Name:_____

Algebra I – Summer Review Packet

About Algebra I:

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

Table of Contents

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.

P – Parenthesis - Perform operations in grouping symbols …. (Parenthesis) inside [brackets] first.
E – Exponents - Simplify exponents
M – Multiplication - Perform multiplication and division in order from left to right
D – Division - Perform multiplication and division in order from left to right
A – Addition - Perform addition and subtraction in order from left to right
S – Subtraction - Perform addition and subtraction in order from left to right

Example 1

$2 - 3^2 + (6 + 3 \times 2)$
$2 - 3^2 + (6 + 6)$
$2 - 3^2 + 12$
$2 - 9 + 12$
$-7 + 12$
$=5$

Example 2

$-7 + 4 + (2^3 - 8 + -4)$
$-7+4+(8-8+-4)$
$-7 + 4 + (8 - -2)$
$-7+4+10$
$-3 + 10$
$=7$

Watch video here: http://rb.gy/j85naq or Scan here:

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

1. $6+4-2\cdot3=$
2. $(-2) \bullet 3 + 5 - 7 =$
3. $15+3\bullet5-4=$
4. $29 - 3 \bullet 9 + 4 =$
5. $20 - 7 \bullet \mathbf{4} =$
6. $4-9-9+7=$
7. $50-(17+8)=$
8. $(12-4)+8=$
9. $12\cdot5+6+6=$
10. $18 - 4^2 + 7 =$
11. $3(2+7) - 9 \bullet 7 =$
12. $(3 + 8) \bullet 2^2 - 4 =$
13. $16 + 2 \bullet 5 \bullet 3 + 6 =$
14. $12 + 3 - 6 \bullet 2 - 8 + 4 =$

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

16. $6.9 - 3.2 \bullet (10 + 5) =$

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

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

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

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

Integer Operations

Adding and Subtracting Integers

Adding integers Numbers

Like Signs	Different Signs
Add the numbers & keep the sign	Subtract the numbers & carry the sign of the number furthest from 0
(+)+(+)=+ (+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)

Find a video here: http://rb.gy/a4igli or Scan here:

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

1. 9 + -4 =
2. -8 + 7 =
3. -14 - 6 =
4. -30 + -9 =
7. 20- - 6 =
8. 7-10 =
9. -6 - -7 =
10. 5-9=

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) *I* (+4) = +12	(+)/(-)=-	(+2)/(- 3)=- 6
(+)/(+)=+	(+3) / (+4) = +12	(-)/(+)=-	(-7) / (+1)=-7

Find a video here: http://rb.gy/jyp4j6 or Scan here:

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

1. (-5)(-3) =

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

3. (2)(4) =

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

5. (-1)(-5) =

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

7. $21 \div (-7) =$

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

9. (-10) (-3) =

10. (-2)(7) =

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

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 — 2 is less than 5 so keep the 1 the same — 23.1

2. 64.2685 — 6 is greater than 5 so add one to the 2 — 64.3

3. 83.9721 — 7 is greater than 5 so add one to the 9

$$\begin{array}{r} {\scriptstyle 1} \\ 83.9721 \\ +\ \ 1 \\ \hline 84.0 \end{array}$$

84

Find a video here: https://rebrand.ly/fyw2zll or Scan here:

Round the following numbers to the tenths place.

1. 18.6231
2. 25.0543
3. 3.9215
4. 36.9913
6. 0..2658 _____
7. 100.9158 _____
8. 19.9816 _____
9. 17.1083 _____

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

Find a video here: https://rebrand.ly/q76wjf3 or Scan here:

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

1. $3x$

2. $2x^2$

3. $3x^2 + y$

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

5. $y+4$

6. $5z - 6$

7. $xy + z$

8. $2x + 9$

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

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

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

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

Combining Like Terms

What is a ***term?*** The palts 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.

