Name:_____

Parent Signature_____ **Date**_____

This packet must be signed/dated by a parent/guardian upon its completion by the student whose name appears above. It will not be graded without a parent's signature.

Ridgefield Park Public Schools

Summer Honors Algebra 8 Packet

For Students Entering Grade 8

- **Complete the following mathematics review packet and hand it in to your 8th grade Algebra 8 teacher on the first day of school in September.**
- **The front of each page, the Reteaching worksheets, will provide you with guidance on the steps needed to complete the back of each page, the Practice worksheets.**
- **It will be graded and counted as a 1st Marking Period quiz grade...based on 100 points! Record your answers to the Practice worksheets on the Answer Sheet provided (last pages of the packet).**
- **Unanswered questions and answers without work shown will be marked incorrect. <u>All work must be shown on separate sheets of paper that you attach.</u>**
- **Beginning on the 2nd day of school the packet will be marked lower by 5 points per day it is late until such time as you would have 0 points.**

Please attach this cover page to the front of the materials you will be handing in to your 8th grade Algebra 8 teacher on the first day of school.

OFFICE OF THE SUPERINTENDENT OF SCHOOLS
Ridgefield Park Public Schools
712 Lincoln Avenue
Ridgefield Park, New Jersey 07660

Dr. John C. Richardson
Superintendent of Schools

Telephone: (201)807-2638
(201)807-2640
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ENTERING ALGEBRA 8

June

Dear Parents/Guardians and Student,

School is out for the summer! However, reading and learning must continue year round...and both should last a lifetime!

To keep your child's skills and knowledge sharp this summer, our Algebra teachers have prepared mathematics assignments attached. They will help your child to review thoroughly important material learned during this school year and to prepare properly for the challenges of learning Algebra in Grade 8!

For your child to complete the assignments effectively, I suggest that you set a regular, daily and weekly schedule of work time, beginning immediately and continuing through the end of August.

Of course, I fully expect your child to do his/her best work, to complete it all, and to hand it in to his/her Algebra 8 teacher on the first day of school in September.

Thank you for your cooperation and support of this extremely important summer mathematics project.

Sincerely,

Dr. John C. Richardson
Superintendent of Schools

Name _____ Class _____ Date _____

Reteaching 1-1

Using Variables

OBJECTIVE: Using variables as a shorthand way of expressing relationships

You often hear word phrases such as *half as much* or *three times as deep*. These phrases describe mathematical relationships. You can translate word phrases like these into mathematical relationships called *expressions*.

Example

Translate the following word expressions into algebraic expressions.

the sum of x and 15

$x + 15$

Remember that "sum" means to add.

seven times x

$7x$

Remember that "times" mean to multiply.

Example

Translate the following word sentence into an algebraic equation.

The weight of the truck is two times the weight of the car.

The weight of the truck = is two times the weight of the car.

$t = 2 \cdot c$

$t = 2c$

← **Write an equal sign under the word *is*. Whatever is written to the left of *is* belongs on the left side of the =. Whatever is written to the right of *is* belongs on the right side of the =.**

← **Represent the unknown amounts with variables.**

← **The translation is complete. Check to make sure you have translated all parts of the equation.**

Exercises

Translate the following word expressions and sentences into algebraic expressions or equations.

1. a number increased by 5 $n+5$
2. 8 subtracted from a number $n-8$
3. a number divided by 9 $\frac{n}{9}$
4. 3 less than five times a number $5n-3$
5. A number multiplied by 12 is 84. $12n = 84$
6. 7 less than n is 22. $n-7=22$
7. 8 times a number x is 72. $8x = 72$
8. A number divided by 3 is 18. $\frac{n}{3} = 18$

Name _____ Class _____ Date _____

Practice 1-1

Using Variables

Write an algebraic expression for each phrase.

1. 7 increased by x
2. p multiplied by 3
3. 10 decreased by m
4. n less than 7
5. the product of 2 and q
6. 3 more than m

Write a phrase for each algebraic expression.

7. $\frac{8}{a}$
8. $s - 10$
9. $x + 13$
10. $ab + 2$

Define a variable and write an algebraic expression for each phrase.

11. the difference of 8 and a number
12. the sum of 4 and a number
13. the product of 2 and a number
14. 3 increased by a number
15. 10 plus the quotient of a number and 15
16. 12 less than a number

Define a variable and write an algebraic equation to model each situation.

