

CUT & GLUE SORT



CONDITIONAL STATEMENTS AND TRUTH VALUE

Does This Case Show the If-Then Statement Is False?

12 pieces · 3 rows · a case must make the if part true

FREE

A If a month has 31 days, then it is July. Case: July (31 days)	B If a number is a multiple of 4, then it is a multiple of 8. Case: the number 12	C If a person lives in Texas, then that person lives in Houston. Case: a person who lives in Miami, Florida	D If two angles are supplementary, then one of them is obtuse. Case: two angles of 90° and 90°
E If a number is a multiple of 4, then it is a multiple of 8. Case: the number 6	F If a person lives in Texas, then that person lives in Houston. Case: a person who lives in Houston, Texas	G If a month has 31 days, then it is July. Case: March (31 days)	H If two angles are supplementary, then one of them is obtuse. Case: two angles of 100° and 30°

Cut & Glue Sort — how to run it

25 minutes, the cutting included

1. **Hand out pages 3 and 4.** Students cut out the 12 pieces on page 4.
2. **Say this once:** *“A case shows an if-then statement is false only when the if part is true and the then part is false. If the if part is not true, the case tells you nothing.”*
3. **Students glue each piece in the row that says what its case does.** Every row gets 4 pieces.

Student sheets	pages 3 (the rows) and 4 (the pieces), one of each per student.
Answers	page 5: the letters in each row, and why.

Row 1 is the counterexample from the last lesson, under a new name. Say this link out loud once. Row 1 holds exactly the cases the class learned to call counterexamples.

Row 3 is the hardest idea in the lesson. A statement says nothing about a case that its if part does not cover. The number 6 is not a multiple of 8. But it is not a multiple of 4 either, so it says nothing about “if a number is a multiple of 4, then it is a multiple of 8”. Students argue with this rule more than with any other. The rule has a reason. A promise of a reward for finishing homework is not broken by someone who never started.

The same statement is in every row. Each of the 4 statements comes with three cases, one for each row, so the words of the statement never decide the row. A student who ignores the if part puts every case with a false then part in row 1. That student gets only 8 of the 12 pieces right and puts nothing in row 3.

All 4 statements are false. Each one has a case in row 1, and only a false statement can have one. So every case in row 2 agrees with a false statement. A case that agrees with a statement proves nothing. One case in row 3 (two angles of 100° and 30°) makes the then part true. So a true then part alone does not put a piece in row 2.

Every fact a case needs is on the piece: the days in the month, the state the city is in, the two angle measures. No outside knowledge is needed.



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.

chooseyourlesson.com — 135 free geometry lessons.

Cut & Glue Sort

What does the case show?

Name _____

Period _____

Date _____

Each piece has an if-then statement and one case. Decide what the case does to the statement. Glue the piece in the row that says it.

Check the if part first. Is it true for the case? Then check the then part.

1. Correct: this case shows the statement is false.

The if part is true. The then part is false.

2. Wrong: both parts are true for this case.

It does not show the statement is false.

3. Wrong: the if part is not true for this case.

So this case cannot show that the statement is false.

Cut & Glue Sort — the pieces

Cut along the dashed lines

Cut out the 12 pieces. Read each statement and its case. Then glue the piece in a row on the other sheet.

A If a month has 31 days, then it is July. Case: July (31 days)	B If a number is a multiple of 4, then it is a multiple of 8. Case: the number 12	C If a person lives in Texas, then that person lives in Houston. Case: a person who lives in Miami, Florida	D If two angles are supplementary, then one of them is obtuse. Case: two angles of 90° and 90°
E If a number is a multiple of 4, then it is a multiple of 8. Case: the number 6	F If a person lives in Texas, then that person lives in Houston. Case: a person who lives in Houston, Texas	G If a month has 31 days, then it is July. Case: March (31 days)	H If two angles are supplementary, then one of them is obtuse. Case: two angles of 100° and 30°
I If a person lives in Texas, then that person lives in Houston. Case: a person who lives in Dallas, Texas	J If two angles are supplementary, then one of them is obtuse. Case: two angles of 120° and 60°	K If a number is a multiple of 4, then it is a multiple of 8. Case: the number 16	L If a month has 31 days, then it is July. Case: April (30 days)



135 free geometry lessons: worksheets, worked answers and lesson plans.
chooseyourlesson.com

Cut & Glue Sort — answers

For the teacher

1 **Correct: this case shows the statement is false.**

B: the number 12 (if part true, then part false)

D: two angles of 90° and 90° (if part true, then part false)

G: March (31 days) (if part true, then part false)

I: a person who lives in Dallas, Texas (if part true, then part false)

2 **Wrong: both parts are true for this case.**

A: July (31 days) (if part true, then part true)

F: a person who lives in Houston, Texas (if part true, then part true)

J: two angles of 120° and 60° (if part true, then part true)

K: the number 16 (if part true, then part true)

3 **Wrong: the if part is not true for this case.**

C: a person who lives in Miami, Florida (if part NOT true, then part false)

E: the number 6 (if part NOT true, then part false)

H: two angles of 100° and 30° (if part NOT true, then part true)

L: April (30 days) (if part NOT true, then part false)

What “Correct” and “Wrong” mean in the row names. They say whether the case is a correct counterexample, that is, whether it shows the statement is false. They do not mean the piece is in the wrong place: a piece in row 2 or 3 is sorted right when its case does not show the statement is false.

The 4 statements. Each one has one case in every row.

- If a number is a multiple of 4, then it is a multiple of 8.
- If two angles are supplementary, then one of them is obtuse.
- If a month has 31 days, then it is July.
- If a person lives in Texas, then that person lives in Houston.