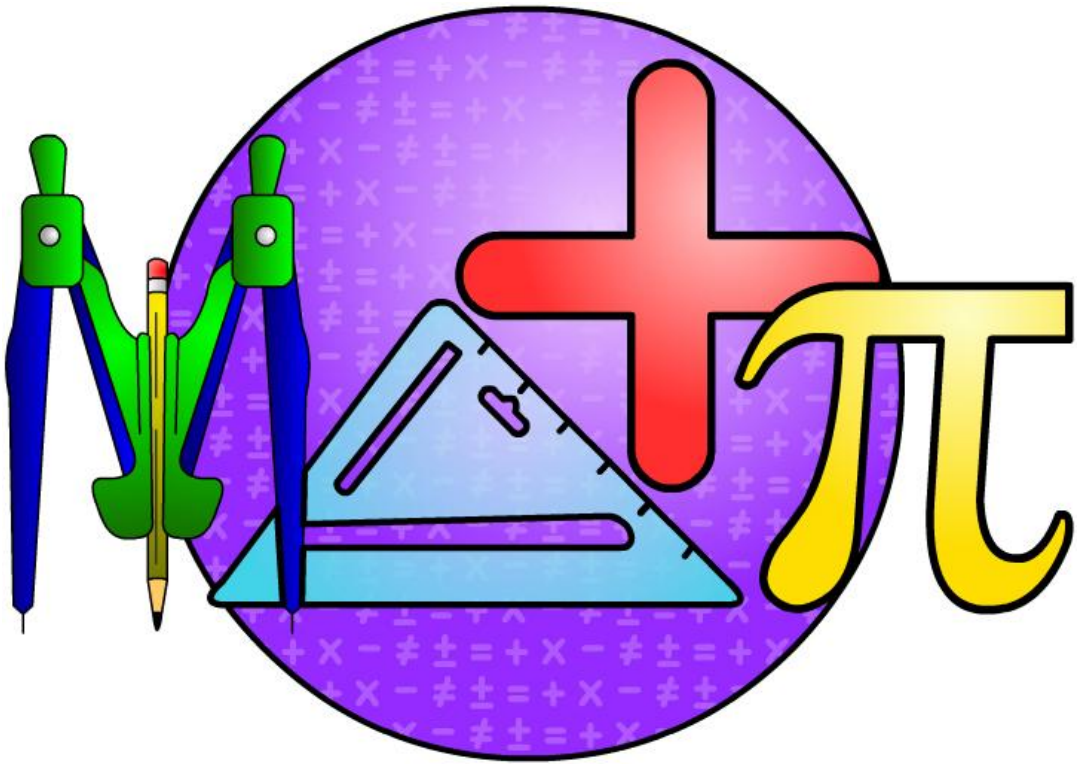
Prealgebra Summer Math Packet



Summer 2020

Summer Math Packet - PreAlgebra Summer 2020

Name _____

This summer math booklet was developed to provide students entering PreAlgebra an opportunity to review necessary math objectives and to improve math performance. We hope this helps to build anticipation for new learning and gives you confidence in your abilities, so that you are well prepared for PreAlgebra. This packet will help ease the transition and help you reinforce skills that are needed prior to the start of PreAlgebra to ensure future success.

All students are expected to complete the entire Summer Math packet to the *best of their ability.* Students should show their work so we can see the thought process use to complete the problems. Please circle or box your final answer. Please keep in mind we are looking for *good effort* at completing the problems more than a correct answer. Good effort includes attempting the problems and showing the work/thought process used to achieve an answer.

THIS ASSIGNMENT IS DUE WEDNESDAY, AUGUST 12TH
THE FIRST DAY OF THE NEW SCHOOL YEAR.
THIS PACKET WILL BE WORTH 50 POINTS.
IT WILL COUNT AS THE FIRST GRADE OF THE NINE WEEKS IN MATH CLASS.

Chapters/Lessons and Suggested Completion Dates

Chapter 1 - Lessons 1, 2, 3 . . . . . June 19th
- 1-1 - Words and Expressions
- 1-2 - Variables and Expressions
- 1-3 - Properties

Chapter 1 - Lessons 4, 5, 6 . . . . . July 10th
- 1-4 - Ordered Pairs and Relations
- 1-5 - Words, Equations, Tables and Graphs
- 1-6 - Scatter Plots

Chapter 2 - Lessons 1, 2, 3 . . . . . July 24th
- 2-1 - Integers and Absolute Value
- 2-2 - Adding Integers
- 2-3 - Subtracting Integers

Chapter 2 - Lessons 4, 5, 6 . . . . . August 7th
- 2-4 - Multiplying Integers
- 2-5 - Dividing Integers
- 2-6 - Graphing in Four Quadrants

NAME _____ DATE _____

1-1 Pre-Algebra Summer Skills

Words and Expressions

Translate Verbal Phrases into Expressions A **numerical expression** contains a combination of numbers and operations such as addition, subtraction, multiplication, and division. Verbal phrases can be translated into numerical expressions by replacing words with operations and numbers.

+	–	×	÷
plus	minus	times	divide
the sum of	the difference	the product of	the quotient of
Increased by	decreased by	of	divided by
more than	less than		among

Example **Write a numerical expression for each verbal phrase.**

a. the product of seventeen and three

Phrase the product of seventeen and three

Expression 17×3

b. the total number of pencils given to each student if 18 pencils are shared among 6 students

Phrase 18 shared among 6

Expression $18 \div 6$

Exercises

Write a numerical expression for each verbal phrase.

