

Summer bucket list:

Algebra 1 /1A



Summer Break Packet

Congratulations on completing 6th grade and I look forward to meeting you next year as an Algebra student!

Algebra 1 requires students to think, reason and communicate mathematically. The skills learned during the Algebra 1 curriculum will be used as a foundation in all subsequent math classes, such as geometry, algebra II and on.

This packet was not created to torture you!!! It was created to help you maintain your math skills, help make you a math expert and to prepare you for Algebra!!!

Packet expectations

I suggest that you work on this packet gradually over the summer. If you wait until the last week or the day before you come back to school you will not complete it!

The summer packet contains material learned during Pre-Algebra curriculum. **Students are expected to show their work** for each problem of this review packet. Each problem should be worked through to its entirety, and correctly; not just attempted. The packet will be counted as part of each student's homework average for the first quarter.

At the end of the packet is a reflection form for you and your parents to be completed after you have finished all the assignments. Please have them both filled out to be turned in on the first day of school.

Completed packets are due the first day of school!!!! (August 23, 2023)

After reviewing the packet the first few days of school there will be an assessment.

Good Luck and have a Marvelous summer!!! I cannot wait to see you in the fall!

Sincerely,

Mrs. Carmichael

Teachers' Rule!



Table of Contents

| | | |
|-----|--------------------------------|---------|
| 1. | Order of Operations | page 1 |
| 2. | Operations with Signed Numbers | page 3 |
| 3. | Rounding Numbers | page 5 |
| 4. | Evaluating Expressions | page 6 |
| 5. | Combining Like terms | page 8 |
| 6. | Graphing | page 9 |
| 7. | Solving Equations | page 13 |
| 9. | Algebraic Translations | page 17 |
| 10. | Word Problems | page 19 |



Order of Operations

To avoid having different results for the same problem, mathematicians have agreed on an order of operations when simplifying expressions that contain multiple operations.

1. Perform any operation(s) inside grouping symbols. (Parentheses, brackets above or below a fraction bar)
2. Simplify any term with exponents.
3. Multiply and divide in order from left to right.
4. Add and subtract in order from left to right.

One easy way to remember the order of operations process is to remember the acronym PEMDAS or the old saying, "Please Excuse My Dear Aunt Sally."

- P** - Perform operations in grouping symbols
E - Simplify exponents
M - Perform multiplication and division in order from left to right
D
A - Perform addition and subtraction in order from left to right
S

Example 1

$$\begin{aligned}2 - 3^2 + (6 + 3 \times 2) \\2 - 3^2 + (6 + 6) \\2 - 3^2 + 12 \\2 - 9 + 12 \\-7 + 12 \\= 5\end{aligned}$$

Example 2

$$\begin{aligned}-7 + 4 + (2^3 - 8 + -4) \\-7 + 4 + (8 - 8 + -4) \\-7 + 4 + (8 - 2) \\-7 + 4 + 10 \\-3 + 10 \\= 7\end{aligned}$$

Order of Operations

Evaluate each expression. Remember your order of operations process (PEMDAS).

