Lesson 5.5 Warm Up

1. The midsegment of a triangle has a measurement of 12 in. The triangle's side parallel to the midsegment has a measurement of 4x. What is x?

2. A centroid is the point where the three ____________ of a triangle intersect.

3. What is the intersection point called when the three angle bisectors of a triangle intersect?

Lesson 5.5 Indirect Proof

The goal of this game is to fill in the empty squares with numbers. The numbers 1, 2, 3, and 4 must appear once in each row and once in each column. Copy and complete the games on a piece of paper.

Game A

1			2
4		1	
	4		
		2	

Game B

			3
	1		
2		1	
	4		

The above puzzles are what we know as sudoku puzzles. When you use reasoning to write a number in a box, you are using indirect reasoning--all possibilities are considered and then all but one are proved false. The remaining possibility must be true.

An indirect proof is a proof involving indirect reasoning. Often in an indirect proof, a statement and its negation are the only possibilities. When you see that one of these possibilities leads to a conclusion that contradicts a fact you know to be true, you can eliminate that possibility. This is why indirect proof is sometimes called proof by contradiction.

take note

Key Concept Writing an Indirect Proof

Step 1 State as a temporary assumption the opposite (negation) of what you want to prove.

Step 2 Show that this temporary assumption leads to a contradiction.

Step 3 Conclude that the temporary assumption must be false and that what you want to prove must be true.

Ex. Write the first step of an indirect proof for the following:

a. an integer n is divisible by 5

Answer: Assume that n is not divisible by 5

b. you do not have soccer practice today

In indirect proofs you need to recognize accurate contradictions.

Ex. Which two statements contradict each other?

I. $\overline{FG} \parallel \overline{KL}$ II. $\overline{FG} \cong \overline{KL}$ III. $\overline{FG} \perp \overline{KL}$

Ex. Which two statements contradict each other?

I. $\triangle XYZ$ is acute.
II. $\triangle XYZ$ is scalene.
III. $\triangle XYZ$ is equiangular.

Ex. Given: triangle ABC is scalene
Prove: <A, <B, and <C all have different measures

Assume temporarily that two angles of $\triangle ABC$ have the same measure. Assume that $m\angle A = m\angle B$.

By the Converse of the Isosceles Triangle Theorem, the sides opposite $\angle A$ and $\angle B$ are congruent. This contradicts the given information that $\triangle ABC$ is scalene.

The assumption that two angles of $\triangle ABC$ have the same measure must be false. Therefore, $\angle A$, $\angle B$, and $\angle C$ all have different measures.

Ex. *Given*: $7(x + y) = 70$ and $x \neq 4$
Prove: $y \neq 6$