

Name _____

Match each property or identity with the appropriate definition.

1. G Additive Identity

2. I Multiplicative Inverse

3. D Reflexive Property

4. B Transitive Property

5. H Associative Property
for Multiplication

6. L Commutative Property
for Multiplication

7. F Associative Property
for Addition

8. C Distributive Property
from left over subtraction

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

ADDITIVE INVERSE

B. Two valid statements will initially be given, one can then logically arrive at a third valid statement by passing on the shared trait

TRANSITIVE PROPERTY

C. When a value on the left side of a set of parentheses, is multiplied across terms separated by an operation of subtraction.

DISTRIBUTIVE PROP FROM LEFT OVER SUB

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

REFLEXIVE PROPERTY

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

SUBSTITUTION

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

ADDITIVE IDENTITY

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

ASSOCIATIVITY FOR MULTIPLICATION

I. Multiplying reciprocals produces a result that is the multiplicative identity "1"

MULTIPLICATIVE INVERSE

K. 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 PROPERTY

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

COMMUTATIVITY FOR MULTIPLICATION

Match each property or identity with the appropriate example.

1. E Multiplicative Identity

2. H Additive Inverse

3. A Symmetric Property

4. F Transitive Property

5. B Distributive Property from left over addition

6. D Multiplicative Property of Zero

7. C Associative Property for addition

8. J Distributive Property from left over subtraction

9. K Commutative Property for multiplication

10. L Commutative Property for Addition

A. If $y = 2f - 7$, then $2f - 7 = y$
SYMMETRIC

B. $\frac{2}{3}(9m + 3) = 6m + 2$
DISTRIBUTIVE FROM LEFT OVER ADDITION

C. $5 + (8 + 9) = (5 + 8) + 9$
ASSOCIATIVITY FOR ADDITION

D. $-\frac{4}{5}(0) = 0$
MULTIPLICATIVE PROPERTY OF ZERO

E. $WOZ = 1(WOZ)$
MULTIPLICATIVE IDENTITY

F. If $3(5) = 10 + 5$ and $10 + 5 = 15$
then $3(5) = 15$
TRANSITIVE PROPERTY

G. $(7x - 3)6 = 7x \cdot 6 - 3 \cdot 6$
DISTRIBUTIVE FROM RIGHT OVER SUBTRACTION

H. $-\frac{2}{3} + \frac{2}{3} = 0$
ADDITIVE INVERSE

J. $8(3w - 9) = 24w - 72$
DISTRIBUTIVE FROM LEFT OVER SUBTRACTION

K. $em + 3 = me + 3$
COMMUTATIVITY FOR MULTIPLICAT

L. $9 + 7 + 6 = 7 + 6 + 9$
COMMUTATIVITY FOR ADDITION

M. $45 + 0 = 45$
ADDITIVE IDENTITY

N. $B \cdot \left(\frac{1}{B}\right) = 1$
MULTIPLICATIVE INVERSE

Order of Operation

1. $5\frac{2}{3} \cdot \left[3\frac{1}{2} - \left(1\frac{3}{5} \cdot 4\frac{5}{6} \right) \div 7\frac{5}{8} \right] + 6$

$5\frac{2}{3} \left[3\frac{1}{2} - 7\frac{11}{15} \div 7\frac{5}{8} \right] + 6$

$5\frac{2}{3} \left[3\frac{1}{2} - 1\frac{13}{915} \right] + 6$

$5\frac{2}{3} [2.48579] + 6$

$14.08616 + 6$

20.08616

: FORCES ONE TO CONVERT TO DECIMALS

2. $\left(2\frac{1}{3} \right)^2 - \left[4\frac{1}{3} - 1\frac{1}{4} \div 2\frac{5}{6} + 7\frac{1}{2} \right]$

$5\frac{4}{9} - \left[4\frac{1}{3} - \frac{15}{34} + 7\frac{1}{2} \right]$

$5\frac{4}{9} - 11\frac{20}{51}$

$-5\frac{145}{153}$

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

3. {Even Integers}; addition

Counter example if applicable:

3. ∴ CLOSED

4, 12: $4 + 12 = 16 \checkmark$

12, 4: $12 + 4 = 16 \checkmark$

-8, 10: $-8 + 10 = 2 \checkmark$

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

Counter example if applicable:

4. ∴ CLOSED

6, 10: $(6-3) + (10+1)$
 $3 + 11 = 14 \checkmark$

10, 6: $(10-3) + (6+1)$
 $7 + 7 = 14 \checkmark$

-2, 0: $(-2-3) + (0+1)$
 $-5 + 1 = -4 \checkmark$

Write the Solution Set to each of the following.

