5.4 Inverses and Contrapositives Date: \_\_\_\_\_\_\_

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| **Learning Targets** | **Help!** | **I’m getting there…** | **I’m almost there…** | **Yes! I totally got this! ☺** |
| 1. I can write the converse of a conditional statement. |  |  |  |  |
| 2. I can write the inverse of a conditional statement. |  |  |  |  |
| 3. I can write the contrapositive of a conditional statement. |  |  |  |  |
| 4. I can determine the truth of a statement. |  |  |  |  |
| 5. I can provide a counterexample to show a statement is false. |  |  |  |  |

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| --- | --- | --- |
| **Conditional Statements:** | **Symbolic Form:** | **Meaning:** |
| Conditional | p → q | If p, then q |
| Converse | q → p | If q, then p |
| Inverse | not p → not q | If not p, then not q |
| Contrapositive | not q → not p | If not q, then not p |



Ex 1: If an angle has a measure of 90°, then it is a right angle.



Converse: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Inverse: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Contrapositive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



TRY 1: If a figure is a square, then it has 4 congruent sides.



Converse: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Inverse: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Contrapositive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Truth Value:**

Inverse: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Contrapositive: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Deductive Reasoning:**

* Logical reasoning
* Given statements to a conclusion

Ex 2: An auto mechanic knows that if a car has a dead battery, then it won’t start. They begin work on a car and the battery is dead. What can you conclude?



The car won’t start!

**Law of Detachment**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Ex 3: If M is the midpoint of a segment, then it divides the segment into two congruent segments.



M is the midpoint of segment AB



Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Ex 4: If I study for 3 hours, then I get an A on my test.



a. I studied for 3 hours.



Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



b. I got an A on my test.



Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



**Law of Syllogism:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Ex 5: If I stay up late, then I am tired in the morning. If I am tired in the morning, then I oversleep.



Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



Ex 6: If I pass the driving test, then I get my license. If I want to use the car, then I have to get my license.



Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



TRY 2: Make a conclusion from the following statements and state the law that allows that conclusion.



1. If a road is icy, then driving conditions are hazardous.



LaGrange Road is icy.



The driving conditions on LaGrange Rd are hazardous



1. If a number ends in 6, then it is divisible by 2. If a number ends in 4, then it is divisible by 2.



No Conclusion!



Challenge: If I pass the driving test, then I get my license. If I get my license, then I want to use the car. If I want to use the car, then I need to be nice to my parents.

Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Challenge: If you practice, then your basketball game imporves. If you don’t practice, then you don’t make the team. (HINT: Consider all contrapositives.)

Conclusion: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_