

CUT & GLUE SORT



UNDEFINED TERMS, POSTULATES AND THEOREMS

Proof Formats: Is There a Reason, and Does It Allow the Step?

12 steps · two columns, charts and paragraphs · 3 rows

FREE

G		J	B	E
Statement	Reason			
$\angle 1$ and $\angle 2$ are complementary	Given	$\angle 3$ and $\angle 4$ are vertical angles	$\angle 5$ and $\angle 6$ are vertical angles. So $m\angle 5 = m\angle 6$.	$m\angle 7 = 90$
$m\angle 1 + m\angle 2 = 90$	Definition of complementary angles	$\downarrow$ Definition of vertical angles		$\downarrow$ Definition of a right angle
		$m\angle 3 = m\angle 4$		$\angle 7$ is a right angle

Cut & Glue Sort — how to run it

25 minutes

1. Give each student pages 3 and 4, and scissors and glue.
2. Say this once: *“Cut out the twelve steps. For each one, find the reason next to it. Glue the step in the row that says what is true about its reason.”*
3. Let them work. Nothing else is needed.

Rows	page 3, one per student.
Pieces	page 4, one per student. Students cut.
Answers	page 5 — yours.

Every row gets four pieces. A row with more or fewer has a piece in the wrong place.

Every row holds all three proof formats: two columns, a chart and a paragraph. So the look of a piece never tells its row. Many students believe that the layout makes a proof. It does not. The reasons do.

The third row is the main point of this lesson. Every step in it is correct mathematics, but it still proves nothing, because no reason is written next to it. In two of its pieces the proof is a paragraph. For example, “ $\angle 5$ and $\angle 6$ are vertical angles. So $m\angle 5 = m\angle 6$.” states a fact, but it gives no reason for it.

The second row holds reasons that students often confuse with the right one. One piece uses the definition of vertical angles where the step needs “Vertical angles have equal measure.” One calls a linear pair complementary. One uses the Addition Property for a step that subtracts. One uses “Linear pairs are supplementary” for two angles that are only said to be supplementary.



This is the free lesson this activity came from. The worksheet, the full answers and the lesson plan are on it, at three levels of difficulty.

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Cut & Glue Sort — is there a reason?

Rows

Name _____

Period _____

Date _____

Each piece is one step of a proof. Look at the step and the reason next to it. Glue the piece in the row that is true for it.

A reason is the name of a definition, a postulate, a property, or a statement the course has proved. In two columns, it is in the right-hand column. In a chart, it is written on the arrow. In a paragraph, the sentence names it, for example “by the definition of complementary angles”.

Correct: the reason next to the step allows it.

Wrong: there is a reason, but it does not allow this step.

Wrong: the step has no reason next to it.

Cut & Glue Sort — the pieces

Cut on the dashed lines

Cut out each piece on its dashed line. A step is correct math on every piece. Only the reason changes.

G		C		K		E	
Statement	Reason	Statement	Reason	Statement	Reason	Statement	Reason
$\angle 1$ and $\angle 2$ are complementary	Given	$\angle 3$ and $\angle 4$ are vertical angles		$\angle 5$ and $\angle 6$ form a linear pair. So		$m\angle 7 = 90$	
$m\angle 1 + m\angle 2 = 90$	Definition of complementary angles	↓ Vertical angles have equal measure		$m\angle 5 + m\angle 6 = 180$, because linear pairs are supplementary.		↓ Definition of a right angle	
		$m\angle 3 = m\angle 4$				$\angle 7$ is a right angle	

A		J		F		L	
Statement	Reason	Statement	Reason	Statement	Reason	Statement	Reason
$\angle 1$ and $\angle 2$ form a linear pair	Given	$\angle 3$ and $\angle 4$ are vertical angles		$m\angle 5 + 40 = 90$. So		$\angle 7$ and $\angle 8$ are supplementary	Given
$m\angle 1 + m\angle 2 = 180$	Definition of complementary angles	↓ Definition of vertical angles		$m\angle 5 = 50$, by the Addition Property of Equality.		$m\angle 7 + m\angle 8 = 180$	Linear pairs are supplementary
		$m\angle 3 = m\angle 4$					

D		H		B		I	
Statement	Reason	Statement	Reason	Statement	Reason	Statement	Reason
$\angle 1$ and $\angle 2$ are supplementary	Given	$\angle 3$ and $\angle 4$ are congruent		$\angle 5$ and $\angle 6$ are vertical angles. So $m\angle 5 = m\angle 6$.		$m\angle 7 + 35 = 90$. Then	
$m\angle 1 + m\angle 2 = 180$		↓				$m\angle 7 = 55$.	
		$m\angle 3 = m\angle 4$					



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Row 1: C E G K • Row 2: A F J L • Row 3: B D H I

Correct: the reason next to the step allows it.

C (chart): $\angle 3$ and $\angle 4$ are vertical angles $\rightarrow m\angle 3 = m\angle 4$. Printed: Vertical angles have equal measure.

1 **E** (chart): $m\angle 7 = 90 \rightarrow \angle 7$ is a right angle. Printed: Definition of a right angle.

G (two columns): $\angle 1$ and $\angle 2$ are complementary $\rightarrow m\angle 1 + m\angle 2 = 90$. Printed: Definition of complementary angles.

K (paragraph): $\angle 5$ and $\angle 6$ form a linear pair $\rightarrow m\angle 5 + m\angle 6 = 180$. Printed: Linear pairs are supplementary.

Wrong: there is a reason, but it does not allow this step.

A (two columns): $\angle 1$ and $\angle 2$ form a linear pair $\rightarrow m\angle 1 + m\angle 2 = 180$. Printed: Definition of complementary angles. It needs: Linear pairs are supplementary.

2 **F** (paragraph): $m\angle 5 + 40 = 90 \rightarrow m\angle 5 = 50$. Printed: Addition Property of Equality. It needs: Subtraction Property of Equality.

J (chart): $\angle 3$ and $\angle 4$ are vertical angles $\rightarrow m\angle 3 = m\angle 4$. Printed: Definition of vertical angles. It needs: Vertical angles have equal measure.

L (two columns): $\angle 7$ and $\angle 8$ are supplementary $\rightarrow m\angle 7 + m\angle 8 = 180$. Printed: Linear pairs are supplementary. It needs: Definition of supplementary angles.

Wrong: the step has no reason next to it.

B (paragraph): $\angle 5$ and $\angle 6$ are vertical angles $\rightarrow m\angle 5 = m\angle 6$. No reason printed. It needs: Vertical angles have equal measure.

3 **D** (two columns): $\angle 1$ and $\angle 2$ are supplementary $\rightarrow m\angle 1 + m\angle 2 = 180$. No reason printed. It needs: Definition of supplementary angles.

H (chart): $\angle 3$ and $\angle 4$ are congruent $\rightarrow m\angle 3 = m\angle 4$. No reason printed. It needs: Definition of congruent angles.

I (paragraph): $m\angle 7 + 35 = 90 \rightarrow m\angle 7 = 55$. No reason printed. It needs: Subtraction Property of Equality.