Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Inductive Reasoning	
Conjecture	

Examples: Find the next five terms of the sequences then write a conjecture.

1. 38, 31, 24, 17, _____, _____, _____, _____, _____

Conjecture: _____

_____

2. 2, 5, 11, 23, _____, _____, _____, _____, _____

Conjecture: _____

_____

3. 1, 4, 9, 16, _____, _____, _____, _____, _____

Conjecture: _____

_____

4. A, D, G, J, _____, _____, _____, _____, _____

Conjecture: _____

_____

5. 7:30, 7:55, 8:20, _____, _____, _____, _____, _____

Conjecture: _____

_____

6. 3, 1, 4, 1, 5, _____, _____, _____, _____, _____

Conjecture: _____

_____

Counterexample

Examples: Determine whether the conjecture is true or false. If false, provide a counterexample.

1. The sum of any two consecutive integers is always odd.

2. The product of two numbers is always larger than either number.

3. The product of two perfect squares is always a perfect square.

4. If the area of a rectangle is 6 m^2, then the dimensions must be 2 meters by 3 meters.

5. Dividing by 2 always produces a number less than the original number.

6. Vertical angles are never complementary angles.

7. If $a \cdot b = 0$, then either $a = 0$ or $b = 0$.

8. Two angles supplementary to the same angle must be congruent.

9. All state names have at least two syllables.

10. Squaring a number and adding one will always produce an even number.

Write your own conjectures! Then trade with your partner and determine if the conjecture is true or false. If false, provide a counterexample.

11. Conjecture: _____

_____

T/F: _____

12. Conjecture: _____

_____

T/F: _____

Name:	Class:
Topic:	Date:

Main Ideas/Questions	Notes
Deductive Reasoning	
Law of Detachment	**Given a conditional statement, if the _____ is _____, then the _____ is _____.** **Symbolic Map:**

Examples: Use the Law of Detachment to give a valid conclusion.
If not possible, write *no valid conclusion.*

1. **Given:** If Mark saves $30, he can buy a new video game.
   Mark saves $30.

   Conclusion: _____

2. **Given:** If a quadrilateral is a rhombus, then it is also a parallelogram.
   Quadrilateral *ABCD* is a rhombus.

   Conclusion: _____

3. **Given:** If you are 18 years old, then you can register to vote.
   Olivia is not 18 years old.

   Conclusion: _____

4. **Given:** If the sum of the measures of two angles is 90°, then they are complementary.
   $m\angle J = 58°$ and $m\angle K = 32°$

   Conclusion: _____

5. **Given:** If you plan to attend prom, then you must purchase a ticket.
   Sarah purchases a prom ticket.

   Conclusion: _____

Law of Syllogism

Allows you to draw a conclusion from _____ conditional statements in which the_____ of the first statement is the _____ of the second statement.

Symbolic Map:

Examples: Use the Law of Syllogism to give a valid conclusion.
If not possible, write *no valid conclusion*.

6. Given: If it is Saturday, then Jake has a baseball tournament.
If Jake has a baseball tournament, then he will need to pack his lunch.

Conclusion: _____

_____

7. Given: If a number is divisible by 12, then it is divisible by 6.
If a number is divisible by 6, then it is divisible by 3.

Conclusion: _____

_____

8. Given: If a quadrilateral is a square, then it is a rectangle.
If a quadrilateral is a rectangle, then it has four right angles.

Conclusion: _____

_____

9. Given: If it is sunny this weekend, then you will go boating.
If it is sunny this weekend, then you will wear shorts.

Conclusion: _____

_____

10. Given: If you shop at Target, then you will use your Target Red Card.
If you do not use your Target Red Card, then you will not get 5% off.

Conclusion: _____

_____

11. Given: If it snows, then school will be canceled.
If school is canceled, then students will need to make-up a day of school.

Conclusion: _____

_____

More Practice: Law of Detachment & Law of Syllogism

Law of Detachment	Law of Syllogism
$p \to q$ p $\therefore q$	$p \to q$ $q \to r$ $\therefore p \to r$

Determine whether the conclusion follows from the given statements by the Law of Detachment or the Law of Syllogism. If it does, state which law was used. If not, write *invalid*.

1. **Given:** If I drive over the speed limit, then I will get a ticket.
   Given: I drove over the speed limit.
   Conclusion: I got a ticket.

   Answer: _____

2. **Given:** If Amanda goes to the restaurant, then she will order a hamburger.
   Given: If she orders a hamburger, then she will get fries.
   Conclusion: If Amanda goes to the restaurant, then she will get fries.

