Two Column Proof Sequence & Templates

This document shows how to develop a unit plan for a smooth transition into proof writing. Start by teaching the properties, postulates, and definitions that will become the justifications used in proofs. Then lead students into the process of justifying steps in the equation solving process they are already familiar with. Some examples are included. There are also blank templates so that you can set up your own examples while keeping a consistent structure for your students.

This file is free on my blog at www.mathgiraffe.com but I have added it here as well for your convenience.

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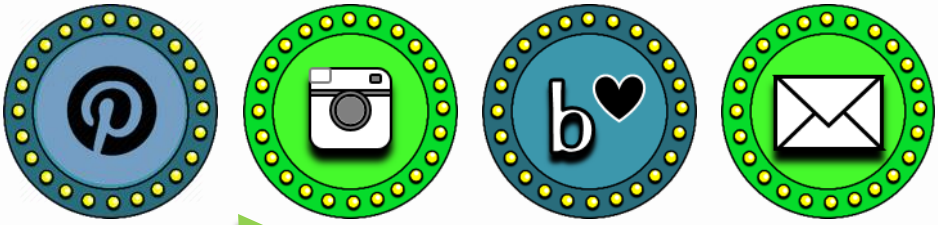

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First, Introduce all definitions, properties, and postulates that will later be used as justifications in proofs. Then Begin the two-column structure with basic algebraic equations that students already know how to solve. (Example: Given that $4x + 2 = 14$, Prove that $x = 3$) Then, lead into more complicated algebraic proofs.

Algebra Proofs that INCLUDE the Transitive Property and Substitution

7. Given: $g = 2h$, $g + h = k$, $k = m$

Prove: $m = 3h$

	Statement	Justification
1	$g = 2h$	Given
2	$g + h = k$	Given
3	$k = m$	given
4	$2h + h = k$	Substitution (1, 2)
5	$3h = k$	(Simplified line 4)
6	$3h = m$	Transitive Prop. (3, 5)
7	$m = 3h$	Symmetric Prop.
8		

Proofs Using Segment Addition Postulate and Angle Addition Postulate

Given: $\overline{CD} \cong \overline{EF}$, $\overline{DE} \cong \overline{FG}$

Prove: $\overline{CE} \cong \overline{EG}$

	Statement	Justification
1	$\overline{CD} \cong \overline{EF}$	Given
2	$\overline{DE} \cong \overline{FG}$	Given
3	CD = EF	Defn. Congruent
4	DE = FG	Defn. congruent
5	CD + DE = CE	Segment Addition Postulate
6	EF + FG = EG	Segment Addition Postulate
7	CD + FG = EG	Substitution (3, 6)
8	CD + DE = EG	Substitution (4, 7)
9	CE = EG	Transitive Prop. (5, 8)
10	$\overline{CE} \cong \overline{EG}$	Defn. congruent

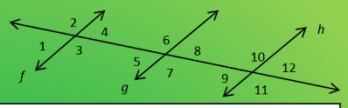
Proofs Using Definitions

Sequence for introducing proofs

Proofs with Transversals and Parallel Lines

Given: $\angle 12 \cong \angle 4$, $\angle 12 \cong \angle 5$

Prove: $m\angle 3 + m\angle 5 = 180°$



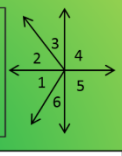
	Statement	Justification
1	$\angle 12 \cong \angle 4$	Given
2	$\angle 12 \cong \angle 5$	Given
3	$\angle 4 \cong \angle 5$	Transitive Property (1, 2)
4	f ∥ g	Converse of Alternate Interior Angles Theorem
5	$m\angle 3 + m\angle 5 = 180$	Same-Side Interior Angles Theorem
6		
7		
8		
9		
10		

On to Proofs with Triangles

Proofs Using Special Angle Pairs

1. Given: $\angle 4$ is a right angle, $\angle 1 \cong \angle 2$

Prove: $\angle 2$ and $\angle 6$ are complementary.



	Statement	Justification
1	$\angle 4$ is a right angle	Given
2	$\angle 1 \cong \angle 2$	Given
3	$m\angle 4 = 90$	Defn. right angle
4	$m\angle 1 = m\angle 2$	Defn. congruent
5	$m\angle 1 + m\angle 6 = m\angle 4$	Vertical Angles Theorem
6	$m\angle 1 + m\angle 6 = 90$	Substitution (3, 5)
7	$m\angle 2 + m\angle 6 = 90$	Substitution (4, 6)
8	$\angle 2$ and $\angle 6$ are complementary	Defn. complementary

Before beginning proofs with triangles, introduce Theorems such as Interior Angles Theorem, Exterior Angles Theorem, Base Angles of an Isosceles Triangle Theorem, etc.

Suggested set of justifications to get you started

PROPERTIES

Addition Property of Equality
Subtraction Property of Equality
Multiplication Property of Equality
Division Property of Equality
Reflexive Property of Equality
Reflexive Property of Congruence
Symmetric Property of Equality
Symmetric Property of Congruence
Transitive Property of Equality
Transitive Property of Congruence
Substitution

DEFINITIONS

congruent
bisect
midpoint
right angle
complement
supplement

POSTULATES

Angle Addition Postulate
Segment Addition Postulate
Corresponding Angles Postulate (& its Converse)

THEOREMS

Vertical Angles Theorem
Right Angles Theorem
Linear Pair Theorem
Alternate Interior Angles Theorem (& its Converse)
Alternate Exterior Angles Theorem (& its Converse)
Same-Side Interior Angles Theorem (& its Converse)
Same-Side Exterior Angles Theorem (& its Converse)
Triangle Sum Theorem
Base Angles of an Isosceles Triangle Theorem (& its Converse)

Name: _____
Date: _____ Class: _____

1. Given:

Prove:

	Statement	Justification
1		
2		
3		
4		
5		
6		
7		
8		

2. Given:

Prove:

	Statement	Justification
1		
2		
3		
4		
5		
6		
7		
8		

3. Given:

Prove:

	Statement	Justification
1		
2		
3		
4		
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6		
7		
8		

4. Given:

Prove:

	Statement	Justification
1		
2		
3		
4		
5		
6		
7		
8		

Name: _____
Date: _____ Class: _____

Given:

Prove:

	Statement	Justification
1		
2		
3		
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9		
10		

Given:

Prove:

	Statement	Justification
1		
2		
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