

Notes: ALGEBRAIC PROPERTIES

Content Objective: I will be able to use algebraic properties to prove logical arguments.

PROPERTIES OF EQUALITY

PROPERTY	ALGEBRAIC EXAMPLE	EXAMPLE
Addition Property	If $a = b$, then $a + c = b + c$	If $x - 3 = 6$, then $x =$ _____
Subtraction Property	If $a = b$, then $a - c = b - c$	If $2x + 12 = 20$, then $2x =$ _____
Multiplication Property	If $a = b$, then $a \cdot c = b \cdot c$	If $\frac{x}{4} = -2$, then $x =$ _____
Division Property	If $a = b$, then $\frac{a}{c} = \frac{b}{c}$	If $-6x = 20$, then $x =$ _____

PROPERTY	ALGEBRAIC EXAMPLE	EXAMPLE
Reflexive Property	$a = a$	$3 =$ _____
Symmetric Property	If $a = b$, then $b = a$	If $3 = x$, then _____
Transitive Property	If $a = b$, $b = c$, then $a = c$	If $2 = x$, $x = a$, then _____

Distributive Property	$a(b + c) =$ _____
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Substitution Property	If $x = 3$ and $x + 8$, _____
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Notes: CONDITIONAL STATEMENTS

Content Objective: I will be able to identify the hypothesis and conclusion of a conditional statement and formulate my own conditional statement.

TERM	DEFINITION	EXAMPLE
CONDITIONAL STATEMENT	A statement written in <u>if then</u> format	
HYPOTHESIS	The phrase following but NOT INCLUDING the word <u>if</u>	
CONCLUSION	The phrase following but NOT INCLUDING the word <u>then</u>	

EXAMPLE 1: State the hypothesis and conclusion of the conditional statement below:

If you have no more than two absences and a 90-average, then you can be exempt from your final.

Hypothesis:

Conclusion:

QUICK CHECK: State the hypothesis and conclusion of the conditional statement below:

If the sun shines bright, then you will need sunblock.

Hypothesis:

Conclusion:

Notes: INDUCTIVE REASONING

Content Objective: *I will be able to apply inductive reasoning to determine conclusions based on given patterns or sets of observations.*

TERM	DESCRIPTION	EXAMPLE
INDUCTIVE REASONING	The process of arriving at a _____ based on a set of _____.	

EXAMPLE 1:

Complete the patterns.

3, 5, 7, 9, _____, _____

20, 40, 80, 160, _____, _____

$\frac{1}{2}, \frac{1}{3}, \frac{2}{9}, \dots$

QUICK CHECK:

Complete the patterns.
Determine the next terms of the sequences.

2, 5, 9, 14, _____, _____

1, 4, 9, 16, _____, _____

1, 1, 2, 3, 5, 8, 13, 21, _____, _____

ABA, ABB, ABBA, ABBA, ABBBA, _____, _____

Notes: MORE CONDITIONAL STATEMENTS

Content Objective: I will be able to write the converse, inverse, and contrapositive for conditional statements. I will also be able to give counter examples for statements when applicable.

TERM	DEFINITION	EXAMPLE
CONVERSE	Formed by switching the _____ and _____ of a conditional	if q then $\sim p$
INVERSE	Formed by _____ the conditional statement, _____ both hypothesis and conclusion	if not p then not q $\sim p \rightarrow \sim q$
CONTRAPOSITIVE	Formed by _____ the converse, _____ both hypothesis and conclusion	if not q then not p $\sim q \rightarrow \sim p$

A negation is to deny a statement.

The negation of 'an angle is obtuse' is 'an angle is not obtuse'.

$\sim p$ represents 'not p ' or the negation of p

EXAMPLE 1: Write the negation of the following statement.

The sky is blue.

Negation:

QUICK CHECK: Write the negation of the following statement.

A circle is a polygon.

Negation:

Handwritten notes in blue, red, and green ink:

- if q then $\sim p$ (blue)
- if not p then not q (blue)
- $\sim p \rightarrow \sim q$ (red)
- if not q then not p (blue)
- $\sim q \rightarrow \sim p$ (blue)
- if p then q (green)
- $p \rightarrow q$ (green)

Notes: MORE CONDITIONAL STATEMENTS

QUICK CHECK: Rewrite the statement below as a conditional statement, state the hypothesis and conclusion, and then negate both to create the inverse.

Linear pairs of angles add up to 180°

Conditional: if \angle s are L.P. then the \angle s (+) 180 .

Hypothesis: \angle s are LP

Conclusion: the \angle s (+) 180

Inverse: if \angle s are not L.P. then the \angle s (+) is not 180

EXAMPLE 4: Rewrite the statement below as a conditional statement, then write the converse, and use negation to write the inverse and contrapositive.



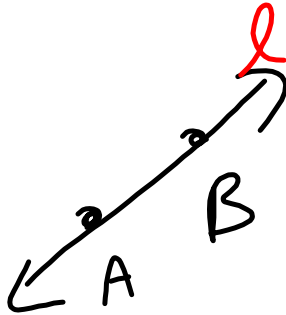


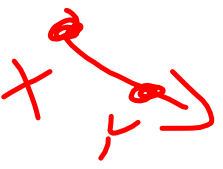
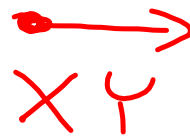
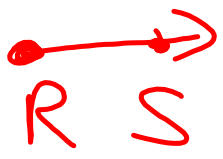

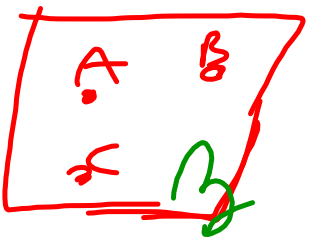
All teenage girls like Justin Bieber.

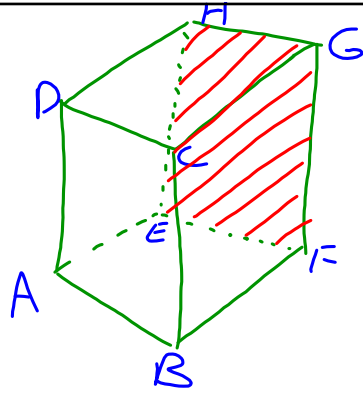
Conditional: if you are a teenage girl, then  J.B

Converse: if  J.B then T.G.

Inverse: if \sim T.G. Then \sim  J.B.

Contrapositive:

	<p>point P</p>	
	<p>line AB</p>	
	<p>line BA</p>	
	<p>line l</p>	
	<p>ray XY</p>	
	<p>Wrong ray SR</p>	
	<p>Plane AB Plane ABC Plane CAB</p>	



Find intersection
of
 \square ABD and $P_{\text{line } FGC}$

Colinear
Coplaner

