

Lesson 1.2.4: Unknown Angle Proofs

Targets:

1. I can write proofs for unknown angles using previously learned geometric facts.

Vocabulary

Watch the video and take notes here:

- Deductive Reasoning
 - Definition:

 - Examples:
 - 1.
 - 2.
 - 3.

Your Favorite Example

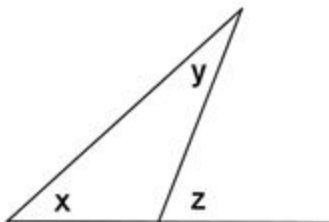
Read through the list of more deductive reasoning examples and write your favorite example here:

Sherlock Holmes Showing off Deductive Reasoning

Watch this video and enjoy :)

Writing a Proof: Exterior Angle of a Triangle

Watch this video to see what a proof is and how to write them. This video will walk you step by step through a proof. It is a long video, but please watch the entire thing. And definitely write everything down that I write down. Writing proofs can be a difficult thing, so listen closely to my advice as I work through this proof.



Suppose that we know that the angles of a triangle sum to 180° . Given the labeled diagram at the left, can we prove that $x + y = z$ (or, in other words, that the exterior angle of a triangle equals the sum of the remote interior angles)?

Prove: $x + y = z$

Statement	Reason

Helpful Properties for Proofs

Here is a list of properties that you can use while you are writing proofs. You can and should use these properties when writing your proofs for this unit and beyond.

Use a highlighter or pen to emphasize the following: Reflexive Property, Addition Property of Equality, Subtraction Property of Equality, and Substitution Property of Equality. We will use these properties most often.

Basic Properties Reference Chart

Property	Meaning	Geometry Example
Reflexive Property	A quantity is equal to itself.	$AB = AB$
Transitive Property	If two quantities are equal to the same quantity, then they are equal to each other.	If $AB = BC$ and $BC = EF$, then $AB = EF$.
Symmetric Property	If a quantity is equal to a second quantity, then the second quantity is equal to the first.	If $OA = AB$ then $AB = OA$.
Addition Property of Equality	If equal quantities are added to equal quantities, then the sums are equal.	If $AB = DF$ and $BC = CD$, then $AB + BC = DF + CD$.
Subtraction Property of Equality	If equal quantities are subtracted from equal quantities, the differences are equal.	If $AB + BC = CD + DE$ and $BC = DE$, then $AB = CD$.
Multiplication Property of Equality	If equal quantities are multiplied by equal quantities, then the products are equal.	If $m\angle ABC = m\angle XYZ$ then $2(m\angle ABC) = 2(m\angle XYZ)$.
Division Property of Equality	If equal quantities are divided by equal quantities, then the quotients are equal.	If $AB = XY$ then $\frac{AB}{2} = \frac{XY}{2}$.
Substitution Property of Equality	A quantity may be substituted for its equal.	If $DE + CD = CE$ and $CD = AB$, then $DE + AB = CE$.
Partition Property (includes "Angle Addition Postulate," "Segments add," "Betweenness of Points," etc.)	A whole is equal to the sum of its parts.	If point C is on \overline{AB} , then $AC + CB = AB$.

Exit Ticket

Now write a proof for these 3 situations.

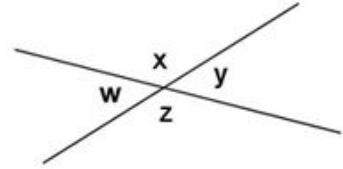
1. You know that angles on a line sum to 180° .

Prove that vertical angles are congruent.

Make a plan:

- What do you know about $\angle w$ and $\angle x$? $\angle y$ and $\angle z$?
- What conclusion can you draw based on both pieces of knowledge?

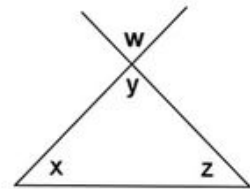
Write out your proof:



Statement	Reason

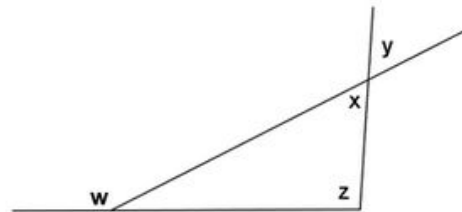
2. Given the diagram on the right, prove that $m\angle w + m\angle x + m\angle z = 180^\circ$.

(Make a plan first. What do you know about $\angle x$, $\angle y$, and $\angle z$?)



Statement	Reason

3. Given the diagram on the right, prove that $m\angle w = m\angle y + m\angle z$.



Statement	Reason