Triangle Theory Building

Student Handout · Grades 8–11 · 3–4 sessions

Group: _____   Date: _____

Part 1: Claim Inventory

What do you believe to be true about triangles? Write down as many claims as you can. These can be about angles, sides, area, types of triangles, or anything else.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____

Part 2: Proof Trees

Pick a claim from your inventory. We are going to ask "why should I believe that?" and trace the reasoning back as far as we can.

Proof Tree 1

Claim:

Why should I believe this? What does this claim rely on?

Premise 1:

Premise 2:

Premise 3:

How do these premises lead to the claim? Write the argument:

Dig deeper — pick one of the premises above.

Which premise?

What does it rely on?

*Is this a **definition**, a **theorem** (something we can prove), or an **axiom** (something we accept without proof)?*

Proof Tree 2

Claim:

....

Why should I believe this? What does this claim rely on?

Premise 1: ....

Premise 2: ....

Premise 3: ....

How do these premises lead to the claim? Write the argument:

....

....

....

Dig deeper — pick one of the premises above.

Which premise?

....

What does it rely on?

....

*Is this a **definition**, a **theorem**, or an **axiom**?*

....

Proof Tree 3

Claim:

_____

Why should I believe this? What does this claim rely on?

Premise 1: _____

Premise 2: _____

Premise 3: _____

How do these premises lead to the claim? Write the argument:

_____

_____

_____

Dig deeper — pick one of the premises above.

Which premise?

_____

What does it rely on?

_____

_____

Is this a **definition**, a **theorem**, or an **axiom**?

_____

Part 3: Classification

By sides

Fill in the table. For each type, write the definition your class agreed on.
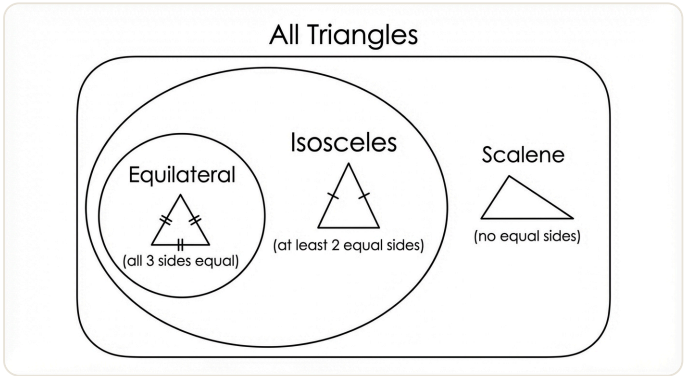
TYPE	DEFINITION	EXAMPLE
Scalene		
Isosceles		
Equilateral		

Is an equilateral triangle a type of isosceles triangle? Why or why not?

....

....

....

Draw a Venn diagram showing the relationship between these three types:

By angles

Fill in the table.

TYPE	DEFINITION	EXAMPLE
Acute		
Right		
Obtuse		

Is this classification complete? That is, does every triangle fit into exactly one of these categories? How do you know?

....

....

....

Why do we classify triangles using right angles (90°) rather than, say, 47.5°? What makes 90° special?

....

....

....

Part 4: Reflection

1. *Which claim was the hardest to justify? What made it hard?*

2. *Did you find any circular reasoning — a chain of justification that looped back on itself? Describe it.*

3. *What did you have to leave as an axiom — something you accepted without proof? Why could you not dig any deeper?*

4. *What is the difference between a definition and a theorem?*