

Name \_\_\_\_\_

Match each property or identity with the appropriate definition.

1. D Multiplicative Identity

2. G Reflexive Property

3. A Additive Inverse

4. B Distributive Property  
from right over addition

5. H Commutative Property  
for Addition

6. E Symmetric Property

A. Adding opposites produces a result that is the additive identity "0"

ADDITIVE INVERSE

B. When a value on the right side of a set of parentheses, is multiplied across terms separated by an operation of addition.

DIST FROM RIGHT OVER ADDITION

C. Any number multiplied by zero will produce an answer of zero.

MULTIPLICATIVE PROPERTY OF ZERO

D. When the product of a number and one is taken, the result is that the number is unchanged.

MULTIPLICATIVE IDENTITY

E. 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

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

ASSOCIATIVITY FOR ADDITION

G. This occurs when an exact copy or duplicate of an expression or equation

REFLEXIVE

H. When a series of terms are being added together one can rearrange the terms without effecting the end result.

COMMUTATIVITY FOR ADDITION

Match each property or identity with the appropriate example.

1. G Transitive Property

2. K Substitution Property

3. A Associative Property for Multiplication

4. I Distributive Property from right over subtraction

5. B Additive Identity

6. L Multiplicative Inverse

7. C Commutative Property for Multiplication

8. E Symmetric Property

9. J Multiplicative Property of Zero

A.  $(de)f = d(ef)$  ASSOCIATIVITY FOR MULTIPLICATION

B.  $-\frac{5}{7} = -\frac{5}{7} + 0$  ADDITIVE IDENTITY

C.  $2(5)(9) = 2(9)(5)$  COMMUTATIVITY FOR MULTIPLICATION

D.  $-6 + 6 = 0$  ADDITIVE INVERSE

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

F.  $7(2x + 3) = 14x + 21$  DIST. FROM LEFT OVER ADDITION

G. If  $2(5) = 7 + 3$  and  $7 + 3 = 10$ , then  $2(5) = 10$  TRANSITIVE

H.  $7 + 2 + 5 = 2 + 5 + 7$  COMMUTATIVITY FOR ADDITION

I.  $(4p - 5)2 = 8p - 10$  DIST FROM RIGHT OVER SUBTRACTION

J.  $-\frac{4}{5}(0) = 0$  MULT. PROP OF ZERO

K.  $11^2 + [6 - 3] = 121 + 3$  SUBSTITUTION

L.  $1 = \frac{-1}{17} \cdot \frac{-17}{1}$  MULTIPLICATIVE INVERSE

Find the pattern and fill in the blanks

A. 5, 6, 4, 7, 3, 8, 2, 9, 1, 10  
 $\begin{matrix} \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark \\ +1 & -2 & +3 & -4 & +5 & -6 & +7 & -8 & +9 \end{matrix}$

2, 9, 1, 10

B. 1, 3, 1, 2, 6, 4, 5, 15, 13, 14, 42, 40, 41  
 $\begin{matrix} \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark & \checkmark \\ \cdot 3 & -2 & +1 & \cdot 3 & -2 & +1 & \cdot 3 & -2 & +1 & \cdot 3 & -2 & +1 \end{matrix}$

42, 40, 41

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

1. {Odd Integers}; multiplication

Counter example if applicable:

$$\begin{array}{l} 3, 5: \\ 5, 3: \\ -1, 7: \end{array} \quad \begin{array}{l} 3 \cdot 5 = 15 \\ 5 \cdot 3 = 15 \\ -1 \cdot 7 = -7 \end{array}$$

1.  $\therefore$  CLOSED

2. {Whole};  $-A \cdot (B-5)$

Counter example if applicable:

$$\begin{array}{l} 5, 12: \\ \\ \end{array} \quad \begin{array}{l} -5(12-5) \\ -5(7) = -35 \end{array} \quad \text{COUNTER EXAMPLE}$$

2.  $\therefore$  NOT CLOSED

3. {Odd Integers}; subtraction

Counter example if applicable:

$$\begin{array}{l} 11, 7: \\ \\ \end{array} \quad \begin{array}{l} 11 - 7 = 4 \end{array} \quad \text{COUNTER EXAMPLE}$$

