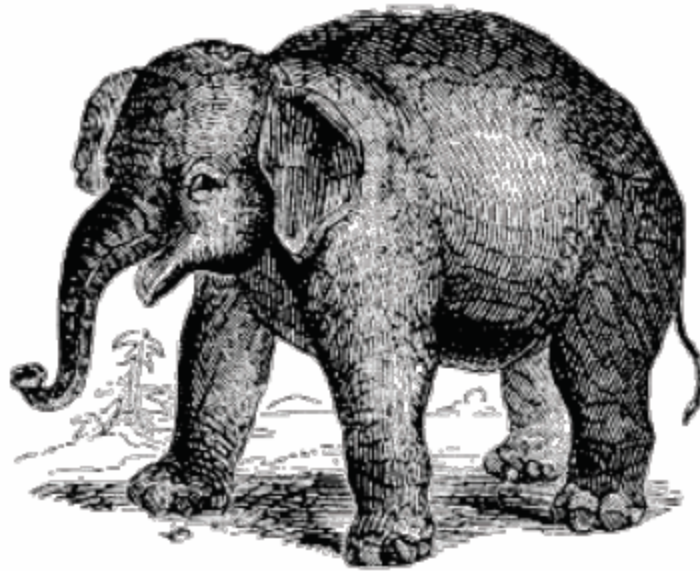


Math 017



Homework
Class work
Quizzes

July 2010

1. Name the operation that is to be performed in the following algebraic expressions.

a) $2 + x$

b) $2 - x$

c) $2(-x)$

d) x^2

e) $\frac{2}{x}$

2. Fill in the blanks with numbers to make the statement true.

a) $A = A \cdot \underline{\hspace{2cm}}$

b) $0 = A \cdot \underline{\hspace{2cm}}$

c) $-A = A \cdot \underline{\hspace{2cm}}$

1. In the following expressions parentheses are needed. Explain why they are needed.

a) $4 + (-x)$

b) $4 \div (-x)$

c) $(2x)^3$

d) $(a + 2)^4$

e) $y(-x)z$

2. Determine which expression is raised to the 5-th power.

a) $(-x)^5$

b) $-(xy)^5$

c) $(-xy)z^5$

d) $(4 - x)^5$

e) $(-xy)^5$

f) $\frac{x^5}{y}$

1. Write the following phrases as algebraic expressions. Remember to place parentheses when needed. Do not simplify.

a) $-n$ subtracted from m

b) The product of $-a$ and $-b$

c) $-n$ divided by $-m$

d) The sum of x , p and y

e) $\frac{b}{a}$ raised to the tenth power

f) $2ab$ squared

g) The opposite of $-\frac{2a}{7}$

h) The opposite of $\frac{-2a}{-7}$

1. Use the letter x to represent a number and write the following phrases as algebraic expressions. Do not simplify.

a) One-eighth of a number

b) A number multiplied by -3

c) A number subtracted from -3

d) The product of AB and a number.

2. Let a be a variable representing the length of the side of a square. Use a to write the following statements as algebraic expressions.

a) Four times the side of a square.

b) The side of a square raised to the second power.

c) The side of a square doubled.

1. Give your answer in the form of an algebraic expression.

a) John has x dollars in his bank account. How much money will John have in the bank, after he withdraws \$100?

b) John's salary is x dollars. He got a new job and his salary doubled. How much does John earn in his new job?

c) If a family has x children, and each of those children has 3 children of his own, how many grandchildren are there?

d) If a family has x children, and each of those children has x children of his own, how many grandchildren are there?

2. Let t be a variable representing temperature on a given day. Use the variable to write the following statement as an algebraic expression.

a) The temperature on the given day increased by 5 degrees.

b) The temperature on the given day decreased by 5 degrees.

1. Evaluate, if possible, each of the following expressions when $x = 9$. If not possible, explain why it is not possible to evaluate.

a) $x + 2$

b) $10 - x$

c) $4x$

d) $\frac{18}{x}$

2. Evaluate the following when $x = 3$.

a) 2^x

b) x^2

c) x^x

3. Circle all expressions that cannot be evaluated, when $x = 10$. Explain why they cannot be evaluated.

$$\frac{0}{3x}, \quad \frac{5}{x-10}, \quad \frac{x-10}{5}, \quad \frac{1}{10}x, \quad x-10, \quad \frac{6}{x+10}, \quad \frac{2}{10-x}, \quad \frac{3x}{0}$$

1. Let $a = 10$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $-12 + a$

b) $-5 - a$

c) $-3 + 2 - a - 7$

d) a^5

e) $-22a$

f) $\frac{5}{a-10}$

g) $\frac{0}{-a}$

1. Let $v = -1$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $-v$

b) $v - 8$

c) $v \div (-2)$

d) $-3 - v$

e) $\frac{-4}{v}$

2. Let $x = -2$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. If evaluation is not possible, write “undefined”.

a) $-2 + x + 7$

b) $\frac{4}{x}$

c) $400x$

d) $x \div (-1)$

1. Let $m = \frac{3}{7}$. Rewrite the expression replacing the variable with its value and evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{120}{7} - m$

b) $\frac{1}{14} + m$

c) $m + 2$

d) $-2m$

e) $\frac{4}{m}$

f) $-\frac{9}{21} \div m$

g) $-m \cdot \frac{2}{81} \cdot 9$

1. Let $x = -\frac{7}{9}$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{1}{3} - x$

b) $-x - 1$

c) $\frac{2}{3} + x - \frac{8}{9}$

d) $\frac{15}{2}x$

e) $-14 \div x$

f) $-x + \frac{7}{9}$

g) x^2

1. Let $y = 0.6$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $y + 72.86$

b) $1.3 - y$

c) $-y - 0.2$

d) $0.01y$

e) $\frac{y}{0}$

f) $\frac{-0.12}{y}$

g) $\frac{-y}{0.01}$

1. Let $x = -1.1$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $-3 - x$

b) $-0.1 + x + 0.002$

c) $\frac{x}{2.2}$

d) $\frac{5}{1.1 + x}$

e) $x \div (-0.02)$

f) x^2

g) $x \div (-1)$

1. Let $x = -3$ and $y = \frac{4}{5}$. Rewrite the expression replacing each variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $x - y$

b) $\frac{2}{3} + x$

c) y^3

d) xy

e) $\frac{y}{3+x}$

f) $x \div (-y)$

g) $\frac{y}{x}$

1. Let $a = -\frac{3}{4}$, $b = \frac{5}{6}$. Rewrite the expression replacing each variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $b - a$

b) a^2

c) $a + 2 - b$

d) $4ab$

e) $\frac{b}{a}$

f) $\frac{a}{b}$

g) $\frac{-a}{b}$

1. If possible, evaluate AB , if

a) $A = -100$, $B = 2$

b) $A = \frac{2}{5}$, $B = -\frac{1}{4}$

c) $A = -0.3$, $B = -0.05$

2. If possible, evaluate $A - B$, if

a) $A = -100$, $B = 2$

b) $A = \frac{2}{5}$, $B = -\frac{1}{4}$

c) $A = -0.3$, $B = -0.05$

1. Use the letter x to represent a number and write the following statements as algebraic expressions.

Then evaluate each expression when $x = \frac{9}{11}$.

a) A number doubled

b) Four sixth of a number

c) A number decreased by $\frac{3}{22}$

d) A number divided by -2

e) A number raised to the second power

f) A number multiplied by $\frac{11}{18}$.

1. How are the following expressions read?

a) y^3

b) $y \cdot 3$

2. Write the following phrases as algebraic expressions. Remember to place parentheses when needed. Do not simplify.

a) $-x$ raised to the sixth power

b) The sum of $-x$ and $-y$

3. Evaluate the following when $x = 1$

a) 2^x

b) $x - 5$

4. Evaluate, if possible, when $A = \frac{1}{2}$, $B = -\frac{1}{2}$. Otherwise, write “undefined”. Before evaluating, rewrite the expression substituting the numerical values of the variables.

a) $A + B$

b) $\frac{A}{B}$

1. Write the phrase “The opposite of $-h$ ” as algebraic expressions. Remember to place parentheses if needed. Do not simplify.

2. Let $S = -2$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $-3S$

b) $S \div (-2)$

c) $\frac{-1}{S+2}$

3. Evaluate, if possible, when $B = -\frac{1}{3}$. Indicate, if not possible. Before evaluating, rewrite the expression substituting the numerical values of the variables.

a) $\frac{3}{4} + B$

b) $12B$

c) $\frac{1}{B}$

1. Name the operation that is to be performed in the following algebraic expressions.

a) $a(-b)$

b) $a - b$

2. Let $a = -2$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $a - 7$

b) $-a + 3$

3. Let $y = \frac{2}{5}$. Rewrite the expression replacing each variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $y - \frac{1}{3}$

b) $-\frac{10}{11}y$

4. Let $y = -0.5$. Rewrite the expression replacing each variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) y^2

b) $\frac{0}{y}$

1. Rewrite the expression $(a+bc)6$, inserting a multiplication sign whenever multiplication is implied. If there is no operation of multiplication, write “there is no multiplication”.

2. Write the following statements as an algebraic expression.

a) The sum of $3a$ and $-x$

b) The product of $3a$ and $-x$

3. Let $a = -4$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $5a$

b) $-a + 3$

4. Let $x = \frac{3}{4}$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{2}{5} + x$

b) $-x + \frac{1}{10}$

5. Use the letter x to represent a number and write the following statement “A number multiplied by ten” as an algebraic expression. Then evaluate the expression when $x = -0.2$.

1. Determine which expression is raised to the 3-rd power.

a) $\frac{-m^3}{n}$

b) $-(nm)^3$

2. Using the letter B to represent a quantity, write each phrase as an algebraic expression. Remember about parentheses. Do not simplify.

a) A quantity multiplied by $-y$

b) $-y$ subtracted from a number or quantity

3. Let $y = -0.4$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $0.1y$

b) $\frac{0.4 + y}{-8}$

4. Let $y = \frac{5}{6}$. Rewrite the expression replacing the variable with its value, and then evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{2}{3} - y$

b) $y \div (-2)$

1. In each example, determine which expression is raised to the 4-th power.

a) $\frac{ca^4}{b}$

b) $\left(\frac{a}{b}\right)^4$

2. Write the following phrases as algebraic expressions. Remember to place parentheses if needed.

a) $-2s$ squared

b) $3x$ subtracted from y

3. Evaluate, if possible, when $A = \frac{3}{7}$. Otherwise, write “undefined”.

$$4 \div A$$

4. Evaluate, if possible, when $A = -4$, $B = 8$. Otherwise, write “undefined”.

$$A - 3 + B$$

5. Evaluate, if possible, when $A = 0.04$, $B = -0.002$. Otherwise, write “undefined”.

$$\frac{A}{B}$$

1. Rewrite the following expressions and circle the arithmetic operation together with its operands that has to be performed first. Write the name of the operation next to your expression. For example, in $4 + 3x$, multiplication of 3 and x must be performed first, thus the answer is

$$4 + \textcircled{3x} \text{ multiplication}$$

a) $2 + 3x$

b) $a - b \div 2$

c) $\left(\frac{x}{2}\right)^3$

d) $\frac{x^3}{2}$

e) $4 \div a + y$

f) $4 \div (a + y)$

g) $\frac{4}{a + y}$

h) ax^3

i) $(ax)^3$

1. For each of the following expressions, list all arithmetic operations together with the operands in the same order as the order of operations (for example, for the expression $a + 3b$ we would write “first multiply 3 and b, and then add a ”).

a) $\frac{a+b}{x}$

b) $(x+y)^7$

c) $a+b \div x$

d) $3+2x$

e) $(3+x) \cdot 2$

f) $x+y^7$

g) $x \div yz$

h) $a-x \div y$

1. Determine if, in the following algebraic expressions, parentheses are necessary, i.e. they change or do not change the order of operations. To this end, determine if the first operation that should be performed is the same as if the expression were written without any parentheses. If the operation is different, write “parentheses are needed”, otherwise rewrite the expression without any changes.

a) $a - (b + c)$

b) $a(b \div c)$

c) $a + (bc)$

d) $z(xy)^3$

e) $(c \div d)s$

f) $\left(\frac{2}{x}\right)^6$

g) $(2 + w)x$

1. Write the algebraic expression representing the following. Do not simplify.

a) The opposite of $x - yz$

b) $c^2 + c$ subtracted from A

c) A subtracted from $c^2 + c$

d) $2 + m$ multiplied by $mn - 7$

2. Write the following phrases using algebraic symbols.

a) x raised to the third power, and then multiplied by y

b) x multiplied by y , and then raised to the third power

c) The opposite of the sum of x and y

d) x divided by y , and then subtracted from 5

e) The opposite of A , and then raised to the m -th power

f) The sum of A and the opposite of B

1. Using the letter of your choice to represent a number, write each phrase as an algebraic expression.

a) A quantity multiplied by $-y$, and then divided by 3

b) Subtract a number from 7, and then take the opposite of it

c) The sum of A and a number, then raised to the fifth power

d) The quotient of a number and 3, then increased by 7

e) The sum of 1 and a number, then doubled

f) Take a number, increase it by 5, and then multiply the result by your original number

g) A number decreased by 3, and then multiplied by x

h) A number squared, and then the result tripled

2. Let F be a variable representing the temperature. Use this variable to write the following phrases as an algebraic expression.

The temperature minus 32, then multiplied by five ninths.

