

# Geometry

## Unit 7 Contradiction Overview C

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Per: 1 2 3 4 5 6

Steps to prove a theorem by contradiction:

1. Assume the opposite of what you want to prove
2. Show the assumption leads to a contradiction with the "Given:" statement.
3. Therefore, the assumption must be false! (so the original statement is true.)

Example: Given: Triangle ABC is equilateral

Prove:  $m\angle A = m\angle B = m\angle C$

In proving by contradiction,

1. Assume  $m\angle A \neq m\angle B \neq m\angle C$ .
2. Given states  $\triangle ABC$  is equilateral which also means it is equiangular. Since the sum of the angles =  $180^\circ$  and each angle is the same, then each of them equals  $60^\circ$  ( $180^\circ / 3$ ). BUT, this contradicts our assumption that the angles are not equal.
3. THEREFORE, our assumption that " $m\angle A \neq m\angle B \neq m\angle C$ " is **FALSE**. So, therefore the opposite " $m\angle A = m\angle B = m\angle C$ " must be true.

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1. Given:  $\triangle ABC$  is a **isosceles** triangle with vertex angle B.

If we **assume** that  $m\angle A \neq m\angle C$ , then  $AB \neq BC$  by the triangle inequality theorem. However, this would **contradict** our given statement that the triangle IS ISOSCELES. So, what can we conclude about the measurement of angles A and C?

2. Theorem: A triangle has at most one right angle. Ashlynn is proving the theorem above by contradiction. She began by assuming that in  $\triangle ABC$ ,  $\angle A$  and  $\angle B$  are both right. Which theorem (below) will Ashlynn use to reach a contradiction?

- A) If two angles of a triangle are equal, the sides opposite the angles are equal.
- B) If two supplementary angles are equal, the angles each measure  $90^\circ$ .
- C) The largest angle in a triangle is opposite the longest side.
- D) The sum of the measures of the angles of a triangle is  $180^\circ$ .

3. Given: Polygon ABCDE is a pentagon.

Prove: Sum of the measures of the interior angles of Pentagon ABCDE =  $540^\circ$

Step 1: Assume \_\_\_\_\_

Step 2: \_\_\_\_\_

\_\_\_\_\_

Step 3: \_\_\_\_\_