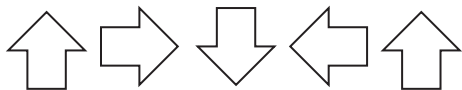


## LESSON 161 Review: Reasoning and Proofs

1. What comes next in the sequence 1, 22, 333, 4444, ...?

2. Draw the next figure in the sequence.



3. Determine if each conjecture is true. If false, give a counterexample.

- A) The sum of two odd numbers is odd.  
 B) The square of an odd number is odd.  
 C) The product of three negative numbers is negative.  
 D) The difference between two numbers is less than either number.  
 E) The sum of three consecutive integers is a multiple of 3.  
 F) The absolute value of a number is always positive.

4. Write the following statement in if-then form and write its converse.

All  $180^\circ$  angles are straight angles.

5. Write the following definition as a biconditional statement and as two conditional statements.

Adjacent angles are two angles that have a common vertex and a common side but do not overlap.

6. Draw a logical conclusion from the following two statements.

If  $M$  bisects  $\overline{PQ}$ , then  $\overline{PM} \cong \overline{MQ}$ .

If  $\overline{PM} \cong \overline{MQ}$ , then  $PM = MQ$ .

7. State the property that justifies each statement.

A) If  $3x = 15$ , then  $x = 5$ .

B) If  $m\angle 1 + 10 = 90$ , then  $m\angle 1 = 80$ .

C) If  $AB = CD$ , then  $CD = AB$ .

D) If  $\angle P \cong \angle Q$  and  $\angle Q \cong \angle R$ , then  $\angle P \cong \angle R$ .

8. Solve  $3(1 + 2x) - 5x = 3$ . Justify each step.

<u>Steps</u>	<u>Reasons</u>
$3(1 + 2x) - 5x = 3$	1. Given
$3 + 6x - 5x = 3$	2.
$3 + x = 3$	3. Simplify.
$x = 0$	4.

9. Complete the proof of the Right Angles Congruence Theorem [29.1].

Given:  $\angle 1$  and  $\angle 2$  are right angles.

Prove:  $\angle 1 \cong \angle 2$

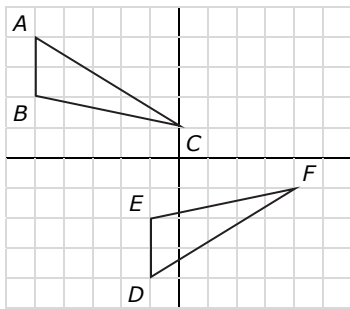
STATEMENTS	REASONS
1. $\angle 1, \angle 2$ right $\angle$ s	1. Given
2. $m\angle 1 = 90^\circ$ $m\angle 2 = 90^\circ$	2. Def. of right angles
3. $m\angle 1 = m\angle 2$	3.
4. $\angle 1 \cong \angle 2$	4.

10. If  $x \neq 4$ , then  $3x - 2 \neq 10$ .

Order the steps to prove this statement using indirect proof.

- A) By the Addition Property,  $3x = 12$ .  
 B) Therefore, our assumption is wrong and  $3x - 2 \neq 10$ .  
 C) Assume  $3x - 2 = 10$ .  
 D) By the Division Property,  $x = 4$ .  
 E) This contradicts the given statement that  $x \neq 4$ .

11. Prove  $\triangle ABC \cong \triangle DEF$  by describing a sequence of transformations that maps  $\triangle ABC$  to  $\triangle DEF$ .



12. Complete the proof of the Congruent Complements Theorem [29.2].

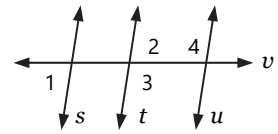
Given:  $\angle 1$  is complementary to  $\angle 3$ .  
 $\angle 2$  is complementary to  $\angle 3$ .

Prove:  $\angle 1 \cong \angle 2$

STATEMENTS	REASONS
1. $\angle 1$ & $\angle 3$ , $\angle 2$ & $\angle 3$ complementary	1. Given
2. $m\angle 1 + m\angle 3 = 90^\circ$ $m\angle 2 + m\angle 3 = 90^\circ$	2.
3.	3. Transitive Prop.
4. $m\angle 1 = m\angle 2$	4.
5. $\angle 1 \cong \angle 2$	5.

13. Complete the proof.

Given:  $\angle 1 \cong \angle 2$ ,  
 $\angle 3 \cong \angle 4$



Prove:  $s \parallel u$

STATEMENTS	REASONS
1. $\angle 1 \cong \angle 2$	1. Given
2. $s \parallel t$	2.
3. $\angle 3 \cong \angle 4$	3. Given
4. $t \parallel u$	4.
5. $s \parallel u$	5.

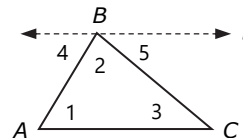
14. In a plane, line  $l$  is parallel to line  $m$ , line  $m$  is parallel to line  $n$ , and line  $t$  is perpendicular to line  $l$ . Choose the correct words to complete the following sentence.

Line  $l$  is (parallel, perpendicular) to line  $n$ , and line  $t$  is (parallel, perpendicular) to line  $m$ .

15. Write a two-column proof of the Triangle Sum Theorem [32.1].

Given:  $\overline{AC} \parallel l$

Prove:  $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$



16. (HONORS) Write a paragraph proof of the Polygon Interior Angles Theorem [32.3].

Given: a polygon with  $n$  sides

Prove: interior angle sum =  $180(n - 2)$