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| **Property** | **Definition** | **Algebraic Definition** | **Example** |
| **Reflexive Property** | Any number is equal to itself. | $$a=a$$ | $$2=2$$ |
| **Symmetric Property** | You switch sides of the equals sign. | $$a=b and b=a$$ | $x=6 and$ $6=x$ |
| **Transitive Property** | If two separate terms are equal to a third term, then the two terms are equal. | $$a=b and c=b, so$$$$ a=c$$ | $$x=6 and x=y$$ so $y=6$ |
| **Commutative Property** | You can add any 2 numbers in any order and get the same answer. | $$a+b=b+a$$ | $$2+3=3+2$$$$5=5$$ |
| **Associative Property** | You can rearrange grouping in an addition problem and get the same answer. | $$\left(a+b\right)+c=a+(b+c)$$ | $$\left(2+3\right)+4=2+\left(3+4\right)$$$$\left(5\right)+4=2+\left(7\right)$$$$9=9$$ |
| **Addition Property** | As long as you add the same number to both sides of an equation, the equation is still equal. | If $a=b$, then $a+c=b+c$ | If $x=2$, then $x+2=2+2$ |
| **Multiplication Property** | You can multiply both sides of an equation by the same number and the equation is still true. | $$If a=b, then ac=bc$$ | $$If x=2, $$$$then 4x=4×2$$ |
| **Additive Identity** | You can add 0 to anything and it doesn’t change. | $$a+0=a$$ | $$2+0=2$$ |
| **Multiplicative identity** | You can multiply anything by 1 and it doesn’t change. | $$a×1=a$$ | $$2×1=2$$ |
| **Property of Opposites** | If you add opposite numbers, it will equal 0. | $$a+\left(-a\right)=0$$ | $$2+\left(-2\right)=0$$ |
| **Property of Reciprocals** | If you multiply by a reciprocal, it equals 1. | $$b\left(\frac{1}{b}\right)=1$$ | $$3×\frac{1}{3}=$$$$\frac{3}{3}=1$$ |
| **Distributive Property** | Multiplying a number into parenthesis, or pulling a number out of parenthesis. | $$a\left(b+c\right)=ab+ac$$or$$qr+qs=q(r+s)$$ | $$3\left(a+1\right)=3a+3$$or$$4x+8=4(x+2)$$ |
| **Zero Product Property** | If the product of two numbers is 0, then at least one of those numbers must be 0. | $$If ab=0, $$$$the a or b must be 0.$$ | $$If 2x=0,$$then $x=0.$ |