1. Evaluate $\frac{x+1}{x-7}$ for each of the following values of x , when possible (otherwise, write “undefined”).

a) $x = -7$

b) $x = 7$

c) $x = 0$

d) $x = -1$

2. Substitute $m = -3$, $n = 4$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

a) $2 - m - n$

b) $2 - (m - n)$

c) $2 - m(-n)$

1. Substitute $x = -2$, $y = 3$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

a) $x^3 - y$

b) $-xy^2$

2. Substitute $x = -2$, $y = 1$, $z = -8$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

a) $x + y - z$

b) $(x - y)z$

c) $x + y(-z)$

1. Let $a = -2$, $b = 10$. Evaluate, if possible.

a) $-ab$

b) $a(-b)$

c) $-a(-b)$

d) $-a - b$

2. Evaluate $(x + 6)(5 - x)(4 + x)$ for each of the following values of x , when possible (otherwise, write “undefined”).

a) $x = -6$

b) $x = -5$

c) $x = -4$

3. Evaluate $-x^{21} - x^{12}$ if $x = -1$.

1. The expression $\frac{a}{c-8}$ cannot be evaluated for which of the following values of a and c ?

Explain why.

a) $a = 3, c = 0$

b) $a = 3, c = 8$

c) $a = 3, c = -8$

d) $a = 0, c = -8$

e) $a = 0, c = 0$

f) $a = 0, c = 8$

2. Let $x = -2$. Rewrite the expression replacing the variable with its value and evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{-x}{3}$

b) $4x^2$

c) $(4x)^2$

1. Let $x = -0.2$. Evaluate if possible. Otherwise, write “undefined”. Before evaluating, rewrite the expression using numerical values of variables.

a) $2x^2$

b) $\frac{-x}{0.02}$

c) $(x - 0.4)(x - 0.8)$

2. Evaluate $\frac{(-x)(-y)}{-x-y}$ for each of the following values of x and y , when possible (otherwise, write “undefined”). Before evaluating, rewrite the expression using numerical values of variables.

a) $x = 0, y = 0$

b) $x = 0, y = -3$

c) $x = 3, y = -3$

d) $x = 3, y = 0$

1. Let $v = -1$. Rewrite the expression replacing the variable with its value and evaluate, if possible. Otherwise, write “undefined”.

a) $255^{(v+2)}$

b) v^4

c) $-v^4$

d) $(-v)^4$

e) $255v^{(v+2)}$

g) v^{255}

h) v^{256}

1. Evaluate, if possible (otherwise, write “undefined”), when $x = -\frac{1}{2}$ and $y = \frac{2}{3}$. Before evaluating, rewrite the expression substituting the numerical values of x and y .

a) $-2x + y$

b) $-2(x + y)$

c) $\frac{2x}{y}$

d) xy^2

e) $(xy)^2$

1. Let $x = -3$, $y = -2$, $z = \frac{4}{3}$. Evaluate the following expressions if possible (otherwise, write “undefined”). Before evaluating, rewrite the expression using numerical values of variables.

a) $y - x + z$

b) $-x + 15z$

c) $(x + y)^2$

d) $\frac{z}{3 - x}$

e) $-z^2$

1. If possible (otherwise, write “undefined”), evaluate the following expressions if $A = -\frac{2}{5}$, $B = -\frac{1}{4}$. Before evaluating, rewrite the expression using numerical values of variables.

a) $5A - B$

b) $AB - 1$

c) $(-A)(-B)$

d) $(A - B)^2$

e) $\frac{1+A}{B}$

1. Let $x = -0.2$, $y = 0.5$. If possible (otherwise, write “undefined”), evaluate the following expressions. Before evaluating, rewrite the expression using numerical values of variables.

a) $-xy$

b) $y + 5x$

c) $100xy$

d) $(x - 0.3)y$

e) $y \div 0.02 + x$

f) $\frac{5x}{y}$

1. First write the following phrases using algebraic symbols, and then evaluate them when $x = 2$.

a) Subtract 2 from x , and then multiply the result by x .

b) Raise x to the fourth power, and then divide it by -2

c) One sixth of x added to 4.

d) Take the opposite of x , and then raise it to the third power.

1. For each of the following expression, list all arithmetic operations together with the operands in the same order as the order of operations (for example, for the expression $a + 3b$ we would write “first multiply 3 and b, and then add a ”).

a) $5 + 4a$

b) xy^7

2. Write the following phrase using algebraic symbols.

The quotient of F and G , and then raised to the tenth power.

3. Substitute $x = 2$, $y = -1$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{1}{3} - xy$

b) $(x - 3)(y - x)$

c) $\frac{x - 2}{y}$

4. Substitute $a = \frac{3}{7}$, $b = -\frac{5}{2}$ in the following expression and then evaluate, if possible. Otherwise, write “undefined”.

$$\frac{7a}{b}$$

1. Determine if, in the following algebraic expressions, parentheses are necessary, i.e. they change or do not change the order of operations. To this end, determine if the first operation that should be performed is the same as if the expression were written without any parentheses. If the operation is different, write “parentheses are needed”, otherwise rewrite the expression without any changes.

a) $a \div (b + c)$

b) $(ab)^4$

2. Write the following phrase using algebraic symbols.
The product of $-x$ and y , then subtracted from s

3. Evaluate the following expression, if $m = -1$, $n = 2$, and $p = -3$. Before evaluating, rewrite the expression substituting the numerical values of variables.

$$-m - n + p$$

4. Substitute $m = -\frac{2}{3}$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

$$\frac{m - \frac{1}{3}}{m}$$

5. Substitute $a = 0.08$, $b = -0.2$ in the following expressions and then evaluate, if possible. If not possible, write “undefined”.

$$b - 10a$$

1. Determine if, in the following algebraic expressions, parentheses are necessary, i.e. they change or do not change the order of operations. To this end, determine if the first operation that should be performed is the same as if the expression were written without any parentheses. If the operation is different, write “parentheses are needed”, otherwise rewrite the expression without any changes.

a) $-(s+t)$

b) $(-s)+t$

2. Write the following phrase using algebraic symbols.

CA raised to the second power, and then multiplied by D .

3. Let $a = 3$, $b = -0.2$, $c = -1$. If possible (otherwise, write “undefined”), evaluate the following expressions. Before evaluating, rewrite the expression using numerical values of variables.

a) $a - 5c$

b) $\frac{b}{0.1} - a$

c) $a - (c - 2)$

d) ac^2

e) $\frac{c}{a} + \frac{1}{3}$

1. Write the following phrases using algebraic symbols.

a) The sum of m and n , and then multiplied by x .

b) The product of m and n , and then added to x .

2. Find the value of $a + ba$ if

a) $a = -2$, $b = 3$

b) $a = \frac{1}{2}$, $b = -2$

c) $a = \frac{2}{3}$, $b = \frac{6}{5}$

d) $a = -0.3$, $b = 0.1$

1. Write the following phrases using algebraic symbols.

a) The product of 2 and x , then raised to the tenth power

b) The product of m and n , and then added to x .

2. Substitute $a = -2$, and then evaluate the following expressions, if possible. Otherwise, write “undefined”.

a) $\frac{a+2}{a-2}$

b) $(a+2)(a-2)$

c) $2 - \frac{1}{2}a$

d) $0.7 + 0.3a$

1. Let $x = -\frac{1}{4}$, $y = \frac{6}{7}$. If possible (otherwise, write “undefined”), evaluate the following expressions. Before evaluating, rewrite the expression using numerical values of variables.

a) $-xy$

b) $4x - y$

2. Substitute $x = -4$ in the following expressions and then evaluate, if possible. Otherwise, write “undefined”.

a) $\frac{x-4}{2x}$

b) $\frac{5x}{4+x}$

c) $x - x^2$

d) $(-x-6)^2$

1. How many terms are in the following expressions? List all of them.

a) $4 + y$

b) $2 - c + x^2$

c) $4 - \frac{x}{y}$

d) $3xy$

e) $2a - 4ab + 5a(b + c)$

f) $-2(a + 3)^2 - \frac{xy}{a + 1} + c$

2. Using the fact that changing the order of terms results in an equivalent expression, rewrite the following expressions in their equivalent form by rearranging the terms. Use the equal sign to indicate that the resulting expressions are equivalent (for example, the expression $A + 9$ should be rewritten as $A + 9 = 9 + A$).

a) $2x + 7$

b) $x - \frac{7}{3}$

c) $-2x - 7$

d) $-x + \frac{7}{3}$

e) $3A - 4B$

f) $2a - (4xy)^2$

g) $-\frac{x}{y} - \frac{y}{x}$

h) $-(2a + b) + x$

1. For each of the following expressions (1)-(5), find an expression equivalent to it among expressions (A)-(E). Write each matched pair with the equal sign between them to indicate their equivalence.

(1) $2s + 3v - w$

(A) $2s - 3v - w$

(2) $-3v + 2s - w$

(B) $w - 3v - 2s$

(3) $w - 2s + 3v$

(C) $2s + w - 3v$

(4) $w + 2s - 3v$

(D) $3v - w + 2s$

(5) $-3v + w - 2s$

(E) $3v + w - 2s$

2. Determine which of the following expressions are equal to $-x + 2y - 7z$.

a) $-x - 7z + 2y$

b) $2y - 7z - x$

c) $-7z - x + 2y$

d) $x - 2y + 7z$

e) $(-x)(+2y)(-7z)$

f) $-7z + x + 2y$

3. List all terms, and then, by changing the order of these terms, create two new equivalent expressions for each of the following.

a) $x - 2y + z$

b) $(x + y)^2 - 2 + x^2$

c) $\frac{2x + y}{4} - xy + (2 + y)^2$

4. Replace Ψ with expressions such that the resulting statement is true. Use parentheses when needed.

a) $a - 2b + c = \Psi + c + a$

b) $ab - cd + ef = \Psi + ef + ab$

1. Rewrite the following expressions placing the multiplication sign '×' whenever (according to the convention) it was omitted. In each expression, identify all explicit factors.

a) $2x$

b) $-3ab$

c) $2\frac{x-1}{t}$

d) $5(b+5)(b-c)$

2. Rewrite each of the following expressions in its equivalent form using the commutative property of multiplication $xy = yx$. Use the equal sign to indicate that the resulting expression is equivalent to the original one (for example, the expression $9A$ should be rewritten as $9A = A \cdot 9$). Remember about parentheses.

a) $-8 \times (-9)$

b) $a(-b)$

c) $-a(-b)$

d) $b(a+1)$

e) $-b(a+1)$

f) $-b \cdot \frac{x+2}{3}$

3. Fill in the blanks to make a true statement.

a) $abx = x \cdot \underline{\hspace{2cm}}$

b) $\frac{2}{y}(-b)c = -b \cdot \underline{\hspace{2cm}}$

c) $(a+b)(c+d) = (c+d) \cdot \underline{\hspace{2cm}}$

1. According to the rule for multiplication of fractions the following is true $\frac{3x}{7} = \frac{3}{7}x$. We can say that the quotient $\frac{3x}{7}$ was written as a product of a numerical factor $\frac{3}{7}$ and an algebraic expression x . Write the following expressions as a product of a numerical factor and an algebraic expression.

a) $\frac{2a}{9}$

b) $\frac{3(x^2 + y)}{8}$

c) $\frac{5z}{-2y}$

d) $\frac{4z^2}{9(a+b)}$

e) $\frac{x^2 + y}{9}$

f) $\frac{-a}{9}$

2 The correct answer to a problem is $\frac{3x}{2}$.

Student A gave the answer: $\frac{3}{2}x$.

Student B gave the answer: $\frac{3}{2x}$.

Student C gave the answer: $3 \cdot \frac{x}{2}$.

Is any of these students right?

1. According to the rule for multiplication of fractions $\frac{x}{y}a = a\frac{x}{y} = \frac{ax}{y}$ (for example $2 \cdot \frac{x}{y} = \frac{2x}{y}$).

According to this rule, rewrite each of the following expressions as a single fraction. Remember about parentheses.

a) $\frac{7}{3}m$

b) $3 \cdot \frac{-a}{4}$

c) $\frac{7}{3-y} \cdot m$

d) $\frac{7}{m} \cdot (3-y)$

e) $\frac{-m}{n} \cdot 2$

f) $-7 \cdot \frac{m}{4}$

g) $-7 \cdot \frac{1}{m+2}$

h) $\frac{1}{m+2}(m-7)$

i) $2 \cdot \frac{x+y}{z}$

j) $-3 \cdot \frac{a^2-b}{c}$

1. Write each of the following expressions in its equivalent form as one fraction.

a) $\frac{u}{3} + \frac{v^2}{3}$

b) $\frac{s^2}{7} - \frac{w}{7}$

c) $\frac{2}{3x} + \frac{b}{3x}$

d) $\frac{-u}{3-x} - \frac{s+t}{3-x}$

e) $\frac{4}{m} - \frac{a+4c}{m}$

2. Write the following expressions in their equivalent form as a sum or difference of two expressions.

a) $\frac{2+x}{11}$

b) $\frac{3x^2 - x}{4}$

c) $\frac{a^2 - s^2}{t+4}$

d) $\frac{-2x+4y}{x+y}$

1. Write the following expressions as a single fraction.

a) $\frac{7}{5}s + \frac{4}{5}t$

b) $\frac{2}{m}s - \frac{1}{m} \cdot t$

c) $s \frac{-2}{m} + \frac{1}{m} \cdot t$

d) $2 \cdot \frac{s}{m} - 3 \frac{t}{m}$

e) $-\frac{7}{nm} + 2 \frac{t-v}{nm}$

f) $(s+1) \frac{1}{m+5} - \frac{1}{m+5}t$

g) $2 \cdot \frac{x+y^2}{4s} - \frac{2t+1}{4s}$

h) $-\frac{m+n}{x+y} + 3 \cdot \frac{p-q}{x+y}$

2. Write the following expressions in a form of a single fraction using the fact that

$$\frac{a}{d} + \frac{b}{d} + \frac{c}{d} = \frac{a+b+c}{d}.$$

a) $\frac{c-1}{5} - \frac{d}{5} + \frac{ef}{5}$

b) $\frac{x-y}{a-b} + \frac{z^2}{a-b} - \frac{3x+v}{a-b}$

1. Using the fact that $-\frac{x}{y} = \frac{-x}{y} = \frac{x}{-y}$ rewrite each of the following expressions twice, each time placing the minus in a different way. Use parentheses when needed.