1. eleven less than twenty

2. twenty-five increased by six

3. sixty-four divided by eight

4. the product of seven and twelve

5. the quotient of forty and eight

6. sixteen more than fifty–four

7. six groups of twelve

8. eighty–one decreased by nine

NAME _____ DATE _____

1-1 Pre-Algebra Summer Skills *(continued)*

Words and Expressions

Order of Operations Evaluate, or find the numerical value of, expressions with more than one operation by following the **order of operations.**

Step 1 Evaluate the expressions inside grouping symbols.

Step 2 Multiply and/or divide from left to right.

Step 3 Add and/or subtract from left to right.

Example **Evaluate each expression.**

a. $\mathbf{6 \cdot 5 - 10 \div 2}$

$6 \cdot 5 - 10 \div 2 = 30 - 10 \div 2$ Multiply 6 and 5.

$= 30 - 5$ Divide 10 by 2.

$= 25$ Subtract 5 from 30.

b. $\mathbf{4(3 + 6) + 2 \cdot 11}$

$4(3 + 6) + 2 \cdot 11 = 4(9) + 2 \cdot 11$ Evaluate $(3 + 6)$.

$= 36 + 22$ Multiply 4 and 9, and 2 and 11.

$= 58$ Add 36 and 22.

c. $\mathbf{3[(7 + 5) \div 4 - 1]}$

$3[(7 + 5) \div 4 - 1] = 3[12 \div 4 - 1]$ Evaluate $(7 + 5)$ first.

$= 3(3 - 1)$ Divide 12 by 4.

$= 3(2)$ Subtract 1 from 3.

$= 6$ Multiply 3 and 2.

Exercises

Evaluate each expression.

1. $6 + 3 \cdot 9$

2. $7 + 7 \cdot 3$

3. $14 - 6 + 8$

4. $26 - 4 + 9$

5. $10 \div 5 \cdot 3$

6. $22 \div 11 \cdot 6$

7. $2(6 + 2) - 4 \cdot 3$

8. $5(6 + 1) - 3 \cdot 3$

9. $2[(13 - 4) + 2(2)]$

NAME _____ DATE _____

1-2 Pre-Algebra Summer Skills

Variables and Expressions

Translate Verbal Phrases An **algebraic expression** is a combination of variables, numbers, and at least one operation. A **variable** is a letter or symbol used to represent an unknown value. To translate verbal phrases with an unknown quantity into algebraic expressions, first define the variable.

Algebraic Expressions

The letter x is most often used as a variable. → $x + 3$

$7d$ means $7 \times d$. mn means $m \times n$. → $7d - 2$, mn

$\frac{b}{5}$ means $b \div 5$. → $\frac{b}{5}$

Example **Translate each phrase into an algebraic expression.**

a. five inches longer than the length of a book

Words five inches longer than the length of a book

Variable Let b represent the length of the book.

Expression $b + 5$

b. two less than the product of a number and eight

Words two less than the product of a number and eight

Variable Let n represent the unknown number.

Expression $8n - 2$

Exercises

Translate each phrase into an algebraic expression.

1. eight inches taller than Mycala's height
2. twelve more than four times a number
3. the difference of sixty and a number
4. three times the number of tickets sold
5. fifteen dollars more than a saved amount
6. the quotient of the number of chairs and four
7. a number of books less than twenty-three
8. five more than six times a number

NAME _____ DATE _____

1-2 Pre-Algebra Summer Skills *(continued)*

Variables and Expressions

Evaluate Expressions To evaluate an algebraic expression, replace the variable(s) with known values and follow the order of operations.

Substitution Property of Equality

Words If two quantities are equal, then one quantity can be replaced by the other.

Symbols For all numbers a and b, if $a = b$, then a may be replaced by b.

Example **ALGEBRA** Evaluate each expression if $r = 6$ and $s = 2$.

a. $8s - 2r$

$8s - 2r = 8(2) - 2(6)$ Replace r with 6 and s with 2.

$= 16 - 12$ or 4 Multiply. Then subtract.

b. $3(r + s)$

$3(r + s) = 3(6 + 2)$ Replace r with 6 and s with 2.

$= 3 \cdot 8$ or 24 Evaluate the parentheses. Then multiply.

c. $\frac{5rs}{4}$

$\frac{5rs}{4} = 5rs \div 4$ Rewrite as a division expression.

$= 5(6)(2) \div 4$ Replace r with 6 and s with 2.

$= 60 \div 4$ or 15 Multiply. Then divide.

Exercises

ALGEBRA Evaluate each expression if $x = 10$, $y = 5$, and $z = 1$.

1. $x + y - z$ **2.** $\frac{x}{y}$ **3.** $2x + 4z$ **4.** $x(2 + z)$ **5.** $\frac{6y}{10z}$

ALGEBRA Evaluate each expression if $r = 2$, $s = 3$, and $t = 12$.

6. $2t - rs$ **7.** $\frac{t}{rs}$ **8.** $t(4 + r)$ **9.** $(t - 2s)7$ **10.** $\frac{5t}{(r+3)}$

NAME _____ DATE _____

1-3 Pre-Algebra Summer Skills

Properties

Properties of Addition and Multiplication In algebra, there are certain statements called properties that are true for any numbers.