5. $3x + 18 \leq x^2$

$r = \{-7, -3, 0, 4, 11\}$

-7: $-21 + 18 \leq 49$
 \checkmark

-3: $-9 + 18 \leq 9$
 \checkmark

0: $0 + 18 \leq 0$
 \times

4: $12 + 18 \leq 16$
 \times

11: $33 + 18 \leq 121$
 \checkmark

5. $\{-7, -3, 11\}$

6. $x^2 > 4x + 1$

$r = \{-5, 0, 1, 2, 5\}$

-5: $25 > -20 + 1$
 \checkmark

0: $0 > 0 + 1$
 \times

1: $1 > 4 + 1$
 \times

2: $4 > 8 + 1$
 \times

5: $25 > 20 + 1$
 \checkmark

6. $\{-5, 5\}$

Use the **Distributive Property** to simplify each expression.

7. $11(2m+5) - 7(5m-2) - 2m$

$$\begin{array}{r} \underline{22m} + 55 \quad \underline{-35m} + 14 \quad \underline{-2m} \\ -15m + 69 \end{array}$$

7. $-15m + 69$

8. $\frac{2}{7}(14h+28) - \frac{3}{5}(20h+40) + 3h$

$$\begin{array}{r} \underline{4h} + 8 \quad \underline{-12h} - 24 \quad \underline{+3h} \\ -5h - 16 \end{array}$$

8. $-5h - 16$

9. $-3 + 5(2g+4) + 3(2g-1) - 11g$

$$\begin{array}{r} -3 + \underline{10g} + 20 \quad \underline{+6g} - 3 \quad \underline{-11g} \\ 5g + 14 \end{array}$$

9. $5g + 14$

Perform the Indicated Unit Conversion

(Use two **decimal places** unless the answer is exceptionally small e.g. .000027 mi / cup and **commas** for larger values e.g. 243,000)

10. Convert 62 miles per hour to feet per sec.

62 MILES	5280 Ft	1 Hour	1 MIN
Hour	1 MILE	60 MIN	60 SEC

$$(62 \cdot 5280) / (60 \cdot 60) = 90.93 \text{ ft/SEC}$$

10. 90.93 ft/SEC

11. Convert 84 km per week to meters per hour.

84 KM	1000 M	1 WEEK	1 DAY
WEEK	1 KM	7 DAYS	24 HOUR

$$(84 \cdot 1000) / (7 \cdot 24) = 500 \text{ M/HR}$$

11. 500 M/HR

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

Use "n" to represent the number unless otherwise stated

12. Twice the sum of five times a number and three is nine.

$$2(5n + 3) = 9$$

12. $2(5n + 3) = 9$

13. The square of the difference of two times x and eight is equal to four more than five times x.

$$(2x - 8)^2 = 5x + 4$$

13. $(2x - 8)^2 = 5x + 4$

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

$$n - 9 = 7n + 2$$

14. $n - 9 = 7n + 2$

15. Three more than twice a number is the same as four less than five times the sum of twice the number and three.

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

15. $2n + 3 = 5(2n + 3) - 4$

16. Seven times the sum of nine times a number and two is equal to twelve more than three times the number.

$$7(9n + 2) = 3n + 12$$

16. $7(9n + 2) = 3n + 12$

Find the pattern and fill in the blanks

A. 6, 4, 8, 5, 15, 11, 44, 39, 195, 189
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ -2 & -2 & -3 & -3 & -4 & -4 & -5 & -5 & -6 \end{matrix}$

44, 39, 195, 189

B. 2, 4, 7, 11, 16, 22, 29, 37, 46
 $\begin{matrix} \vee & \vee & \vee & \vee & \vee & \vee & \vee & \vee \\ +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \end{matrix}$

22, 29, 37, 46

Take Home Portion

Name _____

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

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

1. \therefore CLOSED

Counter example if applicable:

3, 7: $3 \cdot 7 + 6$
 $21 + 6 = 27 \checkmark$
 7, 3: $7 \cdot 3 + 6$
 $21 + 6 = 27 \checkmark$
 -1, 5: $-1 \cdot 5 + 6$
 $-5 + 6 = 1 \checkmark$

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

2. \therefore CLOSED

Counter example if applicable:

0, 7: $0^2 + 7 = 7 \checkmark$
 7, 0: $7^2 + 0 = 49 \checkmark$
 4, 2: $4^2 + 2 = 18 \checkmark$

3. {Odd Integers}; Addition

3. \therefore NOT CLOSED

Counter example if applicable:

7, 1: $7 + 1 = 8$ COUNTER EXAMPLE

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

Use "n" to represent the number unless otherwise stated

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

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

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

5. Seven less than three times the difference of twice a number and five is the same as four more than nine times the number.

