Please have your homework on your desk.　　Calculator? No

Date:

TSW identify algebraic properties.

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**QRQ2:**

Match each verbal expression with the correct algebraic expression.

C **1.** nine divided by 2 plus $n$

B **2.** four divided by the difference of $n$ and six

F **3.** $n$ plus five squared

H **4.** three times the quantity eight plus $n$

G **5.** nine divided by the quantity 2 plus $n$

D **6.** three times eight plus $n$

A **7.** the quantity $n$ plus five squared

E **8.** four divided by $n$ minus six

**a.** $(n + 5)^2$

**b.** $4 \div (n - 6)$

**c.** $9 \div 2 + n$

**d.** $3(8) + n$

**e.** $4 \div n - 6$

**f.** $n + 5^2$

**g.** $9 \div (2 + n)$

**h.** $3(8 + n)$

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Simplify each expression.

1　　$-4x - (5 + 2x) - 10$

$-4x - 5 - 2x - 10$

$-6x - 15$

2　　$-5(x + 7) - 2(x - 3)$

$-5x - 35 - 2x + 6$

$-7x - 29$

3　　$9a + 4b - 11 - 12a + 5b + 20$

$-3a + 9b + 9$

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15) $n - 4 - 9$　　　$n - 13$

16) $4n - n$　　　$3n$

17) $-3x - 9 + 15x$　　　$12x - 9$

18) $-9k + 8k$　　　$-k$

19) $-16n - 14n$　　　$-30n$

20) $15n - 19n$　　　$-4n$

21) $-4(1 - 3m)$　　$-4 + 21m$　　$3 - 21m$

22) $-5n(9n + 7n)$　　$-8n + 18 + 2 \cdot 1n$　　$16n + 18$　　$16n + 18$　　$18 + 16n$

23) $-2n(9 - 10n)$　　$-2n - 9 + 10n$　　$8n - 9$　　$8n - 9$　　or　　$-9 + 8n$

24) $10(-3n - 9)$　　$10 - 45n + 45$　　$55 - 45n$　　$55 - 45n$　　$-45n + 55$

25) $9a(10a - 1)$　　$9a + 60a - 10$　　$69a - 10$　　$69a - 10$

26) $-3(10m - 3)(11 + 4m)$　　$-30m + 27 + 6 + 24m$　　$-30m + 33$

27) $-10(1 - 9x) + 6(x - 10)$　　$-10 + 90x + 6x - 60$　　$-70 + 96x$

28) $5(-2n + 4) + 2(n + 3)$　　$-10n + 20 + 2n + 6$　　$-8n + 26$

29) $-3(10a + 10) + 5(b + 2)$　　$-30b - 30 + 5b + 10$　　$-25b - 20$

30) $-7(n + 3) - 8(1 + 8n)$　　$-7n - 3 - 64n$　　$-71n - 29$

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Open Notes QUIZ on

　Translate and Combine Like Terms

Graded Classwork:

　Attempt to answer properties examples using the Algebraic Properties List.

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**Field Properties**

| Property | Addition | Multiplication |
|---|---|---|
| Associative | $(a + b) + c = a + (b + c)$ | $(ab)c = a(bc)$ |
| Commutative | $a + b = b + a$ | $ab = ba$ |
| Identity | $a + 0 = a$ | $a \cdot 1 = a$ |
| Inverse | $a + (-a) = 0$ | $a \cdot \dfrac{1}{a} = 1$ 　if $a \neq 0$ |
| Distributive | $a(b + c) = ab + ac$ 　and　 $ab + ac = a(b + c)$ | |

**Properties of Equality and Inequality**

| Property | Equality | Inequality |
|---|---|---|
| Multiplicative Property of Zero | $a \cdot 0 = 0$ | |
| Zero Product | If $ab = 0$, then $a = 0$ or $b = 0$. | |
| Reflexive | $a = a$ | |
| Symmetric | If $a = b$, then $b = a$. | |
| Transitive | If $a = b$ and $b = c$, then $a = c$. | If $a > b$ and $b > c$, then $a > c$. <br> If $a < b$ and $b < c$, then $a < c$. |

| Property | Equality | Inequality |
|---|---|---|
| Addition | If $a = b$, then $a + c = b + c$. | If $a < b$, then $a + c < b + c$. <br> If $a > b$, then $a + c > b + c$. |
| Subtraction | If $a = b$, then $a - c = b - c$. | If $a < b$, then $a - c < b - c$. <br> If $a > b$, then $a - c > b - c$. |
| Multiplication | If $a = b$, then $ac = bc$. | If $a < b$ and $c > 0$, then $ac < bc$. <br> If $a < b$ and $c < 0$, then $ac > bc$. <br> If $a > b$ and $c > 0$, then $ac > bc$. <br> If $a > b$ and $c < 0$, then $ac < bc$. |
| Division | If $a = b$ and $c \neq 0$, then $\dfrac{a}{c} = \dfrac{b}{c}$. | If $a < b$ and $c > 0$, then $\dfrac{a}{c} < \dfrac{b}{c}$. <br> If $a < b$ and $c < 0$, then $\dfrac{a}{c} > \dfrac{b}{c}$. <br> If $a > b$ and $c > 0$, then $\dfrac{a}{c} > \dfrac{b}{c}$. <br> If $a > b$ and $c < 0$, then $\dfrac{a}{c} < \dfrac{b}{c}$. |
| Substitution | If $a = b$, then $b$ can be substituted for $a$ in any equation or inequality. | |

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## What do these properties allow us to do?