Property	Explanations	Example
Commutative Property of Addition	$a + b = b + a$	$6 + 3 = 3 + 6$ $9 = 9$
Commutative Property of Multiplication	$a \cdot b = b \cdot a$	$4 \cdot 5 = 5 \cdot 4$ $20 = 20$
Associative Property of Addition	$(a + b) + c =$ $a + (b + c)$	$(3 + 4) + 7 = 3 + (4 + 7)$ $14 = 14$
Associative Property of Multiplication	$(a \cdot b) \cdot c =$ $a \cdot (b \cdot c)$	$(2 \cdot 5) \cdot 8 = 2 \cdot (5 \cdot 8)$ $80 = 80$
Additive Identity	$a + 0 = 0 + a = a$	$10 + 0 = 0 + 10 = 10$
Multiplicative Identity	$a \cdot 1 = 1 \cdot a = a$	$5 \cdot 1 = 1 \cdot 5 = 5$
Multiplicative Property of Zero	$a \cdot 0 = 0 \cdot a = 0$	$15 \cdot 0 = 0 \cdot 15 = 0$

Example 1 **Is subtraction of whole numbers associative? If not, give a counterexample.**

$(9 - 4) - 2 \stackrel{?}{=} 9 - (4 - 2)$ State the conjecture.

$5 - 2 \stackrel{?}{=} 9 - 2$ Simplify.

$3 \stackrel{?}{=} 7$ Simplify.

This is a counterexample. So, subtraction of whole numbers is not associative.

Example 2 **Name the property shown by the statement.**

$15 \times b = b \times 15$ The order of the numbers and variables changed. This is the Commutative Property of Multiplication.

Exercises

1. State whether the following conjecture is true or false: The multiplicative identity applies to division also. If false, give a counterexample.

Name the property shown by each statement.

2. $75 + 25 = 25 + 75$

3. $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$

4. $14 \cdot 1 = 14$

5. $p \cdot 0 = 0$

NAME _____ DATE _____

1-3 Pre-Algebra Summer Skills *(continued)*

Properties

Simplify Algebraic Expressions To **simplify** an algebraic expression, perform all possible operations. Properties can be used to help simplify an expression that contains variables.

Example **Simplify each expression.**

a. $(9 + r) + 7$

$(9 + r) + 7 = (r + 9) + 7$ Commutative Property of Addition

$= r + (9 + 7)$ Associative Property of Addition

$= r + 16$ Add 9 and 7.

b. $3 \cdot (x \cdot 5)$

$3 \cdot (x \cdot 5) = 3 \cdot (5 \cdot x)$ Commutative Property of Multiplication

$= (3 \cdot 5) \cdot x$ Associative Property of Multiplication

$= 15x$ Multiply 3 and 5.

Exercises

Simplify each expression.

1. $24 + (x + 6)$

2. $3 \cdot (4a)$

3. $9 + (12 + c)$

4. $13d \cdot 0$

5. $(3 + f) + 17$

6. $11 + (m + 5)$

7. $(b + 0) + 7$

8. $15(a \cdot 1)$

9. $4w(6)$

10. $(n + 7) + 12$

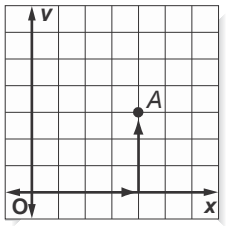
NAME _____ DATE _____

1-4 Pre-Algebra Summer Skills

Ordered Pairs and Relations

Ordered Pairs In mathematics, a **coordinate system** is used to locate points. The horizontal number line is called the ***x*-axis** and the vertical number line is called the *y*-axis. The point where the two axes intersect is the **origin** (0, 0). An **ordered pair** of numbers is used to locate points in the coordinate plane. The point (4, 3) has an ***x*-coordinate** of 4 and a ***y*-coordinate** of 3.

Example 1 **Graph *A*(4, 3) on the coordinate plane.**

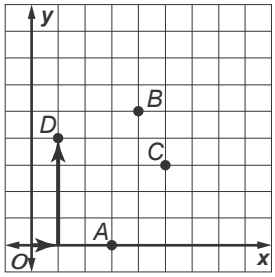


Step 1 Start at the origin.

Step 2 Since the *x*-coordinate is 4, move 4 units to the right.

Step 3 Since the *y*-coordinate is 3, move 3 units up. Draw a dot.

Example 2 Write the ordered pair that names point *D*.



Step 1 Start at the origin.

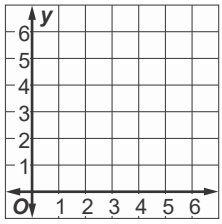
Step 2 Move right on the *x*-axis to find the *x*-coordinate of point *D*, which is 1.

Step 3 Move up the *y*-axis to find the *y*-coordinate, which is 4.

The ordered pair for point *D* is (1, 4).

Exercises

Graph each ordered pair on the coordinate plane.



1. *A*(4, 1)

2. *B*(2, 0)

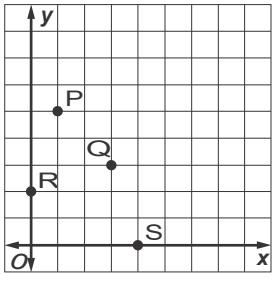
3. *C*(1, 3)

4. *D*(5, 2)

5. *E*(0, 3)

6. *F*(6, 4)

Refer to the coordinate plane shown at the right.
Write the ordered pair that names each point.