$3(2n - 5) - 7 = 9n + 4$

5. $3(2n - 5) - 7 = 9n + 4$

6. Three times the square of the sum of twice a number and two is fourteen less than five times the number.

$3(2n + 2)^2 = 5n - 14$

6. $3(2n + 2)^2 = 5n - 14$

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

SAME AS #4

7. $2(6n^3 + 1) = 9n - 4$

Order of Operation

$$8. 11\frac{1}{5} \left[\left(2\frac{4}{7} - 3\frac{1}{2} \right) \div \left(6\frac{4}{5} + 1\frac{5}{8} \right) - 2\frac{3}{4} \right]$$

$$11\frac{1}{5} \left[\frac{-13}{14} \div 8\frac{17}{40} - 2\frac{3}{4} \right]$$

$$11\frac{1}{5} \left[-.11022 - 2\frac{3}{4} \right] \quad ; \text{ FORCES ONE TO CONVERT TO DECIMAL}$$

$$11\frac{1}{5} \left[-2.86022 \right]$$

$$-32.03442$$

$$9. \left(1\frac{1}{3} \right)^2 - \left[2\frac{2}{3} + 5\frac{1}{4} \div 6\frac{3}{6} + 8\frac{1}{2} \right] - 4$$

$$1\frac{7}{9} - \left[2\frac{2}{3} + \frac{21}{26} + 8\frac{1}{2} \right] - 4$$

$$1\frac{7}{9} - 11\frac{38}{39} - 4$$

$$-14\frac{23}{117}$$

Use the Distributive Property to simplify each expression.

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

$$\underline{4k + 10} - \underline{9k + 6} + \underline{2k}$$

$$-3k + 16$$

$$10. \underline{-3k + 16}$$

$$11. -7 + 4(3g + 2) + 7(2g - 1) - 9g$$

$$-7 + \underline{12g} + 8 + \underline{14g} - 7 - \underline{9g}$$

$$17g - 6$$

$$11. \underline{17g - 6}$$

$$12. 9(2t + 4) - 5(3t - 5)$$

$$\underline{18t + 36} - \underline{15t + 25}$$

$$3t + 61$$

$$12. \underline{3t + 61}$$

$$13. -(5r - 7) + 8(11r + 1)$$

$$-5r + 7 + \underline{88r} + 8$$

$$83r + 15$$

$$13. \underline{83r + 15}$$

$$14. 3(8x - 1) - 5(2x + 3)$$

$$\underline{24x - 3} - \underline{10x - 15}$$

$$14x - 18$$

$$14. \underline{14x - 18}$$

Write the Solution Set to each of the following.

15. $5x + 7 < 2x$ $r = \{-7, -1, 3, 4, 11\}$

3:	$15 + 7 < 6$
x	
4:	$20 + 7 < 8$
x	
11:	$55 + 7 < 22$
x	

$-7: -35 + 7 < -14$
 \checkmark
 $-1: -5 + 7 < -2$
 \times

15. $\{-7\}$

16. $2x + 5 > x^2$ $r = \{-1, 1, 2, 3, 4, 5, 7\}$

4:	$8 + 5 > 16$
x	
5:	$10 + 5 > 25$
x	
7:	$14 + 5 > 49$
x	

$-1: -2 + 5 > 1$ \checkmark
 $1: 2 + 5 > 1$ \checkmark
 $2: 4 + 5 > 4$ \checkmark
 $3: 6 + 5 > 9$ \checkmark

16. $\{-1, 1, 2, 3\}$

17. $x^2 - 14 \geq x$ $r = \{-5, -1, 3, 4, 11\}$

3:	$9 - 14 \geq 3$
x	
11:	$121 - 14 \geq 11$
\checkmark	

$-5: 25 - 14 \geq -5$ \checkmark
 $-1: 1 - 14 \geq -1$ \times
 $4: 16 - 14 \geq 4$ \times

17. $\{-5, 11\}$

Perform the Indicated Unit Conversion

(Use two **decimal places** unless the answer is exceptionally small e.g. .000027 mi / cup and **commas** for larger values e.g. 243,000)

18. Convert 72 km per week to meters per hour.

72 KM	1000 M	1 WEEK	1 DAY
WEEK	1 KM	7 DAYS	24 HR

$(72 \cdot 1000) / (7 \cdot 24) = 428.57 \text{ m/hr}$

18. 428.57 m/hr

19. Convert 210 miles per gallon to inches per cup.

210 MILES	5280 ft	12 IN	1 GAL	1 QRT	1 PT
GAL	1 MILE	1 ft	4 QRT	2 PT	2 cup

$(210 \cdot 5280 \cdot 12) / (4 \cdot 2 \cdot 2) = 831,600 \text{ IN/cup}$

19. 831,600 IN/cup

20. Convert 7,600 yards per pint to miles per gallon.

7,600 YRD	3 ft	1 MILE	2 PTS	4 QRTS
PT	1 YRD	5280 ft	1 QRT	1 GAL

$(7,600 \cdot 3 \cdot 2 \cdot 4) / (5280) = 34.55 \text{ MILES/GAL}$

20. 34.55 MILES/GAL

21. Convert 83,500 km per week to meters per minute.

83,500 KM	1000 M	1 WK	1 DAY	1 Hour
WEEK	1 KM	7 DAY	24 Hour	60 MIN

$(83,500 \cdot 1000) / (7 \cdot 24 \cdot 60) = 8,283.73 \text{ M/MIN}$

21. 8,283.73 M/MIN