9/26/19 - Warm Up Problem

Each statement is false. Think of a counterexample for each one to show that it is false.

1. If the product of two numbers is positive, then both of the number are positive.

$$-2 \cdot -2 = 4$$

2. The product of two <u>positive</u> numbers is always greater than both of the numbers.

$$4 \cdot \frac{1}{2} = 2 \qquad 1 \cdot 1 = 1$$

Concept 6 Worksheet #1 (front)

REASONING IN ALGEBRA

Fill in the missing justifications for each proof.

1. Given: $\dfrac{4x+6}{2} = 9$

Prove: $x = 3$

Statement	Justification
1. $\dfrac{4x+6}{2} = 9$	
2. $4x+6 = 18$	
3. $4x = 12$	
4. $x = 3$	

2. Given: $8x - 5 = 2x + 1$

Prove: $x = 1$

Statement	Justification
1. $8x - 5 = 2x + 1$ $-2x \quad -2x$	Given
2. $6x - 5 = 1$	Subtr. Prop.
3. $6x = 6$	Addition Prop
4. $x = 1$	Division Prop.

3. Given: $5(n-3) = 4(2n-7) - 14$

Prove: $n = 9$

Statement	Justification
1. $5(n-3) = 4(2n-7) - 14$	
2. $5n - 15 = 8n - 28 - 14$	
3. $5n - 15 = 8n - 42$	Simplify
4. $5n = 8n - 27$	
5. $-3n = -27$	
6. $n = 9$	

4. Given: $2x - 15 - x = 21 + 10x$

Prove: $x = -4$

Statement	Justification
1. $2x - 15 - x = 21 + 10x$	
2. $x - 15 = 21 + 10x$	Simplify
3. $-15 = 21 + 9x$	
4. $-36 = 9x$	
5. $-4 = x$	

5. Given: $5(n-1) = 20$

Prove: $n = 5$

Statement	Justification
$5(n-1) = 20$	Given
$5n - 5 = 20$	Distributive Prop.
$5n = 25$	Addition Prop.
$n = 5$	Division Prop.

6. Given: $4r - 5 = 13 + 2r$

Prove: $r = 9$

Statement	Justification

If two lines are perpendicular, then they intersect to form a 90 degree angle.

Write the converse.

If they intersect to form a 90° angle, then 2 lines are perp.

If the converse is true, write the statement as a biconditional.

Two lines are perp. if and only if they intersect to form a 90° angle.

Section 2.5 - Reasoning in Algebra

Goals: Use properties of equality and congruence

Properties of Equality and Congruence

Property	Example	Explanation
Reflexive Property of Equality	$a = a$　　$5 = 5$	Any number is equal to itself.
Reflexive Property of Congruence	$\overline{RT} \cong \overline{RT}$ or $\angle 5 \cong \angle 5$	Any figure is congruent to itself.
Symmetric Property of Equality	If $a = b$, then $b = a$.	The sides of an equation can be switched.
Symmetric Property of Congruence	If $\overline{LM} \cong \overline{RT}$, then $\overline{RT} \cong \overline{LM}$.	The sides of a congruence statement can be switched.
Transitive Property of Equality	If $a = b$ and $b = c$, then $a = c$.　　$x = 5$　$y = 5$, so $x = y$	If two numbers are equal to the same number, then they are equal to each other.
Transitive Property of Congruence	If $\angle A \cong \angle B$ and $\angle B \cong \angle C$, then $\angle A \cong \angle C$.	If two figures are congruent to the same figure, then they are congruent to each other.
Substitution Property of Equality	If $x + y = z$ and $x = 5$, then $5 + y = z$.	If two expressions are equal, one can replace the other in an equation.

4

Equal and Congruent - What's the Difference?

*Numbers can be equal to each other.

*Figures can be congruent to each other.

The length of a segment and the measure of an angle are numbers. **Numbers can be equal.**

$$MN = RT \qquad\qquad m\angle ABC = m\angle GHJ$$

Segments and angles are figures. **Figures can be congruent.**

$$\overline{MN} \cong \overline{RT} \qquad\qquad \angle ABC \cong \angle GHJ$$

Which property of equality or congruence justifies each statement?

1. If $\overline{ST} \cong \overline{QR}$, then $\overline{QR} \cong \overline{ST}$.   **Symmetric Prop of $\cong$**

2. $XY = XY$ **Reflexive Prop. of =**

3. If $x = 9$ and $x + y = 28$, then $9 + y = 28$.   **Subst Prop. of =**

4. If $\angle ABC \cong \angle DEF$ and $\angle ABC \cong \angle GHJ$, then $\angle DEF \cong \angle GHJ$.

Transitive Prop of $\cong$

Using Substitution and Transitive Properties

The Substitution Property and the Transitive Properties are used in proofs to combine two equations or congruence statements together.

Complete each statement using the given property.

Transitive Property of Congruence
If $\angle$ RST $\cong$ $\angle$ UVW and $\angle$ UVW $\cong$ $\angle$ XYZ, then
$\angle$RST $\cong$ $\angle$XYZ.

Substitution Property of Equality
If y + 3x = z and y = 4z then 4z + 3x = z.

Transitive Property of Equality
If $m\angle 1 + m\angle 2 = 180$ and $m\angle 3 + m\angle 4 = 180$, then
$m\angle 1 + m\angle 2$ = $m\angle 3 + m\angle 4$.

Substitution Property of Equality
2·BC
If AB + BC = AC and AB = 2•BC then 2·BC + BC = AC

Assignment:
Concept 6 Worksheet #1 - due Tuesday 10/8
(back)

USING THE PROPERTIES OF EQUALITY AND CONGRUENCE

Identify the property that is being shown in each statement.

7. Given that $m\angle BCA = m\angle DBC$ and $m\angle BCA = m\angle ADB$, we can conclude that $m\angle DBC = m\angle ADB$.

8. Given that $\overline{HI} \cong \overline{JK}$, we can conclude that _____.

9. Given that $\angle 3 \cong \angle 4$ and $\angle 4 \cong \angle 5$, we can conclude that _____.

10. Given that $XY = MN$ and $XY + YZ = XZ$, we can state that $MN + YZ = XZ$.

11. $m\angle ABC = m\angle ABC$

Use the given property to complete each statement.

12. Substitution Property of Equality: If $x + y = 3z$ and $x = 2z$, then _____ = _____.

13. Substitution Property of Equality: If $LN = 5x + 12$ and $x = 2$, then $LN =$ _____.

14. Symmetric Property of Congruence: If $\overline{LM} \cong \overline{GH}$, then _____ $\cong$ _____.

15. Symmetric Property of Equality: If $x = 4$, then _____ = _____.

16. Transitive Property of Congruence: If $\angle 1 \cong \angle 5$ and $\angle 2 \cong \angle 5$, then _____ $\cong$ _____.

17. Transitive Prop. of Equality: If $m\angle 1 + m\angle 2 = 180$ and $m\angle 2 + m\angle 3 = 180$,

then _____ = _____

18. Given: $2 = 4x - x + 8$

Prove: $x = -2$

Statement	Justification
1. $2 = 4x - x + 8$	Given
2. $2 = 3x + 8$	Simplify
3. $-6 = 3x$	Subtraction Prop.
4. $-2 = x$	Division Prop.
5. $x = -2$	Symmetric Prop. of =