   Answer: _____

3. **Given:** If it snows, then I will wear my snow boots.
   Given: If it snows, then I won't go to school that day.
   Conclusion: If I don't go to school, then I will wear my snow boots.

   Answer: _____

4. **Given:** If Tina goes to the beach, she will wear sunscreen.
   Given: Tina goes to the beach.
   Conclusion: Tina will wear sunscreen.

   Answer: _____

5. **Given:** If you get a cold, then you eat chicken soup.
   Given: You ate chicken soup.
   Conclusion: You must have a cold.

   Answer: _____

6. **Given:** If two angles form a linear pair, then they are supplementary.
   Given: If two angles are supplementary, then the sum of their measures is 180°.
   Conclusion: If two angles form a linear pair, then the sum of their measures is 180°.

   Answer: _____

7. **Given:** If Kaylee gets at least a 95 on her final exam, she will get an A in Geometry.
   Given: Kaylee got a 98 on her final exam.
   Conclusion: Kaylee got an A in Geometry.

   Answer: _____

8. **Given:** If it is raining, then you must bring an umbrella.
   Given: You bring your umbrella.
   Conclusion: It is raining.

   Answer: _____

9. Use the **Law of Syllogism** to write three conditional statements that can be formed from the following true statements.

   a. If a quadrilateral is a square, then it has four right angles.

   b. If a quadrilateral is a rhombus, then its opposite sides are parallel.

   c. If a quadrilateral has four right angles, then it is a rectangle.

   d. If a quadrilateral is a rectangle, then its opposite sides are congruent.

   e. If the opposite sides of a quadrilateral are parallel, then it is a parallelogram.

Answer 1: _____

_____

Answer 2: _____

_____

Answer 3: _____

_____

Name: _____ **Unit 2:** Logic & Proof

Date: _____ **Bell:** _____ **Homework 5:** Deductive Reasoning

**** This is a 2-page document! ****

Directions: Use the Law of Detachment to give a valid conclusion.
If not possible, write *no valid conclusion*.

1. Given: If Logan eats his vegetables, then he can have a bowl of ice cream.
Logan eats his vegetables.

Conclusion: _____

2. Given: If a polynomial is prime, then it cannot be factored.
$5x + 13y$ is prime.

Conclusion: _____

3. Given: If you visit Paris, then you will see the Eiffel Tower.
You did not see the Eiffel Tower.

Conclusion: _____

4. Given: If the measure of an angle is greater than 90°, then it is an obtuse angle.
$m\angle PQR = 115°$

Conclusion: _____

Directions: Use the Law of Syllogism to give a valid conclusion.
If not possible, write *no valid conclusion*.

5. Given: If Nicole is tardy to class again, she will get detention.
If Nicole gets detention, her mother will take away her phone.

Conclusion: _____

_____

6. Given: If it is raining, then I will bring my umbrella.
If I do not bring my umbrella, then I do not need my rain boots.

Conclusion: _____

_____

7. Given: If natural number ends in 0, then it is divisible by 10.
If a natural number is divisible by 10, then it is divisible by 5.

Conclusion: _____

_____

Directions: Determine whether the conclusion follows from the given statements by the Law of Detachment of the Law of Syllogism. If it does, state which law was used. If not, write invalid.

8. **Given:** If you go camping, then you will need a flashlight.
Given: If you need a flashlight, then you will need extra batteries.
Conclusion: If you go camping, then you will need extra batteries.

Answer: _____

9. **Given:** If Sally goes to the airport, then she will need to pay for parking.
Given: If Sally does not pay for parking, then her car will get towed.
Conclusion: If Sally does not go to the airport, then her car will not get towed.

Answer: _____

10. **Given:** If you leave the country, then you will need a passport.
Given: Nate is planning a trip to Italy.
Conclusion: Nate will need a passport.

Answer: _____

11. **Given:** If you buy one pair of shoes, then you get another pair for 50% off.
Given: Carolyn does not buy one pair of shoes.
Conclusion: Carolyn does not get another pair for 50% off.

Answer: _____

12. **Given:** If the sum of the measures of two angles is 180°, then they are supplementary.
Given: $m\angle D$ = 110° and $m\angle E$ = 70°
Conclusion: $\angle D$ and $\angle E$ are supplementary angles.

