

MAZE



CONVERSE, INVERSE AND CONTRAPOSITIVE

Converse, Inverse, Contrapositive: Pick the Right Sentence

8 boxes · swap the parts, deny both parts, or both · no dead ends

FREE

3

Original: If a triangle is equilateral, then it is isosceles. Which sentence is the converse?

- If a triangle is not equilateral, then it is not isosceles. **Go to box 6.**
- If a triangle is isosceles, then it is equilateral. **Go to box 8.**

Hint: Look at the part right after If.

8

Original: If a figure is a rhombus, then it is a parallelogram. Which sentence is the inverse?

- If a figure is not a rhombus, then it is not a parallelogram. **Go to box 5.**
- If a figure is a parallelogram, then it is a rhombus. **Go to box 7.**

Hint: Look at the part right after If.

5

Original: If a figure is not a quadrilateral, then it is not a square. Which sentence is the contrapositive?

- If a figure is not a square, then it is not a quadrilateral. **Go to box 6.**
- If a figure is a square, then it is a quadrilateral. **Go to box 1.**

Hint: Look for not in each part.

1

Original: If you live in Houston, then you live in Texas. Which sentence is the contrapositive?

- If you do not live in Houston, then you do not live in Texas. **Go to box 7.**
- If you do not live in Texas, then you do not live in Houston. **Go to box 4.**

Hint: Look at the part right after If.

1. **Hand out page 3.** Students start at box 3. 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. **Students write each box number in the row at the bottom.** A clean run is 3, 8, 5, 1, 4, 2, then Finish.

Student sheet page 3, one per student.

Answers page 4: the route, and the right sentence in every box.

The wrong sentence in each box is a common mistake. Where the box asks for the converse, the wrong sentence is usually the inverse, and the other way round. Mixing up these two names is the most common mistake in this lesson. A student who does it goes wrong at step 1 of the route. Where the box asks for the contrapositive, the wrong sentence is the inverse or the converse. The inverse puts in the nots but does not swap the parts. The converse swaps the parts but does not put in the nots.

Students must check two things: are the parts swapped, and where are the nots? In boxes 4 and 5, both sentences have their parts in the same order, so the order alone cannot decide. Two of the eight original sentences already have not in both parts, so counting the nots does not work either. Every simple guessing rule, such as always taking the first answer, goes wrong within the first four steps.

No box is a dead end. The two boxes off the route (6 and 7) look like every other box. Their right answer leads back onto the route. A clean run has 6 numbers. A longer row shows that the student made a mistake and found the way back.



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.

Name _____

Period _____

Date _____

Start at box 3. Choose the sentence the box asks for. Go to the box it names.

Original: If P, then Q.

↓ *deny both parts*

Inverse: If not P, then not Q.

swap the parts →

swap the parts →

Converse: If Q, then P.

↓ *deny both 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".

1

Original: If you live in Houston, then you live in Texas. Which sentence is the contrapositive?

- If you do not live in Houston, then you do not live in Texas. **Go to box 7.**
- If you do not live in Texas, then you do not live in Houston. **Go to box 4.**

Hint: Look at the part right after If.

2

Original: If two angles form a linear pair, then they are supplementary. Which sentence is the inverse?

- If two angles are not supplementary, then they do not form a linear pair. **Go to box 4.**
- If two angles do not form a linear pair, then they are not supplementary. **Go to Finish.**

Hint: Look at the part right after If.

3

Original: If a triangle is equilateral, then it is isosceles. Which sentence is the converse?

- If a triangle is not equilateral, then it is not isosceles. **Go to box 6.**
- If a triangle is isosceles, then it is equilateral. **Go to box 8.**

Hint: Look at the part right after If.

4

Original: If it is raining, then the ground is wet. Which sentence is the converse?

- If the ground is not wet, then it is not raining. **Go to box 1.**
- If the ground is wet, then it is raining. **Go to box 2.**

Hint: Look for not in each part.

5

Original: If a figure is not a quadrilateral, then it is not a square. Which sentence is the contrapositive?

- If a figure is not a square, then it is not a quadrilateral. **Go to box 6.**
- If a figure is a square, then it is a quadrilateral. **Go to box 1.**

Hint: Look for not in each part.

6

Original: If a number is not even, then it is not a multiple of 6. Which sentence is the converse?

- If a number is not a multiple of 6, then it is not even. **Go to box 8.**
- If a number is even, then it is a multiple of 6. **Go to box 3.**

Hint: Look at the part right after If.

7

Original: If an angle is a right angle, then it measures 90° . Which sentence is the contrapositive?

- If an angle does not measure 90° , then it is not a right angle. **Go to box 5.**
- If an angle is not a right angle, then it does not measure 90° . **Go to box 8.**

Hint: Look at the part right after If.

8

Original: If a figure is a rhombus, then it is a parallelogram. Which sentence is the inverse?

- If a figure is not a rhombus, then it is not a parallelogram. **Go to box 5.**
- If a figure is a parallelogram, then it is a rhombus. **Go to box 7.**

Hint: Look at the part right after If.

Write each box number here, in order, as you go. Start with 3.

--	--	--	--	--	--	--	--	--	--



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

Maze — answers

For the teacher

The route: $3 \rightarrow 8 \rightarrow 5 \rightarrow 1 \rightarrow 4 \rightarrow 2 \rightarrow \text{Finish}$. Boxes 6 and 7 are off the route. A student reaches them only after a wrong answer.

Box	Place on the route	The right sentence	Next box
3	step 1	The converse: If a triangle is isosceles, then it is equilateral. The other sentence is the inverse.	Right: box 8 Wrong: box 6
8	step 2	The inverse: If a figure is not a rhombus, then it is not a parallelogram. The other sentence is the converse.	Right: box 5 Wrong: box 7
5	step 3	The contrapositive: If a figure is a square, then it is a quadrilateral. The other sentence is the converse.	Right: box 1 Wrong: box 6
1	step 4	The contrapositive: If you do not live in Texas, then you do not live in Houston. The other sentence is the inverse.	Right: box 4 Wrong: box 7
4	step 5	The converse: If the ground is wet, then it is raining. The other sentence is the contrapositive.	Right: box 2 Wrong: box 1
2	step 6	The inverse: If two angles do not form a linear pair, then they are not supplementary. The other sentence is the contrapositive.	Right: Finish Wrong: box 4
6	off the route	The converse: If a number is not a multiple of 6, then it is not even. The other sentence is the inverse.	Right: box 8 Wrong: box 3
7	off the route	The contrapositive: If an angle does not measure 90°, then it is not a right angle. The other sentence is the inverse.	Right: box 5 Wrong: box 8