1. $6 + 4 - 2 \cdot 3 =$

2. $(-2) \cdot 3 + 6 - 7 =$

3. $15 \div 3 \cdot 5 - 4 =$

4. $29 - 3 \cdot 9 + 4 =$

5. $20 - 7 \cdot 4 =$

6. $4 \cdot 9 - 9 + 7 =$

7. $50 - (17 + 8) =$

8. $(12 - 4) \div 8 =$

9. $12 \cdot 5 + 6 + 6 =$

10. $18 - 4^2 + 7 =$

11. $3(2 + 7) - 9 \cdot 7 =$

12. $3 + 8 \cdot 2^2 - 4 =$

13. $16 + 2 \cdot 5 \cdot 3 + 6 =$

14. $12 + 3 \cdot 6 \cdot 2 - 8 + 4 =$

15. $10 \cdot (3 - 6^2) + 8 + 2 =$

16. $6 \cdot 9 - 3 \cdot 2 \cdot (10 + 5) =$

17. $32 + [16 + (8 \div 2)] =$

18. $[10 + (2 \cdot 8)] \div 2 =$

19. $180 \div [2 + (12 \div 3)] =$

20. $\frac{1}{4}(3 \cdot 8) + 2 \cdot (-12) =$

21. $\frac{5 + [30 - (8 - 1)^2]}{11 - 2^2} =$

22. $\frac{3[10 - (27 \div 9)]}{4 - 7} =$

23. $5(14 - 39 \div 3) + 4 \cdot \frac{1}{4} =$

24. $[8 \cdot 2 - (3 + 9)] + [8 - 2 \cdot 3] =$

25. $162 + [6(7 - 4)^2] + 3 =$





Operations with Signed Numbers

Adding and Subtracting Signed Numbers

Adding Signed Numbers

| Like Signs | Different Signs |
|--------------------------------------|--|
| Add the numbers & carry the sign | Subtract the numbers & carry the sign of the larger number |
| $(+) + (+) = +$ $(+3) + (+4) = +7$ | $(+) + (-) = ?$ $(+3) + (-2) = +1$ |
| $(-) + (-) = -$ $(-2) + (-3) = (-5)$ | $(-) + (+) = ?$ $(-5) + (+3) = -2$ |

Subtracting Signed Numbers

Don't subtract! Change the problem to **addition** and change the sign of the **second** number. Then use the addition rules.

| | |
|-------------------------------|-----------------------------|
| $(+9) - (+12) = (+9) + (-12)$ | $(+4) - (-3) = (+4) + (+3)$ |
| $(-5) - (+3) = (-5) + (-3)$ | $(-1) - (-5) = (-1) + (+5)$ |

Simplify. *Do not use a calculator for this section.*

1. $9 + -4 =$

7. $20 - -6 =$

2. $-8 + 7 =$

8. $7 - 10 =$

3. $-14 - 6 =$

9. $-6 - -7 =$

4. $-30 + -9 =$

10. $5 - 9 =$

5. $14 - 20 =$

11. $-8 - 7 =$

6. $-2 + 11 =$

12. $1 - -12 =$

Multiplying and Dividing Signed Numbers

If the signs are the same,
the answer is *positive*

If the signs are different,
the answer is *negative*



| Like Signs | | Different Signs | |
|---------------|-------------------|-----------------|------------------|
| $(+)(+) = +$ | $(+3)(+4) = +12$ | $(+)(-) = -$ | $(+2)(-3) = -6$ |
| $(-)(-) = +$ | $(-5)(-3) = +15$ | $(-)(+) = -$ | $(-7)(+1) = -7$ |
| $(+)/(+) = +$ | $(+3)/(+4) = +12$ | $(+)/(-) = -$ | $(+2)/(-3) = -6$ |
| $(-)/(-) = +$ | $(-5)/(-3) = +12$ | $(-)/(+) = -$ | $(-7)/(+1) = -7$ |

Simplify. Do not use a calculator for this section.

1. $(-5)(-3) =$

7. $\frac{-7}{-1} =$

2. $\frac{-6}{2} =$

8. $(3)(-4) =$

3. $(2)(4) =$

9. $\frac{8}{-4} =$

4. $\frac{-12}{-4} =$

10. $(-2)(7) =$

5. $(-1)(-5) =$

11. $\frac{-20}{-1} =$

6. $\frac{-16}{8} =$

12. $(2)(-5) =$

Rounding Numbers

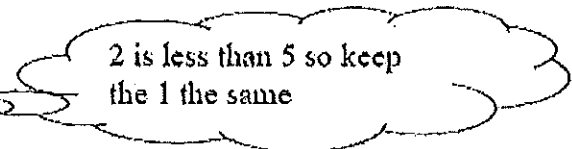
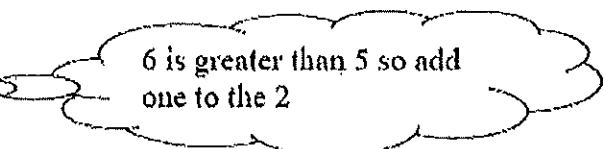
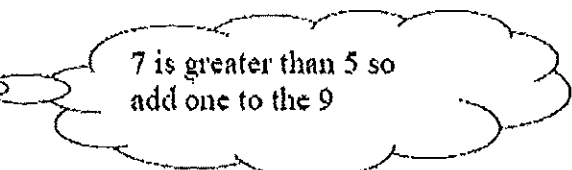
Step 1: Underline the place value in which you want to round.

