

Algebra 2
Properties of Real Numbers
Note Sheet

Name _____

Additive Identity Property:

The *sum* of any number and 0 is equal to that number

Ex: $5 + 0 = 5$; $-11 + 0 = -11$

$16 + 0 = \underline{\hspace{2cm}}$ $-100 + 0 = \underline{\hspace{2cm}}$ $33 + 0 = \underline{\hspace{2cm}}$

Multiplicative Identity Property :

The *product* of any number and 1 is equal to that number

Ex: $23(1) = 23$; $-2 \cdot 1 = -2$

$18(1) = \underline{\hspace{2cm}}$ $72 \cdot 1 = \underline{\hspace{2cm}}$ $(-27)(1) = \underline{\hspace{2cm}}$

Multiplicative Property of Zero:

The *product* of any number and 0 is equal to 0

Ex: $56(0) = 0$; $-89 \cdot 0 = 0$

$117(0) = \underline{\hspace{2cm}}$ $-96 \cdot 0 = \underline{\hspace{2cm}}$ $(47)0 = \underline{\hspace{2cm}}$

Multiplicative Inverse Property:

Two numbers whose product is 1 are called *multiplicative inverses* or *reciprocals*. Zero has no reciprocal because any number times 0 is 0.

Assume that no variable equals zero.

Ex: Name the *multiplicative inverse* of each number or variable:

a) $7; \frac{1}{7}$

b) $z; \frac{1}{z}$

c) $\frac{4}{5}; \frac{5}{4}$

Check: $7\left(\frac{1}{7}\right) \stackrel{?}{=} 1$
YES

$z \cdot \frac{1}{z} \stackrel{?}{=} 1$
YES

$\frac{4}{5} \cdot \frac{5}{4} \stackrel{?}{=} 1$
YES

Find the *multiplicative inverse* of:

3; _____

$\frac{x}{3}$; _____

xy ; _____

Reflexive Property of Equality:

Any quantity is equal to *itself*.

Ex: $9 = 9$; $4 + 3 = 4 + 3$; $12 \cdot 5 = 12 \cdot 5$

$15 + 5 =$ _____

$-14(2) =$ _____

$-3 - 6 =$ _____

Symmetric Property of Equality:

If one quantity equals a second quantity, then the second quantity also equals the first.

Ex: **If $7 + 2 = 9$, then $9 = 7 + 2$; If $8 + 4 = 6 + 6$, then $6 + 6 = 8 + 4$**

• If $4(3) = 12$, then _____

• If $10 + 8 = 12 + 6$, then _____

Transitive Property of Equality:

If one quantity equals a second quantity and the second quantity equals a third quantity, then the first and third quantities are equal.

Ex: If $a = b$ and $b = c$, then $a = c$

If $8 = 5 + 3$ and $5 + 3 = 6 + 2$, then _____

Substitution Property of Equality:

A quantity may be *substituted* for its equal in any expression.

Ex: We know that $2 + 5 = 4 + 3$. Since $2 + 5$ is equal to 7, we can substitute 7 for $2 + 5$ to get $7 = 4 + 3$

$5 + 4 = 6 + 3$, so _____ = $6 + 3$ $10 + 2 = 8 + 4$, so $10 + 2 =$ _____

Name the property illustrated by each statement:

1. $0 + 21 = 21$ 1. _____
2. $(0)15 = 0$ 2. _____
3. If $4 + 5 = 9$, then $9 = 4 + 5$ 3. _____
4. $(1)94 = 94$ 4. _____
5. If $3 + 3 = 6$ and $6 = 3(2)$, then $3 + 3 = 3(2)$ 5. _____
6. $(14 - 6) + 3 = 8 + 3$ 6. _____
7. $23 \cdot 1 = 23$ 7. _____
8. $4 + 3 = 3 + 4$ 8. _____
9. $\frac{5}{9} \cdot \frac{9}{5} = 1$ 9. _____
10. If $8 + 1 = 9$, then $9 = 8 + 1$ 10. _____