

## Advanced Geometry Review – Chapter 2

### Using Inductive Reasoning (Patterns) and Deductive Reasoning (Facts, Logic)

1. What is the next item in the pattern: 1, -3, 9, -27, .... 81

2. Use inductive reasoning to make a conjecture about the product of two odd numbers.

$$\begin{array}{l} 3 \cdot 5 = 15 \\ 7 \cdot 9 = 63 \end{array} \quad \begin{array}{l} 11 \cdot 7 = 77 \\ \dots \end{array} \quad \text{It will be odd}$$

3. Use inductive reasoning to make a conjecture about the sum of two odd numbers.

$$\begin{array}{l} 5 + 7 = 12 \\ 9 + 11 = 20 \end{array} \quad \begin{array}{l} -5 + 3 = -2 \\ \dots \end{array} \quad \text{It will be even}$$

4. Give a counterexample to show that the following is false: "If  $\angle 1$  and  $\angle 2$  are complementary, then the angles are not congruent."

Both angles could be  $45^\circ$   
(this is the only counterexample)

5. Give a counterexample to show that the following is false: "If  $\angle 1$  and  $\angle 2$  are congruent, then they are both obtuse angles."

Both angles could be  $30^\circ$   
(or any set of angles  $0 < x^\circ \leq 90$ )

6. Give a counter example to show that the following is false: If an angle is acute, then it has a measure of  $30^\circ$ .

The angle could be  $50^\circ$   
(or any angle  $0 < x \leq 90$  that is not  $50^\circ$ )

7. Use the statements below to answer parts a and b.

If you are a member of the swim team, then you practice on Saturdays. If you practice on Saturdays, then you have a special pass to get into the pool.

- a. Using Law of Detachment, write a conjecture for the following statement:  
Sue practices with the swim team on Saturdays.

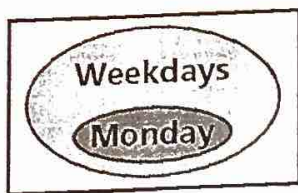
Conjecture: Sue has a special pass to get into the pool

- b. Write a new conditional statement using the Law of Syllogism.

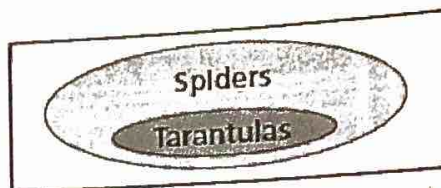
If you are a member of the swim team, then you have a special pass to get into the pool.

## Conditional Statements

8. Write a conditional statement for each Venn Diagram.



If the day is Monday,  
then it is a weekday.



If an insect is a tarantula,  
then it is a spider

9. Write the converse, inverse, and contrapositive. Determine if each statement is true or false.

"If you live in Oklahoma, then you live in the United States."

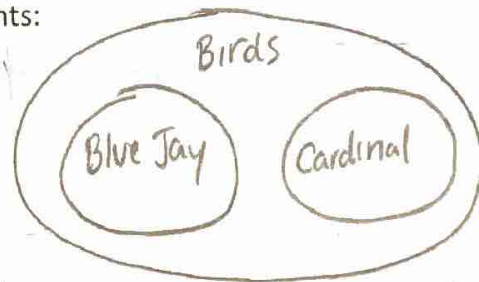
Converse: If you live in the US, then you live in OK. T or  F

Inverse: If you don't live in OK, then you don't live in the US. T or  F

Contrapositive: If you don't live in the US, then you don't live in OK.  T or F

10. Draw a Venn Diagram to illustrate the following conditional statements:

If an animal is a blue jay or a cardinal, then it is a bird.



If an animal is a dog, then it is a mammal.



11. Write the following statements as biconditional statements.

a. The measure of a right angle is  $90^\circ$ .

An angle is a right angle if and only if its measure is  $90^\circ$   
OR

An angle measures  $90^\circ$  if and only if it is a right angle.

b. If this month is September, then next month is October.

This month is September if and only if next month is October.  
OR

Next month is October if and only if this month is September.

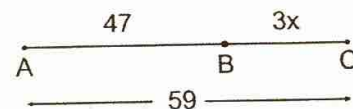
## Proofs about Angles and Segments

12. Write a two-column proof

Given:  $\overline{BD}$  bisects  $\angle ABC$ .  $m\angle ABD = (3x + 25)^\circ$  and  $m\angle BDC = (7x + 5)^\circ$

Prove:  $m\angle ABD = 40^\circ$

Statement	Reason
$\overline{BD}$ bisects $\angle ABC$	Given
$m\angle ABD = 3x + 25$ , $m\angle BDC = 7x + 5$	Given
$\angle ABD \cong \angle BDC$	Def. of bisect
$m\angle ABC = m\angle BDC$	Def. of $\cong$
$3x + 25 = 7x + 5$	Sub
$-3x \quad -3x$	Subtraction POE
$25 = 4x + 5$	Simplify
$-5 \quad -5$	Subtraction POE
$20 = 4x$	Simplify
$\frac{20}{4} = \frac{4x}{4}$	Division POE
$5 = x$	Simplify
$m\angle ABD = 3(5) + 25$	Sub
$m\angle ABD = 40$	Simplify



