

## **5.6 – Indirect Proofs (Part 1)**

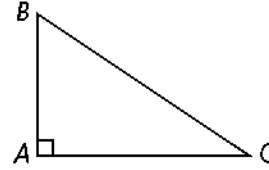
Write the first step of an indirect proof of the given statement.

- 1) A number  $g$  is divisible by 2.
  
- 2) There are more than three red houses on the block.
  
- 3)  $\triangle ABC$  is equilateral.
  
- 4)  $m\angle B \cong 90$
  
5.  $\angle C$  is not a right angle.
  
- 6) There are less than 15 pounds of apples in the basket.
  
- 7) If the number ends in 4, then it is not divisible by 5.
  
- 8) If  $\overline{MN} \cong \overline{NO}$ , then point  $N$  is on the perpendicular bisector of  $\overline{MO}$ .
  
- 9) If two right triangles have congruent hypotenuses and one pair of congruent legs, then the triangles are congruent.
  
- 10) If two parallel lines are intersected by a transversal, then alternate interior angles are congruent.

11) Fill in the blanks to prove the following statement: In right  $\triangle ABC$ ,  $m\angle B + m\angle C = 90$ .

Given: right  $\triangle ABC$

Prove:  $m\angle B + m\angle C = 90$



Assume temporarily that  $m\angle B + m\angle C$  \_\_\_\_\_. If  $m\angle B + m\angle C$  \_\_\_\_\_, then  $m\angle A + m\angle B + m\angle C$  \_\_\_\_\_. According to the Triangle Angle Sum Theorem,  $m\angle A + m\angle B + m\angle C =$  \_\_\_\_\_. This contradicts the previous statement, so the temporary assumption is \_\_\_\_\_ . Therefore, \_\_\_\_\_.

12) Use indirect reasoning to eliminate all but one of the following answers. In what year was Barack Obama born?

1809

1909

1961

2000

Identify the two statements that contradict each other.

- 13) I.  $\triangle ABC$  is acute.                      II.  $\triangle ABC$  is scalene.                      III.  $\triangle ABC$  is equilateral.
- 14) I.  $m\angle B \leq 90$                               II.  $\angle B$  is acute.                              III.  $\angle B$  is a right angle.
- 15) I.  $\overline{FA} \parallel \overline{AC}$                               II.  $\overline{FA}$  and  $\overline{AC}$  are skew.                              III.  $\overline{FA}$  and  $\overline{AC}$  do not intersect.
- 16) I. Victoria has art class from 9:00 to 10:00 on Mondays.                      II. Victoria has math class from 10:30 to 11:30 on Mondays.                      III. Victoria has math class from 9:00 to 10:00 on Mondays.
- 17) I.  $\triangle MNO$  is acute.                              II. The centroid and the orthocenter for  $\triangle MNO$  are at different points.                              III.  $\triangle MNO$  is equilateral.
- 18) I.  $\triangle ABC$  such that  $\angle A$  is obtuse.                      II.  $\triangle ABC$  such that  $\angle B$  is obtuse.                      III.  $\triangle ABC$  such that  $\angle C$  is acute.
- 19) I. The orthocenter for  $\triangle ABC$  is outside the triangle.                      II. The median for  $\triangle ABC$  is inside the triangle.                      III.  $\triangle ABC$  is an acute triangle.