Find a video here: https://rebrand.ly/vtcawll or Scan here:

Examples: Simplify

1. $5x + 3x$
   $5x + 3x = (5 + 3)x$
   $= 8x$

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

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

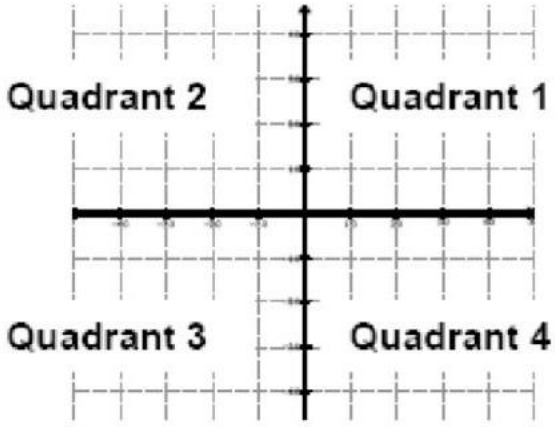
9. $4r + 3r + 6y - 2y$

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

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.

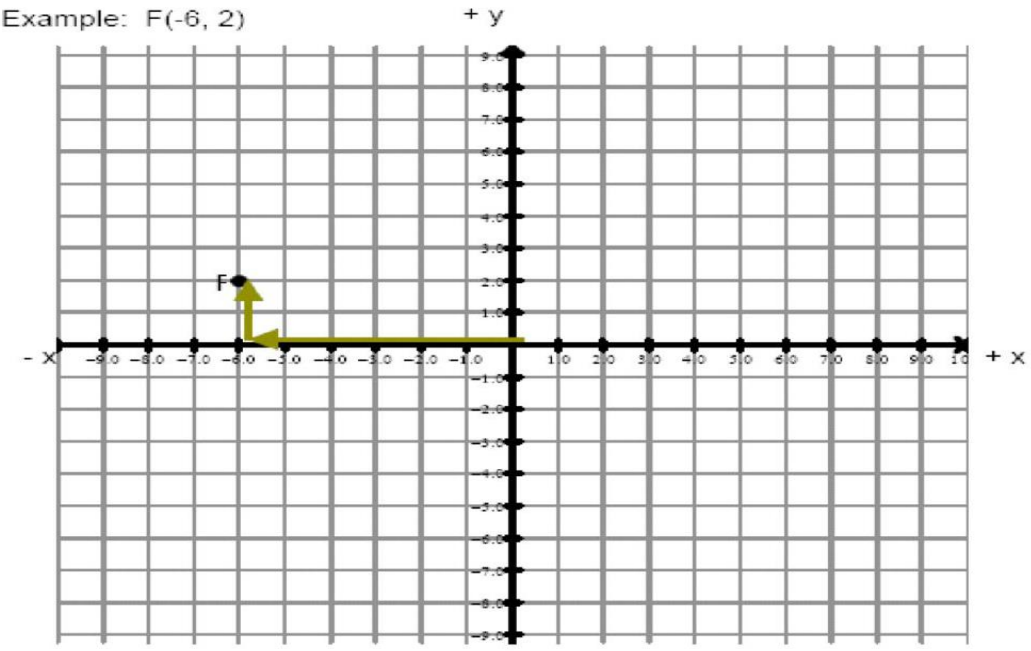


All points in Quadrant 1 has a **positive** x-coordinate and a **positive** y-coordinate (**+ x,** + y).
All points in Quadrant 2 has a **negative** x-coordinate and a **positive** y-coordinate (**- x,** + y).
All points in Quadrant 3 has a **negative** x-coordinate and a **negative** y-coordinate (**-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

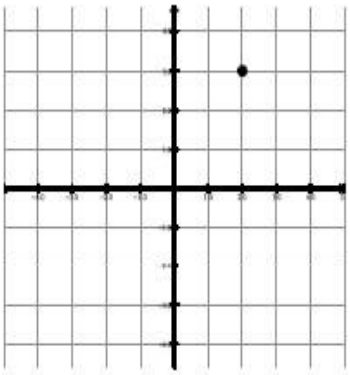
1. A(3, 4) 2. B(4, 0) 3. C(-4, 2) 4. D(-3, -1) 5. E(0, 7)

Example: F(-6, 2)

