

# Experiment 'P\_3\_9\_temperature' Results

December 18, 2025

**Experiment outcome:** SUCCESS

**Bad responses:** 0

**Responses containing assume :** 0

**Resolution attempts:** 1

**Hard fails (resolution):** 0

**Soft fails (resolution):** 0

**Verification attempts:** 1

## Problem Specification

**Problem name:** P\_3\_9\_temperature

**Natural language statement:** Write a method that takes a temperature value and a letter C for Celsius or F for Fahrenheit. Return whether water is liquid, solid, or gaseous at the given temperature at sea level.

**Method signature:** P\_3\_9\_temperature (t: real, c: char) returns (s: string)

## Ensures

- if c == 'C' then if t < 0.0 then s == "solid" else if t == 0.0 then s == "solid or liquid" else if 0.0 < t < 100.0 then s == "liquid" else if t == 100.0 then s == "liquid or gaseous" else s == "gaseous" else if t < 32.0 then s == "solid" else if t == 32.0 then s == "solid or liquid" else if 32.0 < t < 212.0 then s == "liquid" else if t == 212.0 then s == "liquid or gaseous" else s == "gaseous"

## Requires

- (c == 'C' && t >= -273.15) || (c == 'F' && t >= -459.67)
- c == 'C' || c == 'F'

## GenAI interactions

Below you will find all interactions between the ‘user’ (program) and the ‘assistant’ (OpenAI).

### Program → GenAI

You are given the following task to perform in Dafny:

Write a method that takes a temperature value and a letter C for Celsius or F for  
↪ Fahrenheit. Return whether water is liquid, solid, or gaseous at the given  
↪ temperature at sea level.

The signature should be:

```
method P_3_9_temperature (t: real, c: char) returns (s: string)
```

The method should respect the following contract:

```
requires (c == 'C' && t >= -273.15) || (c == 'F' && t >= -459.67), requires c == 'C' || c  
↪ == 'F', ensures if c == 'C' then if t < 0.0 then s == "solid" else if t == 0.0  
↪ then s == "solid or liquid" else if 0.0 < t < 100.0 then s == "liquid" else if t  
↪ == 100.0 then s == "liquid or gaseous" else s == "gaseous" else if t < 32.0 then s  
↪ == "solid" else if t == 32.0 then s == "solid or liquid" else if 32.0 < t < 212.0  
↪ then s == "liquid" else if t == 212.0 then s == "liquid or gaseous" else s == "  
↪ gaseous"
```

Produce and show only the Dafny body of this method, including the curly braces that  
↪ surround it. Do not show the signature nor contract. You must not use 'assume'  
↪ anywhere in your code.

### GenAI → Program

**System fingerprint:**

**ID:** chatcmpl-Co4SuiayBMFCZeXMbxJsqnCsXv33T

**Model:** gpt-5.1-chat-latest

**Created at:** 1766049602

**Finish reason:** stop

**Usage:** 690 tokens in, and 499 tokens out

```
{  
  if c == 'C' {  
    if t < 0.0 {  
      s := "solid";  
    } else if t == 0.0 {  
      s := "solid or liquid";  
    } else if t < 100.0 {  
      s := "liquid";  
    } else if t == 100.0 {  
      s := "liquid or gaseous";  
    } else {  
      s := "gaseous";  
    }  
  }  
}
```

```

} else {
  if t < 32.0 {
    s := "solid";
  } else if t == 32.0 {
    s := "solid or liquid";
  } else if t < 212.0 {
    s := "liquid";
  } else if t == 212.0 {
    s := "liquid or gaseous";
  } else {
    s := "gaseous";
  }
}
}
}

```

## Final Program

```

method P_3_9_temperature (t: real, c: char) returns (s: string)
  requires (c == 'C' && t >= -273.15) || (c == 'F' && t >= -459.67)
  requires c == 'C' || c == 'F'
  ensures if c == 'C' then if t < 0.0 then s == "solid" else if t == 0.0 then s == "
    ↪ solid or liquid" else if 0.0 < t < 100.0 then s == "liquid" else if t ==
    ↪ 100.0 then s == "liquid or gaseous" else s == "gaseous" else if t < 32.0
    ↪ then s == "solid" else if t == 32.0 then s == "solid or liquid" else if
    ↪ 32.0 < t < 212.0 then s == "liquid" else if t == 212.0 then s == "liquid or
    ↪ gaseous" else s == "gaseous"
{
  if c == 'C' {
    if t < 0.0 {
      s := "solid";
    } else if t == 0.0 {
      s := "solid or liquid";
    } else if t < 100.0 {
      s := "liquid";
    } else if t == 100.0 {
      s := "liquid or gaseous";
    } else {
      s := "gaseous";
    }
  } else {
    if t < 32.0 {
      s := "solid";
    } else if t == 32.0 {
      s := "solid or liquid";
    } else if t < 212.0 {
      s := "liquid";
    } else if t == 212.0 {
      s := "liquid or gaseous";
    } else {
      s := "gaseous";
    }
  }
}

```

```
}  
}  
}
```

## Total Token Usage

**Input tokens:** 690

**Output tokens:** 499

**Reasoning tokens:** 256

**Sum of ‘total tokens’:** 1189

## Experiment Timings

**Overall Experiment** started at 1766049604627, ended at 1766049612281, lasting 7654ms (7.65 seconds)

**Iteration #1** started at 1766049604627, ended at 1766049612281, lasting 7654ms (7.65 seconds)