

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: chatmpl-Co4SwiayBMFCZeXMbxJsqnCsXv33T

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)