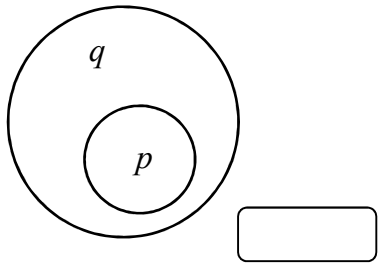
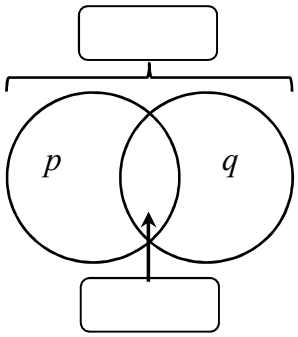
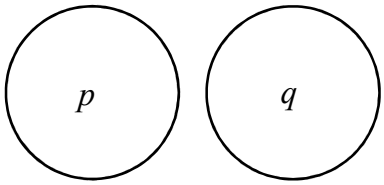
Answer: _____

13. **Given:** If a number is a multiple of 16, then it is a multiple of 8.
Given: If a number is a multiple of 8, then it is a multiple of 4.
Conclusion: If a number is a multiple of 16, then it is a multiple of 4.

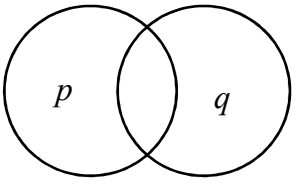
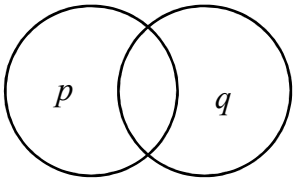
Answer: _____

VENN DIAGRAMS

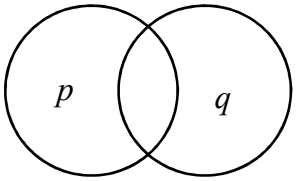
Venn Diagrams are a visual way of displaying the relationships between sets.

Types of Venn Diagrams		
All, Always, Every	**Some, Sometimes**	**Never, No, None**
		
All elements of p are elements of q.	**Some elements of p are elements of q.**	**There is no relationship between p and q.**

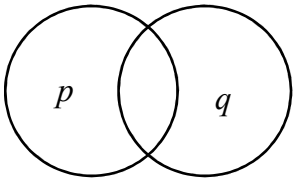
Directions: Draw a Venn Diagram to represent each statement.	
1. Some students who take chorus also take band.	**2.** No perfect squares are prime numbers.
3. Numbers divisible by 6 are always divisible by 3.	**4.** Every natural number is a whole number.
5. Some vertical angles are complementary.	**6.** Irrational numbers are never rational numbers.

Directions: Shade the indicated region on the Venn Diagram.	
7. q 	**8.** $p \wedge q$ 

9. $p \vee q$

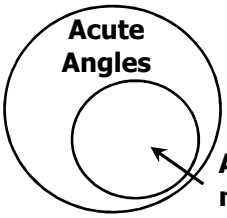


10. $p \wedge \sim q$



Directions: Describe each diagram using a conditional or compound statement.

11.



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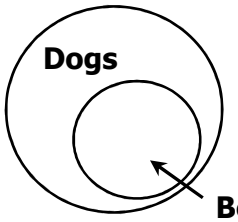

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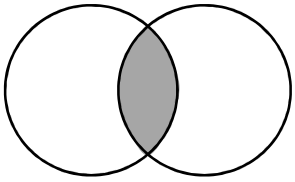

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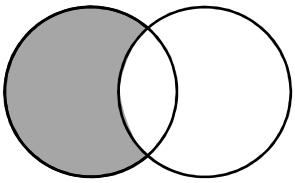

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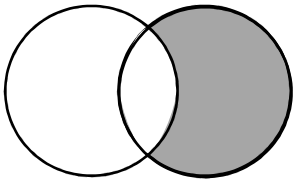
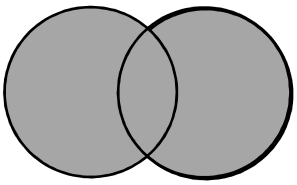
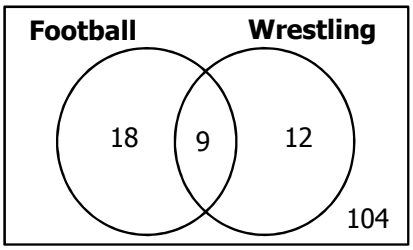


16.