Step 2: Look at the number to the right of that place value you want to round.

Step 3: If the number to the right of the place value you want to round is less than 5, keep the number the same and drop all other numbers.

If the number to the right of the place value you want to round is 5 or more, round up and drop the rest of the numbers.

Example: Round the following numbers to the tenths place.

- Tenths
1. 23.1246  23.1
2. 64.2685  64.3
3. 83.9721 
$$\begin{array}{r} 83.9721 \\ + 1 \\ \hline 84.0 \end{array}$$
 84

Round the following numbers to the tenths place.

- | | | | |
|------------|-------|-------------|-------|
| 1. 18.6231 | _____ | 6. 0.2658 | _____ |
| 2. 25.0543 | _____ | 7. 100.9168 | _____ |
| 3. 3.9215 | _____ | 8. 19.9816 | _____ |
| 4. 36.9913 | _____ | 9. 17.1083 | _____ |
| 5. 15.9199 | _____ | 10. 0.6701 | _____ |



Evaluating Expressions

Example

Evaluate the following expression when $x = 5$

Rewrite the expression substituting 5 for the x and simplify.

- a. $5x = 5(5) = 25$
- b. $-2x = -2(5) = -10$
- c. $x + 25 = 5 + 25 = 30$
- d. $5x - 15 = 5(5) - 15 = 25 - 15 = 10$
- e. $3x + 4 = 3(5) + 4 = 19$

Evaluate each expression given that: $x = 5$ $y = -4$ $z = 6$

1. $3x$

5. $y + 4$

2. $2x^2$

6. $5z - 6$

3. $3x^2 + y$

7. $xy + z$

4. $2(x + z) - y$

8. $2x + 3y - z$

Evaluate each expression given that: $x = 5$ $y = -4$ $z = 6$



9. $5x - (y + 2z)$

13. $5z + (y - x)$

10. $\frac{xy}{2}$

14. $2x^2 + 3$

11. $x^2 + y^2 + z^2$

15. $-4x + 2y - z$

12. $2x(y + z)$

16. $\frac{yz}{2}$

Combining Like Terms



What is a *term*?

The parts of an algebraic expression that are separated by an addition or subtraction sign are called *terms*.

The expression $4x + 2y - 3$ has 3 terms.

What are *like terms*?

Terms with the same variable factors are called *like terms*.

$2n$ and $3n$ are like terms, but $4x$ and $3y$ are not like terms because their variable factors x and y are different.

To simplify an expression, you must combine the like terms.

Examples:

Simplify

1. $5x + 8x$
 $5x + 8x = (5 + 8)x = 13x$

2. $3y - 6y$
 $3y - 6y = (3 - 6)y = -3y$

3. $3x + 4 - 2x + 3$
 $3x - 2x + 4 + 3 = (3 - 2)x + 4 + 3 = x + 7$

4. $2b + 5c + 3b - 6c$
 $2b + 3b + 5c - 6c = (2 + 3)b + (5 - 6)c = 5b - c$

Practice: Simplify each expression

1. $6n + 5n$

2. $25b + 15b$

3. $37z + 4z$

4. $x - 5x$

6. $3n + 1 - 2n + 8$

6. $4f + 5f - 6 + 8$

7. $7t + 9 - 4t + 3$

8. $2k + 4 - 8k - 1$

9. $4r + 3r + 6y - 2y$

10. $8g + 9h - 4g - 5h$

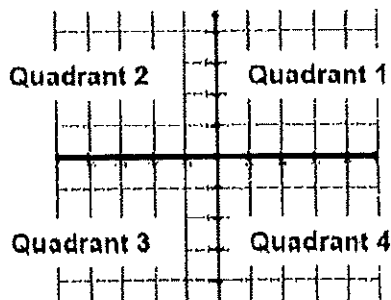
11. $2m + 3n - 4m + 5n$

12. $a + 5b - 2a + 9b$

Graphing

Points in a plane are named using 2 numbers, called a coordinate pair. The first number is called the x-coordinate. The x-coordinate is positive if the point is to the right of the origin and negative if the point is to the left of the origin. The second number is called the y-coordinate. The y-coordinate is positive if the point is above the origin and negative if the point is below the origin.

The x-y plane is divided into 4 quadrants (4 sections) as described below.

