

Name KEY

Match the Property or Identity with the appropriate Definition

1. D Distributive Property from right over subtraction

2. C Commutative Property for Addition

3. B Substitution Property

4. G Multiplicative Inverse

5. E Additive Identity

6. J Reflexive Property

7. I Additive Inverse

8. F Associative Property for Multiplication

A. 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. SYMMETRIC

B. This is the catch 22, If no other property or identity describes the scenario this "replacement property" should be used. SUBSTITUTION

C. When a series of terms are being added together one can rearrange the terms without effecting the end result. COMMUTATIVE FOR ADDITION

D. When a value on the right side of a set of parentheses, is multiplied across terms separated by an operation of subtraction. DISTRIBUTIVE FROM RIGHT OVER SUBTRACTION

E. When the sum of a number and zero is taken, the result is that the number is unchanged. ADDITIVE IDENTITY

F. When a series of terms are being multiplied together one can regroup the terms using parentheses but the end result is left unchanged. ASSOCIATIVE FOR MULT.

G. Multiplying reciprocals produces a result that is the multiplicative identity "1" MULTIPLICATIVE INVERSE

H. When a series of terms are being added together one can regroup the terms using parentheses but the end result is left unchanged. ASSOCIATIVE FOR ADD

I. Adding opposites produces a result that is the additive identity "0" ADDITIVE INVERSE

J. This occurs when an exact copy or duplicate of an expression or equation is created. REFLEXIVE

K. When a value on the left side of a set of parentheses, is multiplied across terms separated by an operation of subtraction. DIST. FROM LEFT OVER SUBTRACTION

Match the Property or Identity with the appropriate Example

1. F Distributive Property from left over subtraction

2. E Multiplicative Property of Zero

3. J Commutative Property for Addition

4. B Distributive Property from right over subtraction

5. H Additive Inverse

6. G Multiplicative Identity

7. K Transitive Property

8. C Associative Property for Addition

9. D Symmetric Property

A. $3(2m+5) = 3 \cdot 2m + 3 \cdot 5$
DIST FROM LEFT ADD

B. $(4p-5)2 = 8p-10$
DIST FROM RIGHT SUBTRACT

C. $(a+b)+c = a+b+c$
ASSOCIATIVE ADD

D. If $A-7 = B+4$, then
 $B+4 = A-7$
SYMMETRIC

E. $-\frac{4}{5}0 = 0$
MULT PROP ZERO

F. $8(3w-9) = 24w-72$
DISTRIB LEFT SUB

G. $1 \cdot \left(-\frac{4}{5}\right) = -\frac{4}{5}$
MULT IDENT

H. $-6+6=0$
ADD INVERSE

I. $1 = \frac{-1}{17} \cdot \frac{-17}{1}$
MULT INVERS

J. $ab+5+c = 5+ab+c$
COMMUTATIVE ADDITION

K. If $2(5) = 7+3$ & $7+3=10$,
then $2(5) = 10$
TRANSITIVE

Simplify

1. $4(2x-1) - 3(5x-2)$

$8x - 4 - 15x + 6$

$-7x + 2$

1. $-7x + 2$

2. $\frac{3}{7}(21y+14) - \frac{2}{3}(12y-9) + 2y$

$9y + 6 - 8y + 6 + 2y$

$3y + 12$

2. $3y + 12$

3. $-11 + 5(2g+7) + 3(2g-5) - 13g$

$-11 + 10g + 35 + 6g - 15 - 13g$

$3g + 9$

3. $3g + 9$

4. $9(2t+4) - 5(3t-5)$

$18t + 36 - 15t + 25$

$3t + 61$

4. $3t + 61$

5. $-(3m-4) + 8(5m+7)$

$-3m + 4 + 40m + 56$

$37m + 60$

5. $37m + 60$

Patterns

A. 6, 4, 8, 5, 15, 11, 44, 39, 195
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ -2 & \cdot 2 & -3 & \cdot 3 & -4 & \cdot 4 & -5 & \cdot 5 & -6 \end{matrix}$

44, 39, 195, 189

B. 3, 4, 6, 9, 13,
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ +1 & +2 & +3 & +4 & +5 & +6 & +7 & +8 \end{matrix}$

18, 24, 31, 39

C. 12, 7, 14, 9, 18, 13, 26, 21, 42
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ -5 & \cdot 2 & -5 & \cdot 2 & -5 & \cdot 2 & -5 & \cdot 2 \end{matrix}$

21, 42, 37

D. 2, 3, 6, 3, 4, 8, 5, 6, 12, 9
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ +1 & \cdot 2 & -3 & +1 & \cdot 2 & -3 & +1 & \cdot 2 & -3 \end{matrix}$

6, 12, 9

Find the solution set

6. $3x + 5 \leq 20$

$r = \{-1, 3, 4, 11\}$

-1: $2 \leq 20 \checkmark$ 11: $38 \leq 20 \times \times$

3: $14 \leq 20 \checkmark$

4: $17 \leq 20 \checkmark$

$\{-1, 3, 4\}$

6. $\{-1, 3, 4\}$

7. $x^2 - 4 \geq x$

$r = \{-3, -1, 1, 4\}$

-3: $5 \geq -3 \checkmark$ 1: $-3 \geq 1 \times \times$

-1: $-3 \geq -1 \times \times$ 4: $12 \geq 4 \checkmark$

$\{-3, 4\}$

7. $\{-3, 4\}$

8. $5x + 7 < 2x$

$r = \{-7, -1, 3, 5\}$

-7: $-28 < -14 \checkmark$ 3: $22 < 6 \times \times$ $\{-7\}$

-1: $2 < -2 \times \times$ 5: $17 < 10 \times \times$

8. $\{-7\}$

9. $2x + 5 > x^2$

$r = \{-1, 2, 4, 5\}$

-1: $3 > 1 \checkmark$ 4: $13 > 16 \times \times$ $\{-1, 2\}$

2: $9 > 4 \checkmark$ 5: $15 > 25 \times \times$

9. $\{-1, 2\}$

Translate the following (There is nothing to solve in this section)