7. *P*

8. *Q*

9. *R*

10. *S*

NAME _____ DATE _____

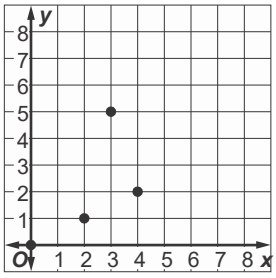
1-4 Pre-Algebra Summer Skills *(continued)*

Ordered Pairs and Relations

Relations A relation is a set of ordered pairs, such as {(0, 3), (1, 2), (3, 6), (7, 4)}. A relation can also be shown in a table or a graph. The set of x-coordinates is the **domain** of the relation, while the set of y-coordinates is the **range** of the relation.

Example **Express the relation {(0, 0), (2, 1), (4, 2), (3, 5)} as a table and as a graph. Then determine the domain and range.**

x	y
0	0
2	1
4	2
3	5



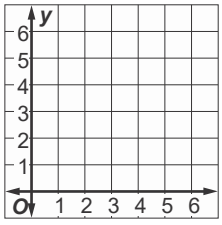
The domain is {0, 2, 4, 3}, and the range is {0, 1, 2, 5}.

Exercises

Express each relation as a table and as a graph. Then determine the domain and range.

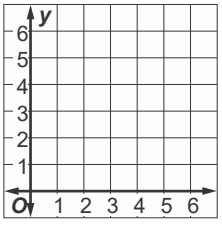
1. {(4, 6), (0, 3), (1, 4)}

x	y



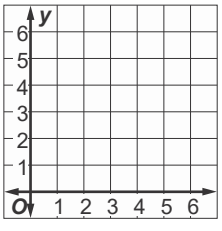
2. {(2, 5), (5, 3), (2, 2)}

x	y



3. {(1, 2), (3, 4), (5, 6)}

x	y



NAME _____ DATE _____

1-5 Pre-Algebra Summer Skills

Words, Equations, Tables, and Graphs

Represent Functions Functions are relations in which each member of the domain is paired with *exactly* one member in the range. The function rule describes the operation(s) which must be performed on a domain value to get the corresponding range value. Function tables organize and display the input values (the x-coordinates), the function rule, and the output values (the y-coordinates).

Example **TICKETS** **June is ordering tickets for a show. Tickets cost $22 each and there is a $6 surcharge per order. Make a function table for 4 different input values and write an algebraic expression for the rule. Then state the domain and range of the function.**

Step 1 Create a function table showing the input, rule, and output. Enter 4 different input values.

Step 2 The phrase "Tickets cost $22 each and there is a $6 surcharge per order" translates to $22x + 6$. Use the rule to complete the table.

Input (x)	Rule: $22x + 6$	Output (y)
1	22(1) + 6	28
2	22(2) + 6	50
3	22(3) + 6	72
4	22(4) + 6	94

Step 3 The domain is {1, 2, 3, 4}. The range is {28, 50, 72, 94}.

Exercises

For each ticket cost and surcharge given below, make a function table for 4 different input values and write an algebraic expression for the rule. Then state the domain and range of the function.

1. Ticket cost: $8; surcharge: $1.50

Input (x)	Rule:	Output (y)

2. Ticket cost: $12; surcharge: $3

Input (x)	Rule:	Output (y)

NAME _____ DATE _____

1-5 Pre-Algebra Summer Skills *(continued)*

Words, Equations, Tables, and Graphs

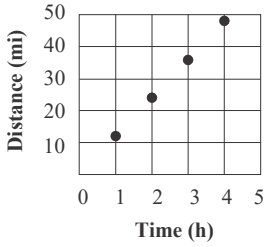
Multiple Representations Functions can be described as words, equations, tables and graphs.

Words The distance biked is equal to 12 miles per hour times the number of hours.
Equation $d = 12t$

Table

Time (h)	Distance (mi)
1	12
2	24
3	36
4	48

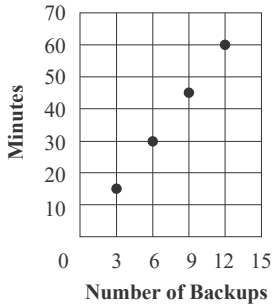
Graph



Example **FILE PROTECTION** **Tori's computer backs up the file she is working on every 5 minutes. Make a function table to find the time for 3, 6, 9, and 12 backups. Then graph the ordered pairs.**

Let m represent the number of minutes and b represent the number of backups. So, the rule is $m = 5b$.

Input (x)	$5b$	Output (y)
3	5(3)	15
6	5(6)	30
9	5(9)	45
12	5(12)	60



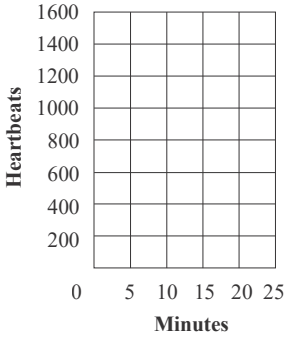
Exercise

1. Viktor's heart beats 72 times a minute.

a. ALGEBRAIC Write an equation to find the number of times Viktor's heart beats for any number of minutes.

b. TABULAR Make a function table to find the number of times Viktor's heart beats in 5, 10, 15, and 20 minutes.

c. GRAPHICAL Graph the ordered pairs for the function.



