

MYSTERY PICTURE



CONVERSE, INVERSE AND CONTRAPOSITIVE

Converse, Inverse or Contrapositive?

Name the Sentence

25 squares · 5 original sentences · swap the parts, deny both parts

FREE

Row 1 original: If a figure is a square, then it is a rectangle.	¹ If a figure is not a square, then it is not a rectangle. Is this the contrapositive?	² If a figure is a rectangle, then it is a square. Is this the contrapositive?	³ If a figure is not a rectangle, then it is not a square. Is this the contrapositive?	⁴ If a figure is a rectangle, then it is a square. Is this the converse?	⁵ If a figure is a rectangle, then it is not a square. Is this the contrapositive?
Row 2 original: If a figure is not a polygon, then it is not a triangle.	⁶ If a figure is a polygon, then it is a triangle. Is this the converse?	⁷ If a figure is not a triangle, then it is not a polygon. Is this the contrapositive?	⁸ If a figure is a triangle, then it is a polygon. Is this the contrapositive?	⁹ If a figure is a polygon, then it is a triangle. Is this the contrapositive?	¹⁰ If a figure is not a triangle, then it is not a polygon. Is this the converse?
Row 3 original: If you are a member, then you get free shipping.	¹¹ If you get free shipping, then you are a member. Is this the contrapositive?	¹² If you are not a member, then you do not get free shipping. Is this the converse?	¹³ If you do not get free shipping, then you are not a member. Is this the contrapositive?	¹⁴ If you get free shipping, then you are not a member. Is this the converse?	¹⁵ If you do not get free shipping, then you are not a member. Is this the inverse?
Row 4 original: If an angle measures 47° , then it is acute.	¹⁶ If an angle is acute, then it measures 47° . Is this the converse?	¹⁷ If an angle does not measure 47° , then it is not acute. Is this the inverse?	¹⁸ If an angle is not acute, then it does not measure 47° . Is this the contrapositive?	¹⁹ If an angle does not measure 47° , then it is not acute. Is this the contrapositive?	²⁰ If an angle is not acute, then it does not measure 47° . Is this the inverse?
Row 5 original: If two angles are vertical angles, then they are congruent.	²¹ If two angles are not congruent, then they are not vertical angles. Is this the contrapositive?	²² If two angles are congruent, then they are vertical angles. Is this the converse?	²³ If two angles are not vertical angles, then they are not congruent. Is this the inverse?	²⁴ If two angles are not congruent, then they are not vertical angles. Is this the inverse?	²⁵ If two angles are vertical angles, then they are not congruent. Is this the inverse?

Mystery Picture — how to run it

25–35 minutes

1. **Hand out page 3, one per student.** Nothing else is needed.
2. **Say this once:** *“The converse swaps the two parts. The inverse puts not in both parts. The contrapositive does both.”*
3. **Check the picture on page 4.** A correct sheet shows a musical note, with 11 squares filled.

Student sheet page 3, one per student.

Answers page 4: the picture and the name of every sentence.

Each row has its own original sentence, and nothing has to be written. Students only name the sentences. This shows clearly whether a student mixes up the converse and the inverse. When students write the sentences themselves, this mistake is often harder to see.

The white squares show the common mistakes. In 2 of them, the square asks for the converse and the sentence is the inverse, or the other way round. A student who mixes up these two names gets 8 squares wrong. In 6, the inverse and the contrapositive are mixed up. This catches a student who puts in the nots but forgets to swap the parts. In 3, the square asks for the contrapositive and the sentence is the converse. This catches a student who swaps the parts but forgets the nots. In 3, the sentence puts not in only one of its parts, so it is none of the three.

Counting the nots does not work. One of the five original sentences already has not in both parts, so there the converse has two nots and the inverse has none. A student who names sentences only by their nots, or only by the order of the parts, gets at least 6 squares wrong, and the picture is clearly wrong.

No square asks whether a sentence is true. The squares are about the three names only.



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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Mystery Picture

Converse, inverse or contrapositive?

Name _____

Period _____

Date _____

Each row has its own original sentence, at the left. Answer the question in each square. If the answer is yes, fill the square with slanted lines. If the answer is no, leave it white. When you finish, a picture appears. If part of it looks wrong, check that square again.

Original: If P, then Q.	swap the parts →	Converse: If Q, then P.
↓ deny both parts		↓ deny both parts
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".

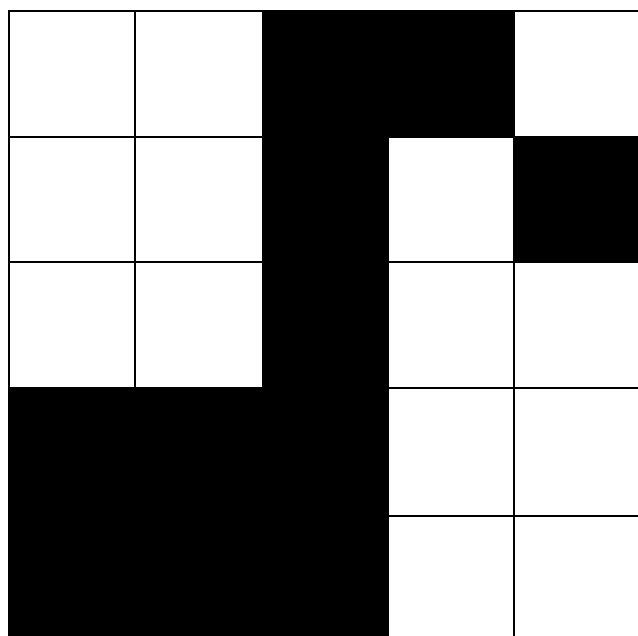
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Mystery Picture — answers

For the teacher



A musical note: 11 squares filled.

1. Asks for the contrapositive. The sentence is the inverse. Leave white.	2. Asks for the contrapositive. The sentence is the converse. Leave white.	3. Asks for the contrapositive. The sentence is the contrapositive. Fill.	4. Asks for the converse. The sentence is the converse. Fill.	5. Asks for the contrapositive. The sentence is none of the three. Leave white.
6. Asks for the converse. The sentence is the inverse. Leave white.	7. Asks for the contrapositive. The sentence is the converse. Leave white.	8. Asks for the contrapositive. The sentence is the contrapositive. Fill.	9. Asks for the contrapositive. The sentence is the inverse. Leave white.	10. Asks for the converse. The sentence is the converse. Fill.
11. Asks for the contrapositive. The sentence is the converse. Leave white.	12. Asks for the converse. The sentence is the inverse. Leave white.	13. Asks for the contrapositive. The sentence is the contrapositive. Fill.	14. Asks for the converse. The sentence is none of the three. Leave white.	15. Asks for the inverse. The sentence is the contrapositive. Leave white.
16. Asks for the converse. The sentence is the converse. Fill.	17. Asks for the inverse. The sentence is the inverse. Fill.	18. Asks for the contrapositive. The sentence is the contrapositive. Fill.	19. Asks for the contrapositive. The sentence is the inverse. Leave white.	20. Asks for the inverse. The sentence is the contrapositive. Leave white.
21. Asks for the contrapositive. The sentence is the contrapositive. Fill.	22. Asks for the converse. The sentence is the converse. Fill.	23. Asks for the inverse. The sentence is the inverse. Fill.	24. Asks for the inverse. The sentence is the contrapositive. Leave white.	25. Asks for the inverse. The sentence is none of the three. Leave white.