13. Given: B is between A and C.

Prove:  $x = 4$

Statement	Reason
B is btwn A and C	Given
$AB + BC = AC$	Segment Add. Post
$AB = 47$ , $BC = 3x$ , $AC = 59$	Given
$47 + 3x = 59$	Sub
$-47 \quad -47$	Subtraction POE
$\frac{3x}{3} = \frac{12}{3}$	Simplify
$x = 4$	Division POE
	Simplify

14. Identify the property that justifies each statement.

L a.  $25 = 25$

B b. If  $\angle RST \cong \angle ABC$ , then  $\angle ABC \cong \angle RST$

J c.  $2x = 9$ , and  $y = 9$ , so  $2x = y$ .

C d.  $\angle XYZ \cong \angle XYZ$

G e. If  $x = y$ , then  $x + 5 = y + 5$

E f. If  $x = y$ , then  $2x = 2y$ .

H g.  $3(x + y) = 3x + 3y$

K h. If  $x = y$ , then  $y = x$ .

D i. If  $x = y$ , then  $\frac{x}{w} = \frac{y}{w}$ .

F j. If  $x = y$ , then  $x - 7 = y - 7$

A. Transitive Property of Congruence

B. Symmetric Property of Congruence

C. Reflexive Property of Congruence

D. Division Property of Equality

E. Mult. Property of Equality

F. Subtraction Property of Equality

G. Addition Property of Equality

H. Distributive Property

I. Substitution Property of Equality

J. Transitive Property of Equality

K. Symmetric Property of Equality

L. Reflexive Property of Equality

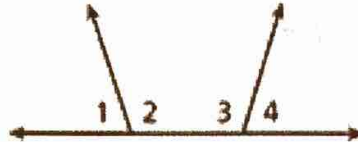


15. Given:  $\angle 1$  and  $\angle 2$  complementary and  $\angle 1 \cong \angle 3$ .  
 Prove:  $\angle 3$  and  $\angle 2$  are complementary

Statement  
 $\angle 1 + \angle 2$  comp.  $\angle$ 's  
 $\angle 1 \cong \angle 3$   
 $m\angle 1 = m\angle 3$   
 $m\angle 1 + m\angle 2 = 180$   
 $m\angle 3 + m\angle 2 = 180$   
 $\angle 3$  and  $\angle 2$  are comp.  $\angle$ 's

Reason  
 Given  
 Given  
 Def. of  $\cong$   
 Def. of comp.  $\angle$ 's  
 Substitution  
 Def. of comp.  $\angle$ 's

16. Given:  $m\angle 1 + m\angle 3 = 180^\circ$   
 Prove:  $\angle 1 \cong \angle 4$

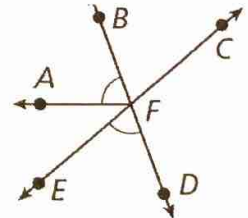


Statements	Reasons
1. $m\angle 1 + m\angle 3 = 180$	1. Given
2. $\angle 1$ and $\angle 3$ are supplementary	2. Definition of Supplementary Angles
3. $\angle 3$ and $\angle 4$ are supplementary	3. Linear Pair Postulate
4. $\angle 3 \cong \angle 3$	4. Reflexive POC
5. $\angle 1 \cong \angle 4$	5. Congruent Supplements Thm.

17. Given:  $\angle AFB \cong \angle EFD$

Prove:  $\overrightarrow{FB}$  bisects  $\angle AFC$   
Statement  
 $\angle AFB \cong \angle EFD$   
 $\angle BFC + \angle EFD$  vert.  $\angle$ 's  
 $\angle BFC \cong \angle EFD$   
 $\angle AFB \cong \angle BFC$   
 $\overrightarrow{FB}$  bisects  $\angle AFC$

Reason  
 Given  
 Def. of vertical  $\angle$ 's  
 Vert.  $\angle$ 's  $\cong$  thm  
 Transitive POC  
 Def. of bisects



18. Given:  $\angle 1$  and  $\angle 2$  are straight angles.  
 Prove:  $\angle 1 \cong \angle 2$

Statement  
 $\angle 1 + \angle 2$  are straight  $\angle$ 's  
 $m\angle 1 = 180, m\angle 2 = 180$   
 $m\angle 1 = m\angle 2$   
 $\angle 1 \cong \angle 2$

Reason  
 Given  
 Def. of straight  $\angle$   
 transitive poe  
 Def. of  $\cong$