**Associative:** When adding or multiplying numbers it does not matter how we __Group__ them. Remember . . . Your __Group__ of friends is who you __associate__ with.

**Commutative:** When adding or multiplying numbers the __order__ is not important. When you __commute__ from home to school you change __locations__.

**Distributive:** When distributing, you are __multiplying__ the number __outside__ the parentheses with all the terms __inside__ the parentheses. The parentheses __disappear__ when this happens!

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**Identity:** Adding __zero__ to a number does not change its identity. Multiplying by __one__ does not change its identity.

**Inverse:** Adding a number with the __opposite__ of that number will always EQUAL ZERO. Multiplying a number with its __reciprocal__ will always EQUAL ONE.

$\dfrac{1}{5} \cdot \dfrac{5}{1} = 1 \qquad \dfrac{2}{3} \cdot \dfrac{3}{2} = 1 \qquad 3 \cdot \dfrac{1}{3} = 1$

**Multiplicative Property of Zero:** Multiplying a number by __zero__ will always equal __zero__.

**Reflexive:** Something equal to __itself__. Think of a reflection in a mirror. Nothing changes.

**Symmetric:** What was on the __left__ side of the equation is now on the __right__. What was on the __right__ side of the equation is now on the __left__. The order of the operations does not change, just the side the information is on changes.

Commutative
$h + s = s + h$

Symmetric
If $h + s = m + F$
when
$m + F = h + s$

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**Transitive:** If the __1st__ amount equals the __2nd__ amount, and the __2nd__ amount equals the __3rd__ amount, then the __1st__ will also equal the __3rd__.

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

**Addition:** __Adding__ the same number to each side of an equation does not change the equation.

**Subtraction:** __Subtracting__ the same number from each side of an equation does not change the equation.

**Multiplication:** __Multiplying__ each side of an equation does not change the equation.

**Division:** __Dividing__ each side of an equation by the same __nonzero__ number does not change the equation.

**Substitution:** You can __replace__ an expression with another expression or real number that has the same __value__.
(Combine Like Terms is an example of using substitution)

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**Name the property illustrated by each statement.**
-**Commutative** (of multiplication or addition)    -**Associative** (of multiplication or addition)
-**Identity** (of multiplication or addition)    -**Inverse** (of multiplication or addition)
-**Distributive**  -**Zero Property**    -**Reflexive**    -**Symmetric**   -**Transitive**

1.) $2(m + 5) = 2m + 10$    Distributive

2.) $q = q$    Reflexive

3.) $2 + 2 = 4$ and $4 = 3 + 1$, then $2 + 2 = 3 + 1$.    Transitive

4.) $6 \cdot 0 = 0$    Zero property

5.) $(3 + 2) + 4 = 3 + (2 + 4)$    Associative of addition

6.) $6 + 7 = 7 + 6$   Commutative of addition

7.) $k + 0 = k$   Additive identity

8.) $5 \cdot \frac{1}{5} = 1$   Multiplicative inverse

9.) $8(7x) = (7x)8$   Commutative of multiplication

10.) $9 \cdot (3 \cdot x) = (9 \cdot 3) \cdot x$   Associative of multiplication

11.) $1 \cdot b = b$   Multiplicative identity

12.) If $2(3) = 6$, then $6 = 2(3)$.   Symmetric

13.) $t + (-t) = 0$   additive inverse

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Justify each step using your Algebraic Properties Chart.

| | |
|---|---|
| $8x + 3(5 - 4x)$ | Given |
| $8x + 15 - 12x$ | Distributive |
| $8x - 12x + 15$ | Commutative |
| $(8x - 12x) + 15$ | Associative |
| $-4x + 15$ | Substitution |

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Justify each step using your Algebraic Properties Chart.

| | |
|---|---|
| $5x + 1 = 11$ | Given |
| $5x + 1 + (-1) = 11 + (-1)$ | Additive inverse |
| $5x = 10$ | Substitution |
| $(1/5)(5x) = (1/5)(10)$ | Multiplicative inverse |
| $x = 2$ | Substitution |

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Justify each step using your Algebraic Properties Chart.

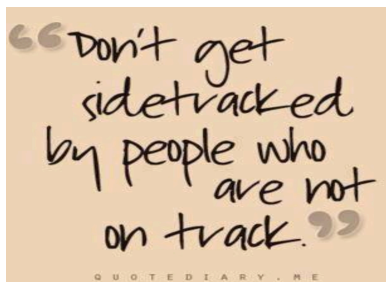| | |
|---|---|
| $2(3x - 4) = 10$ | Given |
| $6x - 8 = 10$ | Distributive |
| $6x - 8 + 8 = 10 + 8$ | Additive Inverse |
| $6x = 18$ | Substitution |
| $(1/6)(6x) = (1/6)(18)$ | Multiplicative inverse |
| $x = 3$ | Substitution |

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Assignment:

  Properties Handout!

Closed Notes Quiz on Properties tomorrow!!!



"Don't get sidetracked by people who are not on track."

QUOTEDIARY.ME