a) $\frac{-2}{3}$

b) $-\frac{2x}{z}$

c) $\frac{2}{-(a+b)}$

d) $\frac{-xy}{c-d}$

2. Determine which of the following expressions are equivalent to $-\frac{a+2}{3-b}$

a) $\frac{-a+2}{3-b}$

b) $\frac{-(a+2)}{3-b}$

c) $\frac{a+2}{-(3-b)}$

d) $\frac{-(a+2)}{-(3-b)}$

e) $\frac{a+2}{-3-b}$

1. Perform all numerical operations that are possible. If no numerical operation can be performed, write “not possible”.

a) $2 + 5y$

b) $2 \cdot 5y$

c) $\frac{4x}{16}$

d) $3x(-2)y$

e) $-1 + x - 2$

f) $(4 + 3)(-2a)$

g) $(-5x)(7y)$

h) $\frac{-t}{-1}$

1. Perform all numerical operations that are possible. If no numerical operation can be performed, write “not possible”.

a) $4 - 3a + 2$

b) a^{4+2}

c) $\frac{3-y}{3}$

d) $-4 + 3(2a)$

e) $\frac{0.8x}{1.2}$

f) $-2a(-1+3)$

g) $\left(\frac{1}{3} + \frac{2}{5}\right)^m$

h) $-\frac{1}{3}(2y)(9x)$

1. Perform all numerical operations that are possible. If no numerical operation can be performed, write “not possible”.

a) $5(-2x)$

b) $5 - 2x$

c) $-4x^2(-3)$

d) $\frac{18x}{-9}$

e) $\frac{5x}{15}$

f) $4 \cdot 3^m$

g) $-(-4w)$

h) $-4x^2 2 - 2$

1. Determine which of the following expressions are equal to $2x$

$$x \cdot 2 \quad \frac{3x}{6} \quad -(-2x) \quad 4 - 2x \quad 5x(-3)$$

2. Determine which of the following expressions are equal to $-abc$

$$b(-a)c \quad \frac{cba}{-1} \quad a - bc \quad -\frac{bca}{1} \quad ab - c \quad ab(-c)$$

3. Determine which of the following expressions are equivalent to $3x$

$$\frac{3x}{1} \quad \frac{1}{3x} \quad (1+2)x \quad 1+2x \quad x\left(\frac{1}{2} + \frac{5}{2}\right)$$

4. Determine which of the following expressions is equivalent to $\frac{2xy}{9}$

$$\frac{2}{9}xy, \quad 2 \cdot \frac{xy}{9}, \quad 2xy \cdot \frac{1}{9}, \quad \frac{1}{9}xy \cdot 2, \quad \frac{xy}{9} \cdot 2, \quad \frac{2x}{9} \cdot y$$

1. Show that $(-x)^2$ is not equivalent to $-x^2$ by evaluating both expressions when $x = -2$ and demonstrating that the values are not the same.

2. Show that $(a+b)^2$ is not equivalent to $a^2 + b^2$ by evaluating both expressions when $a = 2$, $b = 3$ and demonstrating that the values are not the same.

3. Use $m = 3$ to show that 2^m is not equivalent to m^2 . To this end evaluate both of the expressions and demonstrate that the values are not the same.

1. Replace Δ with expressions such that the resulting statement is true. Use parentheses when needed.

a) $\frac{m+n}{v} = \Delta \cdot (m+n)$

b) $\frac{-2}{x} = -2 \div \Delta$

c) $2(a-2b)(3+d) = (3+d)\Delta$

d) $da - b = -b + \Delta d$

e) $\frac{m}{2} - \Delta = \frac{m-n}{2}$

f) $AB(-C) = -C\Delta$

g) $\frac{-a}{b} = \frac{a}{\Delta}$

1. List all terms and then using the fact that changing the order of terms results in an equivalent expression, rewrite the following expressions in their equivalent form by rearranging the terms. Use the equal sign to indicate that the resulting expressions are equivalent (for example, the expression $A + 9$ should be rewritten as $A + 9 = 9 + A$).

a) $3x - mn$

b) $-2 - \frac{a+b}{3}$

2. Write the following expression as a product of a numerical factor and an algebraic expression.

$$\frac{3(xy-3)}{4}$$

3. Perform all possible numerical operations to create equivalent expressions. If no numerical operation can be performed, write "not possible".

a) $\frac{-3x}{3}$

b) $2 + (0.2 - 0.3)b$

4. Replace Ω with expressions such that the resulting statement is true. Use parentheses when needed.

a) $\frac{2x-7y}{ab} = \Omega - \frac{7y}{ab}$

b) $(m-n)xy = y(m-n)\Omega$

1. Determine which of the following expressions are equal to $-a - b + c$

$$-a + c - b$$

$$c - a - b$$

$$-a - c + b$$

$$-b + c - a$$

2. Fill in the blanks to make a true statement.

$$\frac{m}{5} = \underline{\hspace{2cm}} \cdot m = \frac{1}{5} \cdot \underline{\hspace{2cm}} = m \cdot \underline{\hspace{2cm}}$$

3. If performing a numerical operation is possible, perform it. If not, write “not possible”.

a) $10 \cdot 4^m$

b) $4 - 2b$

c) $-(-b)$

4. Rewrite the following expressions in its equivalent form as a single fraction.

a) $3 \frac{-m}{x+y}$

b) $-\frac{2}{b} + 4 \frac{(c-d)}{b}$

1. Rewrite each of the following expressions in its equivalent form using the commutative property of multiplication. $xy = yx$.

a) $-mn$

b) $(4-x)y$

2. Write the following expression in their equivalent form as a sum or difference of two expressions.

$$\frac{s - s^2}{x - 2}$$

3. Determine which of the following expressions are equal to $\frac{x}{2}$.

$$x \cdot \frac{1}{2}, \quad \frac{2x}{4}, \quad \frac{1}{2}x, \quad \frac{x}{2+0}, \quad \frac{2}{x}, \quad \frac{x}{1+1}$$

4. Rewrite each expression in its equivalent form as a single fraction,

a) $\frac{4}{7}y$

b) $-y^2 \cdot \frac{1}{5} - \frac{2}{5}x$

5. The correct answer to the question is $-m + n$. Susan's answer is $n - m$. Is Susan also correct?

1. Write the following expression as a product of a numerical factor and an algebraic expression.

a) $\frac{-2a}{7}$

b) $\frac{xyz}{4}$

2. Evaluate $(n - m)^2$ and $n^2 - m^2$ when $n = 1, m = 3$ to show that the expressions are not equivalent to.

3. List all terms and then using the fact that changing the order of terms results in an equivalent expression, rewrite the following expressions in their equivalent form by rearranging the terms. Use the equal sign to indicate that the resulting expressions are equivalent (for example, the expression $A + 9$ should be rewritten as $A + 9 = 9 + A$).

a) $-\frac{5a}{2} + x^2$

b) $(a + b)^2 + (c - d)^2$

4. Determine which of the following expressions are equal to $\frac{2a}{3}$.

$\frac{2}{3}a$, $a \cdot \frac{2}{3}$, $2 \cdot \frac{a}{3}$, $\frac{3a}{2}$, $2a \cdot \frac{1}{3}$

1. Rewrite each of the following expressions as a single fraction.

a) $\frac{-3}{7} \cdot s$

b) $-t \frac{3}{a} + (1-x) \frac{1}{a}$

2. When possible, perform a numerical operation to create an equivalent expression. If no numerical operation can be performed, write “not possible”.

a) $-3xy \cdot 5$

b) $\frac{x}{4} \cdot 2$

c) $\frac{1}{3} + a - \frac{5}{7}$

3. Replace Ω with an expression such that the resulting statement is true.

a) $\frac{abc}{3} = \frac{ab}{3} \cdot \Omega$

b) $\frac{abc}{3} = \frac{1}{3} \cdot \Omega$

c) $\frac{abc}{3} = abc \div \Omega$

1. Using the fact that $-\frac{x}{y} = \frac{-x}{y} = \frac{x}{-y}$ rewrite the expression $\frac{c}{-(a+4b)}$ twice, each time placing the minus in a different way. Use parentheses when needed.

2. Replace Ψ so that that the resulting statement is true.

a) $abc = bc\Psi$

b) $abc = 3 \cdot \frac{abc}{\Psi}$

3. Determine which of the following expressions are equal to x .

$$1 \times x, \quad \frac{x}{1}, \quad \frac{0}{2} + x, \quad \frac{-x}{-1}, \quad -2 + 3x, \quad -(-x)$$

4. If performing a numerical operation is possible, perform it. If not, write “not possible”.

a) $-3x(-2y)$

b) $\frac{3}{4} + x - \frac{1}{2}$

c) $\frac{7xy}{-1}$

1. In the expression $-7a^n$, -7 is called the _____, n is called the _____ or _____ and a is called the _____.

2. In the following expressions, identify exponents, bases, and numerical coefficients.

| | Numerical coefficient | Base | Exponent |
|--------------------------|-----------------------|-------|----------|
| a) $3a^{15}$ | _____ | _____ | _____ |
| b) $(yx)^3$ | _____ | _____ | _____ |
| c) $-x^2$ | _____ | _____ | _____ |
| d) $-\frac{4}{5}(ab)^m$ | _____ | _____ | _____ |
| e) $(y-x)^{m+2}$ | _____ | _____ | _____ |
| f) $-\frac{x^4}{7}$ | _____ | _____ | _____ |
| g) $\frac{2(a+6c)^4}{3}$ | _____ | _____ | _____ |

1. Write the following expression without using the exponential notation.

a) 3^5

b) s^4

c) $3y^5$

d) $-y^4$

e) $(am)^3$

f) am^3

g) $m + n^2$

h) $(m + n)^2$

i) $\frac{a^3}{c}$

1. Whenever possible, write using exponential notation.

a) $x \cdot x \cdot x$

b) $\frac{aaa}{4bbbb}$

c) $(-x)(-x)(-x)$

d) $\frac{2}{a} \times \frac{2}{a} \times \frac{2}{a} \times \frac{2}{a} \times \frac{2}{a} \times 2$

e) $x \cdot x - x \cdot x \cdot x \cdot x$

f) $-x - x \cdot x \cdot x \cdot x$

g) $(-x)(-x) - x \cdot x \cdot x \cdot x$

h) $(-x)(-x)(-x) - x$

1. Whenever possible, write using exponential notation.

a) $(a + b)(b + a)$

b) $3 \times 3 \times 3 \times 3 \times (a - 2b) \cdot (-2b + a)$

c) $\frac{xyxyx}{-b - b - b}$

d) $\left(-\frac{m}{n}\right)\left(\frac{-m}{n}\right)\left(\frac{m}{-n}\right)$

e) $\left(\frac{a}{3} + \frac{b}{3}\right)\left(\frac{a+b}{3}\right)$

f) $(-a - b)(a - b)(-b - a)(-b + a)(a - b)$

g) $\frac{2v \cdot 2v \cdot 2v}{5u \cdot 5u} \cdot 2v$

h) $(2x + 3y - z)mmm(-z + 3y + 2x)mm$

1. Fill in the blanks.

a) In -2^m , the expression that is raised to the m -th power is _____ .

b) In $-x^m$, the expression that is raised to the m -th power is _____ .

c) In $-\frac{2^m}{x}$, the expression that is raised to the m -th power is _____ .

d) In $-\left(\frac{2}{x}\right)^m$, the expression that is raised to the m -th power is _____ .

e) In $\left(-\frac{2}{x}\right)^m$, the expression that is raised to the m -th power is _____ .

2. Evaluate. a) $(34567y)^0$

b) $34567y^0$

3. Evaluate. a) $(-x)^2$ when $x = 1$

b) $-x^2$ when $x = 1$

1. Replace Σ with a number to make the following statements true.

a) $x^\Sigma = 1$

b) $x^\Sigma = x$

c) $\Sigma^3 = -1$

2. Identify the base in each of the following expressions and then determine if the base would be the same if the expression is written without any parentheses.

a) $3(x)^5$

b) $(-x)^4$

c) $(a + b)^M$

d) $\left(\frac{c}{d}\right)^8$

e) $(a)(b)^n$

f) $(ab)^n$

1. Perform the indicated operations and simplify.

a) $a^2 a^3$

b) $m^5 m^3 m$

c) $\frac{m^7}{m^5}$

d) $(m^4)^3$

e) $m^3 \cdot \frac{1}{m^2}$

f) $-aa^2$

g) $\frac{m^3}{-m^3}$

1. Perform the indicated operations and simplify.

a) $(2a)(-3a^4)$

b) $2(a^7)^2$

c) $\frac{10a^7}{5a^2}$

d) $\frac{6a^5}{9a^3}$

e) $a^3(-a^4)$

f) $a^3 \frac{1}{5a}$

g) $\left(\frac{4}{5}a^8\right)\left(-\frac{15}{8}\right)a^2$

h) $\frac{4}{a^7} \cdot 2a^8$

1. Write as a single exponential expression.

a) $2(-x)(-2x)^2$

b) $\frac{a^3(2a)}{a^2}$

c) $\frac{-2a^6}{2a^2a^4}$

d) $(m^3)^4m^2$

e) $\left(\frac{x^4}{6x}\right)^6$

f) $\frac{0.2x(-0.2x^{12})}{0.004x^5}$

1. Perform the indicated operations and simplify.

a) $\left(\frac{2a^4}{a^2}\right)^3$

b) $-\frac{1}{6}a^2(6a)^2$

c) $\frac{3x^2(-x)x^4}{6}$

d) $xx^2(-x)^4$

e) $\frac{5x^4(x^2)^3}{-2x}$

1. Perform the indicated operations and simplify.

a) $(3b^2)(-2ab^3)$

b) $(3a^2b)^3 a$

c) $\frac{3a^2b^4b}{-9a}$

d) $\left(\frac{a^3b^5}{4a^2b^3}\right)^{10}$

e) $-\left(\frac{3a^5}{b}\right)^2\left(\frac{b^4}{12}\right)$

1. Perform the indicated operations and simplify.

a) $\frac{-7(a^3b)^2}{14a^5b}$

b) $(wv)^2 \cdot \frac{(2v)^3}{wv}$

c) $\frac{1}{8(1-x)^2}(1-x)^3$

d) $\frac{(a+b)^2(a+b)^3}{a+b}$

e) $\frac{(xy^4)^2}{-xy^5xy^3}$

1. Remove parentheses and write as a single exponential expression. Identify the numerical coefficient of the final expression.