Input (x)		Output (y)

NAME _____ DATE _____

1-6 Pre-Algebra Summer Skills

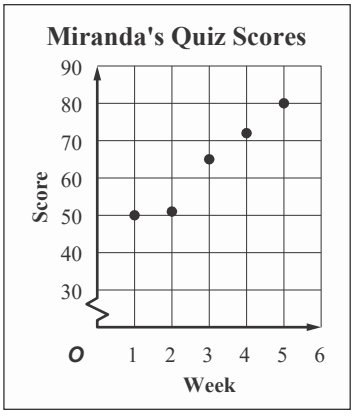
Scatter Plots

Construct Scatter Plots A **scatter plot** is a graph that shows the relationship between two sets of data. In a scatter plot, two sets of data are graphed as ordered pairs on a coordinate system.

Example **SCHOOL The table shows Miranda's math quiz scores for the last five weeks. Make a scatter plot of the data.**

Since the points are showing an upward trend from left to right, the data suggest a positive relationship.

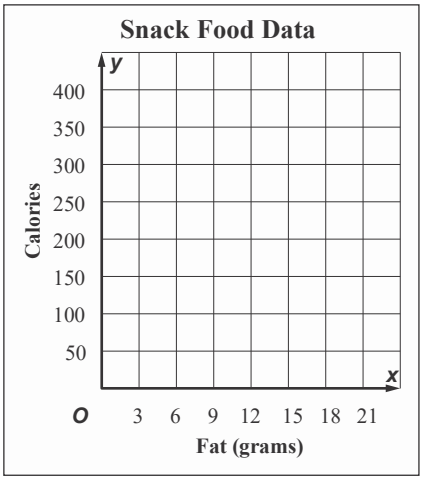
Week	Score
1	50
2	51
3	65
4	72
5	80



Exercise

FOOD The table below shows the fat grams and calories for several snack foods.

Food	Fat grams per serving	Calories per serving
doughnut	13	306
corn chips	13	200
pudding	3	150
cake	13	230
snack crackers	6	140
ice cream (light)	5	130
yogurt	2	70
cheese pizza	18	410



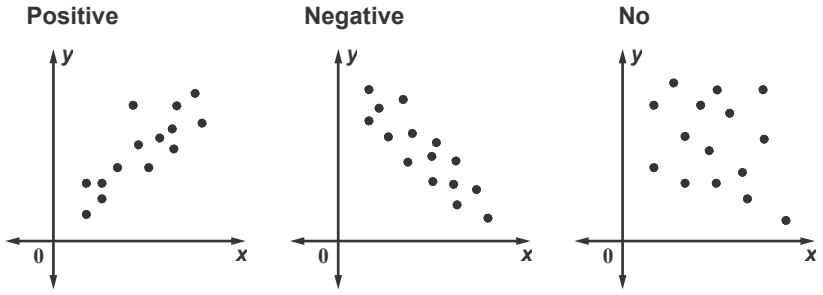
1. Make a scatter plot of the data in the table.

NAME _____ DATE _____

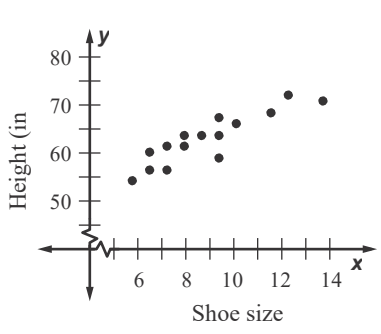
1-6 Pre-Algebra Summer Skills *(continued)*

Scatter Plots

Analyze Scatter Plots A scatter plot may show a pattern or relationship of the data.



Example **SHOE SIZE AND HEIGHT** **Determine whether a scatter plot of shoe size and height of people at a gym might show a *positive, negative,* or *no* relationship. Explain your answer.**



Height affects shoe size. A person's shoe size increases as their height increases. Therefore, a scatter plot of the data would show a positive relationship.

Exercises

Determine whether a scatter plot of the data for the following might show a *positive, negative,* or *no* relationship. Explain your answer.

1. fat grams and the amount of calories in food

2. time spent relaxing and blood pressure levels

3. age of a child and number of siblings

4. age of a tree and its height

NAME _____ DATE _____

2-1 Pre-Algebra Summer Skills

Integers and Absolute Value

Compare and Order Integers The set of **integers** can be written {…, –3, –2, –1, 0, 1, 2, 3, …} where … means *continues indefinitely*. Two integers can be compared using an **inequality**, which is a mathematical sentence containing < or >.

Example 1 **Write an integer for each situation.**

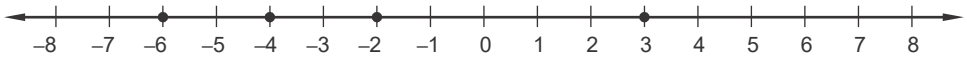
a. 16 feet below the surface

The integer is –16.

b. 5 strokes over par

The integer is +5 or 5.

Example 2 **Use the integers graphed on the number line below.**



Replace each ● with < , >, or = to make a true sentence.

a. – 6 ● – 2

–2 is greater since it lies to the right of –6.
So write –6 < –2.

b. 3 ● – 4

3 is greater since it lies to the right of –4.
So write 3 > –4.

Exercises

Write an integer for each situation.

1. 2 inches less than normal

2. 13°F above average

3. a deposit of $50

4. a loss of 8 yards

Replace each ● with <, >, or = to make a true sentence.

