

Name Key

Match each property or identity with the appropriate definition.

1. G Additive Identity

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

2. I Multiplicative 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

3. D Reflexive 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 PROPERTY FROM LEFT OVER SUBTRACTION

4. B Transitive Property

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

5. H Associative Property for Multiplication

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

6. L Commutative Property for Multiplication

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

7. F Associative Property for Addition

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

8. C Distributive Property from left over subtraction

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 PROPERTY

~~B.~~ $\frac{2}{3}(9m + 3) = 6m + 2$
DISTRIBUTIVE PROPERTY 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 PROPERTY FROM RIGHT OVER SUBTRACTION

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

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

~~K.~~ $em + 3 = me + 3$
COMMUTATIVITY FOR MULTIPLICATION

~~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

Find the pattern and fill in the blanks

A. 6, 4, 8, 5, 15, 11, _____
 $\begin{array}{cccccc} \vee & \vee & \vee & \vee & \vee & \vee \\ -2 \cdot 2 & -3 \cdot 3 & -4 \cdot 4 & -5 \cdot 5 & -6 \end{array}$

44, 39, 195, 189

B. 2, 4, 7, 11, 16, _____
 $\begin{array}{cccccc} \vee & \vee & \vee & \vee & \vee & \vee \\ +2 & +3 & +4 & +5 & +6 & +7 & +8 & +9 \end{array}$

22, 29, 37, 46

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:

$3 \cdot 5 + 6$	$5 \cdot 3 + 6$	$9 \cdot 5 + 6$
$15 + 6$	$15 + 6$	$45 + 6$
$21 \checkmark$	$21 \checkmark$	$51 \checkmark$

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

2. \therefore CLOSED

Counter example if applicable:

$4^2 + 7$	$7^2 + 4$	$2^2 + 5$
$16 + 7$	$49 + 4$	$4 + 5$
$23 \checkmark$	$53 \checkmark$	$9 \checkmark$

3. {Odd Integers}; Addition

3. \therefore NOT CLOSED

Counter example if applicable:

$-3 + 11$
 8 COUNTER EXAMPLE

4. {Even Integers}; addition

4. \therefore CLOSED

Counter example if applicable:

$4 + 6$	$6 + 4$	$8 + 12$
$10 \checkmark$	$10 \checkmark$	$20 \checkmark$

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

5. \therefore CLOSED

Counter example if applicable:

$(4 - 3) + (6 + 1)$	$(6 - 3) + (4 + 1)$	$(10 - 3) + (2 + 1)$
$1 + 7$	$3 + 5$	$7 + 3$
$8 \checkmark$	$8 \checkmark$	$10 \checkmark$

EVIDENCE WILL VARY FROM STUDENT TO STUDENT

Use the Distributive Property to simplify each expression.

6. $5(3x-1) + 2(4x+3)$
 $\boxed{15x} - 5 \quad \boxed{+8x} + 6$
 $23x + 1$

6. $23x + 1$

7. $11(2m+5) - 7(5m-2) - 2m$
 $\boxed{22m} + 55 \quad \boxed{-35m} + 14 \quad \boxed{-2m}$
 $-15m + 69$

7. $-15m + 69$

8. $\frac{2}{7}(14h+28) - \frac{3}{5}(20h+40) + 3h$
 $\boxed{4h} + 8 \quad \boxed{-12h} - 24 \quad \boxed{+3h}$
 $-5h - 16$

8. $-5h - 16$

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

Use "n" to represent the number unless otherwise stated

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

$2(4n + 9) = 6$

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

10. The cube of B decreased by three is equal to eleven less than twice B.

$B^3 - 3 = 2B - 11$

10. $B^3 - 3 = 2B - 11$

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

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

11. $(2x - 8)^2 = 5x + 4$

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

$n - 7 = 3n + 2$

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

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

$2(5n - 2) = 6$

13. $2(5n - 2) = 6$

14. The cube of M increased by four is equal to three less than twice G.

$M^3 + 4 = 2G - 3$

14. $M^3 + 4 = 2G - 3$

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

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

15. $(5x + 9)^2 = 3x + 12$

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

Use "n" to represent the number unless otherwise stated

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

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

$$16. \underline{n + 3 = 5n - 11}$$

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

$$4(2n + 3)$$

$$17. \underline{4(2n + 3)}$$

18. Nine less than five times a number

$$5n - 9$$

$$18. \underline{5n - 9}$$

19. The sum of a number squared and three.

$$n^2 + 3$$

$$19. \underline{n^2 + 3}$$

20. Eight more than five times a number squared.

$$5n^2 + 8$$

$$20. \underline{5n^2 + 8}$$

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

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

$$21. \underline{2(6n^3 + 1) = 9n - 4}$$

22. 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.

