- **°C = (°F − 32) × 5/9**. Subtract first, then multiply.
- **K = °C + 273.15**. No multiplying at all — the degrees are the same size.
- The **+32** is there because the two scales put zero in different places.
- Kelvin has **no degree sign** and no negative values.
- Landmarks to check against: water freezes at **0°C = 32°F** and boils at **100°C = 212°F**.

Part A — Celsius to Fahrenheit (6 marks)

0 °C → _____ **°F**	**100 °C** → _____ **°F**	**25 °C** → _____ **°F**
-40 °C → _____ **°F**	**37 °C** → _____ **°F**	

		180 °C → _____ **°F**

Part B — Fahrenheit to Celsius (6 marks)

68 °F → _____ **°C**	**32 °F** → _____ **°C**	**212 °F** → _____ **°C**
14 °F → _____ **°C**	**50 °F** → _____ **°C**	**104 °F** → _____ **°C**

Part C — Kelvin (4 marks)

25 °C → _____ **K**	**0 °C** → _____ **K**
300 K → _____ **°C**	**373.15 K** → _____ **°C**

Part D — Think it through (10 marks)

1. A student converts 20°C to Fahrenheit by adding 32 first and then multiplying by 9/5, getting 93.6°F. Explain the mistake and give the correct answer.

2. Why does converting Celsius to kelvin involve no multiplication, when converting to Fahrenheit does?

Temperature Conversions — Answer Key

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Part A — Celsius to Fahrenheit

1. 0°C → **32°F**
2. 100°C → **212°F**
3. 25°C → **77°F**
4. -40°C → **−40°F**
5. 37°C → **98.6°F**
6. 180°C → **356°F**

Part B — Fahrenheit to Celsius

1. 68°F → **20°C**
2. 32°F → **0°C**
3. 212°F → **100°C**
4. 14°F → **−10°C**
5. 50°F → **10°C**
6. 104°F → **40°C**

Part C — Kelvin

1. 25 °C → **298.15 K**
2. 0 °C → **273.15 K**
3. 300 K → **26.85°C**
4. 373.15 K → **100°C**

Part D — Think it through

1. **68°F**
   Order matters. The formula multiplies first: 20 × 9/5 = 36, then +32 = 68°F. Doing it the other way applies the scaling to the offset as well. The landmark check catches it: 20°C is comfortable room temperature, and 93.6°F is a hot day.

2. **The degrees are the same size.**
   A kelvin and a Celsius degree are exactly the same interval, so only the zero point differs and you just add 273.15. A Fahrenheit degree is a different size as well as starting somewhere else, so it needs both a multiplication and an addition.