a) $(-x)^5$

b) $-x^3(-x)^4$

c) $(-a)^3(-a^3)(-a)^8$

d) $(-a^2)^3$

e) $-\left(\frac{a}{7}\right)^2(-a)^7$

f) $\frac{-a^7}{(-a)^7}$

1. Simplify the following expressions and then evaluate when $x = -1$, and $y = 10$.

a) $\frac{(y+x)^3}{(x+y)^2}$

b) $-x(y^3)^2$

c) $\frac{2x^5yx}{(0.2x^3)^2y}$

2. Simplify $\frac{(-a)^3(-a)^8}{a^9}$ and then evaluate, when

a) $a = -\frac{2}{5}$

b) $a = 1.1$

1. Write the following statements as algebraic expressions using parentheses where appropriate, then remove parentheses and simplify.

a) The product of $3x$ and $-4x^2$

b) The quotient of $-4x^7$ and $8x$

c) Five sixth of a , then squared

d) The quotient of 5 and b , then raised to the third power

e) B raised to the second power, then raised to the tenth power

f) The opposite of c , then raised to the tenth power

g) c raised to the tenth power, and then the opposite of the result is taken

1. Circle all expressions that are equivalent to $-x^6$

$$(-x)^6, \quad -(x^2)^3, \quad -x^2x^3, \quad -x^2x^4, \quad \frac{x^6}{-1}, \quad -(x^4)^2$$

2. Circle all expressions that are equivalent to z^5y^2 .

$$y^2z^5, \quad yyz^5, \quad (z^3)^2y^2, \quad y^2z^2z^3, \quad (z^2)^2y^2z, \quad z^3(zy)^2$$

3. Circle all expressions that are equivalent to $ss(-sss)$.

$$s^2 - s^3, \quad -s^5, \quad s, \quad s^2(-s^3), \quad -s^2s^3, \quad -sssss$$

1. Replace Ψ with a number so the following are equal.

a) $4^2 = 2^\Psi$

b) $27^{15} = 3^\Psi$

c) $\left(\frac{1}{16}\right)^7 = \frac{1}{4^\Psi}$

2. Evaluate.

a) $\frac{11^{100}}{11^{99}}$

b) $\frac{(0.7)^5 (0.7)^{16}}{(0.7)^{19}}$

c) $\frac{13^{21} \cdot 13^{19}}{(13^2)^{19}}$

1. Whenever possible, write using exponential notation.

a) $x \cdot y \cdot x \cdot y \cdot x$

b) $m - mm - mmm$

2. Perform the indicated operations and simplify.

a) $(-2x^3)x$

b) $\frac{(2a)^2}{3}$

c) $(-2x^2)(-3x^3)$

d) $(-3a^2)^2 4a$

1. Write the following expression without using the exponential notation.

a) $-x^3$

b) $(-x)^3$

2. Perform the indicated operations and simplify.

a) $3x^2(-4x^5)$

b) $\frac{(-3a^2)^2}{4a}$

c) $\frac{(m-2n)^4}{m-2n}$

3. Simplify the following expression first, and then evaluate when $x = 2$.

$$\frac{3x^3}{6x}$$

1. Are the following expressions equal? Why?

$$(ab)^0 \quad ab^0$$

2. Remove parentheses and write as a single exponential expression. Perform all possible numerical operations.

a) $(2a^2)^3$

b) $2(a^2)^3$

c) $\left(\frac{2a^2}{a}\right)^3$

3. Evaluate.

$$\frac{6^{25}}{6^{24}}$$

1. Write the following expressions without using exponential notation.

a) $\frac{m^3}{n}$

b) $-\left(\frac{m}{n}\right)^3$

c) $-a^2 - a^3$

2. Perform the indicated operations and simplify.

$$(-a)^3(3a)$$

3. Simplify the expression $\frac{10a^2}{15a}$ and then evaluate when $a = -\frac{1}{2}$

4. Replace Ψ with a number so the following is equal.

$$4^5 = 2^\Psi$$

1. Whenever possible, write using exponential notation.

$$\frac{aa + aaa}{-a - aaa}$$

2. Remove parentheses and write as a single exponential expression. Identify the numerical coefficient of the final expression.

a) $\frac{4x^3}{(4x)^2}$

b) $\frac{(4x)^3}{(4x)^2}$

c) $\frac{(4x)^3}{4x^2}$

3. Evaluate.

$$\frac{(0.3)^{49} (0.3)^{51}}{(0.3)^{98}}$$

1. Write as an algebraic expression using parentheses where appropriate, then remove the parentheses and simplify.

a) Take the opposite of $4x^2$, and then raise the result to the third power.

b) Raise $4x^2$ to the third power, and then take the opposite of the result.

2. Perform the indicated operations and simplify.

a) $\frac{a^2}{b^3}(b^3)^4$

b) $\frac{12x^4}{2x(-6x^3)}$

c) $\frac{9a^2b^4}{12ab^2}$

3. Simplify the following expression first, and then evaluate when $a = -\frac{1}{4}$

$$-8a\left(\frac{a}{2}\right)$$

1. Rewrite the following expressions without parentheses.

a) $2(x + y)$

b) $-2(x + y)$

c) $-(x + y)$

d) $(x + 2y) \cdot 4$

e) $\left(\frac{x}{2} - \frac{y}{4}\right) \cdot 4$

f) $3(-2x + 0.4)$

1. Remove parentheses.

a) $-4a(c - 5d)$

b) $\left(\frac{1}{5}x + 10y\right) \cdot 15$

c) $0.1a(30c + 10a)$

d) $-(4x - 6y + 3z)$

2. Circle all expressions that are equivalent to $5\left(x + \frac{y}{5}\right)$.

a) $5x + y$

b) $\left(x + \frac{y}{5}\right)5$

c) $5\left(\frac{y}{5} + x\right)$

d) $5x + \frac{y}{5}$

e) $5\left(x + \frac{5}{y}\right)$

1. Write the following statements as algebraic expressions using parentheses where appropriate and then remove parentheses.

a) The product of $2x$ and $3 - x$

b) The product of $2b + \frac{1}{4}c$ and 4 .

c) The product of $3x^2 - 2x$ and -2 .

d) The opposite of $3x - y$.

e) The product of $\frac{2}{5}$ and $x^3 - \frac{10}{11}$.

f) The opposite of $-x^2 + \frac{x}{2} - 3$.

1. Remove parentheses and perform the indicated operations.

a) $(m + n)(x + y)$

b) $(x^2 + 1)(a + 2x)$

c) $(-x + y^2)(y + 3)$

d) $(2b + \frac{1}{2}a^3)(2a - b)$

e) $(3x^2y - xy) \cdot (2x - y^3)$

f) $(3.6m^2 - 0.2m)(-10m^2 + 0.01)$

1. Remove parentheses.

a) $-a(b + 2c - 4d)$

b) $(x - 3y)(3x^2 - 2y + z^3)$

c) $(3x - xy - 2)(1 - z)$

d) $(2 - z + y)(z^3 - v)$

e) $\left(\frac{x}{2} + \frac{2y}{3}\right)\left(2x - y^2 + \frac{9}{10}\right)$

1. Write the following statements as algebraic expressions using parentheses where appropriate and then remove parentheses.

a) The product of $a + 4$ and $2 - b$

b) The product of $-x + 2$ and $x^3 - 1$

c) The product of $\frac{2}{3} - a$ and $a^2 + \frac{1}{4}$.

d) The product of $x - 2x^2 + x^3$ and $x - z$.

1. Factor 2 from the following expression.

$$2l + 2w$$

2. Factor 3 from the following expression.

$$3x - 6y$$

3. Factor $2x$ from the following expression.

$$2xb + 4ax$$

4. Factor $2x^2$ from the following expression.

$$4x^2 - 2x^3$$

5. Factor xy from the following expression.

$$-5xy + 4yx^3z$$

6. Factor $2y$ from the following expression.

$$2x^2y + 4y^4$$

1. Factor x^2 from the following expression.

$$x^2 - 3x^4$$

2. Factor $2x^2y$ from the following expression.

$$6x^2y + 14y^7x^3$$

3. Factor z^3 from the following expression.

$$3z^5 + 5z^4 - z^3$$

4. Factor $3abc^2$ from the following expression.

$$3abc^2 - 12a^6bc^5 + 6a^2b^2c^2$$

5. Factor $3ay$ from the following expression.

$$3a^3y - 3x^2ay + 6a^4y^2$$

6. Factor x^2y^3 from the following expression.

$$2s^2x^2y^7 - x^2y^3 - zx^4y^3$$

1. Factor -1 in each of the following.

a) $a + b$

b) $a - b$

c) $-a + b$

d) $-a - b$

e) $2d - \frac{a-b}{2} + c$

2. Underline all expressions that are equivalent to $-(a - 2b)$.

a) $-a - 2b$

b) $-a + 2b$

c) $(a - 2b) - 1$

d) $-1 \cdot (a - 2b)$

e) $a + 2b$

1. Factor $\frac{1}{3}$ from the following expression.

$$\frac{1}{9}x - \frac{2}{3}y$$

2. Factor $\frac{1}{2}$ from the following expression.

$$\frac{q}{2} - \frac{xy}{4}$$

3. Factor $\frac{5}{2}$ from the following expression.

$$\frac{15}{2}F - \frac{25}{2}$$

4. Factor $\frac{7}{8}$ from the following expression.

$$\frac{7}{8} - \frac{7}{16}a$$

5. Factor 0.4 from the following expression.
 $-0.4x + 0.8y - 0.2$

1. Factor $(x - y)$ from the following expression.

$$a(x - y) + b(x - y)$$

2. Factor $(x - y)^2$ from the following expression.

$$2(x - y)^3 - (x - y)^2$$

3. Factor $3x - 4y$ from the following expression.

$$xy(3x - 4y)^3 - 2x(3x - 4y)$$

4. Factor $x^2 + y$ from the following expression.

$$m(x^2 + y) - n^2(x^2 + y)^4$$

1. From $3 + a$ factor.

a) -1

b) 3

c) a

2. From $r^2 + rR + R^2$ factor.

a) r

b) R

c) rR

1. Consider $\frac{a^2}{1+a^2}$

- a) Can a^2 be viewed as a factor of the denominator?
- b) Can a^2 be viewed as a factor of the numerator?
- c) Can we ‘cancel a^2 ’. If not, why? If yes, what is the resulting expression?

2. Consider $\frac{2x}{x(1+a)}$

- a) Can x be viewed as a factor of the denominator?
- b) Can x be viewed as a factor of the numerator?
- c) Can we “cancel x ”. If not, why? If yes, what is the resulting expression?

3. Consider $\frac{4xy^3(1-z)}{8yx^2}$

- a) Can $4xy^2$ be viewed as a factor of the denominator?
- b) Can $4xy^2$ be viewed as a factor of the nominator?
- c) Can we “cancel $4xy^2$ ”. If not, why? If yes, what is the resulting expression?

1. Simplify, when possible, by dividing numerator and denominator by the same expression. Name the expression by which you divide the numerator and the denominator. If the simplification is not possible, write “not possible”.

a) $\frac{x^2 y}{8y}$

b) $\frac{3m^{25}n}{m^2}$

c) $\frac{3x^3}{9x^2 y}$

d) $\frac{6 + a^5}{a^5}$

e) $\frac{-uv}{u(v-u)}$

f) $\frac{12x(a+b)}{-6x}$

1. Simplify, if possible. If simplification is not possible, write “not possible”.

a) $\frac{3x - xy}{x}$

b) $\frac{22a - b}{11a}$

c) $\frac{ab - a}{8ab}$

d) $\frac{30z^2y - 25yz}{5yz}$

e) $\frac{h - 2t}{2t - h}$

f) $\frac{x^2yz}{3x^2y - y^2x^2}$

1. Simplify, if possible. If simplification is not possible, write “not possible”.

a) $\frac{4-a}{1-a}$

b) $\frac{3a^2b}{3a-9ba}$

c) $\frac{A^5}{A^3-A^7}$

d) $\frac{-ab+2ab^2}{3ab}$

e) $\frac{p-q-r}{q-p+r}$

f) $\frac{x^2}{4x^7-2x^5+x^2}$

1. Remove parentheses. Simplify.

a) $b(a + b^3)$

b) $(2x - y)(3x^3 - 1)$

2. Factor a^2 from the following expression.

$$a^3 - 4a^2x$$

3. Factor -1 .

$$\frac{a-b}{2} + 2d$$

4. Simplify, if possible. Otherwise, write “not possible”.

a) $\frac{2ab}{4ab^2}$

b) $\frac{3xy - y}{y}$

c) $\frac{3xy - 9x^2y}{9x^2y}$

1. Simplify, if possible. If simplification is not possible, write “not possible”.

a) $\frac{4x}{8(y+x)}$

b) $\frac{2q-s+t}{t-s+2q}$

2. Write the following statement as algebraic expressions using parentheses where appropriate and then remove parentheses: The product of $-a - \frac{b}{3}$ and -12

3. Factor $3ab$ from the following expression.

$$6ab^5 - 3ba$$

4. Factor a^2b from the following expression.

$$a^3b - a^2b + 4a^7b^2$$

5. Remove parentheses.

$$(-3 + b^3)(0.2 + 8a)$$

1. Remove parentheses. Simplify.

a) $(3a^2 - b)a$

b) $\left(\frac{2}{3} - c\right)\left(\frac{1}{4} + d\right)$

2. Write the following statement as algebraic expressions using parentheses where appropriate and then remove parentheses: The product of 0.7 and $2 - x + 0.3y$.