17. What is the total cost of buying several shirts at $24.95 each?
18. The number of gal of water used to water trees is 30 times the number of trees.
19. What is the amount of money in a bank containing only dimes?
20. What is the number of marbles left in a 48-marble bag after some marbles have been given away?
21. The total cost equals the price of the tickets multiplied by eight people.
22. What is the cost of buying several pairs of pants at $32.95 per pair?

Define variables and write an equation to model the relationship in each table.

23.

Number of Tickets	Total Cost
2	$7
4	$14
6	$21

24.

Number of Hours	Distance Traveled
1	55 mi
3	165 mi
5	275 mi

25.

Number of Hours	Total Pay
8	$40
12	$60
16	$80

26.

Total Cost	Change From $10
$10.00	$0
$9.00	$1.00
$7.50	$2.50

27.

Number of Days	Length
1	0.45 in.
4	1.80 in.
8	3.60 in.

28.

Miles Traveled	Miles Remaining
0	500
125	375
350	150

Name _____ Class _____ Date _____

Reteaching 1-2

Exponents and Order of Operations

OBJECTIVE: Using the order of operations	MATERIALS: Three index cards or small pieces of paper

Review the order of operations to help you with this activity.

Order of Operations

1. Perform any operations inside grouping symbols.
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.

Example

Write + on the first index card, − on the second card, and × on the third card. Shuffle the cards and place them face down on your desk. Randomly pick cards to fill in the blanks with operation signs. Once you have filled in the operation signs, simplify the expression.

6___(9___7)___8	←	**Pick cards to fill in the blanks with operation signs.**
6 × (9 − 7) + 8	←	**Subtract 7 from 9 inside the grouping symbols.**
6 × 2 + 8	←	**Do multiplication and division first. Multiply 6 by 2.**
12 + 8	←	**Do addition and subtraction last. Add 12 and 8 to get the answer.**
20	←	**The answer is 20.**

Exercises

Randomly pick cards to fill in the operation symbols of the following expressions. Simplify the expressions.

1. 7___5___1
2. (3___9)___4
3. 8___2___(5___10)
4. (3___7___6)___1

Simplify each expression.

5. $(5 \cdot 3) - 18 = 15 - 18 = -3$
6. $5 \cdot (3 - 18) = 5 \cdot (-15) = -75$
7. $2 \cdot (27 - 13 \cdot 2) = 2 \cdot (27 - 26) = 2 \cdot 1 = 2$
8. $2 \cdot 27 - 13 \cdot 2 = 54 - 26 = 28$
9. $18 \div (9 - 15 \div 5) = 18 \div (9 - 3) = 18 \div 6 = 3$
10. $18 \div 9 - 15 \div 5 = 2 - 3 = -1$
11. $2 \cdot 8 - 6^2 = 2 \cdot 8 - 36 = 16 - 36 = -20$
12. $2 \cdot (8 - 6^2) = 2 \cdot (8 - 36) = 2(-28) = -56$

Name _____ Class _____ Date _____

Practice 1-2

Exponents and Order of Operations

Simplify each expression.

1. $4 + 6(8)$
2. $\frac{4(8-2)}{3+9}$
3. $4 \times 3^2 + 2$
4. $40 \div 5(2)$
5. $2.7 + 3.6 \times 4.5$
6. $3[4(8-2)+5]$
7. $4 + 3(15 - 2^3)$
8. $17 - [(3+2) \times 2]$
9. $6 \times (3+2) \div 15$

Evaluate each expression.

10. $\frac{a+2b}{5}$ for $a = 1$ and $b = 2$
11. $\frac{5m+n}{5}$ for $m = 6$ and $n = 15$
12. $x + 3y^2$ for $x = 3.4$ and $y = 3$
13. $7a - 4(b+2)$ for $a = 5$ and $b = 2$

Simplify each expression.

