G1 Topic Breakdown
SOL - Geometry
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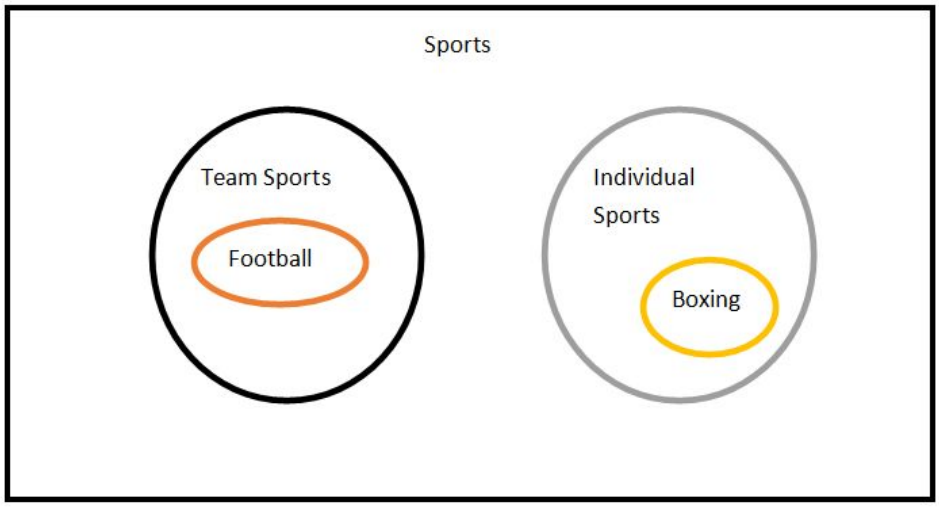
Identifying the converse, inverse, and contrapositive of a statement

Original Statement - If *p*, then *q*
Converse → If *q*, then *p*
Inverse → If not *p*, then not *q*
Contrapositive → If not *q*, then not *q*

Statement	Symbolic Form
Original **If the football team is the Redskins, then Kirk Cousins is the quarterback**	**P→ Q** **P: The football team is the Redskins** **Q: Kirk Cousins is the quarterback**
Inverse If the football team is **not** the Redskins, then Kirk Cousins is **not** the quarterback	**~P→ ~Q**
Converse If Kirk Cousins is the quarterback, then the Redskins is the football team	**Q→P**
Contrapositive If the quarterback is **not** Kirk Cousins then the football team is **not** the Redskins	**~Q→~P**

Statement	Symbolic Form
Original **If the Cavs are the last team standing, then they are the champions**	**P→ Q** **P:** The Cavs are the last team standing **Q:** They are the champions
Inverse If the Cavs are **not** the last team standing, then they are **not** the champions	**~P→ ~Q**
Converse If they are the champions, then the Cavs are the last team standing.	**Q→P**
Contrapositive If they are **not** the champions, then the Cavs are **not** the last team standing.	**~Q→~P**

Using venn diagrams to represent set relationships:



Statement
If it is football, then it is a team sport.
ALWAYS TRUE

Inverse
If it is not football, then it is not a team sport
NOT ALWAYS TRUE

Converse
If it is a team sport, then it is football
NOT ALWAYS TRUE

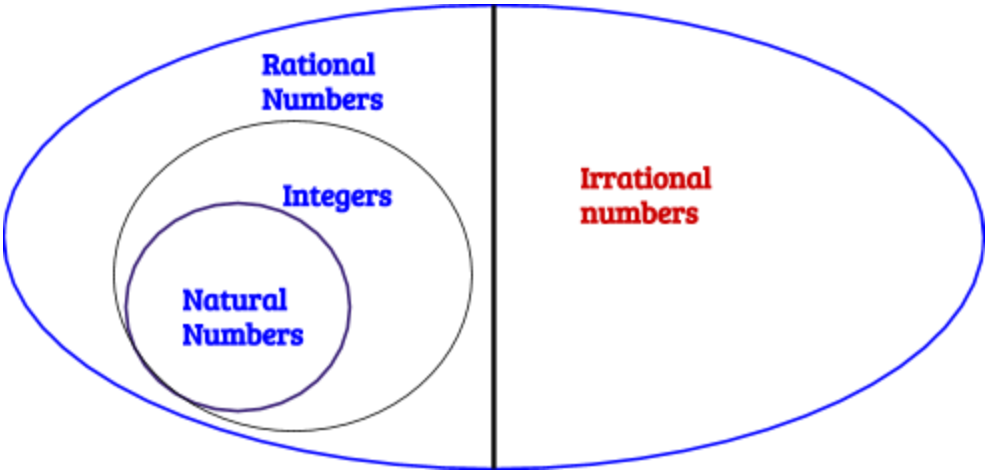
Contrapositive
If it is not a team sport, then it is not football
ALWAYS TRUE

