Name _____

Lesson 10: Introduction to Proofs

LEARNING TARGET

I CAN make a plan to write a proof using geometric facts that I know are true.

Warm Up

Sudoku

The objective of Sudoku is to enter a digit from 1 through 9 in each cell, in such a way that:

- Each horizontal **row** contains each digit exactly **once**
- Each vertical **column** contains each digit exactly **once**
- Each 3x3 **region** contains each digit exactly **once**

9		7		6	2	8	1	4
4	6				8		5	7
		8		4				
	1			9				
		3	2		1	7		
				5			2	
				7		1		
8	2		4				7	6
1	7	6	8	2		3		5

What was the first step that you filled in?

Why was that?

Mini Lesson

Let's look at a video:

http://www.youtube.com/watch?v=H9PY_3E3h2c

How did the townspeople come to the conclusion that the young woman was a "witch"?

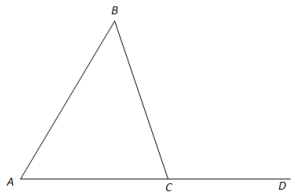
In geometry, we follow a similar deductive thought process, much like the Monty Python scene uses, to prove geometric theorems.

We are going to learn how to put together a plan for what we think the necessary deductive thought process is going to be in order to prove geometric theorems!

But before we use the deductive thought process to prove geometric theorems, let's look at some of the geometric facts that we know are true…

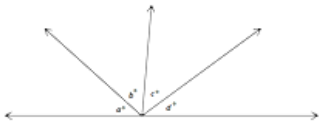
Match the geometric fact with the diagram and/or statement:

_____ 1.



$m\angle BAC + m\angle ABC = m\angle BCD$

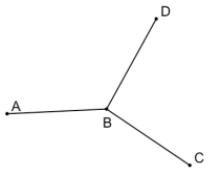
_____ 2.



$a° + b° + c° + d° = 180$

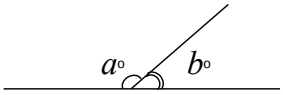
_____ 3.

_____ 4.



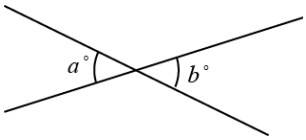
$m\angle ABC + m\angle CBD + m\angle DBA = 360°$

_____ 5.



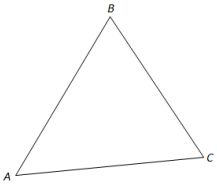
$a° + b° = 180$

_____ 6.



$a° = b°$

_____ 7.



$m\angle A + m\angle B + m\angle C = 180°$

a. Vertical angles are equal in measure.

b. Linear pairs form supplementary angles.

c. Consecutive adjacent angles on a line sum to $180°$.

d. The sum of the angle measures in a triangle is $180°$.

e. The exterior angle of a triangle equals the sum of the two opposite interior angles.

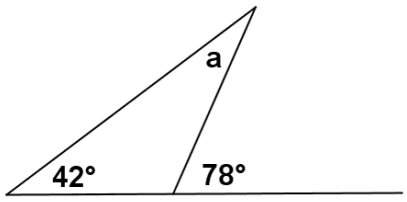
f. Base angles of an isosceles triangle are equal in measure.

g. Angles at a point sum to $360°$.

The list above is not comprehensive. You will receive a more comprehensive list.

Now let's look at an example:

Example 1: Solve for a.



You needed to figure out the measure of a, and used the **"fact/facts"** that:

The measure of $\angle a$ must therefore be 36°.

Suppose that we rearrange the diagram just a little bit.

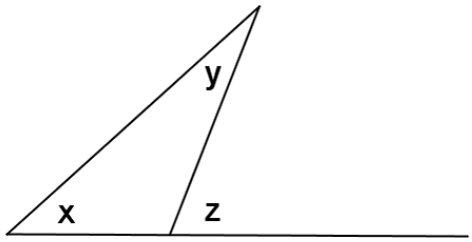
Instead of using numbers, we'll use variables to represent angle measures.

Let us use the fact that the angles of a triangle sum to 180°.

Example 2: Given the labeled diagram at the right,

Prove: $x + y = z$

PLAN:



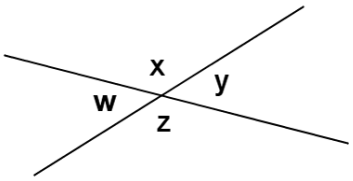
Proof:

Statement	Reason
1. Label $\angle w$, as shown in the diagram.	1.
2. $\angle x + \angle y + \angle w = 180^\circ$	2.
3. $\angle w + \angle z = 180^\circ$	3.
4. $\angle x + \angle y + \angle w = \angle w + \angle z$	4.
5. $\angle x + \angle y = \angle z$	5.

The ability to identify the steps used to reach a conclusion based on known facts is ***deductive reasoning***.

Work Time

You know that angles on a line sum to 180°.



Exercise 1: Prove that vertical angles are congruent.

Make a plan:

Write out your proof:

STATEMENT	REASON