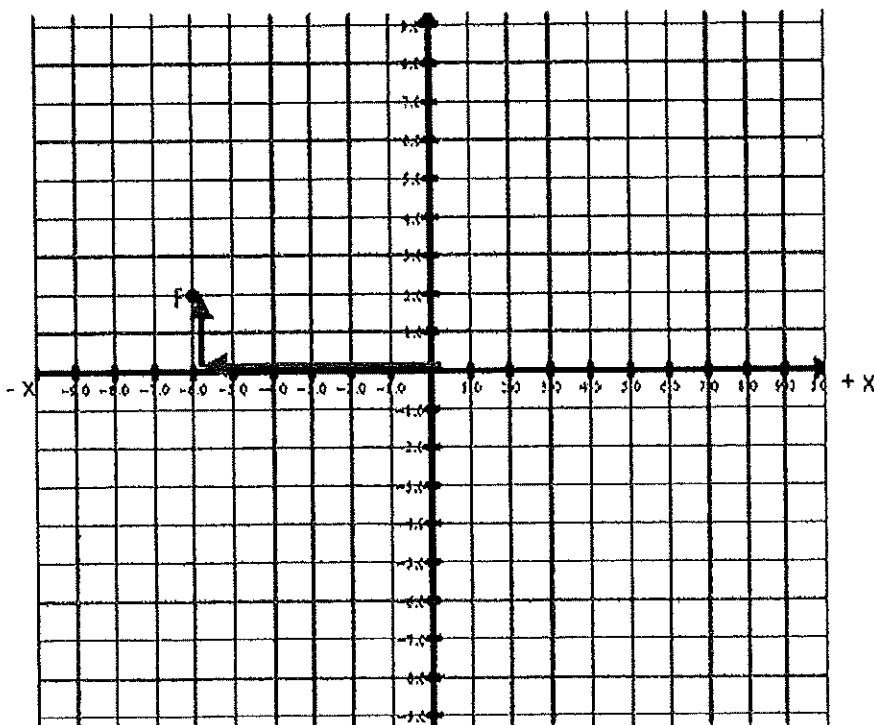


All points in Quadrant 1 has a **positive** x-coordinate and a **positive** y-coordinate (+ x, + y).
 All points in Quadrant 2 has a **negative** x-coordinate and a **positive** y-coordinate (- x, + y).
 All points in Quadrant 3 has a **negative** x-coordinate and a **negative** y-coordinate (- x, - y).
 All points in Quadrant 4 has a **positive** x-coordinate and a **negative** y-coordinate (+ x, - y).

Plot each point on the graph below. Remember, coordinate pairs are labeled (x, y). Label each point on the graph with the letter given.

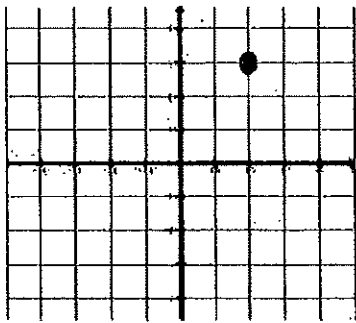
1. A(3, 4) 2. B(4, 0) 3. C(-4, 2) 4. D(-3, -1) 5. E(0, 7)

Example: F(-6, 2)

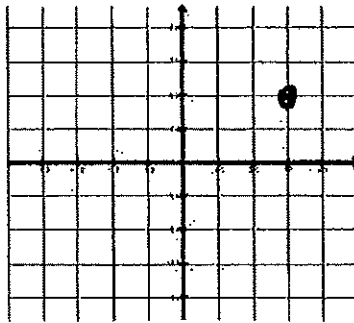


Determine the coordinates for each point below:

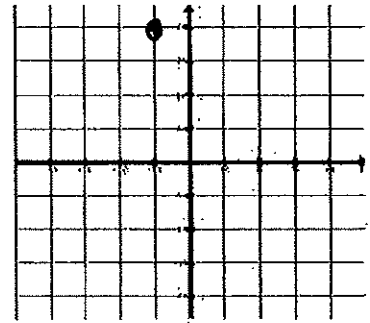
Example. (2, 3)