3.  $\therefore$  NOT CLOSED

4. {Even Whole}; addition

Counter example if applicable:

$$\begin{array}{l} 4, 6: \\ 6, 4: \\ 12, 2: \end{array} \quad \begin{array}{l} 4 + 6 = 10 \\ 6 + 4 = 10 \\ 12 + 2 = 14 \end{array}$$

4.  $\therefore$  CLOSED

5. {Odd Integers};  $(A-1) + (B+2)$

Counter example if applicable:

$$\begin{array}{l} 3, 5: \\ 5, 3: \end{array} \quad \begin{array}{l} (3-1) + (5+2) \\ 2 + 7 = 9 \\ (5-1) + (3+2) \\ 4 + 5 = 9 \end{array} \quad \begin{array}{l} -3, 11: \\ (-3-1) + (11+2) \\ -4 + 13 = 9 \end{array}$$

5.  $\therefore$  CLOSED

Use the Distributive Property to simplify each expression.

6.  $3(8x-1) - 5(2x+3)$

$$\begin{array}{l} \underline{24x-3} \quad \underline{-10x-15} \\ 14x-18 \end{array}$$

6.  $14x - 18$

7.  $5(2k+3) - 7(2k-1) + 2k$

$$\begin{array}{l} \underline{10k+15} \quad \underline{-14k+7} \quad \underline{+2k} \\ -2k+22 \end{array}$$

7.  $-2k + 22$

8.  $\frac{2}{5}(10k+25) - \frac{3}{4}(12k-8) + 2k$

$$\begin{array}{l} \underline{4k+10} \quad \underline{-9k+6} \quad \underline{+2k} \\ -3k+16 \end{array}$$

8.  $-3k + 16$

### Order of Operation

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

$$\frac{1}{9} - \left[\frac{2}{3} + \frac{1}{5} \cdot \frac{1}{2} \cdot \frac{5}{6} - \frac{3}{4}\right]$$

$$\frac{1}{9} - \left[\frac{2}{3} + \frac{1}{12} - \frac{3}{4}\right]$$

$$\frac{1}{9} - \left[\frac{8+1-9}{12}\right]$$

$$\frac{1}{9} - \frac{0}{12}$$

$$\frac{1}{9}$$

$$2. \left(\frac{8}{9} - \frac{2}{3}\right) \div \frac{4}{9} - \frac{1}{2} \cdot \frac{1}{5}$$

$$\left(\frac{8-6}{9}\right) \cdot \frac{9}{4} - \frac{1}{10}$$

$$\frac{2}{9} \cdot \frac{9}{4} - \frac{1}{10}$$

$$\frac{1}{2} - \frac{1}{10}$$

$$\frac{5-1}{10}$$

$$\frac{4}{10} = \frac{2}{5}$$

Write the Solution Set to each of the following.