5. 4 ● – 4

6. 8 ● 12

7. –7 ● –5

8. 2 ● 5

9. –1 ● 1

10. 4 ● –3

11. 6 ● 8

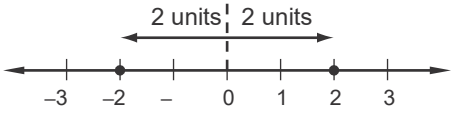
12. –2 ● 12

NAME _____ DATE _____

2-1 Pre-Algebra Summer Skills *(continued)*

Integers and Absolute Value

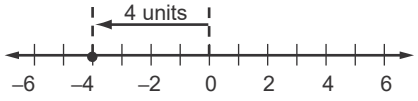
Absolute Value Numbers on opposite sides of zero and the same distance from zero have the same **absolute value.**



The symbol for absolute value is two vertical bars on either side of the number. $|2| = 2$ and $|-2| = 2$

Example 1 **Evaluate each expression.**

a. $|-4|$



$|-4| = 4$ On the number line, –4 is 4 units from 0.

b. $|-3| + |6|$

$|-3| + |6| = 3 + 6$ $|-3| = 3,\ |6| = 6$

$= 9$ Simplify.

Example 2 **Evaluate $|x| - 7$ if $x = -8$.**

$|x| - 7 = |-8| - 7$ Replace x with –8.

$= 8 - 7$ The absolute value of –8 is 8.

$= 1$ Simplify.

Exercises

Evaluate each expression.

1. $|-6|$ **2.** $|15|$ **3.** $|-12|$ **4.** $|21|$

ALGEBRA Evaluate each expression if $x = 8$ and $y = -3$.

5. $12 + |y|$ **6.** $x - |y|$ **7.** $2|x| + 3|y|$

NAME _____ DATE _____

2-2 Pre-Algebra Summer Skills

Adding Integers

Adding Integers with the Same Sign	Add their absolute values. The sum is: • positive if both integers are positive. • negative if both integers are negative.

Example 1 **Find the sum –3 + (–4).**

$-3 + (-4) = -7$ Add $|-3|$ and $|-4|$. The sum is negative.

Adding Integers with Different Signs	Subtract their absolute values. The sum is: • positive if the positive integer's absolute value is greater. • negative if the negative integer's absolute value is greater.

Example 2 Find each sum.

a. –5 + 4

$-5 + 4 = |-5| - |4|$ Subtract $|4|$ from $|-5|$.
$= 5 - 4$ or 1 Simplify.
$= -1$ The sum is negative because $|-5| > |4|$.

b. 6 + (–2)

$6 + (-2) = |6| - |-2|$ Subtract $|-2|$ from $|6|$.
$= 6 - 2$ or 4 Simplify.
$= 4$ The sum is positive because $|6| > |-2|$.

2-2

Exercises

Find each sum.

1. $6 + (-3)$ **2.** $-3 + (-5)$ **3.** $7 + (-3)$

4. $-4 + (-4)$ **5.** $-8 + 5$ **6.** $-12 + (-10)$

7. $6 + (-13)$ **8.** $-14 + 4$ **9.** $6 + (-6)$

10. $-15 + (-5)$ **11.** $-9 + 8$ **12.** $20 + (-8)$

NAME _____ DATE _____

2-2 Pre-Algebra Summer Skills *(continued)*

Adding Integers

Add More Than Two Integers Two numbers with the same absolute value but different signs are **opposites**. An integer and its opposite are also called **additive inverses**. This property is useful when adding 2 or more integers.

Additive Inverse Property

Words	The sum of any number and its additive inverse is zero.
Example	$5 + (-5) = 0$
Symbols	$a + (-a) = 0$

Example **Find each sum.**

a. –7 + (–16) + 7

$-7 + (-16) + 7 = -7 + 7 + (-16)$ Commutative Property

$= 0 + (-16)$ Additive Inverse Property

$= -16$ Identity Property of Addition

b. 12 + (– 4) + 9 + (–7)

$12 + (-4) + 9 + (-7) = 12 + 9 + (-4) + (-7)$ Commutative Property

$= (12 + 9) + [-4 + (-7)]$ Associative Property

$= 21 + (-11)$ or 10 Simplify.

Exercises

Find each sum.

1. 2 + 14 + (–2)

2. –8 + (–7) + 8

3. –13 + 11 + (–4)

4. 7 + (–5) + (–6)

5. 15 + 14 + (–12)

6. –9 + 17 + (–3)

7. 24 + (–5) + 3

8. 54 + 39 + (–54)

9. –42 + 20 + (–8)

10. –11 + (–6) + 22

NAME _____ DATE _____

2-3 Pre-Algebra Summer Skills

Subtracting Integers

Subtracting Integers	To subtract an integer, add its additive inverse.

Example 1 **Find each difference.**

a. 9 – 17

$9 - 17 = 9 + (-17)$ To subtract 17, add –17.

$= -8$ Simplify.

b. $-7 - 3$

$-7 - 3 = -7 + (-3)$ To subtract 3, add –3.

$= -10$ Simplify.

Example 2 **Find each difference.**

a. 4 – (–5)

$4 - (-5) = 4 + 5$ To subtract –5, add +5.

$= 9$ Simplify.

b. $-6 - (-2)$

$-6 - (-2) = -6 + 2$ To subtract –2, add +2.

$= -4$ Simplify.

Exercises

Find each difference.

1. $9 - 16$ **2.** $7 - 19$ **3.** $12 - 21$

4. $-5 - 3$ **5.** $-8 - 9$ **6.** $-13 - 17$

7. $7 - (-4)$ **8.** $9 - (-9)$ **9.** $-11 - (-2)$

10. $-6 - (-9)$ **11.** $-6 - 4$ **12.** $-16 - (-20)$

NAME _____ DATE _____

2-3 Pre-Algebra Summer Skills *(continued)*

Subtracting Integers

Evaluate Expressions Use the rule for subtracting integers to evaluate expressions.