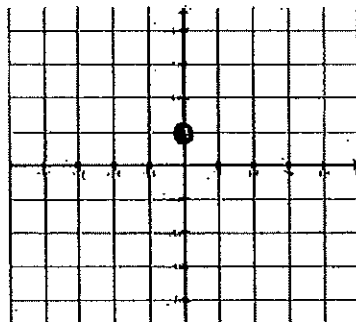
6. (__, __)



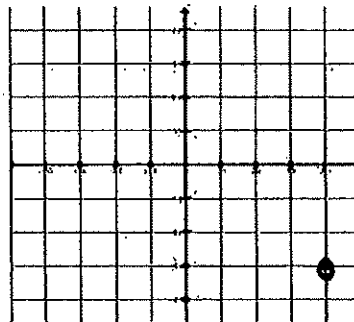
7. (__, __)



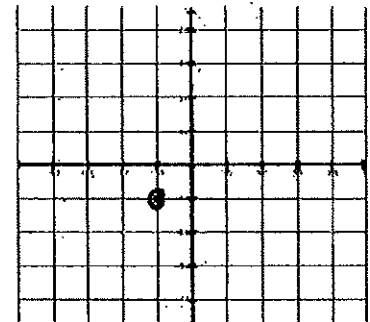
8. (__, __)



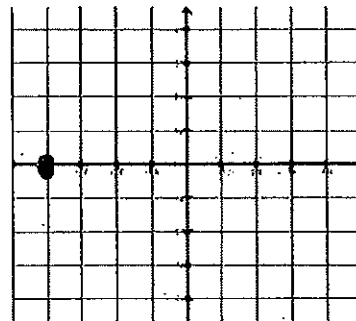
9. (__, __)



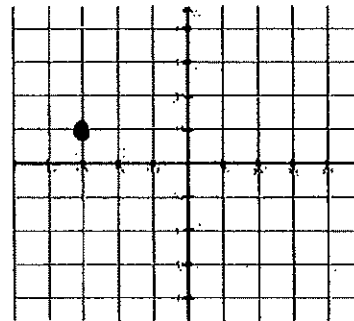
10. (__, __)



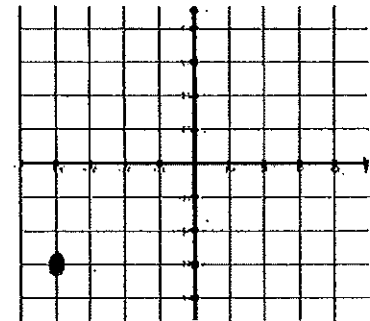
11. (__, __)



12. (__, __)



13. (__, __)



Complete the following tables. Then graph the data on the grid provided.

Example: $y = -2x - 3$

| X | Y |
|----|----|
| -3 | 3 |
| -2 | 1 |
| -1 | -1 |
| 0 | -3 |

Work:

$$x = -3$$

$$y = -2(-3) - 3 = 6 - 3 = 3$$

$$\text{Therefore } (x, y) = (-3, 3)$$

$$x = -2$$

$$y = -2(-2) - 3 = 4 - 3 = 1$$

$$\text{Therefore } (x, y) = (-2, 1)$$

$$x = -1$$

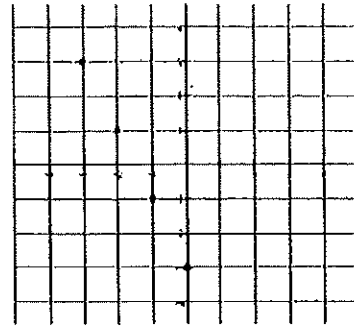
$$y = -2(-1) - 3 = 2 - 3 = -1$$

$$\text{Therefore } (x, y) = (-1, -1)$$

$$x = 0$$

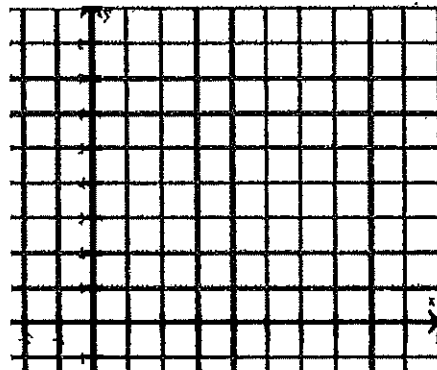
$$y = -2(0) - 3 = 0 - 3 = -3$$

$$\text{Therefore } (x, y) = (0, -3)$$



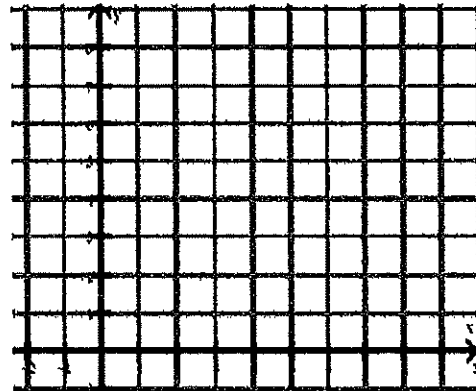
14. $y = x + 2$

| X | Y |
|---|---|
| 0 | |
| 1 | |
| 2 | |



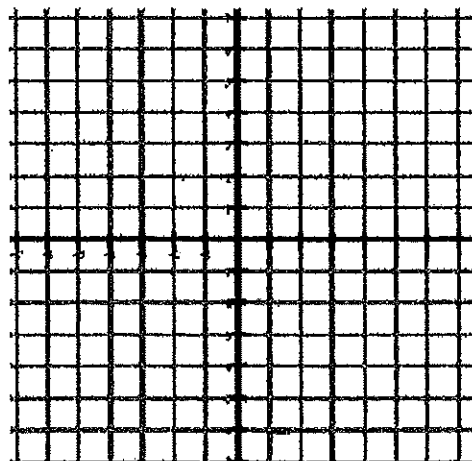
15. $y = 2x$

| X | Y |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |



16. $y = -x$

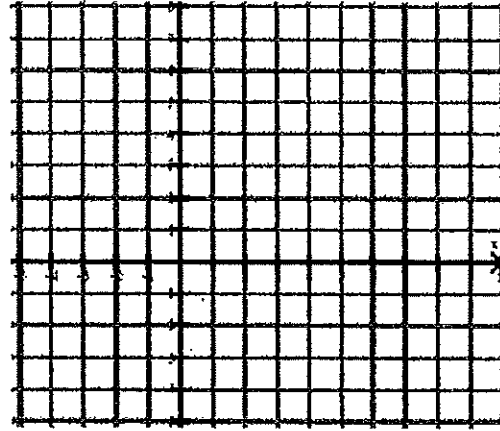
| X | Y |
|----|---|
| -3 | |
| -1 | |
| 1 | |
| 3 | |