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

$$22. \underline{(7n - 2)^2 = 5(n + 5) + 3}$$

Order of Operation

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

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

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

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

$$5 \left[\frac{13}{10} \right]$$

$$\frac{13}{2} = 6\frac{1}{2}$$

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

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

$$\frac{1}{9} - \left[\frac{1}{3} - \frac{3}{10} + \frac{1}{2} \right]$$

$$\frac{1}{9} - \left[\frac{10 - 9 + 15}{30} \right]$$

$$\frac{1}{9} - \frac{16}{30}$$

$$\frac{1}{9} - \frac{8}{15}$$

$$\frac{5 - 24}{45} = -\frac{19}{45}$$

Use the Distributive Property to simplify each expression.

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

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

$$-3k + 16$$

3. -3k + 16

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

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

$$17g - 6$$

4. 17g - 6

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

$$\boxed{18t} + 36 \quad \boxed{-15t} + 25$$

$$3t + 61$$

5. 3t + 61

$$6. -(5r-7) + 8(11r+1)$$

$$\boxed{-5r} + 7 \quad \boxed{+88r} + 8$$

$$83r + 15$$

6. 83r + 15

$$7. 3(8x-1) - 5(2x+3)$$

$$\boxed{24x} - 3 \quad \boxed{-10x} - 15$$

$$14x - 18$$

7. 14x - 18

Write the Solution Set to each of the following.

$$8. 5x + 7 < 2x$$

$$r = \{-7, -1, 3, 4, 11\}$$

8. {-7}

$$-7: -28 < -14 \checkmark \quad 3: 22 < 6 \times \quad 11: 62 < 22$$

$$-1: 2 < -2 \times \quad 4: 27 < 8 \times$$

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

$$r = \{-1, 1, 2, 3, 4, 5, 7\}$$

9. {-1, 1, 2, 3}

$$-1: 3 > 1 \checkmark \quad 2: 9 > 4 \checkmark \quad 4: 13 > 16 \times$$

$$1: 7 > 1 \checkmark \quad 3: 11 > 9 \checkmark \quad 5: 15 > 25 \times \quad 7: 19 > 49 \times$$

$$10. x^2 - 14 \geq x$$

$$r = \{-5, -1, 3, 4, 11\}$$

10. {-5, 11}

$$-5: 25 - 14 \geq -5 \checkmark \quad 4: 2 \geq 4 \times$$

$$-1: -13 \geq -1 \times \quad 11: 107 \geq 11 \checkmark$$

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

Perform the Indicated Unit Conversion

(Use two decimal places unless the answer is exceptionally small e.g. .000027 mi / cup)

11. Convert 65 miles per hour to feet per sec.

11. $\underline{95.33 \text{ ft/SEC}}$

65 MI	5280 ft	1 HR	1 MIN
HR	1 MI	60 MIN	60 SEC

$$\frac{65 \times 5280}{60 \times 60} = 95\frac{1}{3} = 95.33 \text{ ft/SEC}$$

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

12. $\underline{428.57 \text{ METERS/HOUR}}$

72 KM	1000 M	1 WK	1 DAY
WK	1 KM	7 DAY	24 HR

$$\frac{72 \times 1000}{7 \times 24} = 428\frac{4}{7} = 428.57 \text{ m/hour}$$

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

13. $\underline{831,600 \text{ IN/CUP}}$

210 MILES	5280 ft	12 INCHES	1 GAL	1 QRTS	1 pt
GAL	1 MILE	1 ft	4 QRTS	2 pts	2 cup

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

14. Convert 4,500 yards per pint to miles per gallon.

14. $\underline{20.45 \text{ MILES/GAL}}$

4500 YRD	3 ft	1 MILE	2 pt	4 QRT
PT	1 YRD	5280 ft	1 QRT	1 GAL

$$\frac{4500(3)(2)(4)}{5280} = 20\frac{5}{11} = 20.45 \text{ MILES/GAL}$$

15. Convert 55,000 km per week to meters per minute.

15. $\underline{5,456.35 \text{ METERS/MIN}}$

55,000 KM	1 WK	1 DAY	1 HR	1000 M
WK	7 DAY	24 HR	60 MIN	1 KM

$$\frac{55,000(1,000)}{7(24)(60)} = 5,456.35 \text{ METER/MIN}$$