3. Factor $3z^2y^3$ from the following expression.

$$3z^4y^6 - 9y^4z^2$$

4. Factor $v - w$ from the following expression.

$$4(v - w) - y(v - w)$$

5. Simplify, if possible. If simplification is not possible, write “not possible”.

a) $\frac{-4xy^3}{xy(a+1)}$

b) $\frac{xy - x^2}{3x}$

1. Circle all expressions that are equivalent to $-4(x + 3y)$

a) $-4x - 12y$

b) $(x + 3y)(-4)$

c) $(x + 3y) - 4$

d) $-4x + 3y$

2. Remove parentheses. Simplify.

a) $(b + 2c)(-0.5)$

b) $(3x^3 - 9)(2 + \frac{xy}{3})$

3. Write the following statement as algebraic expressions using parentheses where appropriate and then remove parentheses: The product of $\frac{1}{4}$ and $4 - 8a$.

4. Factor $3x$ from the following expression.

$$3x - 6x^2 + 9x^4$$

5. Simplify, if possible. If simplification is not possible, write "not possible"

a) $\frac{xy - y}{y}$

b) $\frac{m - n}{-n + m}$

1. Remove parentheses. Simplify.

a) $\frac{2}{7}(14 - 7a)$

b) $a(2a - 3a^2 - a^4)$

2. Write the following statement as algebraic expressions using parentheses where appropriate and then remove parentheses: The opposite number to $-4(a + b) - \frac{c}{7}$

3. Factor x^2 from the expression $2x^3 - x^2$

4. Simplify, if possible. Otherwise, write “not possible”.

a) $\frac{6x^3a - 3x}{9x}$

b) $\frac{2c - 4d}{c}$

1. Remove parentheses. Simplify.

$$(2xy + 8x)(3y - 5x)$$

2. From the expression $4xy - 8xy^2 + 12x^3y^5$, factor the following.

a) -1

b) 4

c) $4xy$

3. Simplify, if possible. If simplification is not possible, write “not possible”.

a) $\frac{y(a+1)}{2ya}$

b) $\frac{2x}{4x-8x^2}$

1. Are the following like terms?

$$-2x^3y \quad -2xy^3 \quad -2(xy)^3$$

2. Are the following like terms?

$$3a^2 \quad -3a^2 \quad 3^2a^2$$

3. In which of the following rows are all the terms like terms?

a) $-\frac{3}{5}x$, $-6x^2$, $0.2x^2$, $-\frac{1}{7}x^2$, $8x$

b) $-3ab$, $9ba$, $-0.3ab$, $-8ab$, $-\frac{2}{5}ba$

c) $3x$, $3x^2$, $3x^3$, $3x^4$, 3

d) $-4y$, $-7y$, $8y$, $9y$, y , $-y$

4. Circle all terms that are like $-a^2b^3$

$$6(ab)^3 \quad -2b^3a^2 \quad 7ab^3a \quad 0.3a^2b^3$$

5. Circle all terms that are like $\frac{5x}{y}$

$$-\frac{x}{y} \quad \frac{5y}{x} \quad \frac{25x^2}{y^2} \quad -2x\frac{1}{y} \quad \frac{4}{y} \cdot x$$

1. If possible, add (or subtract) the following expressions. If not possible, write “not possible”.

a) $-2x + 3x$

b) $5a - 7a$

c) $-xy - yx$

d) $4a - 7a^2$

e) $-xy^2 + 4y^2x$

f) $-y + y$

g) $4m^2 - 6m^2$

h) $5q^3r - 6qr^3$

1. If possible, add (or subtract) the following expressions. If not possible, write “not possible”.

a) $abc + bca$

b) $2x^2y + 3yx$

c) $-m^2n - 3nm^2$

d) $-\frac{xy}{z} - \frac{y}{z}x$

e) $a^6 - 8(a^3)^2$

f) $ab^3 - (ab)^3$

g) $3mn^2 - 4mnn$

h) $3s^5s^7 - 5(s^4)^3$

1. Simplify the following expressions by collecting like terms.

a) $4a - 7a - 2a$

b) $-m + m - 3m$

c) $-5x^2 + 8x^2 - 7x^2$

d) $xy - 3yx - 2yx$

e) $3y^3 - 7y^3 - 5y^3$

f) $y^2x^2 + 3y^2x^2 - 5y^2x^2$

1. Simplify the following expressions by collecting like terms.

a) $\frac{2x}{3} - \frac{2}{3}x$

b) $\frac{1}{2}x + \frac{1}{2}x$

c) $-\frac{7}{5}a^2 - \frac{2}{3}a^2$

d) $3.5u - 4.01u$

e) $-\frac{2}{3}vt + \frac{5}{6}tv$

1. Simplify by collecting like terms.

a) $-x + 4y - 7x - 2$

b) $3a + b - 7a + b$

c) $xy - xy^2 + 2 - 4xy - 5xy^2$

d) $\frac{a^2}{7} - \frac{2}{3}a^2 - 7a + 2a - 1$

e) $0.3n + m + k - 0.4n - k + m$

1. Remove parentheses and collect like terms.

a) $3x - 2 + (-4x + 1)$

b) $3x - 2 - (-4x + 1)$

c) $3x - 2 + 5(-4x + 1)$

d) $3x - 2 - 5(-4x + 1)$

e) $-(3x - 2) + 5 - 4x + 1$

f) $4(2a - 3) - 3(1 - a)$

1. Remove parentheses and collect like terms.

a) $-2acb + 3a - 2(-4abc - a)$

b) $-x^2y - 2 - \frac{2}{5}(10yx^2 + 15)$

c) $-2x - \frac{2}{5}y - \left(\frac{4}{3}y - x\right)$

d) $-(-0.5x^2) + (-0.7x + 0.2x^2)$

1. Remove parentheses and collect like terms.

a) $x^3 - 2x^2 - 2(-4x^2 + 7x^3)$

b) $-(2b^2a + 3a^2) - (-4ab^2 + 2 - a^2)$

c) $2(-2xy - 2) - 3(5yx^2 - 4)$

d) $5a - \frac{1}{7}b - \left(a - \frac{4}{3}b - \frac{1}{3}\right)$

e) $0.1 \cdot (20 - 3x) - (0.5x + 1) \cdot 2$

1. Remove parentheses in each of the following expression, then collect like terms, and evaluate when $x = -\frac{5}{6}$.

a) $-(x - 2) + (-x - 2)$

b) $-(x - 2) - (-x - 2)$

2. Collect like terms, and only then evaluate $\frac{R}{4} - \frac{R}{3} + \frac{13R}{12}$ when $R = 0.123$.

3. Remove parentheses, collect like terms.

$$2(3x - y) - (5x + 3y)$$

After collecting like terms, evaluate the expression when

a) $x = -15, y = -3$

b) $x = 3, y = -\frac{1}{5}$

1. Write the following statements as algebraic expressions, and then rewrite without using parentheses. Collect like terms.

a) Add $-A + 2$ and $-A$

b) Subtract $xyz - v$ from $3yzx - 7v$

c) Subtract $-x + \frac{2y}{3}$ from $2x - \frac{1}{3}y$

d) Subtract $ab - c + de$ from $3ab - 7ed$

1. Remove parentheses and collect like terms.

a) $(c + 2a)^2$

b) $(3s^2 - 1)^2$

c) $(0.2 + Z)^2$

d) $\left(\frac{1}{2} - x\right)^2$

1. Remove parentheses and then collect like terms.

a) $(a + 3)(a - 2)$

b) $(1 + x)\left(2 - \frac{x}{2}\right)$

c) $(3x - 2y)(x - y)$

d) $(6 + m)(6 - m)$

e) $(1000 - x)(0.32 + 0.01x)$

1. Write the following statements as algebraic expressions, and then rewrite without them using parentheses. Collect like terms.

a) Subtract $4x$ from y and then raise the result to the second power.

b) Add $\frac{b}{3}$ and y^2 , and then raise the quantity to the second power

c) Multiply $4x - 2$ by $1 - x$.

d) Write the opposite of $3x + 4y$, and then add $-2x + y$ to the result.

1. Circle all terms that are like $4m^2n^5$

$$-n^5m^2 \quad 7 \cdot m \ n^5m \quad \frac{m^2n^5}{2} \quad -2(mn)^2n^3$$

2. If possible, add (or subtract) the following expressions. If not possible, write “not possible”.

a) $-2x - 7x$

b) $-4ca + 7cb$

c) $\frac{7}{8}a - \frac{4}{5}a$

3. Remove parentheses and then collect like terms.

a) $(x + 2y)^2$

b) $-(-a) - (b + a)$

4. Write the following statement as algebraic expressions and then rewrite without using parentheses. Collect like terms.

Multiply $-3x + 2$ and 5

1. If possible, collect like terms. Otherwise, write “not possible”.

a) $2s - s + 4 - 3s$

b) $-\frac{1}{2}x - \frac{1}{2}x$

2. Remove parentheses and then collect like terms.

a) $(a - b^3)^2$

b) $-(3x - 2) + 4x$

c) $ab - b^3 - 2(ab + 2b^3)$

d) $-4(a - b + 0.2) + (-1.3)$

1. Circle all expressions that are like $\frac{x}{y}$

$$2\frac{x}{y}$$

$$\frac{3}{y}x$$

$$4\frac{y}{x}$$

$$\frac{x}{y}$$

$$5x\frac{1}{y}$$

2. If possible, add (or subtract) the following expressions. Otherwise, write “not possible”.

a) $3ab - 2ba$

b) $-4c^2 - 7c^3$

c) $-xyy - 2y^2x$

3. Remove parentheses and then collect like terms.

a) $(xy - 1)(3 + 2yx)$

b) $\left(\frac{3}{5} - y\right)^2$

4. Write the following statement as algebraic expressions and then rewrite without using parentheses. Collect like terms.

Subtract $-4x + 5$ from $3x$

1. Simplify by collecting all like terms.

a) $3x - x - 4 - 1$

b) $abc - 3bc - 2acb + cb$

2. Remove parentheses and then collect like terms.

a) $(ab - b)^2$

b) $(2 - x^2)(x - 2x^2)$

3 Write the following statement as algebraic expressions and then rewrite without using parentheses. Collect like terms.

Subtract $-2x + 4a - 1$ from $-x + \frac{2}{3}a$

1. Remove parentheses and then collect like terms.

a) $3z - 2 + 4z + 5$

b) $-mn - nm - m^2n + 3mn^2$

2. Remove parentheses and then collect like terms.

a) $\left(x + \frac{2}{7}\right)^2$

b) $xy - 3x - (x + 2yx)$

c) $(A + 2)(1 - A)$

2. Remove parentheses, collect like terms.

$$-\frac{3}{4}x - \left(\frac{1}{3}x - 1\right)$$

And then evaluate when $x = 12$

2. Remove parentheses and collect like terms.

a) $-\frac{1}{3}(3x + 6z) - (-2 - z)$

b) $-5\left(-\frac{3}{5}x - 8y\right) - \frac{2}{3}y$

c) $(a - 10b)^2$

2. Remove parentheses, collect like terms, and then evaluate $-(x - 2y) + (2x - 3y + 2)$ when $x = -1$, $y = -3$

1. Evaluate the following expressions, if $x + y = \frac{1}{3}$

a) $3(x + y)$

b) $\frac{x + y}{7}$

c) $-(y + x) + 2$

d) $(x + y)^2$

e) $2(x + y)^3$

f) $\frac{x}{4} + \frac{y}{4}$

1. If $z^2 = 3$, evaluate

a) $-z^2$

b) $z^2 z^2$

c) $2z \times 5z$

d) $(-z^2)^2$

e) $-(z^2)^2$

2. Evaluate $(x + y)z$, if

a) $x + y = 0.2$, $z = -3$

b) $xz = -\frac{5}{9}$, $yz = -\frac{2}{3}$

1. Evaluate the following expressions, if $abc = -3$

a) $-\frac{3}{abc}$

b) $\frac{cba}{2}$

c) $a(-2)c(-3)b$

d) $(ab)^2 \cdot c^2$

2. Evaluate $\frac{v}{u}$, if

a) $\frac{u}{v} = 3$

b) $\frac{u}{v} = \frac{4}{9}$

c) $\frac{u}{v} = 0.2$

1. Evaluate the following expressions, if $ab = \frac{3}{4}$, and $bc = -\frac{1}{9}$.

a) $ab + bc$

b) $bacb$

2. Evaluate the following expressions, if $A + B = \frac{3}{4}$ and $C = -\frac{2}{7}$

a) $\frac{A + B}{C}$

b) $A - C + B$

c) $2A + 2B + C$

d) $AC + BC$

1. Evaluate the following expressions, if $\frac{a+b}{c} = -2$

a) $-\left(\frac{a+b}{c}\right)^2 - 3\left(\frac{a+b}{c}\right)$

b) $\frac{a}{c} + \frac{b}{c}$

c) $-\frac{1}{c} \cdot (a+b)$

2. Evaluate the following expressions, if $2m - n = -7$.

a) $-n + 2m$

b) $4m - 2n$

c) $n - 2m$

1. If $a^2 + b^2 = 4$, $ab = -\frac{1}{4}$, evaluate

a) $(a^2 + b^2)ab$

b) $\frac{b^2 + a^2}{ab}$

2. Evaluate the following expressions, if $m + n = 3$ and $x = -1$

a) x^{m+n}

b) $(x - 1)^{m+n-1}$

c) $mx + nx$

1. Evaluate the following expressions, if $a^2b^8c = 0.3$

a) $\frac{a^2b^8c}{0.01}$

b) $-10(ca^2b^8)^2$

c) $c(ab^4)^2$

d) $\frac{a^2b^8}{2} \cdot (-c)$

2. Simplify the following expressions and then evaluate when $x = 2$, $y = -1$.

a) $\frac{3x - 3y}{6}$

b) $-(x^2 - 2y^2) + 2(x^2 - y^2)$

1. Express $-2P$ in terms of m , when the following is true. Write your final answer without parentheses.

a) $P = -m$

b) $P = m^2 - m$

2. Express A^3 in terms of x , when the following is true. Write your answer without parentheses. Simplify.

a) $A = 2x$

b) $A = -x$

c) $A = x^7$

d) $A = -x^3$

1. Express $-a + 2b$ in terms of x , if $a = 5x$ and $b = -x$. Remove parentheses and simplify.

2. Write the expression $a^2 + 4a$ in terms of x , if $a = x - 2$. Remove parentheses and simplify.

3. Write the following expression in terms of a and b . Remove parentheses and simplify.

$$\frac{x - y}{x + y} \quad \text{if } x = a + b, \quad y = a - b$$

4. Write the following expression in terms of x . Simplify the new expression.

$$\frac{x - y}{x + y} \quad \text{if } y = x$$

5. Knowing that $x + y = t$, express the following in terms of t . Simplify your answer.

a) $\frac{x}{3} + y + \frac{y}{3} + x$

b) $\frac{x + 2 + y}{x + y}$

1. Let $P = -x + 2$, $Q = 4x - 1$. Express the following in terms of x . Write your final answer without parentheses, in a simplified form.

a) $P + Q$

b) $P - Q$

c) PQ

d) Q^2

2. Let $A = -x + 2$, $B = 4x$ and $C = \frac{x}{3} - 2$. Express the following in terms of x . Write the expressions without parentheses. Simplify.

a) $A + B - C$

b) $-AB - C$

1. Express $4A^2 - AB$ in terms of x and y , if the following is true. Write your answer without parentheses. Simplify.

a) $A = x, B = -y$

b) $A = 2x, B = 3y^2$

c) $A = \frac{x}{2}, B = 2y$

2. Let $P = -x^3$ and $R = 2x^2$. Express the following expressions in terms of x . Simplify.

a) PR^2

b) $\frac{P}{R}$

1. Rewrite the expression $a^2 - b^2$ in terms of

a) x , if $a = 5x$ and $b = 1$. Write the new expression without parentheses. Simplify.

b) x , if $a = 5x - 2$ and $b = -x$. Write the new expression without parentheses. Simplify.

c) a , if $a = b$. Simplify.

d) a , if $a = -b$. Simplify.