More Practice with Venn Diagrams

1. The Venn diagram below shows the number of senior boys who play football or wrestle.



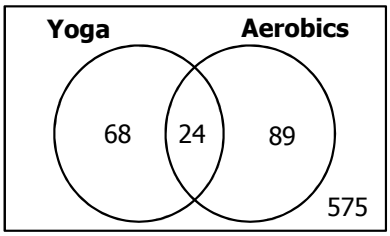
a. How many senior boys play football and wrestle? _____

b. How many senior boys play football but do not wrestle? _____

c. How many senior boys play football or wrestle? _____

d. How many senior boys wrestle? _____

2. The Venn diagram below shows the number of people at the gym signed up for yoga or aerobics class.



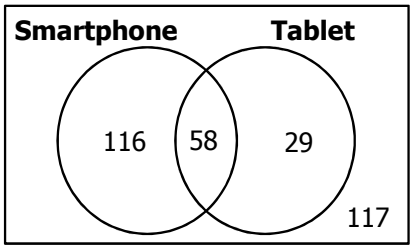
a. How many people are signed up for yoga class? _____

b. How many people are signed up for yoga or aerobics? _____

c. How many people are signed up for aerobics but not yoga? _____

d. How many people belong to the gym? _____

3. The Venn diagram below shows the number of 8th grade students who have a smartphone or tablet.



a. How many students have a smartphone and a tablet? _____

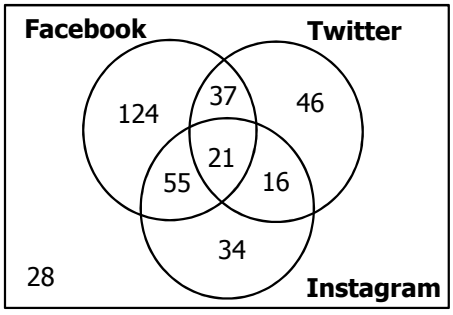
b. How many students do not have a smartphone or tablet? _____

c. How many 8th grade students are there? _____

d. How many students have a tablet? _____

e. How many students have a smartphone but not a tablet? _____

4. The Venn diagram below shows the number of sophomores with Facebook, Twitter, and Instagram accounts.



a. How many sophomores just have a Facebook account? _____

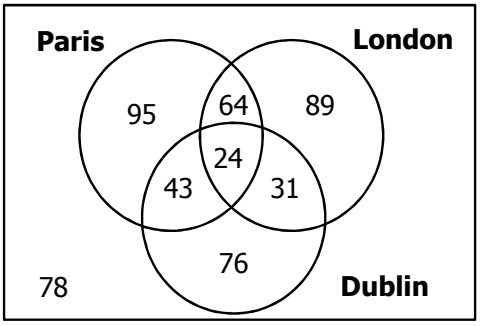
b. How many sophomores have a Twitter or Instagram account? _____

c. How many sophomores have Facebook, Twitter, and Instagram accounts? _____

d. How many students do not have a Twitter account? _____

e. How many students do not have a Facebook and Instagram account? _____

5. The Venn diagram below shows survey results of cities visited by group of people on a recent trip to Europe.



a. How many people visited Dublin or London? _____

b. How many people visited London and Paris? _____

c. How many people visited London or Paris? _____

d. How many people visited Dublin and not London?_____

e. How many people only visited Dublin? _____

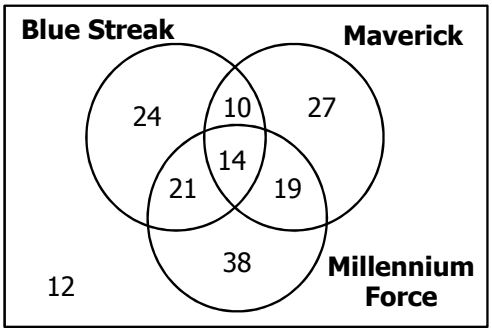
f. How many people visited Dublin and Paris? _____

g. How many people visited all three cities? _____

h. How many people visited London? _____

i. How many people took the survey? _____

6. On a recent field trip to Cedar Point, students reported which rollercoasters they went on. The Venn Diagram below represents the results of the survey.



a. How many students just went on the Maverick? _____

b. How many students went on the Blue Streak or the Millennium Force? _____

c. How many students went on the Millennium Force and Maverick? _____

d. How many students went on the Blue Streak?_____

e. How many students went on the Blue Streak and Maverick, but not the Millennium Force? _____

Name: _____ **Unit 2:** Logic & Proof

Date: _____ **Bell:** _____ **Homework 4:** Venn Diagrams

**** This is a 2-page document! ****

Directions: Draw a Venn diagram to represent each statement.

1. Trapezoids are never parallelograms.

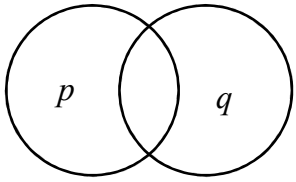
2. Every apple is a fruit.