Example Evaluate each expression.

a. $x - 16$ if $x = 6$.

$x - 16 = 6 - 16$ Write the expression. Replace x with 6.

$= 6 + (-16)$ To subtract 16, add its additive inverse, –16.

$= -10$ Add 6 and –16.

b. $a - b - c$ if $a = 7$, $b = 2$, and $c = -3$.

$a - b - c = 7 - 2 - (-3)$ Replace a with 7, b with 2, and c with –3.

$= 5 - (-3)$ Use order of operations.

$= 5 + 3$ To subtract –3, add its additive inverse, 3.

$= 8$ Add 5 and 3.

Exercises

ALGEBRA **Evaluate each expression if $a = 11$, $b = -1$, and $c = -8$.**

1. $a - 14$ **2.** $b - 5$ **3.** $12 - c$

4. $33 - a$ **5.** $c - 8$ **6.** $-19 - b$

7. $-5 - c$ **8.** $3 - a$ **9.** $b - (-1)$

10. $a - (-7)$ **11.** $6 - b$ **12.** $c - (-12)$

NAME _____ DATE _____

2-4 Pre-Algebra Summer Skills

Multiplying Integers

Multiplying Integers with Different Signs	The product of two integers with different signs is negative.

Example 1 **Find each product.**

a. 4(–3)

$4(-3) = -12$

b. –8(5)

$-8(5) = -40$

Multiplying Integers with the Same Sign	The product of two integers with the same sign is positive.

Example 2 Find each product.

a. 6(6)

$6(6) = 36$

b. –7(–4)

$-7(-4) = 28$

Example 3 **Find 6(–3)(–2).**

$6(-3)(-2) = [6(-3)](-2)$ Use the Associative Property.

$= -18(-2)$ $6(-3) = -18$

$= 36$ $-18(-2) = 36$

Exercises

Find each product.

1. $-5(7)$

2. $6(-9)$

3. $-10 \cdot 4$

4. $-12 \cdot -2$

5. $5(-11)$

6. $-15(-4)$

7. $-14(2)$

8. $6(14)$

9. $-18 \cdot 2$

10. $-4(-4)(5)$

11. $6(-7)(2)$

12. $-10(-4)(-6)$

NAME _____ DATE _____

2-4 Pre-Algebra Summer Skills *(continued)*

Multiplying Integers

Algebraic Expressions Use the rules for multiplying integers to simplify and evaluate algebraic expressions.

Example 1 **Simplify $-3a(-12b)$.**

$-3a(-12b) = (-3)(a)(-12)(b)$ $-3a = (-3)(a)$, $-12b = (-12)(b)$

$= (-3 \cdot -12)(a \cdot b)$ Commutative Property of Multiplication

$= 36ab$ $-3 \cdot -12 = 36$, $a \cdot b = ab$

Example 2 **Evaluate $4xy$ if $x = 3$ and $y = -5$.**

$4xy = 4(3)(-5)$ Replace x with 3, and y with -5.

$= [4(3)](-5)$ Associative Property of Multiplication

$= 12(-5)$ The product of 4 and 3 is positive.

$= -60$ The product of 12 and -5 is negative.

Exercises

ALGEBRA Simplify each expression.

1. $9(-3w)$ **2.** $2e \cdot 9f$ **3.** $-8 \cdot 7m$

4. $-4s(-7)$ **5.** $10p(-5q)$ **6.** $n \cdot 6 \cdot 8$

ALGEBRA Evaluate each expression if $x = -4$ and $y = 8$.

7. $4x$ **8.** $3y$ **9.** $-12x$

10. $-6y$ **11.** xy **12.** $-xy$

NAME _____ DATE _____

2-5 Pre-Algebra Summer Skills

Dividing Integers

Dividing Integers with the Same Sign	The quotient of two integers with the same sign is positive.

Example 1 Find each quotient.

a. 14 ÷ 2

$14 \div 2 = 7$ — The dividend and the divisor have the same sign. The quotient is positive.

b. $\frac{-25}{5}$

$\frac{-25}{5} = -25 \div (-5)$ — The dividend and divisor have the same sign.

$= 5$ — The quotient is positive.

Dividing Integers with Different Signs	The quotient of two integers with different signs is negative.

Example 2 **Find each quotient.**

a. 36 ÷ (–4)

$36 \div (-4) = -9$ — The signs are different. The quotient is negative.

b. $-\frac{42}{6}$

$-\frac{42}{6} = -7$ — The signs are different. The quotient is negative.

Exercises

Find each quotient.

1. $32 \div (-4)$

2. $-18 \div (-2)$

3. $-24 \div 6$

4. $-36 \div (-2)$

5. $50 \div (-5)$

6. $-81 \div (-9)$

7. $-72 \div (-2)$

8. $-45 \div 3$

9. $-60 \div (-12)$

10. $-\frac{28}{2}$

11. $\frac{36}{-4}$

12. $\frac{-125}{-25}$

NAME _____ DATE _____

2-5 Pre-Algebra Summer Skills *(continued)*

Dividing Integers

Mean (Average) To find the mean, or average, of a set of numbers, find the sum of the numbers and then divide by the number of items in the set. Use the rules for dividing integers to find the mean.