14. $\frac{100-15}{9+8}$
15. $\frac{2(3+4)}{7}$
16. $\frac{3(4+12)}{2(7-3)}$
17. $14 + 3 \times 4$
18. $8 + 3(4+3)$
19. $3 + 4[13 - 2(6-3)]$
20. $8(5 + 30 \div 5)$
21. $(3.4)(2.7) + 5$
22. $50 \div 2 + 15 \times 4$
23. $7(9-5)$
24. $2(3^2) - 3(2)$
25. $4 + 8 \div 2 + 6 \times 3$
26. $(7+8) \div (4-1)$
27. $5[2(8+5) - 15]$
28. $(6+8) \times (8-4)$
29. $12\left(\frac{6+30}{9-3}\right)$
30. $14 + 6 \times 2^3 - 8 \div 2^2$
31. $\frac{7(14)-3(6)}{2}$
32. $14 \div [3(8-2) - 11]$
33. $3\left(\frac{9+13}{6}\right)$
34. $\frac{4(8-3)}{3+2}$
35. $5 + 4^2 \times 8 - 2^3 \div 2^2$
36. $4^2 + 5^2(8-3)$
37. $5(3^2+2) - 2(6^2 - 5^2)$

Evaluate each expression for $a = 2$ and $b = 6$.

38. $2(7a - b)$
39. $(a^3 + b^2) \div a$
40. $3b \div (2a-1) + b$
41. $\frac{5a+2}{b}$
42. $\frac{3(b-2)}{4(a+1)}$
43. $9b + a^4 \div 8$

Use the expression $r + 0.12m$ to calculate the cost of renting a car. The basic rate is r. The number of miles driven is m.

44. The basic rate is \$15.95. The car is driven 150 mi.
45. The basic rate is \$32.50. The car is driven 257 mi.

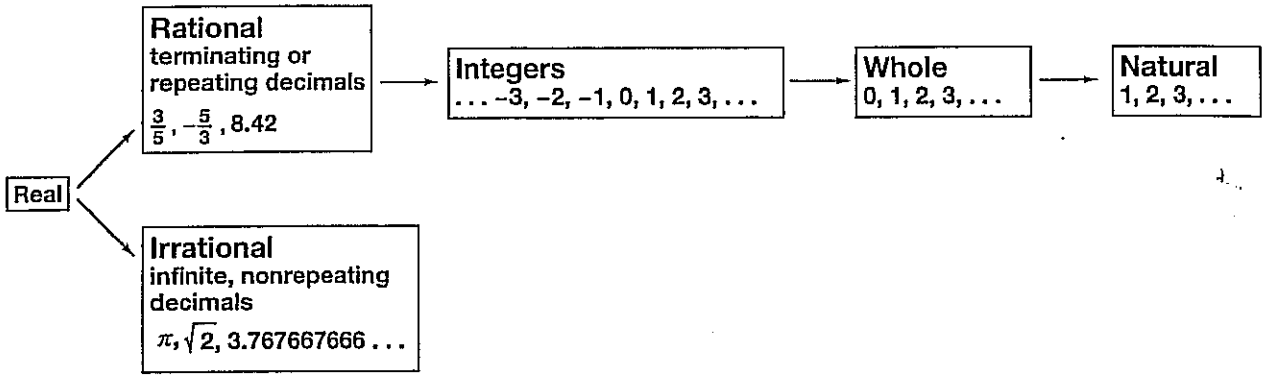
Name _____ Class _____ Date _____

Reteaching 1-3

Exploring Real Numbers

OBJECTIVE: Classifying numbers

Review the following chart which shows the different classifications of real numbers.



Example

Given the numbers $-4.4, \frac{14}{5}, 0, -9, 1\frac{1}{4}, -\pi$ and 32, tell which numbers belong to each set.

Natural:	32	numbers used to count
Whole:	0, 32	natural numbers and zero
Integers:	$0, -9, 32$	whole numbers and their opposites
Rational:	$-4.4, \frac{14}{5}, 0, -9, 1\frac{1}{4}, 32$	integers and terminating and nonrepeating decimals
Irrational:	$-\pi$	infinite, nonrepeating decimals
Real:	$-4.4, \frac{14}{5}, 0, -9, 1\frac{1}{4}, -\pi, 32$	rational and irrational numbers

Exercises

Name the set(s) of numbers to which each number belongs.

1. $\frac{-5}{6}$ rational, real	2. 35.99 rational, real	3. 0 whole, integer, rational, real	4. $4\frac{1}{8}$ rational, real
5. $\sqrt{5}$ irrational, real	6. −80 integer, rational, real	7. $\frac{17}{5}$ rational, real	8. $\frac{12}{3} = 4$ natural, whole, integer, rational, real
9. $\sqrt{100} = 10$ natural, whole, integer, rational, real	10. $-\sqrt{4} = -2$ integer, rational, real	11. 3.24 rational, real	12. 3π irrational, real

Give an example of each kind of number.