2. Rewrite the expression a^2b^3 in terms of

a) x , if $a = x^3$, $b = x^4$. Write the new expression without parentheses. Simplify.

b) x , if $a = x - 2$, $b = x$. Write the new expression without parentheses. Simplify.

c) a , if $a = b$. Simplify.

1. If $a + 3b = m$, express the following expressions in terms of m . Simplify, if possible.

a) $7^a 7^b 7^b 7^b$

b) $\frac{1}{7}a + \frac{3}{7}b$

c) $-3b - a$

d) $(a + 2 + 3b)^{a+3b}$

e) $\frac{a}{3b+a} + \frac{3b+1}{3b+a}$

1. Evaluate $\frac{x}{y}$, if $\frac{y}{x} = 3$

2. Evaluate $a - b + 3c - 4d$, if $a - 4d = -5$ and $3c - b = 4$

3. Express P^3 in terms of x , when the following is true. Write your answer without parentheses. Simplify.

a) $P = -x$

b) $P = -2x^2$

4. Perform the indicated operations to simplify, and then evaluate when $x = 2$ and $y = -3$
 $x - y - (y + x)$

1. Evaluate $\frac{x}{y} + \frac{2z}{y}$, if $x + 2z = -2$ and $y = 4$

2. Evaluate $-\left(\frac{x}{y^2}\right)^3$, if $\frac{x^3}{y^6} = -2$

3. Express $3x + 9y$ in terms of Y , if $x + 3y = Y$.

4. Express $x^2 - xy + y^2$ in terms of v , if the following is true. Remove parentheses and simplify the new expression.

a) $x = y = v$

b) $x = -1, y = v - 2$

1. Evaluate the following expressions, if $x - y = 0.2$.

a) $-y + x$

b) $3x - 3y$

2. Write the expression $(a - b)(a + b)$ in terms of x , if the following is true. Simplify your answer.

a) $a = 5x$ and $b = -x$

b) $a - b = 5x$ and $a + b = -x$

3. Express x^2 in terms of v , if the following is true. Remove parentheses and simplify the new expression.

a) $x = 2v$

b) $x = -\frac{2}{v}$

1. Perform the indicated operations to simplify, and then evaluate when $x = -3$

$$-7x + \frac{3}{2}x + 4x + \frac{5}{2}x$$

2. Evaluate the following expressions, if $x + y = 3$ and $z = -2$

a) $\frac{x + z + y}{4}$

b) $zx + zy$

3. Let $A = a^2$ and $B = -3a$. Write the following expressions in terms of x . Simplify.

a) $(AB)^2$

b) $\frac{1}{3}AB^3$

1. Evaluate the following expressions, if $x^2y = \frac{3}{2}$.

a) $-4x^2y$

b) $-xyx$

2. Rewrite the following expressions in terms of m , if $a = m - 4$. Simplify your answer.

a) $(a - 3)(6 - a)$

b) $2a - a^2$

3. Simplify the expression $\frac{-xy}{2}$ if $y = 2x^2$

1. Evaluate the following expressions, if $m^3 = 0.1$ and $n = -0.2$

a) m^3n

b) $-m^2nm$

2. Rewrite the expression a^2b in terms of x , if $a = -x$ and $b = 3x$. Write the new expression without parentheses. Simplify.

3. Rewrite the following expression in terms of s . Simplify the new expression.

$$\frac{x-y}{x+y} \quad \text{if } y = x - s^2$$

4. Rewrite the expression AB in terms of B , if $A = B^4$. Simplify.

1. Determine whether the following examples represent an equation or an algebraic expression. In the case of an equation, circle the right-hand side of the equation.

a) $4x - 2 + 5y$

b) $x^3 - 2x$

c) $4x - 2 = 5y - 9$

2. Determine whether the following examples represent an equation or an algebraic expression. In the case of an equation, circle the left-hand side of the equation.

a) $3x - 7y = 5$

b) $x^2 - 2y^2 = 0$

c) $-4x + 5 - y + z$

3. Guess a number that is

a) a solution of $3^x = 9$

b) not a solution of $3^x = 9$

4. Guess a number that is

a) a solution of $\frac{1}{x} = \frac{1}{2}$

b) not a solution of $\frac{1}{x} = \frac{1}{2}$

1. Determine which of the following numbers are solutions of $-x = x$. Show how you arrived at your answer.

a) $x = 1$

b) $x = -1$

c) $x = 0$

2. Is $x = -1$ a solution of the following equations? Please, show how you arrived at your answer.

a) $-2x^2 = -2$

b) $-(2x)^2 = -4$

c) $(-2x)^2 = -4$

1. Which of the following statements are true? Why?

a) $x = \frac{2}{3}$ is a solution of $\frac{3x}{2} = 1$

b) $x = 0$ is a solution of $\frac{x}{3} = 0$

c) $x = 0$ is a solution of $\frac{3}{x} = 0$

d) $n = 8$ is a solution of $2^n = 16$

e) $x = -1$ is a solution of $-1 = x^{15}$

1. Is $x = 0$, $y = 0.1$ a solution of the following equations? Show how you arrived at your answer.

a) $\frac{y}{0.1} = x + 1$

b) $3xy = 0.3$

2. Which of the following statements are true? Why?

a) $x = 2$, $y = -3$ is a solution of $-4x + y = 7x - y$

b) $x = 5$, $y = -4$ is a solution of $x^2 + y^2 = 9$

c) $x = \frac{1}{3}$, $y = -\frac{1}{3}$ is a solution of $x + y = -\frac{x}{y}$

d) $x = 2.2$, $y = -0.11$ is a solution of $\frac{x}{y} = 2 - 10x$

1. Solve and check your answer.

a) $-2a = 5$

b) $x + 5 = -1$

c) $-2 = 7 + y$

d) $-0.5a = 5$

e) $a + \frac{1}{2} = -\frac{1}{2}$

f) $-3 = \frac{x}{4}$

g) $\frac{2}{3} = -3x$

1. Solve the following equations. Check your answer.

a) $4x = -8$

b) $3 + b = -2$

c) $-0.9 + x = 8$

d) $-2 = -x$

e) $\frac{a}{3} = 4$

f) $7 = -14a$

g) $-0.7x = 0.07$

1. Solve the following equations.

a) $5 + 2x = 8$

b) $-7x - 21 = 0$

c) $\frac{z}{4} - 3 = 5$

d) $0 = 1 - x$

e) $-3 = -6w + 2$

1. Solve the following equations and check your answer.

a) $2x - 2 = 4$

b) $-\frac{x}{2} + 1 = 1$

c) $-2 = 0.1x + 5$

d) $-0.2x + 3 = -1$

e) $-0.1x + 0.2 = -0.3$

1. Solve the following equations.

a) $2x - 5 = -x$

b) $4n + 5 = -3n - 4$

c) $6n - 1 = 4 + 4n$

d) $-2x - 4 = 11 + x$

1. Solve the following equations and check your answer.

a) $2(a - 1) = 7$

b) $-(x + 3) = 2x$

c) $3x - 1 = 5(1 - x)$

d) $-2(a + 1) = 3a - 2$

1. Determine which of the following equations has no solution, exactly one solution, or solution consisting of all real numbers.

a) $1 - 3x = -3x + 1$

b) $5x = 0$

c) $-x = x$

d) $-(x - 4) = -(4 - x)$

e) $3x - 4x - 7x + 2 = -8x$

1. Determine which of the following equations has no solution, exactly one solution, or solution consisting of all real numbers.

a) $2(x - 4) = -8 + 2x$

b) $2(x - 4) = -8$

c) $2(x - 4) = 2x$

d) $2(3 - 5x) = -10x + 6$

1. Solve the following equations.

a) $6x = 3(2x - 4)$

b) $1 - 4x = -2(1 + 2x)$

c) $x - (2 - x) = -2 + 2x$

d) $3(1 - x) = -3x + 2$

1. Solve the following equations.

a) $-8 - A = -A + 3$

b) $-(5 - x) = x$

c) $3x - 4 = -5(x + 2)$

d) $0.7y = -2 - 0.3y$

e) $2(3 - 6x) = -3(4x - 2)$

1. Determine whether the following examples represent an equation or an algebraic expression. In the case of an equation, circle the right-hand side of the equation.

a) $a - 4 = 6$

b) $a^3 + a$

c) $4(a - 2) - a$

2. Which of the following values of x is a solution of the equation $x^2 = -x$. Please, explain how you arrived at your answer.

a) -1

b) 1

c) 0

3. Solve the following equations and check your answers.

a) $y + 7 = -0.2$

b) $-3x + 2 = 5$

1. Is $x = 20$, $y = -2$ a solution of the following equations? Show how you arrived at your answer.

a) $10y = x$

b) $\frac{y}{0.1} = -x$

2. Solve the following equations and check your answer.

a) $-\frac{z}{4} = 5$

b) $-3 = -6w + 9$

3. Determine which of the following equations has no solution, exactly one solution, or solution consisting of all real numbers.

a) $-2x = 0$

b) $-2x = 2 - (1 + 2x)$

1. Is $x = -1$ a solution of the following equation? Show how you arrived at your answer.

$$\frac{x^2}{2} = -\frac{1}{2}$$

2. Solve the following equations.

a) $0 = 1 - x$

b) $-7x + 4 = 11$

c) $2(x - 3) = 4x + 1$

1. Is $z = \frac{3}{4}$ a solution of the following equation? Show how you arrived at your answer.

$$4z - 2 = \frac{4}{3}z$$

2. Solve the following equations.

a) $1 = \frac{x}{5} - 2$

b) $1 = -(3x + 5)$

c) $4x - 7 + 3x = 7(x - 1)$

1. Is $x = \frac{-1}{2}$, $y = 4$, $z = \frac{3}{4}$ a solution of the equation $xyz = -\frac{3}{2}$? Show how you arrived at your answer.

2. Solve the following equations.

a) $2 = -3x + 7$

b) $3x + 5 = -x + 2$

c) $2(1 - 4x) = 6$

1. Solve the following equations.

a) $-1 = \frac{x}{-2}$

b) $2 - 4x = -2$

c) $2 - x + 3x = 2x + 5$

d) $1 - (3x + 2) = 4x + 5$

1. Solve the following equations.

a) $\frac{v+1}{4} = \frac{2v}{5}$

b) $\frac{x-4}{7} + \frac{x}{2} = -2$

c) $\frac{x}{2} - 1 = \frac{3x}{8}$

1. Solve the following equations.

a) $-\frac{x+2}{10} = \frac{2x-1}{5}$

b) $\frac{A+5}{4} - 1 = \frac{2A}{3}$

c) $\frac{x+1}{2} - \frac{5}{6} = \frac{2-x}{3}$

1. Solve the following equations.

a) $-3x + \frac{x}{2} - 1 = 4x - \frac{1}{3}$

b) $\frac{x}{2} - \frac{2x}{3} = -\frac{x+1}{6}$

c) $\frac{3x-4}{9} + 1 = \frac{1+2x}{6}$

1. Solve the following equations.

a) $-(x+4) = 5 - 2(1-3x)$

b) $\frac{3x-1}{9} + x = \frac{3x+1}{3} + 4$

c) $3(2x-10) = 5(x-6) + x$

1. Let $P = 2x + 3$ and $Q = -x$. Find x so that the following is true.

a) $P = 0$

b) $P = Q$

c) $P - Q = 3$

d) $P = 2Q$

1. Let $P = \frac{1-x}{3}$ and $Q = \frac{2+x}{4}$. Find x such that the following is true.

a) $Q = \frac{1}{2}$

b) $6P - 4Q = 0$

c) $P = Q$

1. Solve the following equations for x .

a) $3x = 5$

b) $ax = m$

2. Solve the following equations for x .

a) $x - 4 = 6$

b) $x - a = m$

3. Solve the following equations for x .

a) $\frac{x}{2} = 7$

b) $\frac{x}{a} = b$

4. Solve the following equations for x .

a) $2 - x = 4$

b) $a - x = m$

1. Solve the following equations for x .

a) $2x - 7 = 3$

b) $ax - b = c$

2. Solve the following equations for x .

a) $\frac{x-2}{5} = 3$

b) $\frac{x-a}{b} = c$

3. Solve the following equations for x .

a) $3x = 21 - 4x$

b) $ax = b - cx$

4. Solve the following equations for x .

a) $2(3x+1) = x$

b) $a(bx+c) = x$

1. Solve for F . Simplify your final answer, if possible.

a) $nF = 4k$

b) $F + 3k^2 = k$

c) $-F = b + A$

d) $-3y + F = 2y$

e) $\frac{F}{y} = y^2$

1. Solve the following equations for a . Simplify your final answer, if possible.

a) $\frac{c}{a} = 1 - c$

b) $2ax = x + x^2$

c) $ax - ac = 2$

2. Solve $D = \frac{C - S}{t}$ for

a) t

b) C

c) S

1. Solve the following equations for x . Simplify your final answer, if possible.

a) $2(bx - b^2) = 0$

b) $ax - bx = c + 1$

c) $\frac{x}{a} + a = c$

2. Solve for v . Simplify your answer.

a) $3sa = as - \frac{v}{a}$

b) $av + b = bv + a$

1. Solve $a^2bx = a^3b^2$ for x , and then find the value of x if $a = \frac{2}{11}$, and $b = \frac{22}{3}$.

2. Solve $\frac{c^5}{x} = 2c^3$ for x , and then find the value of x if $c = -2$.

3. Solve $3(y - x) = -6x$ for y , and then find the value of y if $x = -4$.

1. Let F be the temperature in Fahrenheit. The same temperature expressed in Celsius C is given by the formula

$$C = \frac{5(F - 32)}{9}$$

a) Convert 41 degrees Fahrenheit to Celsius temperature.

b) Convert -4 degrees Fahrenheit to Celsius temperature.

c) Solve $C = \frac{5(F - 32)}{9}$ for F .

d) Convert 10 degrees Celsius to Fahrenheit temperature.

e) Convert -15 degrees Celsius to Fahrenheit temperature.

