

2/5/18

Day 19

2-4 Reasoning in Algebra

Properties of Equality

- 1.) Addition If $a=b$, then $a+c = b+c$
- 2.) Subtraction If $a=b$, then $a-c = b-c$
- 3.) Multiplication If $a=b$, then $a \cdot c = b \cdot c$
- 4.) Division If $a=b$, and $c \neq 0$, then $\frac{a}{c} = \frac{b}{c}$

★ 5.) Reflexive $a=a$

6.) Symmetric If $a=b$, then $b=a$.

★ 7.) Transitive If $a=b$ and $b=c$, then $a=c$

8.) Substitution If $a=b$, then b can replace " a " in any expression.

Distributive Property

$$a(b+c) = a \cdot b + a \cdot c$$
$$a(b-c) = a \cdot b - a \cdot c$$

$$ab - ac$$

You can use **deductive** reasoning to prove other statements, and you use it when solving equations in Algebra.

You can justify each statement you make with a **postulate**, **property** or a **definition**.

Use the given property to complete each statement.

- Symmetric Property of Equality
If $MN = UT$, then $UT = MN$
- Division Property of Equality
If $4m\angle QWR = 120$, then $m\angle QWR = 30^\circ$
- Transitive Property of Equality
If $SB = VT$ and $VT = MN$, then $SB = MN$
- Addition Property of Equality
If $y - 15 = 36$, then $y = 51$
- Reflexive Property of Congruence
 $\overline{JL} \cong \overline{JL}$

Statements **Reasons**
Give a reason for each step.

1. 6.	$7x - 4 = 10$	Given
2.	$7x = 14$	Addition Property
3.	$x = 2$	Division Property

$$\begin{array}{r} 7x - 4 = 10 \\ +4 \quad +4 \\ \hline 7x = 14 \\ \frac{7x}{7} = \frac{14}{7} \\ \boxed{x = 2} \end{array}$$

Statements	Reasons
7. $0.25x + 2x + 12 = 39$	Given
$2.25x + 12 = 39$	Addition
$2.25x = 27$	Subtraction
$225x = 2700$	Multiplication
$x = 12$	Division

There are also corresponding properties of congruence.

① Reflexive $\overline{AB} \cong \overline{AB}$

$$\angle A \cong \angle A$$

② Symmetric If $\overline{AB} \cong \overline{CD}$, then $\overline{CD} \cong \overline{AB}$

If $\angle A \cong \angle B$, then $\angle B \cong \angle A$.

③ Transitive If $\overline{AB} \cong \overline{CD}$ and $\overline{CD} \cong \overline{EF}$, then $\overline{AB} \cong \overline{EF}$

$$\angle A \cong \angle B$$

$$\angle B \cong \angle C$$

$$\text{then } \angle A \cong \angle C$$

Name the property that justifies each statement.

8. If $m\angle G = 35$ and $m\angle S = 35$, then $m\angle G \cong m\angle S$.

Substitution, transitive

$$m\angle G = 35$$

$$35 = m\angle S$$

$$m\angle G = m\angle S$$

9. If $10x + 6y = 14$ and $x = 2y$, then $10(2y) + 6y = 14$.

substitution

10. If $TR = MN$ and $MN = VW$, then $TR = VW$.

Transitive Property of Equality

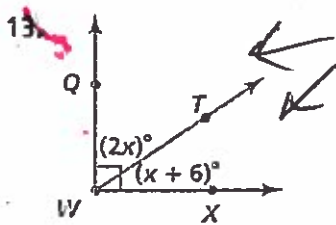
11. If $\overline{JK} \cong \overline{LM}$, then $\overline{LM} \cong \overline{JK}$.

symmetric prop. of congruence

12. If $\angle Q \cong \angle S$ and $\angle S \cong \angle P$, then $\angle Q \cong \angle P$.

transitive property of congruence

Fill in the missing information. Solve for x , and justify each step.



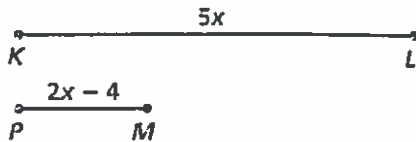
These 2 L's are complementary
add up to 90°

$$\begin{aligned} m\angle QWT + m\angle TWX &= 90 \\ 2x + (x + 6) &= 90 \\ 3x + 6 &= 90 \\ 3x &= 84 \\ x &= 28 \end{aligned}$$

Given
Substitution
Addition
Subtraction
Division

$$\begin{aligned} 3x + 6 &= 90 \\ -6 & \quad -6 \\ \hline 3x &= 84 \\ \frac{3x}{3} &= \frac{84}{3} \end{aligned}$$

14.



$$\begin{aligned} KL &= 3(PM) \\ 5x &= 3(2x - 4) \\ 5x &= 6x - 12 \\ -1x &= -12 \\ x &= 12 \end{aligned}$$

Given
Substitution
Distributive Prop.
Subtraction Prop.
Multiplication or division prop.

$$\begin{aligned} 3(2x - 4) \\ 3 \cdot 2x - 3 \cdot 4 \\ 5x = 6x - 12 \\ -6x \quad -6x \\ \hline -1x = -12 \\ -1(-1x) = (-12) \cdot -1 \end{aligned}$$

HW: p. 105 - 107

(1-24, 27-29)