

1.4 Identity & Equality Properties

$$4 + x = 4$$

$$x + 9 = 9$$

$$14 = 14 + x$$

What does x need to be
for all the above equations?

Additive Identity Property

$$a + 0 = a$$

$$7x = 7$$

$$36 = 36 \cdot x$$

What does x need to be
for all the above equations?

Multiplicative Identity Property

$$a \cdot 1 = a$$

$$3(0) = 0 \quad 0 = 24 \cdot 0$$

$$5 \cdot 6 \cdot 0 \cdot 2 = 0$$

What do you notice about
the above equations?

Multiplicative Property of Zero

$$a \cdot 0 = 0$$

Properties of Equality

Reflexive Property

$$a = a$$

Symmetric Property

If $a = b$, then $b = a$.

Properties of Equality

Transitive Property

If $a = b$ and $b = c$, then $a = c$.

Substitution Property

If $a = b$, then a may be replaced by b .

Name the property illustrated by each statement.

- $7 + 6 = 7 + 6$
reflexive property
- $8 \cdot 1 = 8$
mult. identity property
- $3 + (2 + 1) = 3 + 3$
substitution property
- $14 + 0 = 14$
add. identity property
- If $6 = 3 + 3$, then $3 + 3 = 6$.
symmetric property
- $25 \cdot 0 = 0$
mult. property of zero
- If $8 = 6 + 2$ and $6 + 2 = 5 + 3$,
then $8 = 5 + 3$.
transitive property

Evaluate each expression, showing your work for each step. Indicate the property used in each step.

$$\begin{aligned}
 8. \quad & 3 + 18(12 \div 6 - 2) \\
 & 3 + 18(2 - 2) \text{ subst. prop.} \\
 & 3 + 18(0) \text{ subst. prop.} \\
 & 3 + 0 \text{ mult. prop. of zero} \\
 & 3 \text{ add. identity prop.}
 \end{aligned}$$

$$\begin{aligned}
 9. \quad & (13 + \frac{2}{5} \cdot 5)(3^2 - 2^3) \\
 & (13 + \frac{2}{5} \cdot 5)(9 - 8) \text{ subst. prop.} \\
 & (13 + \frac{2}{5} \cdot 5)(1) \text{ subst. prop.} \\
 & (13 + 2)(1) \text{ subst. prop.} \\
 & (15)(1) \text{ subst. prop.} \\
 & 15 \text{ mult. identity prop.}
 \end{aligned}$$

Evaluate each expression, showing your work for each step. Indicate the property used in each step.

$$\begin{aligned}
 10. \quad & 7 + 5(8 \cdot 2 - 4^2) - 3 \\
 & 7 + 5(8 \cdot 2 - 16) - 3 \text{ subst. prop.} \\
 & 7 + 5(16 - 16) - 3 \text{ subst. prop.} \\
 & 7 + 5(0) - 3 \text{ subst. prop.} \\
 & 7 + 0 - 3 \text{ mult. prop. of zero} \\
 & 7 - 3 \text{ add. identity zero} \\
 & 4 \text{ subst. prop.}
 \end{aligned}$$