

Day 5 – Intro to Algebraic Proofs Notes

1. Solve the following equation.
Justify each step as you solve it.

$2(4x - 3) - 8 = 4 + 2x$ $8x - 6 - 8 = 4 + 2x$ $8x - 14 = 4 + 2x$ $\begin{array}{r} +14 \quad +14 \\ \hline 8x = 18 + 2x \\ -2x \quad -2x \\ \hline 6x = 18 \\ \underline{\quad} \quad \underline{\quad} \\ x = 3 \end{array}$	Distributed 2 Subtract / CLT Added 14 Subtracted 2x Divided by 6
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2. Rewrite your proof so it is "formal" proof.

Statements	Reasons
1. $2(4x - 3) - 8 = 4 + 2x$	1. Given
2. $8x - 6 - 8 = 4 + 2x$	2. Distributive Prop
3. $8x - 14 = 4 + 2x$	3. Subtract / CLT
4. $8x = 18 + 2x$	4. Addition Prop of =
5. $6x = 18$	5. Subtraction Prop of =
6. $x = 3$	6. Division Prop of =

When writing an algebraic proof, you create a chain of logical steps that move from the hypothesis to the conclusion of the conjecture you are proving. By proving the conclusion is true, you have proven the original conjecture is true.



When writing a proof, it is important to justify each logical step with a reason. You can use symbols and abbreviations, but they must be clear enough so that anyone who reads your proof will understand them.

Two Column Proofs

Statements	Reasons
①	①
②	②
③	③
④	④

- No Work
- General reasons
- One step at a time

Bridging from Algebraic to Geometric

Practice #1:

GIVEN $\triangleright \overline{AB} \cong \overline{BC}, \overline{CD} \cong \overline{BC}$



PROVE: $x = 6$

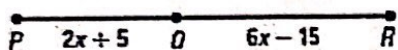
What is the length of \overline{AB} ?

What is the length of \overline{CD} ?

	Statement		Reason
1	$\overline{AB} \cong \overline{BC}$	1	Given
2	$\overline{CD} \cong \overline{BC}$	2	Given
3	$\overline{AB} \cong \overline{CD}$	3	Transitive Prop (1,2)
4	$AB = CD$	4	\cong segments \rightarrow = measures
5	$2x+1 = 4x-11$	5	Substitution Prop
6	$1 = 2x-11$	6	Subtraction Prop of =
7	$12 = 2x$	7	Addition Prop of =
8	$6 = x$	8	Division Prop of =
9	$x = 6$	9	Symmetric Prop

Practice: #2

GIVEN $\triangleright PR = 46$

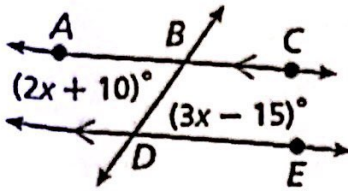


Prove: $x = 7$

	Statement		Reason
1	$PR = 46$ & Diagram	1	Given
2	$PQ + QR = PR$	2	Segment Addition
3	$2x+5 + 6x-15 = 46$	3	Substitution Prop
4	$8x - 10 = 46$	4	Add / CLT
5	$8x = 56$	5	Addition Prop of =
6	$x = 7$	6	Division Prop of =
7		7	
8		8	

Practice: #3

GIVEN: $\angle ABD$ and $\angle BDE$ are



alternate interior angles.

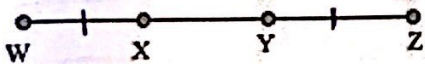
Prove: $x = 25$

STATEMENTS	REASONS
① $\angle ABD$ & $\angle BDE$ are alternate int \angle 's	① Given
② $\angle ABD \cong \angle BDE$	② Alt int \angle 's are \cong
③ $\angle ABD = \angle BDE$	③ $\cong \angle$'s \rightarrow = measures
④ $2x + 10 = 3x - 15$	④ Substitution Prop
⑤ $10 = x - 15$	⑤ Subtraction Prop
⑥ $25 = x$	⑥ Addition Prop
⑦ $x = 25$	⑦ Symmetric Prop

Practice: #4

GIVEN: $\overline{WX} \cong \overline{YZ}$

Y is the midpoint of \overline{XZ} .



Prove: $\overline{WX} \cong \overline{XY}$

STATEMENTS	REASONS
① $\overline{WX} \cong \overline{YZ}$	① Given
② Y is midpoint of \overline{XZ}	② Given
③ $\overline{XY} \cong \overline{YZ}$	③ Definition of midpoint
④ $\overline{WX} \cong \overline{XY}$	④ Transitive Prop (1,3)