

CUT & GLUE SORT



CONVERSE, INVERSE AND CONTRAPOSITIVE

The Rule Is True. What Does This Fact Tell You?

12 pieces · 3 rows · the contrapositive, and the converse that does not follow

FREE

A Rule: If a figure is a square, then it is a rectangle. Fact: Figure K is a square.	B Rule: If a number is a multiple of 12, then it is a multiple of 4. Fact: Kai's number is not a multiple of 4.	C Rule: If a number is not even, then it is not a multiple of 10. Fact: Lee's number is even.	D Rule: If a person does not live in Texas, then that person does not live in Houston. Fact: Maya lives in Houston.
E Rule: If a number is a multiple of 12, then it is a multiple of 4. Fact: Kai's number is a multiple of 4.	F Rule: If a figure is a square, then it is a rectangle. Fact: Figure K is not a rectangle.	G Rule: If a number is not even, then it is not a multiple of 10. Fact: Lee's number is not even.	H Rule: If a person does not live in Texas, then that person does not live in Houston. Fact: Maya does not live in Houston.

Cut & Glue Sort — how to run it

25 minutes, with the cutting

1. **Hand out pages 3 and 4, one of each per student.** Students need scissors and glue. Nothing else is needed.
2. **Say this once:** *“The rule is true. If the then part is false, the if part must be false too. If the then part is true, or the if part is false, the rule tells you nothing.”*
3. **Check the rows with page 5.** Every row gets 4 pieces.

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

Row 1 uses the contrapositive. The rule is true, and the fact says that the then part is false. So the if part must be false too. Students will need this step later, when they write proofs.

Row 3 holds the two most common mistakes. A student who thinks “the then part is true, so the if part is true” is using the converse. A student who thinks “the if part is false, so the then part is false” is using the inverse. Neither one follows from a true rule. Each fact is about a number, a person or a figure that we know nothing else about, so only the rule can help. Each of the four rules has one piece in each row, so the rule alone never tells a student the row.

The word not does not decide the row. Two of the four rules already have not in both parts. A student who reads not as “false” gets only 6 of the 12 pieces right, and no simple guessing rule gets more than 8.



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

The rule is true. What does the fact tell you?

Name _____

Period _____

Date _____

**Each piece has a true rule and a fact about one number, person or figure.
Decide what the fact tells you. Glue the piece in the row that says it.**

First find the part of the rule that the fact talks about. Then check: does the fact say that this part is true, or that it is false?

1. It follows that the if part is false.

The fact says the then part is false. So the if part cannot be true.

2. It follows that the then part is true.

The fact says the if part is true. So the then part is true too.

3. Nothing follows about the other part.

The fact says the then part is true, or the if part is false. The rule does not decide the other part.

Cut & Glue Sort — the pieces

Cut along the dashed lines

Original: If P, then Q.	swap the parts →	Converse: If Q, then P.
↓ <i>deny both parts</i>		↓ <i>deny both parts</i>
Inverse: If not P, then not Q.	swap the parts →	Contrapositive: If not Q, then not P.
To deny a part , put in the word not. If the part already has not, take it out. “Not obtuse” does not mean “acute”.		

Cut out the 12 pieces. Read the rule and the fact on each one. Then glue the piece in a row on the other sheet.

A Rule: If a figure is a square, then it is a rectangle. Fact: Figure K is a square.	B Rule: If a number is a multiple of 12, then it is a multiple of 4. Fact: Kai’s number is not a multiple of 4.	C Rule: If a number is not even, then it is not a multiple of 10. Fact: Lee’s number is even.	D Rule: If a person does not live in Texas, then that person does not live in Houston. Fact: Maya lives in Houston.
E Rule: If a number is a multiple of 12, then it is a multiple of 4. Fact: Kai’s number is a multiple of 4.	F Rule: If a figure is a square, then it is a rectangle. Fact: Figure K is not a rectangle.	G Rule: If a number is not even, then it is not a multiple of 10. Fact: Lee’s number is not even.	H Rule: If a person does not live in Texas, then that person does not live in Houston. Fact: Maya does not live in Houston.
I Rule: If a number is a multiple of 12, then it is a multiple of 4. Fact: Kai’s number is a multiple of 12.	J Rule: If a number is not even, then it is not a multiple of 10. Fact: Lee’s number is a multiple of 10.	K Rule: If a figure is a square, then it is a rectangle. Fact: Figure K is not a square.	L Rule: If a person does not live in Texas, then that person does not live in Houston. Fact: Maya does not live in Texas.



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Cut & Glue Sort — answers

For the teacher

row	what follows, piece by piece	pieces
1	It follows that the if part is false. B: Kai's number is not a multiple of 4, so the if part is false. D: Maya lives in Houston, so the if part is false. F: Figure K is not a rectangle, so the if part is false. J: Lee's number is a multiple of 10, so the if part is false.	B, D, F, J
2	It follows that the then part is true. A: Figure K is a square, so the then part is true. G: Lee's number is not even, so the then part is true. I: Kai's number is a multiple of 12, so the then part is true. L: Maya does not live in Texas, so the then part is true.	A, G, I, L
3	Nothing follows about the other part. C: Lee's number is even, so nothing follows. E: Kai's number is a multiple of 4, so nothing follows. H: Maya does not live in Houston, so nothing follows. K: Figure K is not a square, so nothing follows.	C, E, H, K

The four rules. If a figure is a square, then it is a rectangle. If a number is a multiple of 12, then it is a multiple of 4. If a number is not even, then it is not a multiple of 10. If a person does not live in Texas, then that person does not live in Houston.