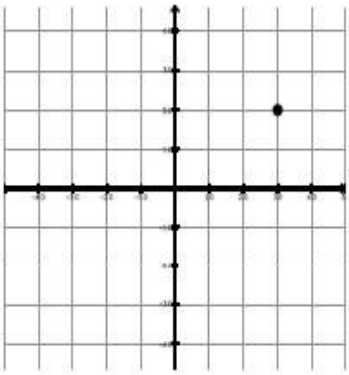


Determine the coordinates for each point below:

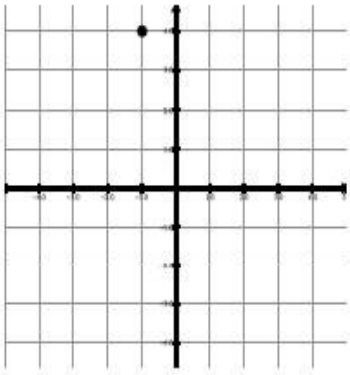
Example. (2 , 3)



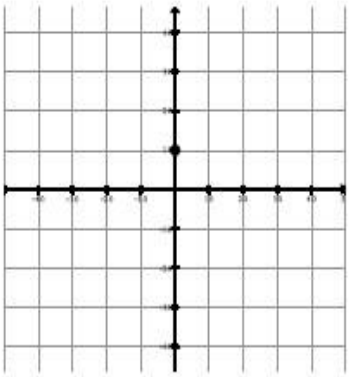
6. (____, ____)



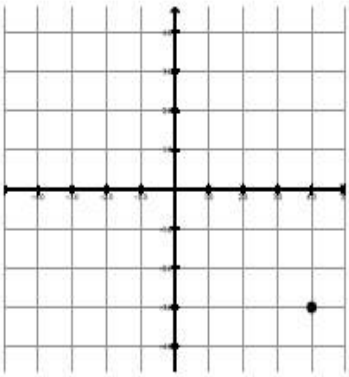
7. (____, ____)



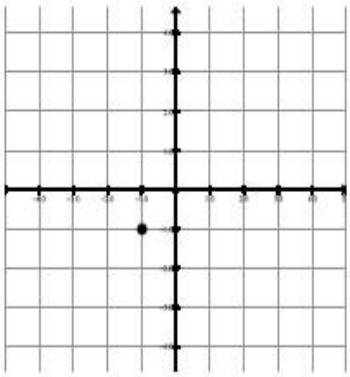
8. (____, ____)



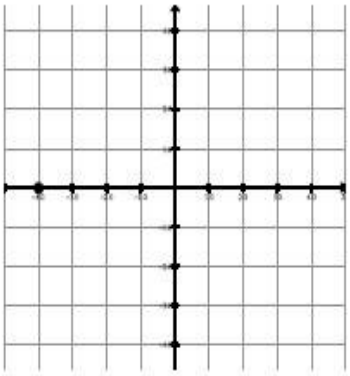
9. (____, ____)



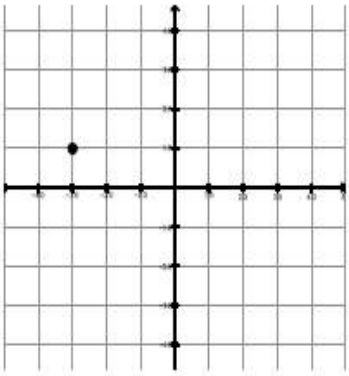
10. (____, ____)



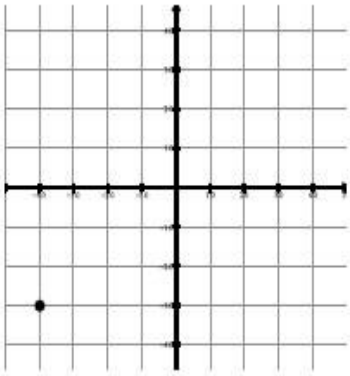
11. (____, ____)



12. (____, ____)



13. (____, ____)



Solving Equations

$2x + 3 = 43$	Original Problem
$2x + 3 = 43$	We want to remove the 3 first.
$2x + 3 - 3 = 43 - 3$	**STEP 1:** Since the original equation is plus 3, we are going to use the opposite operation and subtract 3 from BOTH sides.
$2x = 40$	Simplify. 3 -3 = 0 on the left. 43 -3 = 40 on the right. Then we need to think about how to remove the coefficient 2.
$\frac{2x}{2} = \frac{40}{2}$	**STEP 2:** Since the opposite of multiplication is division, I am going to divide BOTH sides by 2.
$x = 20$	Simplify. 2/2 = 1 on the left. 40/2 = 20 on the right, so our answer is x = 20.
Check: $2x + 3 = 43$ $2(20) + 3 = 43$ $40 + 3 = 43$	Since this is a true statement, our answer of x = 20 is correct.