Use "n" to represent the number

10. Nine less than five times a number

$5n - 9$

10. $5n - 9$

11. The sum of a number squared and three.

$n^2 + 3$

11. $n^2 + 3$

12. Eight more than five times a number squared.

$5n^2 + 8$

12. $5n^2 + 8$

13. Twice the sum of four times a number and nine is six.

$2(4n + 9) = 6$

13. $2(4n + 9) = 6$

Translate the following (There is nothing to solve in this section)

Use "n" to represent the number

14. A number decreased by seven is the same as three times the number increased by two.

$$n - 7 = 3n + 2$$

14. $n - 7 = 3n + 2$

15. Twice the difference of five times a number and two is six.

$$2(5n - 2) = 6$$

15. $2(5n - 2) = 6$

16. The square of the sum of five times x and nine is equal to twelve more than three times x.

$$(5x + 9)^2 = 3x + 12$$

16. $(5x + 9)^2 = 3x + 12$

17. Two times the sum of six times the cube of a number and one is four less than nine times the number.

$$2(6n^3 + 1) = 9n - 4$$

17. $2(6n^3 + 1) = 9n - 4$

18. The square of the difference of seven times a number and two is three more than five times the sum of the number and five.

$$(7n - 2)^2 = 5(n + 5) + 3$$

18. $(7n - 2)^2 = 5(n + 5) + 3$

Order of operations (SHOW YOUR WORK! - V Shape)

19. $\left(\frac{1}{2}\right)^2 - \left[\frac{2}{3} + \frac{1}{5} \div \frac{3}{4} \cdot \frac{5}{6} - \frac{3}{4}\right]$

$$\frac{1}{4} - \left[\frac{2}{3} + \frac{1}{5} \cdot \frac{4}{3} \cdot \frac{5}{6} - \frac{3}{4}\right]$$

$$\frac{1}{4} - \left[\frac{2}{3} + \frac{2}{9} - \frac{3}{4}\right]$$

$$\frac{1}{4} - \left[\frac{24 + 8 - 27}{36}\right]$$

$$\frac{1}{4} - \frac{5}{36}$$

$$\frac{9 - 5}{36} = \frac{4}{36} = \boxed{\frac{1}{9}}$$

20. $8^2 - [5(2 - 9) + 3^2]$

$$64 - [5(-7) + 9]$$

$$64 - [-35 + 9]$$

$$64 - (-26)$$

$$64 + 26$$

$$\boxed{90}$$

Order of operations (SHOW YOUR WORK! - V Shape)

21. $125 \div [5(2+3)] - 2(7)$

$$125 \div [5(5)] - 14$$

$$125 \div 25 - 14$$

$$5 - 14$$

$$\boxed{-9}$$

22. $6 \cdot \left[\frac{1}{2} + \left(\frac{3}{5} \cdot \frac{5}{6} \right) \div \frac{5}{8} \right]$

$$6 \cdot \left[\frac{1}{2} + \left(\frac{1}{1} \right) \cdot \frac{8}{5} \right]$$

$$6 \cdot \left[\frac{1}{2} + \frac{4}{5} \right]$$

$$6 \cdot \left[\frac{5+8}{10} \right]$$

$$6 \cdot \frac{13}{10} = \frac{3 \cdot 13}{5}$$

$$\boxed{7\frac{4}{5}}$$

Determine if each of the following operations are closed under the given number set.

23. {Odd Integers}; $A \cdot B + 6$

Counter example if applicable:

$$\begin{array}{r} 1) \quad 3 \cdot 5 + 6 \\ \quad 15 + 6 \\ \quad \quad 21 \end{array}$$

$$\begin{array}{r} 2) \quad 5 \cdot 1 + 6 \\ \quad 5 + 6 \\ \quad \quad 11 \end{array}$$

23. CLOSED

24. {Whole}; $A^2 + B$

Counter example if applicable:

$$\begin{array}{r} 1) \quad 3^2 + 7 \\ \quad 9 + 7 \\ \quad \quad 16 \end{array}$$

$$\begin{array}{r} 2) \quad 11^2 + 2 \\ \quad 121 + 2 \\ \quad \quad 123 \end{array}$$

24. CLOSED

25. {Odd Integers}; Addition

Counter example if applicable:

$$* \quad 3 + 7 = 10$$

25. NOT CLOSED

26. {Even Integers}; Multiplication

Counter example if applicable:

$$1) \quad 2 \cdot 6 = 12$$

$$2) \quad 4 \cdot 10 = 40$$

26. CLOSED

27. {Even Integers}; $(A-3) + (B+1)$

Counter example if applicable:

$$1) \quad (8-3) + (6+1)$$

$$\begin{array}{r} 5 + 7 \\ 12 \end{array}$$

$$2) \quad (10-3) + (6+1)$$

$$\begin{array}{r} 7 + 7 \\ 14 \end{array}$$

27. CLOSED