Example **OCEANOGRAPHY** The diving depths in feet of 7 scuba divers studying schools of fish were –12, –9, –15, –8, –20, –17, and –10. Find the mean diving depth.

$$\frac{-12 + (-9) + (-15) + (-8) + (-20) + (-17) + (-10)}{7} = \frac{-91}{7}$$ Find the sum of the diving depths.

Divide by the number of divers.

$$= -13$$ Simplify.

The mean diving depth is –13 feet, or 13 feet below sea level.

Exercises

1. **WEATHER** The low temperatures in degrees Fahrenheit for a week were –3, 5, –9, 2, 6, –11, and –4. Find the mean temperature.

2. **MONEY** The last 6 entries in Ms. Caudle's checkbook ledger show both deposits and withdrawals. Ms. Caudle wrote down $100, –$20, –$35, $250, –$150, and –$85. What is the mean dollar amount for these entries?

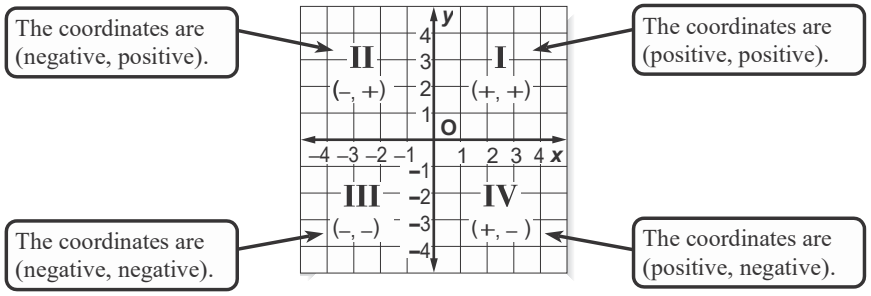
3. **GOLF** During 5 rounds of golf, James had scores of 2, –1, 0, –2, and –4. Find the mean of his golf scores.

4. **TRAINING** To train himself for a triathlon, Josh runs every day. Last week he ran 5 miles, 7 miles, 3 miles, 4 miles, 8 miles, 10 miles and 5 miles. What is the mean number of miles he ran last week?

NAME _____ DATE _____

2-6 Pre-Algebra Summer Skills

Graphing in Four Quadrants



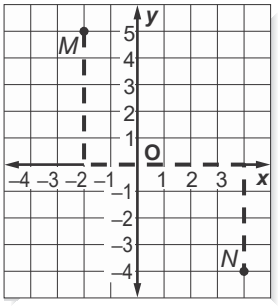
Example **Graph and label each point on a coordinate plane. Name the quadrant in which each point lies.**

a. *M*(–2, 5)

Start at the origin. Move 2 units left. Then move 5 units up and draw a dot. Point *M*(–2, 5) is in Quadrant II.

b. *N*(4, –4)

Start at the origin. Move 4 units right. Then move 4 units down and draw a dot. Point *N*(4, –4) is in Quadrant IV.



Exercises

Graph and label each point on the coordinate plane. Name the quadrant in which each point is located.

1. *A*(2, 6)

2. *B*(–1, 4)

3. *C*(0, –5)

4. *D*(–4, –3)

5. *E*(2, 0)

6. *F*(3, –2)

7. *G*(–4, 4)

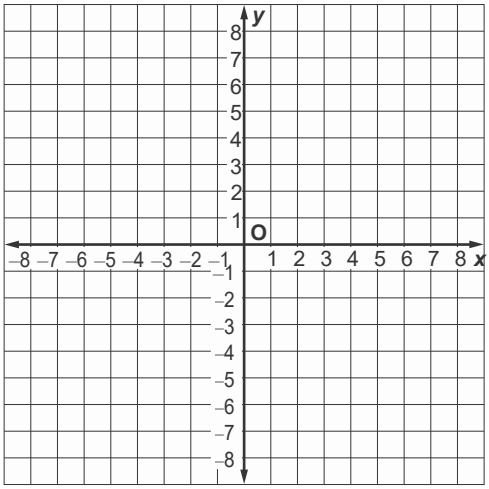
8. *H*(2, –5)

9. *I*(6, 3)

10. *J*(–5, –8)

11. *K*(3, –5)

12. *L*(–7, –3)



NAME _____ DATE _____

2-6 Pre-Algebra Summer Skills *(continued)*

Graphing in Four Quadrants

Graph Algebraic Relationships A coordinate graph can be used to show relationships between two numbers.

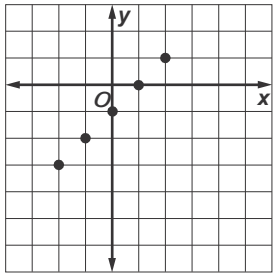
Example **MONEY The difference between Zora's and Charlie's bank accounts is $1. If *x* represents Zora's bank account and *y* represents Charlie's bank account, make a function table of possible values for *x* and *y*. Graph the ordered pairs and describe the graph.**

Step 1 Make a table. Choose values for *x* and *y* that have a difference of 1.

Step 2 Graph the ordered pairs.

The points are along a diagonal line that crosses the *x*-axis at $x = 1$.

$x - y = 1$		
x	***y***	***(x, y)***
2	1	(2, 1)
1	0	(1, 0)
0	–1	(0, –1)
–1	–2	(–1, –2)
–2	–3	(–2, –3)



Exercises

1. **TEMPERATURE** The sum of two temperatures is 3°F. If *x* represents the first temperature and *y* represents the second temperature, make a function table of possible values for *x* and *y*. Graph the ordered pairs and describe the graph.

$x + y = 3$		
x	***y***	***(x, y)***