Find a video here: https://shorturl.at/z5XcS or Scan here:

Solve each equation:

1) $10 = z + 6$

2) $8y = 48$

3) $q - 12 = 1$

4) $18 = \frac{a}{2}$

5) $\frac{r}{3} = 7$

6) $11 = m - 4$

Inequalities

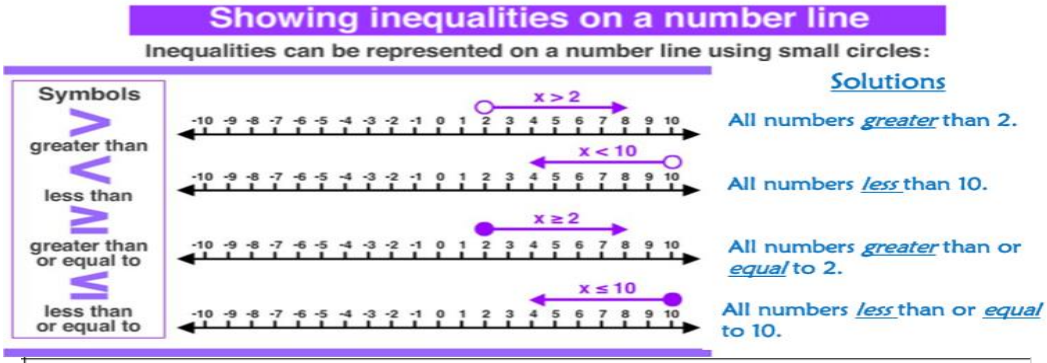
An inequality is like an equation, but instead of an equal sign (=) it has one of these signs:
< : less than **≤** : less than or equal to **>** : greater than **≥** : greater than or equal to

An inequality has many solutions, and we can represent the solutions of an inequality by a set of number on a number line.

Open circle ○ means > or <

Find a video here https://shorturl.at/sRnyD: or Scan here

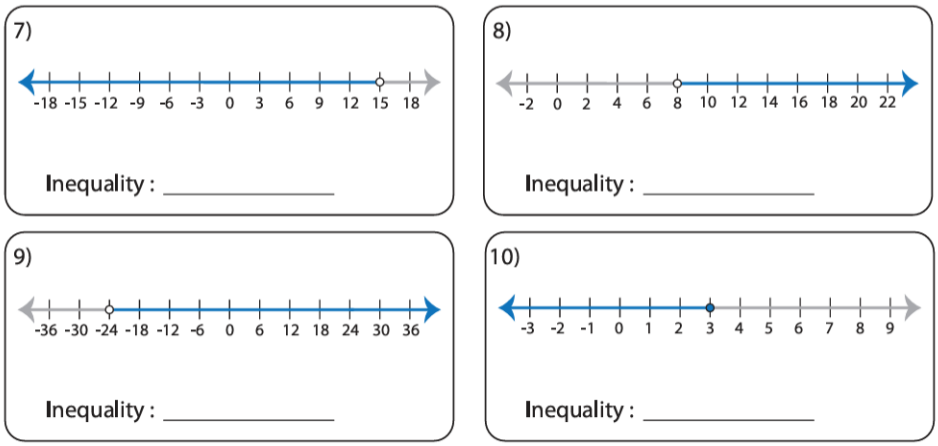
Closed circle ● means ≥ or ≤



Directions: Graph each inequality on the number line.

1. $b > 3$	**2.** $m \leq -6$
3. $x \geq -1$	**4.** $-15 \leq r$
5. $10 > c$	**6.** $n < 8$

Write the inequality that best describes each graph



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

Find a video here https://shorturl.at/4ZWGo Or scan here:

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. $\frac{x}{2}$

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