1. Solve the following equations.

a) $\frac{-A}{3} + 2A = \frac{1}{6}$

b) $-A - (3A + 2) = 4(1 - A)$

2. Solve the following equations for x . Simplify your answer, if possible.

a) $a^3x = a^4$

b) $cx - d = 2d$

1. Solve $A = P(1 + r)$ for

a) P

b) r

2. Solve the following equation.

$$2x = \frac{2x + 5}{6}$$

3. Let $P = 3x$ and $Q = 2 - x$. Find x such that the following is true

$$\frac{P}{4} = \frac{Q}{2}$$

1. Solve $\frac{x^2 - x}{P} = x$ for P , and then find the value of P if $x = \frac{1}{2}$.

2. Solve the following equation

$$\frac{-A}{3} + 2A = \frac{2A+5}{6} - \frac{1}{12}$$

3. Let $a = 3x$ and $b = -x$. Find x such that the following is true.

$$a - b = 0$$

1. Solve $\frac{x-1}{P} = 10$ for x , and then find the value of x if $P = -0.2$.

2. Solve the following equations for P . Simplify your answer, if possible.

a) $\frac{a}{P} = ab$

b) $Pa - Pb = a$

3. Solve the following equation.

$$\frac{x+2}{3} + 1 = \frac{x}{15}$$

1. Solve the following equations for x . Simplify your answer, if possible.

a) $2a - x = a$

b) $-4cx = c + 1$

2. Solve the following equation.

$$-0.9(2x - 1) = 0.2(x - 10)$$

3. Let $a = 3x - 1$ and $c = 4x$. Find x such that the following is true

$$\frac{a}{2} + c = 1$$

1. Solve the following equation.

$$2 - \frac{y-1}{2} = \frac{y+2}{3}$$

2. Solve the following equations for F . Simplify your answer, if possible.

a) $2xF = 4x^5$

b) $c^2 - d = F + 2c^2 + d$

c) $2F - aF = 2 - a$

1. List three numbers x that satisfy the condition $-2 \leq x$

2. List three numbers x that *do not* satisfy the condition $-2 \leq x$

3. Name all numbers that satisfy the inequality $x \geq 5$, but do not satisfy $x > 5$.

4. Circle all numbers that satisfy the inequality $m \leq 1$.

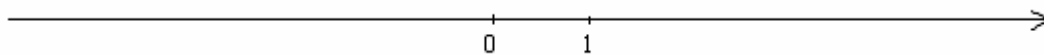
-2 -1 -0.5 $-\frac{1}{7}$ 0 1 2 3

5. Circle all numbers that satisfy the inequality $m > -\frac{2}{7}$.

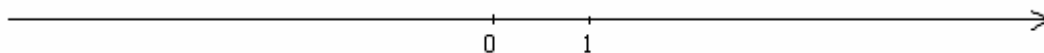
-2 -1 $-\frac{3}{7}$ $-\frac{2}{7}$ $-\frac{1}{7}$ $-\frac{1}{14}$ 0

1. Graph the following inequalities on the number line.

a) $x \leq 3$



b) $x > \frac{1}{2}$

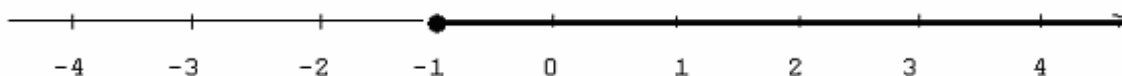


c) $x \geq -2$

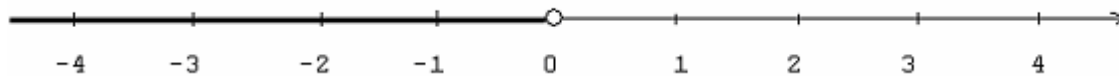


1. Using inequality symbols, describe the set that is graphed below.

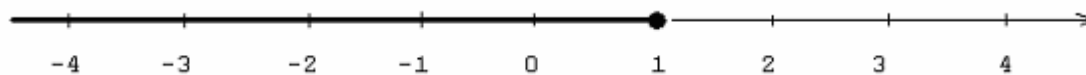
a)



b)



c)



1. Plot the following points on one number line (The points on number lines are equally spaced; choose any point you wish for 0 and 1)

$$-4, 7, 3, -1$$

and then for each condition below find two examples of inequality satisfying the condition.



- a) An inequality that is satisfied by all above points.
- b) An inequality that is not satisfied by any of above points.
- c) An inequality that is satisfied by -4 and -1 , but not by 3 and 7 .
- d) An inequality that is not satisfied by -4 and -1 , but it is satisfied by 3 and 7 .
- e) An inequality that is satisfied by -4 , -1 , and 3 but not by 7 .

1. Describe the following set of numbers using inequality symbols.

a) All numbers x that are not more than 8.

b) All numbers x that are greater than or equal to 5.

c) All numbers x that are non-positive.

d) All numbers x that are at most 6.

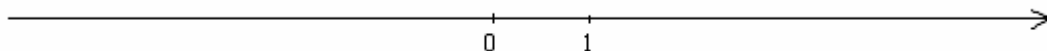
e) All numbers x that are negative.

f) All numbers x that are not less than $\frac{1}{2}$.

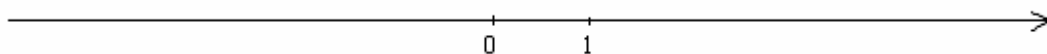
g) All numbers x that are at least equal to 3.

1. Describe the following sets of numbers using inequality signs, and then graph the sets on the number line.

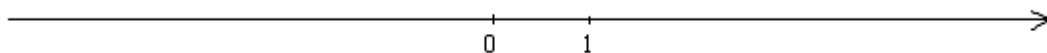
a) All numbers at least 2.



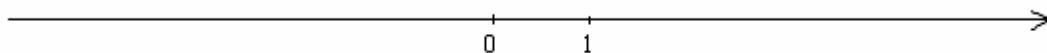
b) All numbers at most 3.



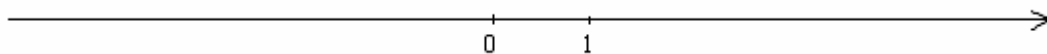
c) All numbers no more than -1 .



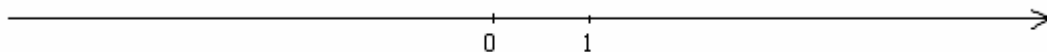
d) All numbers no less than -2 .



e) All positive numbers.



f) All non-negative numbers.



1. The solution of a given inequality is $x \leq 2$

- a) Is $x = 1$ a solution of this inequality?
- b) Is $x = 2$ a solution of this inequality?
- c) Is $x = 2$ *the* solution of this inequality? Why?
- d) List four numbers that are not a solution of this inequality.

2. Without solving the inequalities, determine if the number -3 is a solution of the following inequalities. Show your work.

a) $x - 2 < -3$

b) $-x + 1 \geq 4$

3. Fill in blanks with either 'reverse' or 'do not reverse' words, so the resulting statement is true.

When both sides of an inequality are multiplied by 10, we _____ the inequality sign.

When we add to both sides of an inequality -2 , we _____ the inequality sign.

When both sides of an inequality are divided by -3 , we _____ the inequality sign.

When we subtract from both sides of an inequality -1 , we _____ the inequality sign.

When both sides of an inequality are divided by $\frac{2}{7}$, we _____ the inequality sign.

When both sides of an inequality are multiplied by -5 , we _____ the inequality sign.

1. Knowing that $n < -1$, which of the following inequalities must also be true?

a) $n + 1 < 0$

b) $4n < -4$

c) $-5n < 5$

d) $\frac{n}{-3} < \frac{1}{3}$

2. Knowing that $n \geq \frac{2}{5}$, which of the following inequalities must also be true?

a) $5n \geq 2$

b) $n + \frac{3}{5} \leq 1$

c) $-n \leq -\frac{2}{5}$

d) $n - \frac{2}{5} \geq 0$

1. Name the operation that must be performed on both sides of an inequality to isolate x on one side. Determine if the operation requires reversing the direction of the inequality sign (indicate it in writing), and then perform the operation, actually reversing the inequality sign, if needed. For example, to isolate x in the inequality $x - 1 < 3$, 1 must be added to both sides, the operation of adding 1 does not require reversing the inequality sign, and the resulting inequality is $x < 4$).

a) $x + 3 \leq 4$

b) $-7x \geq 0$

c) $\frac{x}{2} > -\frac{2}{3}$

d) $9 > -x$

e) $-4 > 3x$

f) $9 < -2 + x$

1. Solve the following inequalities. Each time you perform the operation on both sides of the inequality, name the operation together with the operand (for example write “adding 2 to both sides”, “dividing both sides by 3”, and so on).

a) $x + 2 \geq -1$

b) $4x > 2$

c) $-2x > 5$

d) $-3 \leq 5 + x$

e) $\frac{x}{-3} \geq -1$

f) $x - 3 \leq -2$

1. Solve the following inequalities.

a) $-2 \geq 7a + 5$

b) $2 - 3x \geq -1$

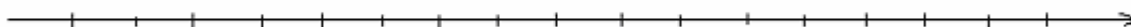
c) $0.6 \leq -0.2x - 1$

d) $-x + \frac{2}{3} \geq 0$

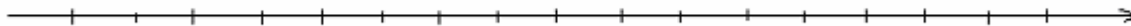
e) $-\frac{x}{3} - 1 < 6$

1. Solve each of the following inequalities and graph each solution (The points on number lines are equally spaced; choose any point you wish for 0 and 1).

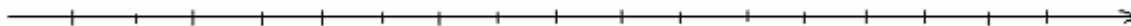
a) $-x - x \geq 0$



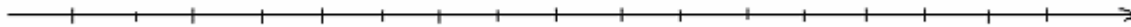
b) $x \geq -x$



c) $-(-x) > 1$



d) $-3x < 6$



1. Solve each of the following inequalities.

a) $-2 + x \geq -3 + 2x$

b) $2x - 4 > -1 + 5x$

c) $2x - 7x > 6 - 5x$

d) $-x + 2 \leq 5 - x$

1. Solve each of the following inequalities.

a) $-2(a - 1) < a + 4$

b) $0.2 + 5x < 0.1(2 + 50x)$

c) $-3(y + 1) \geq 7$

d) $-(x + 2) < 4x + 5$

e) $-2x + 5 > 1 - 2(x + 2)$

1. Solve the following inequalities.

a) $-(x + 2) + 3(x - 2) > 1$

b) $5x - 4x - 8x < 7x$

c) $2x - (1 - 4x) < 6x - 1$

d) $\frac{2x - 3}{8} - x > 2x - \frac{2}{3}$

e) $1 - \frac{z}{2} \leq z - \frac{5}{6}$

1. Describe the following sets of numbers using inequality symbols.

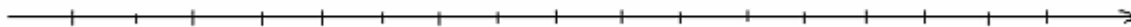
a) All numbers x that are at least $\frac{1}{2}$.

b) All numbers x that are not less than 3

2. Solve the following inequalities and graph each solution.

(The points on number lines are equally spaced; choose any point you wish for 0 and 1)

a) $x - 7 \geq -10$



3. Solve

a) $2(3 - x) < 4$

b) $3x - 4 \geq x - 5$

1. Describe the following set of numbers using inequality symbols.

a) All numbers x that are less than or equal to -2 .

b) All numbers x that are positive.

2. Graph the following inequality on a number line.

$$x < 3$$



3. Solve the following inequalities.

a) $1 - 4x < 0$

b) $\frac{x}{3} + 5 > 1$

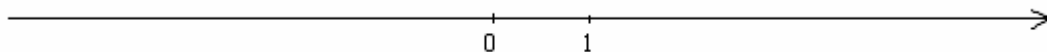
c) $\frac{-3a}{2} + 1 \geq 2(a - 3)$

1. Which of the following numbers satisfy the inequality $x < \frac{1}{2}$? Circle all of them.

-2 0.5 $\frac{4}{5}$ 0.499 0.511 $\frac{2}{3}$ $\frac{1}{2}$

2. Describe the following set of numbers using inequality signs, and then graph the sets on the number line.

All negative numbers.