Statement
If it is boxing, then it is an individual sport.
ALWAYS TRUE

Inverse
If it is not boxing, then it is not an individual sport.
NOT ALWAYS TRUE

Converse
If it is an individual sport, then it is boxing.
NOT ALWAYS TRUE

Contrapositive
If it is not an individual sport, then it is not boxing.
ALWAYS TRUE



Statement
If a natural number, then a rational number.
ALWAYS TRUE

Inverse
If not a natural number, then not a rational number.
NOT ALWAYS TRUE

Converse
If a rational number, then a natural number.
NOT ALWAYS TRUE

Contrapositive
If not a rational number, then not a natural number.
ALWAYS TRUE

Determine if the following statements are true:

If a natural number, then not an irrational number→	**True**
If an integer, then an irrational number →	**False**
If not an irrational number, then not a natural number→	**False**
If not a rational number, then an irrational number →	**True**

The Law of Syllogism

If p→ then q
If q→ then s
Therefore p→ s

If it is winter, it will likely be below freezing temperature.

If it is below freezing temperature, it will likely snow.

Conclusion ***If it is winter, it will likely snow.***

If there is school today, I will be assigned homework.
If I am assigned homework, I will have less time to sleep.

Conclusion ***If there is school today, I will have less time to sleep.***

The Law of Detachment

Given → p
If p → q
Q

Nina is a dog.
Dogs like treats.

Conclusion ***Nina likes treats.***

The SAT is test.
Tests are important on college applications.

Conclusion ***The SAT is important on college applications.***

Practice

FORM	SYMBOLIC FORM	WRITTEN-OUT FORM
Original	**If P , then Q.**	If it's a dog, then it's a mammal.
Converse	**If Q , then P.**	
Inverse	**If ~P , then ~Q.**	
Contrapositive	**If ~Q , then ~P.**	

Practice Problems

G.1 Review

1. Find the contrapositive to the following statement: **If I studied for the test, I will receive a good grade.**

A) I will not receive a good grade if I did not study for the test.
B) I will receive a good grade if I studied for the test.
C) If I studied for the test, I will not receive a good grade.
D) If I did not study for the test, I will get a good grade.

2. Which of the following statements is always true?

A) Converse
B) Inverse
C) Contrapositive
D) Contranegative

3. The inverse of a statement goes as follows: **I will not go for a run today if it rains outside.** Find the original statement.

A) If it does not rain outside, I will not go for a run.
B) If it rains outside, I will not go for a run today.
C) I will not go for a run today if it does not rain outside.
D) I will go for a run today if it does not rain outside.

4. **If a shape is a triangle, the shape has 180 degrees**. Find the converse to this statement.

A) The shape does not have 180 degrees if it is not a triangle.
B) The shape has 180 degrees if the shape is a triangle.
C) If a shape is a triangle, the shape does not have 180 degrees
D) If a shape is not a triangle, it has 180 degrees.

5. **If a shape has four right angles, it is a rectangle. If a shape is a rectangle, it is not a circle.** The Law of Syllogism states:

A) If a shape has four right angles, it is not it is not a circle.
B) If a shape has four angles, it is a circle.
C) If a shape is not a circle, it is a rectangle.
D) If a shape is not a circle, it has four right angles.

6. Let p represent "I will buy a new book."
Let q represent "The bookstore is open."

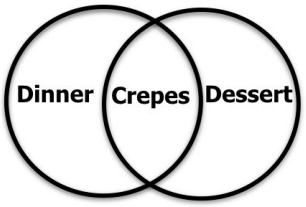
Which of the following symbolic statements represents this statement:
If the bookstore is open, I will buy a new book.

A) P→ Q
B) ~P→ ~Q
C) ~Q→~P
D) Q→P

7. Let p represent "The team won the game."
Let q represent "The team is moving on to finals."

Which of the following symbolic statements represents this statement:
If the team does not win the game, they will not be moving on to finals.

A) P→ Q
B) ~P→ ~Q
C) ~Q→~P
D) Q→P



8. According to the venn diagram above, which of the following statements is true?

A) All crepes are eaten for dessert.
B) All crepes are eaten for dinner.
C) Some crepes are eaten for dessert.
D) No crepes are eaten for both dinner and dessert.

9. Based on the diagram above, which of the following statements is not true?

A) Bakery shops have sweets.
B) Some bakery shops have cupcakes.
C) All sweets are cupcakes.
D) Some cupcakes have sprinkles.

Answer Key: Practice Problems

G.1 Geometry

1.	**A**
2.	**C**
3.	**D**
4.	**B**
5.	**A**
6.	**D**
7.	**B**
8.	**C**
9.	**C**