17. $y = 2x - 3$

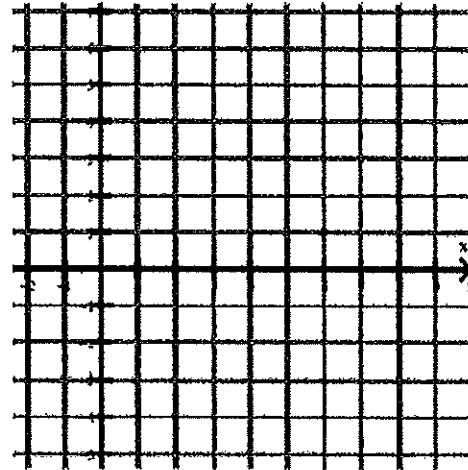


| X | Y |
|---|---|
| 0 | |
| 1 | |
| 2 | |
| 3 | |



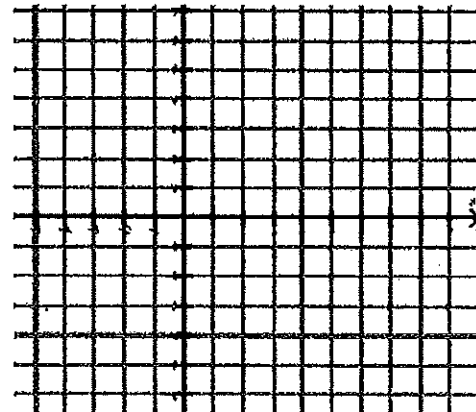
18. $y = \frac{1}{2}x + 1$

| X | Y |
|---|---|
| 0 | |
| 2 | |
| 4 | |
| 6 | |



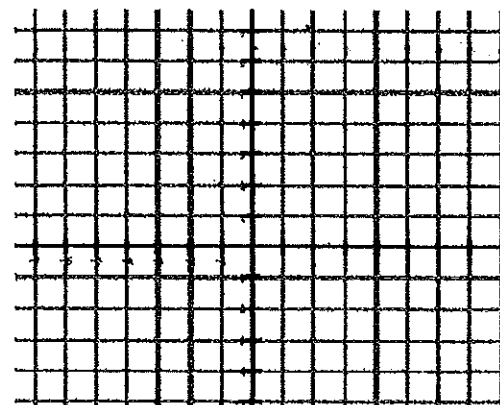
19. $y = \frac{3}{2}x - 1$

| X | Y |
|----|---|
| -2 | |
| 0 | |
| 2 | |



20. $y = -\frac{2}{3}x + 1$

| X | Y |
|----|---|
| -3 | |
| 0 | |
| 3 | |



Solving Equations

To solve an equation means to **find the value** of the variable. We solve equations by isolating the variable using opposite operations.

Example:

Solve.

$$\begin{array}{r} 3x - 2 = 10 \\ + 2 \quad + 2 \end{array}$$

$$\frac{3x}{3} = \frac{12}{3}$$

$$x = 4$$

Check your answer.

$$3(4) - 2 = 10$$

$$12 - 2 = 10$$

$$10 = 10$$

Isolate $3x$ by adding 2 to each side.

Simplify

Isolate x by dividing each side by 3.

Simplify

Substitute the value in for the variable.

Simplify

Is the equation true? If yes, you solved it correctly!

Opposite Operations:
Addition (+) & Subtraction (-)
Multiplication (x) & Division (÷)

Please remember...
to do the same step on
each side of the equation.



**Always check your
work by substitution!**

Try These:

Solve each equation below.

1. $x + 3 = 5$

2. $w - 4 = 10$

3. $c - 5 = -8$

4. $3p = 9$

5. $-7k = 14$

6. $-x = -17$

7. $\frac{h}{3} = 5$

8. $\frac{m}{8} = 7$

9. $\frac{4}{5}d = 12$

10. $\frac{3}{8}j = 6$

11. $2x - 5 = 11$

12. $4n + 1 = 9$

13. $5j - 3 = 12$

14. $2x + 11 = 9$

15. $-3x + 4 = -8$

16. $-6x + 3 = -9$

17. $\frac{f}{3} + 10 = 15$

18. $\frac{a}{7} - 4 = 2$

19. $\frac{b+4}{2} = 5$

20. $\frac{x-6}{5} = -3$

Use substitution to determine whether the solution is correct.

21. $4x - 5 = 7$ $x = 3$

22. $-2x + 5 = 13$ $x = 4$

24. $1 - x = 9$ $x = -8$

23. $6 - x = 8$ $x = 2$

Algebraic Translations - Translating from English to Mathematics

Key Words for Translations:

| Add | Subtract | Multiply | Divide | Inequalities | Variable | = |
|--|--|--|---|--|-------------------------------------|--|
| Plus Sum Longer Than Greater Than Together Total Increased More Than In all And | Decreased Smaller Less than Difference Reduced Differ Fewer Shorter Than Minus Diminished | Per For Every For each Triple Multiplied Of Times Twice Double | One-third Quotient Divided by Each part Half as much Spilt equally | < is less than > is greater than ≤ is less than or equal to ≥ is greater than or equal to | a number some number quantity | Same as Equals Is Total Was Result Outcome Answer |

Examples:

A) Translate into a mathematical expression: 3 less than 5 times some number

3 less than 5 times some number

| | | |
|------------------|----------|----------------|
| to subtract from | multiply | use a variable |
|------------------|----------|----------------|

Translation: $5n - 3$

B) Translate into a mathematical statement: 3 less than 5 times some number is 22

3 less than 5 times some number is 22

| | | | |
|------------------|----------|----------------|---|
| to subtract from | multiply | use a variable | = |
|------------------|----------|----------------|---|

Translation: $5n - 3 = 22$

C) Translate into a mathematical statement: the quotient of a number and -4, less 8 is -42

The quotient of a number and -4, less 8 is -42

| | | |
|--------------------------------|----------|---|
| Divide a variable and a number | subtract | = |
|--------------------------------|----------|---|