$$3. 9x - 20 = x^2 \quad \text{replacement set} = \{-3, 4, 5, 10\}$$

$$-3: 9(-3) - 20 \stackrel{?}{=} (-3)^2 \quad 5: 9(5) - 20 \stackrel{?}{=} 5^2$$

$$X \quad -27 - 20 = 9 \quad \checkmark \quad 45 - 20 = 25$$

$$4: 9(4) - 20 \stackrel{?}{=} 4^2 \quad 10: 9(10) - 20 \stackrel{?}{=} 10^2$$

$$\checkmark \quad 36 - 20 = 16 \quad X \quad 90 - 20 = 100$$

$$1. \underline{\frac{1}{9}}$$

$$2. \underline{\frac{2}{5}}$$

$$3. \underline{x = \{4, 5\}}$$

$$4. \underline{x = \{3, 4, 11\}}$$

$$5. \underline{x = \{-4, 4, 10\}}$$

$$4. 5x + 7 < 10x \quad \text{replacement set} = \{-7, -1, 3, 4, 11\}$$

$$-7: 5(-7) + 7 < 10(-7) \quad 4: 5(4) + 7 < 10(4)$$

$$X \quad -35 + 7 < -70 \quad \checkmark \quad 27 < 40$$

$$-1: 5(-1) + 7 < 10(-1) \quad 11: 5(11) + 7 < 10(11)$$

$$X \quad 2 < -10 \quad \checkmark \quad 62 < 110$$

$$3: 5(3) + 7 < 10(3) \quad \checkmark \quad 22 < 30$$

$$5. x^2 - 11 \geq x \quad \text{replacement set} = \{-4, -1, 1, 4, 10\}$$

$$-4: 16 - 11 \geq -4 \quad 4: 16 - 11 \geq 4$$

$$\checkmark \quad 5 \geq -4 \quad \checkmark \quad 5 \geq 4$$

$$-1: 1 - 11 \geq -1 \quad 10: 100 - 11 \geq 10$$

$$X \quad -10 \geq -1 \quad \checkmark \quad 89 \geq 10$$

$$1: 1 - 11 \geq 1$$

$$X \quad -10 \geq 1$$

6. Convert 38 miles per hour to feet per sec.

$$\frac{38 \text{ MILE}}{\text{Hour}} \left| \frac{5280 \text{ FT}}{1 \text{ MILE}} \right| \left| \frac{1 \text{ Hour}}{60 \text{ MIN}} \right| \left| \frac{1 \text{ MIN}}{60 \text{ SEC}} \right| = 55.7\bar{3} \text{ ft/SEC} \quad 11. \quad \underline{55.7\bar{3} \text{ ft/SEC}}$$

7. Convert 102 km per week to meters per hour.

$$\frac{102 \text{ KM}}{\text{WEEK}} \left| \frac{1000 \text{ M}}{1 \text{ KM}} \right| \left| \frac{1 \text{ WEEK}}{7 \text{ DAYS}} \right| \left| \frac{1 \text{ DAY}}{24 \text{ HRS}} \right| = 607.1429 \text{ m/hour} \quad 12. \quad \underline{607.1429 \text{ m/hour}}$$

8. Convert 145 miles per gallon to inches per cup.

$$\frac{145 \text{ MILES}}{\text{GAL}} \left| \frac{1 \text{ GAL}}{4 \text{ QRTS}} \right| \left| \frac{1 \text{ QRT}}{2 \text{ PT}} \right| \left| \frac{1 \text{ PT}}{2 \text{ CUP}} \right| \left| \frac{5280 \text{ FT}}{1 \text{ MILE}} \right| \left| \frac{12 \text{ INCHES}}{1 \text{ FT}} \right| = 574,200 \text{ INCHES/CUP} \quad 13. \quad \underline{574,200 \text{ INCHES/CUP}}$$

9. Convert 6,200 yards per pint to miles per gallon.

$$\frac{6200 \text{ YRDS}}{\text{PT}} \left| \frac{3 \text{ FT}}{1 \text{ YRD}} \right| \left| \frac{1 \text{ MILE}}{5280 \text{ FT}} \right| \left| \frac{2 \text{ PTS}}{1 \text{ QRT}} \right| \left| \frac{4 \text{ QRTS}}{1 \text{ GAL}} \right| = 28.1\bar{8} \text{ MILES/GAL} \quad 14. \quad \underline{28.1\bar{8} \text{ MILES/GAL}}$$

10. Convert 83,000 km per week to meters per minute.

$$\frac{83,000 \text{ KM}}{\text{WEEK}} \left| \frac{1000 \text{ M}}{1 \text{ KM}} \right| \left| \frac{1 \text{ WEEK}}{7 \text{ DAYS}} \right| \left| \frac{1 \text{ DAY}}{24 \text{ HOURS}} \right| \left| \frac{1 \text{ HR}}{60 \text{ MIN}} \right| = 8,234.127 \text{ METERS/MIN} \quad 15. \quad \underline{8,234.127 \text{ METERS/MIN}}$$

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

Use "n" to represent the number

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

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

12. A number increased by three is the same as five times the number decreased by eleven.

$$n + 3 = 5n - 11$$

13. Four times the sum of twice a number and three.

$$4(2n + 3)$$

14. Nine less than five times a number

$$5n - 9$$

15. The sum of a number squared and three.

$$n^2 + 3$$

16. Eight more than five times a number squared.

$$5n^2 + 8$$

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

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

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 four.

$$(7n - 2)^2 = 5(n + 4) + 3$$