Property / Identity	Definition	Examples
Additive Identity	When the sum of a number and zero is taken, the result is that the number is unchanged.	1) $3+0=3$ 2) $R+0=R$ 3) $-\frac{5}{7}=-\frac{5}{7}+0$
Additive Inverse	Adding opposites produces a result that is the additive identity "0"	1) $-A+A=0$ 2) $-6+6=0$ 3) $1.342-1.342=0$
Multiplicative Identity	When the product of a number and one is taken, the result is that the number is unchanged.	1) $11\bullet 1=11$ 2) $ABC=1ABC$ 3) $1\bullet\left(-\frac{4}{5}\right)=-\frac{4}{5}$
Multiplicative Inverse	Multiplying reciprocals produces a result that is the multiplicative identity "1"	1) $\frac{3}{4}\bullet\left(\frac{4}{3}\right)=1$ 2) $B\bullet\left(\frac{1}{B}\right)=1$ 3) $1=\frac{-1}{17}\bullet\frac{-17}{1}$
Multiplicative Property of Zero	Any number multiplied by zero will produce an answer of of zero.	1) $5\cdot 7\cdot 0\cdot 3=0$ 2) $0=0\cdot W$ 3) $-\frac{4}{5}\cdot 0=0$
Reflexive Property	This occurs when an exact copy or duplicate of an expression or equation is created.	1) $5x-3=5x-3$ 2) $11y+2=11y+2$ 3) $5a^2-2a+3=5a^2-2a+3$
Transitive Property	Two valid statements will initially be given, one can then logically arrive at a third valid statement by passing on the shared trait.	1) If Mike is taller than Troy, and Troy is taller than Peter, then Mike is taller than Peter. 2) If a = b, and b = c, then a = c. 3) If $2(5)=7+3$ & $7+3=10$, then $2(5)=10$
Substitution Property	This is the catch 22, If no other property or identity describes the scenario this "replacement property" should be used.	1) $2(4+3)=2(7)$ 2) $5(7)-11=35-11$ 3) $11^2+[6-3]=121+3$

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Symmetric Property	This is when the R.H.S. and L.H.S. of an equation are switched, but the individual terms are left in the same order.	1) If $A-7=B+4$, then $B+4=A-7$ 2) If $y+2=x^2-4x+9$, then $x^2-4x+9=y+2$ 3) If $w=3f-7$, then $3f-7=w$
Associative Property for Addition	When a series of terms are being added together one can regroup the terms using parentheses but the end result is left unchanged.	1) $5+(8+9)=(5+8)+9$ 2) $(a+b)+c=a+b+c$ 3) $1+(2+3)+1=(1+2+3)+1$
Associative Property for Multiplication	When a series of terms are being multiplied together one can regroup the terms using parentheses but the end result is left unchanged.	1) $(de)f=d(ef)$ 2) $7\cdot(3\cdot 4)\cdot 2=7\cdot[(3\cdot 4)\cdot 2]$ 3) $c(de)f=(cd)(ef)$
Commutative Property for Addition	When a series of terms are being added together one can rearrange the terms without effecting the end result.	1) $7+2+5=2+5+7$ 2) $ab+5+c=5+ab+c$ 3) $9+7+6=7+6+9$
Commutative Property for Multiplication	When a series of terms are being multiplied together one can rearrange the terms without effecting the end result.	1) $abc=bca=cba$ 2) $cd-7=dc-7$ 3) $2(5)(9)=2(9)(5)=9(2)(5)$
Distributive Property from right over addition	When a value on the right side of a set of parentheses, is multiplied across terms separated by an operation of addition.	1) $(11x+3)2=11x\cdot 2+3\cdot 2$ 2) $(3w+7)5=15w+35$ 3) $(2m+1)9=18m+9$
Distributive Property from right over subtraction	When a value on the right side of a set of parentheses, is multiplied across terms separated by an operation of subtraction.	1) $(7x-3)6=7x\cdot 6-3\cdot 6$ 2) $(4p-5)2=8p-10$ 3) $(2y-3)11=22y-33$
Distributive Property from left over addition	When a value on the left side of a set of parentheses, is multiplied across terms separated by an operation of addition.	1) $3(2m+5)=3\cdot 2m+3\cdot 5$ 2) $7(2x+3)=14x+21$ 3) $5(6t+1)=30t+5$
Distributive Property from left over subtraction	When a value on the left side of a set of parentheses, is multiplied across terms separated by an operation of subtraction.	1) $7(2k-3)=7\cdot 2k-7\cdot 3$ 2) $8(3w-9)=24w-72$ 3) $\frac{2}{3}(6m-9)=4m-6$

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Closure Property	This is essentially a containment process where, given a set of numbers and an operation, the results create other numbers within the set.	{Odd Integers}; multiplication 1) $5 \cdot 7 = 35$ 2) $-3 \cdot 11 = -33$ 3) odd(odd) always equals an odd therefore, the operation on the set is considered **closed.**
	Note: One counter example, the example that demonstrates that a result of using the operator does not produce a number within the set, is all that is needed to show the operation is not closed.	{Odd Integers}; addition 1) $5 + 3 = 8$ 2) $-11 + 13 = 2$ 3) odd + (odd) never equals odd therefore, the operation on the set is considered **not closed.**
	Note: Many times it will prove helpful to use the same two numbers when testing for closure but reverse the order in the trials.	{Whole Numbers}; subtraction 1) $11 - 5 = 6$ 2) $5 - 11 = -6$ 3) Whole – Whole sometimes equals a whole number therefore, the operation on the set is considered **not closed.**
		{Integers}; division 1) $30 \div 6 = 5$ 2) $6 \div 30 = \frac{1}{5}$ 3) Integer $\div$ Integer sometimes equals an integer number therefore, the operation on the set is considered **not closed.**
	Note: Here is an example of a more complex operation where multiple steps are involved in the process. As mentioned earlier reverse the order of the numbers when checking for closure.	{Even Numbers}; $a^2 - a \cdot b$ 1) $4^2 - 4 \cdot 6 = -8$ 2) $6^2 - 6 \cdot 4 = 12$ 3) $(-2)^2 - (-2) \cdot 20 = 44$ 4) The results appear to remain within the original set of numbers so the operation on the set is considered **closed.**