Translation: $\frac{n}{-4} - 8 = -42$

D) Translate into a mathematical statement: four plus three times a number is less than or equal to 18

four plus three times a number is less than or equal to 18

| | | | |
|-----|----------|----------------|---|
| add | multiply | use a variable | ≤ |
|-----|----------|----------------|---|

Translation: $4 + 3n \leq 18$

Practice: Translate each phrase into a mathematical statement

1. Seven plus five times a number is greater than or equal to -9
2. Eight times a number increased by 6 is 62
3. One half of a number is equal to 14
4. 6 less than 8 times some number
5. a number divided by 9
6. p decreased by 5
7. twice a number decreased by 15 is equal to -27
8. 9 less than 7 times some number is -6
9. the sum of a number and eight is less than 2
10. eleven increased by a number is -12

Matching – Put the letter of the algebraic expression that best matches the phrase.

- | | |
|------------------------------------|------------------|
| _____ 1. two more than a number | a. $2x$ |
| _____ 2. two less than a number | b. $x + 2$ |
| _____ 3. half of a number | c. $2 - x$ |
| _____ 4. twice a number | d. $x - 2$ |
| _____ 5. two decreased by a number | e. $\frac{x}{2}$ |

Careful! Pay attention to subtraction. The order makes a difference. Translate to an algebraic expression, then reread to check!

Word Problems

Translate each word problem into an algebraic equation, using x for the unknown, and solve. Write a "let $x =$ " for each unknown; write an equation; solve the equation; substitute the value for x into the let statements(s) to answer the question.

For Example:

Kara is going to Maui on vacation. She paid \$325 for her plane ticket and is spending \$125 each night for the hotel. How many nights can she stay in Maui if she has \$1200?

Step 1: What are you asked to find? Let variables represent what you are asked to find.

How many nights can Kara stay in Maui?

Let $x =$ The number of nights Kara can stay in Maui

Step 2: Write an equation to represent the relationship in the problem.

$$325 + 125x = 1200$$

Step 3: Solve the equation for the unknown

$$\begin{array}{r} 325 + 125x = 1200 \\ - 325 \qquad -325 \\ \hline 125x = 875 \\ x = 7 \end{array}$$

Kara can spend 7 nights in Maui

Word Problem Practice Set

1. A video store charges a one-time membership fee of \$12.00 plus \$1.50 per video rental. How many videos can Stewart rent if he spends \$21?
2. Bicycle city makes custom bicycles. They charge \$160 plus \$80 for each day that it takes to build the bicycle. If you have \$480 to spend on your new bicycle, how many days can it take Bicycle City to build the bike?
3. Darel went to the mall and spent \$41. He bought several t-shirts that each cost \$12 and he bought 1 pair of socks for \$5. How many t-shirts did Darel buy?

4. Janet weighs 20 pounds more than Anna. If the sum of their weights is 250 pounds, how much does each girl weigh?

5. Three-fourths of the student body attended the pep rally. If there were 1230 students at the pep rally, how many students are there in all?

6. Two-thirds of the Algebra students took the H S A the first time. If 60 students took the algebra H S A how many algebra students are there in all?

7. The current price of a school t-shirt is \$10.58. Next year the cost of a t-shirt will be \$15.35. How much will the tee shirt increase next year?

8. The school lunch prices are changing next year. The cost of a hot lunch will increase \$0.45 from the current price. If the next year's price is \$2.60, what did a hot lunch cost this year?

9. Next year the cost of gasoline will increase \$1.25 from the current price. If the cost of a gallon of gasoline next year will be \$4.50, what is the current price of gasoline?

10. Sarah drove 3 hours more than Michael on their trip to Texas. If the trip took 37 hours, how long did Sarah and Michael each drive?

Parents Evaluation/Reflection Form

1. How difficult did you feel this summer math challenge was for your student? Was it too easy or too difficult or somewhere in the middle?

2. How much help did you give your son or daughter in completing this challenge? ^(packet)

3. What would you say was the most difficult thing about the summer math challenge? ^(packet)

Student Name: _____ Preferred Name: _____

Parent/Guardian(s) names: _____

Parent/Guardian(s) emails: _____

Parent/Guardian(s) phone numbers: _____

Student and Parent/Guardian Declaration

I have completed this packet to the best of my ability. I am prepared to turn it in

Student Signature

Parent/Guardian Signature