3. All linear pairs are supplementary angles.

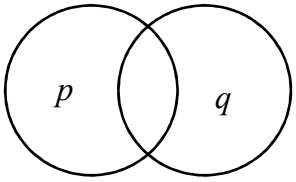
4. Some teens who babysit also mow lawns.

Directions: Shade the indicated region of the Venn diagrams below.

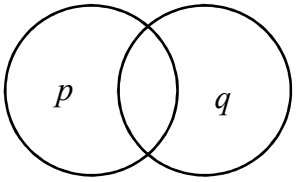
5. p



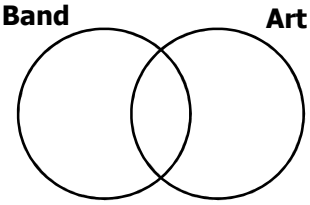
6. $p \wedge q$



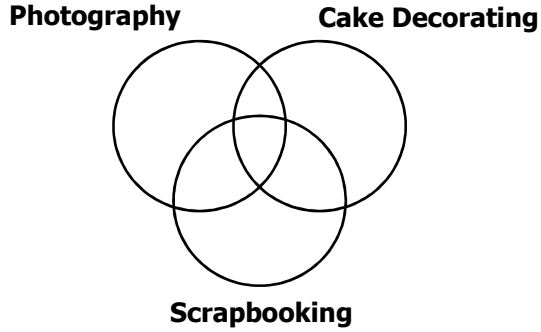
7. $p \vee q$



8. Some students who take band also take art. If Jack takes art but not band, shade the area on the diagram where he would belong.

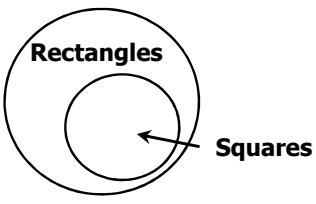


9. There are three classes offered at the craft store: photography, cake decorating, and scrapbooking. If Sarah is signed up for photography and scrapbooking, but not cake decorating, shade the area on the diagram where she would belong.



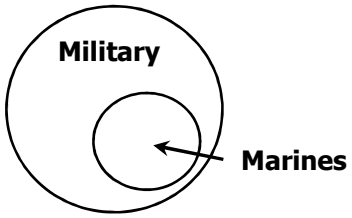
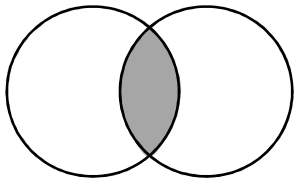
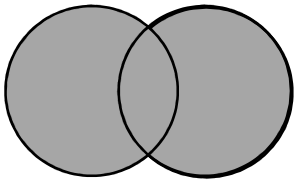
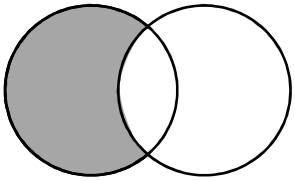
Directions: Describe each Venn diagram using a conditional or compound statement.

10.

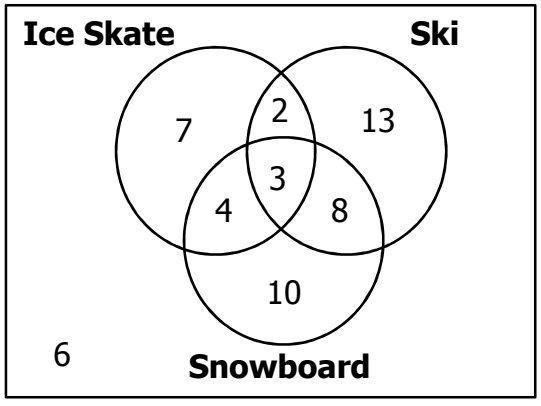


_____

_____

11. 	_____ _____
12.  **Perfect Squares** **Odd Numbers**	_____ _____
13.  **Boy Scouts** **Baseball Players**	_____ _____
14.  **Letters in Mississippi** **Vowels**	_____ _____

15. On a recent survey, students were asked if they ice skate, snowboard, or ski. The Venn diagram below shows the results of the survey.



a. How many students ski or snowboard? _____

b. How many students ice skate and ski? _____

c. How many students ice skate, ski, and snowboard? _____

d. How many students do not ski or ice skate? _____

e. How many students just snowboard? _____

f. How many students do not ice skate, ski, or snowboard? _____

g. How many students ice skate? _____

h. How many students do not snowboard?_____

i. How many students took the survey? _____