3. Solve the following inequalities.

a) $-2x + 5 < 4$

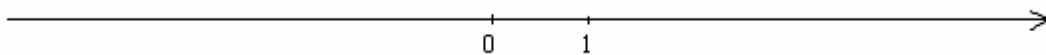
b) $-\frac{1}{3}x \geq 2$

c) $-4x + 2 > 2x + 1 - 6x$

1. The solution of an inequality is $x > 100$, list three numbers that satisfy this inequality, and three that do not satisfy it.

2. Graph the following inequality on a number line.

$$a \geq -2$$



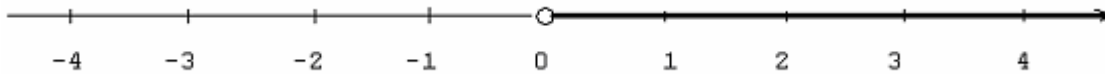
3. Solve the following inequalities.

a) $2 \geq 3x - 4$

b) $\frac{2x}{5} - \frac{1}{2} < 4$

1. Find an inequality that is satisfied by 4 but not by 8 (if it helps, you might plot the points).

2. Using inequality symbols, describe the set that is graphed below.



3. Without solving the inequality, check if the number 4 is a solution of $-x + 5 \leq 8$. Show how you got your answer. Is the number -3 a solution?

4. Knowing that $x > 2$, which of the following inequalities must also be true?

- a) $x - 2 < 0$ b) $-x < -2$ c) $7n > 14$ d) $\frac{x}{5} > \frac{2}{5}$

5. Solve the following inequalities.

a) $1 \leq -0.3x - 2$

b) $\frac{-x + 2x - 5x}{2} \geq 0$

1 a) Write an inequality for each that is satisfied by all points from the set 1, 4, 7

b) Write an inequality for each that is *not satisfied* by any of the above points.

2. Describe the following set of numbers using inequality signs, and then graph the sets on the number line.

All numbers that are not less than -3 .



3. Solve the following inequalities.

a) $\frac{x}{3} \leq 4$

b) $3x - 1 \geq 0$

c) $-2(x - 3) < 1 - 2x$

1. The expression $3x + \frac{2}{3}$ is written in the form $mx + b$. What are the values of m and b ?

2. The expression $-3x^2 + \frac{y^2}{2}$ is written in the form $ax^2 + by^2$. What are the values of a and b ?

3. The expression $\frac{-4-x}{3}$ is written in the form
 - a) $\frac{a-x}{b}$. Determine the values of a and b in this representation.

 - b) $\frac{-a-x}{b}$. Determine the values of a and b in this representation.

4. The expression $\frac{2}{3}x$ is written in the form
 - a) Ax . What is the value of A ?

 - b) $\frac{a}{b}x$. What are the values of a and b ?

1. The expression $\frac{1}{x^2}$ is written in the form

a) $\frac{1}{a}$. Identify the expression representing a .

b) $\frac{1}{a^2}$. Identify the expression representing a .

2. The following expressions are written in the form $3A - B$. For each of them determine what algebraic expression represents A and B .

a) $3x - 4$

b) $3(2xy) - \frac{x}{2}$

3. The following expressions are written in the form $m + n^2$. For each of them determine what algebraic expression represents m and n .

a) $3 + a + b^2$

b) $3 + (a + b)^2$

c) $(3 + a)^3 + (a + b)^2$

1. The following expressions are written in the form a^5b . Without rewriting, identify the expressions representing a and b ?

a) $\left(\frac{4}{9}\right)^5(-2)$

b) $(x^7)^5x^5$

2. The following expressions are written in the form $a^5 - b$. Without rewriting, identify the expressions representing a and b ?

a) $\left(\frac{4}{9}\right)^5 - 2$

b) $(x^7)^5 - x^5$

3. For each of the following expressions (1-5) indicate if they match A, B, C, D or E. Each time identify a and b .

(1) $(3x)^3 - y^3$

(A) $a^2 - b^2$

(2) $(x - y)(x^2 + xy + y^2)$

(B) $(a - b)(a + b)$

(3) $(2x)^2 - 3^2$

(C) $a^3 - b^3$

(4) $(2x - 3)(2x + 3)$

(D) $(a - b)^2$

(5) $(4x - y)^2$

(E) $(a - b)(a^2 + ab + b^2)$

1. Among the expressions below identify those that are written in the form $A - B$ and those that are in the form $A + B$, where A and B are any expressions except 0. Those that are in the form $A - B$ rewrite as $A + B$, those that are in the form $A + B$ rewrite as $A - B$ (In other words, rewrite sums as differences and differences as sums).

a) $x + y$

b) $x - y$

c) $x + (-y)$

d) $x - (-y)$

2. Write the following numbers in the form a^2 .

a) 1

b) 25

c) 0.36

d) $\frac{9}{64}$

e) 0.04

f) 1,000,000

g) $\frac{4900}{81}$

h) 0.16

3. Write the following numbers in the form a^3 .

a) 1

b) 125

c) 0.027

d) 1,000,000

e) 0.064

f) $\frac{8}{27,000,000}$

1. Write the following expressions in the form a^2 , where a is any algebraic expression. In each case state what a is equal to.

a) $64x^2$

b) $4y^2$

c) $\frac{s^2}{100}$

d) $\frac{x^2}{y^2}$

e) $\frac{36}{25}z^2$

f) x^{10}

g) x^2y^6

h) $16x^4y^{12}$

1. Write the following expressions in the form a^3 , where a is any algebraic expression. In each case state what a is equal to.

a) $\frac{x^3}{27}$

b) $0.008y^{12}$

c) $-x^3$

2. Write the following expressions in the form a^4 , where a is any algebraic expression. In each case state what a is equal to.

a) $1000y^4$

b) $\frac{m^4}{n^{12}}$

3. Write the following expressions in the form A^5 , where A is any algebraic expression. Identify A in your representation.

a) x^{10}

b) $-x^5$

c) $-x^{10}$

1. Write the expressions in the form x^6y^{12} in the following form

a) A^2

b) A^3

c) A^6

2. Write in the form ax^m , where a is any number, and m is a non-negative integer. Identify a and m in your representation (notice, that what you are being asked is to write an expression as a single exponential expression and then to identify the numerical coefficient).

a) x

b) $(-x)^{13}$

c) $3x^4(-2x)$

d) $(2x^3)^2$

1. Write in the form $Ax + By + C$, where A, B, C are any numbers. Identify A, B , and C .

a) $\frac{x}{3} - y + 1$

b) $2x + 3y - 3x + 5$

c) $\frac{x - y + 18}{9}$

d) $2(x - 3y) - 2x + 1$

e) $\frac{3x}{0.01} + \frac{0.03y}{0.01}$

1. Write the following expressions in the form $x^3 = a$, where a is any number. Identify a in your representation.

a) $x^3 + 2 = 0$

b) $2x^3 = \frac{2}{3}$

c) $\frac{2x^3}{3} + 1 = 0$

d) $\frac{2x^3 + 1}{3} = 0$

e) $3x^3 - \frac{1}{2} = x^3 + \frac{1}{2}$

1. Write the following expressions in the form $ax + by = c$, where a , b , c are any numbers. Determine the value of a , b , and c in your representation.

a) $x + 2 = 2y$

b) $3(x - 2y + 1) = 0$

c) $x = -y$

d) $\frac{2x + y}{2} = x$

2. Write the following expressions to match the form $y = ax^2 + b$. In each case determine the value of a and b .

a) $y = \frac{-2x^2}{5} + 3$

b) $2y = x^2 - 2$

c) $y - x^2 + 0.4 = 0$

d) $y = 3\left(x^2 - \frac{2}{3}\right) + 2$

1. Determine if the following equation is an example of a linear equation in one variable. If it is, write it in the form $ax + b = 0$, $a \neq 0$, and determine the value of a and b in your representation. If not, write 'not a linear equation'.

a) $3x - 2 = 5$

b) $3x^2 + 4 = 0$

c) $-0.4x = 0$

d) $2(3x - 4) = 7x - 2$

e) $\frac{x+5}{4} = 3$

f) $2x^4 - x = \frac{8x^4 - 4}{4}$

1. Using the difference of squares formula $a^2 - b^2 = (a - b)(a + b)$, factor the following expressions.

a) $x^2 - 3600$

b) $1 - \frac{y^2}{4}$

c) $100 - 4c^2$

d) $x^4 - \frac{1}{49}$

e) $(3b)^2 - (b - 1)^2$

f) $y^8 - x^6$

g) $(2x - 3)^2 - (x - 5)^2$

1. Recall the formula for the square of the sum $(a-b)^2 = a^2 - 2ab + b^2$. The following expressions are written in the form $(a-b)^2$. For each such expression, identify a and b , and then substitute their values in $a^2 - 2ab + b^2$. Simplify.

a) $(x-1)^2$

b) $\left(x - \frac{y}{2}\right)^2$

2. Recall the formula for the square of the sum $(a+b)^2 = a^2 + 2ab + b^2$. The following expressions are written in the form $(a+b)^2$. For each such expression, identify a and b , and then substitute their values in $a^2 + 2ab + b^2$. Simplify.

a) $(m+2)^2$

b) $(2s+t)^2$

1. The following formulas are true

$$a^2 - b^2 = (a - b)(a + b)$$

$$a^3 + b^3 = (a + b)(a^2 - ab + b^2).$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

Factor each of the following expressions using one of the above formulas. To this end, you must first match each expression with one of the above formulas, then identify the value of a and b in your representation, and finally replace a and b in the right-hand side of the used formula, Please, simplify your answer.

a) $m^3 + \frac{n^3}{8}$

b) $10000x^2 - z^2$

c) $8x^3 + 27y^3$

d) $x^6 - 8y^9$

1. The expression $(x-3)^4$ is written in the form $(x-a)^m$. What are the values of m and a ?

2. The following expressions $(x+2)^3 + y^2$ written in the form $m^3 + n^2$. Determine what algebraic expression represents m and n .

3. Using the difference of squares formula $a^2 - b^2 = (a-b)(a+b)$, factor the following expressions.
 - a) $x^2 - 49y^2$

 - b) $\frac{x^2}{y^2} - 100a^2$

4. Write the following expressions in the form $y = mx + b$, where m , b are any numbers. Determine the value of m , b in your representation.
 - a) $y = 3(x-1) + 2$

 - b) $y - \frac{3x}{2} = 0$

1. The expression $-\frac{2}{3}x$ is written in the form $-\frac{a}{b}x$. What are the values of a and b ?

2. Determine if the following equation is an example of a linear equation in one variable. If it is, write it in the form $ax + b = 0$ and determine the value of a and b in your representation. If not, write 'not a linear equation'.

a) $-3(x - 1) + 2 = 0$

b) $2x^2 + 1 = 0$

3. Rewrite the expression $2a + 3y$ as a difference of expressions i.e. in the form $A - B$.

4. Using the formula $a^2 - b^2 = (a - b)(a + b)$, factor the following expression.

$$\frac{x^2}{36} - y^2$$

1. The expression $\frac{2-x}{y-3}$ is written in the form $\frac{a-x}{y-b}$. What are the values of a and b ?

2. Rewrite the following differences as sums i.e. in the form $A + B$.

a) $7 - s$

b) $\frac{ab}{2} - \left(-\frac{c}{3}\right)$

3. Write the following expressions in the form $ax + by = c$, where a , b , c are any numbers. Determine the value of a , b , and c in your representation.

a) $2x - y = 4$

b) $\frac{2x - y}{3} = 0$

4. Using the difference of cubes formula $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$, factor the expression $8x^3 + y^3$

1. The expression $\frac{1}{7}x + \frac{2}{3}y$ is written in the form $\frac{A}{B}x + Cy$. What are the values of A , B and C ?

2. Write the expression x^{12} in the form a^6 , where a is any algebraic expression. State what a is equal to.

3. Determine if the following equation is an example of a linear equation in one variable. If it is, write it in the form $ax + b = 0$ and determine the value of a and b in your representation. If not, write 'not a linear equation'.

$$\frac{2x}{3} = \frac{x}{2}$$

4. Calculate $52^2 - 48^2$ using $a^2 - b^2 = (a - b)(a + b)$ (Show how you matched to the given identity in order to arrive at your answer).

5. The expression $(m - 1)^4 + (2m)^4$ is written in the form $A^m + B^m$, where A and B are any algebraic expressions, and m any positive integer. Identify A , B , and m .

1. The expression $3x + 4^2$ is written in the form $mx + b^2$. What are the values of m and b ?

2. Write the following expressions in the form $\frac{A}{B}$, where A, B are any algebraic expressions. Determine the value of A and B in your representation.

a) $\frac{m}{2} + \frac{n}{2}$

b) $3 \cdot \frac{m}{n+1}$

3. Write the following expression in the form $ax^2 + bx + c = 0$, where a, b, c are any numbers. Determine the value of a, b , and c in your representation.

$$2(x^2 - 3) + 4x = 0$$

4. Using the formula $a^2 - b^2 = (a - b)(a + b)$, factor the following expression

$$x^4 - 25y^2$$

1. The expression a^3b^{4+1} is written in the form $a^m b^{n+1}$. What are the values of m and n ?
2. Write the expression $m - n$ as a sum of two expressions i.e. in the form $A + B$, where A and B are any expressions except 0.
3. Write the expression $(x + 0.3 - 0.4)^2$ in the form $(x + r)^3$, where r is any number. Identify r in your representation.
4. Using the formula $(a - b)^2 = a^2 - 2ab + b^2$, remove the parentheses $(a + b)^2$. To this end, identify a and b , and then substitute their values in $a^2 + 2ab + b^2$. Simplify.
 $(x - 1)^2$
5. Using the formula $a^2 - b^2 = (a - b)(a + b)$ to factor the expression $M^2N^2 - \frac{49}{64}$.