13. irrational number
14. whole number
15. negative integer
16. fractional rational number
17. rational decimal
18. natural number

Name _____ Class _____ Date _____

Practice 1-3

Exploring Real Numbers

Name the set(s) of numbers to which each number belongs.

1. -0.002
2. $12\frac{1}{2}$
3. 8
4. 5π
5. $\sqrt{7}$
6. -22
7. -3.4
8. $\sqrt{36}$

Is each statement *true* or *false*? If the statement is false, give a counterexample.

9. Every whole number is an integer.
10. Every integer is a whole number.
11. Every rational number is a real number.
12. Every multiple of 7 is odd.

Use <, =, or > to compare.

13. $-10.98 \square -10.99$
14. $-\frac{1}{3} \square -0.3$
15. $-\frac{11}{5} \square -\frac{4}{5}$
16. $-\frac{1}{2} \square -\frac{5}{10}$
17. $-\frac{3}{8} \square -\frac{7}{16}$
18. $\frac{3}{4} \square \frac{13}{16}$

Order the numbers in each group from least to greatest.

19. $-\frac{8}{9}, -\frac{7}{8}, -\frac{22}{25}$
20. $-3\frac{4}{9}, -3.45, -3\frac{12}{25}$
21. $-\frac{1}{4}, -\frac{1}{5}, -\frac{1}{3}$
22. $-1.7, -1\frac{3}{4}, -1\frac{7}{9}$
23. $-\frac{3}{4}, -\frac{7}{8}, -\frac{2}{3}$
24. $2\frac{3}{4}, 2\frac{5}{8}, 2.7$

Name _____ Class _____ Date _____

Reteaching 1-4

Patterns and Functions

OBJECTIVE: Writing a function rule

A function rule is an equation that describes how one variable relates to another.

Example

Here is an example where one variable is a multiple of the other.

Number of Cars	1	2	3	4
Number of Wheels	4	8	12	16

When the top row increases by 1, the bottom row increases by 4. If there were no cars, there would be 0 wheels. So, the number of wheels is 4 times the number of cars.
Function rule: $w = 4c$

Here is an example where one variable is a multiple of the other plus a constant amount.

Number of Students	1	2	3	4
Number of Books	32	34	36	38

When the top row increases by 1, the bottom row increases by 2. If there were no students, there would be 30 books. So, the number of books is 2 times the number of students plus 30.
Function rule: $b = 2s + 30$

The value of the dependent variable depends on the value of the independent variable.

Dependent variable: A variable that provides the output values of a function.

Independent variable: A variable that provides the input values of a function.

EXAMPLE:

Memory (mb)	Cost ($)
32	19
64	29
128	39
256	49

The cost is the ***dependent*** quantity because it *depends* on the storage capacity of the memory stick. Memory is the ***independent*** quantity.

Exercises

Fill in the blanks to find the function rule.

1.

Number of Buses (b)	1	2	3	4
Number of Seats (s)	60	120	180	240

When the top row increases by 1, the bottom row increases by 60.
If there were no buses, there would be 0 seats. So, the number of seats is 60 times the number of buses.
Function rule: $s = 60b$

2.

Number of Hours (h)	1	2	3	4
Cost of Canoe Rental (c)	15	25	35	45

When the top row increases by 1, the bottom row increases by 10.
If the canoe were rented for 0 hours, the cost would be 5. So, the cost is 10 times the number of hours plus 5.
Function rule: $c = 10h + 5$

Name _____ Class _____ Date _____

Practice 1-4

Patterns and Functions

The relationships in the tables below are functions. Write a function rule for each.

1.

Number of Baseball Teams	Number of Players Required
1	9
2	18
3	27
4	36

2.

Number of CDs Purchased	Total Cost
1	$13
2	$26
3	$39
4	$52

3.

Number of Homework Questions	Number of Minutes for Homework
1	25
2	30
3	35
4	40

4.

Number of Rides Taken	Cost of Fair
1	$10.00
2	$12.50
3	$15.00
4	$17.50

Identify the independent and dependent quantity in each situation.

5. The amount of money earned babysitting increases with the number of hours spent babysitting.

6. The cost of a skating party increases with the number of people attending the party.

7. The volume of water in a bathtub decreases with the number of minutes it has been draining.

8. The number of people attending the event decreases with the total cost for tickets.

Complete each table. Then write a function rule for each relationship.

9.

Number of Cases of Water	Number of Bottles of Water
1	24
2	48
3	72
4	
5	

Function Rule: _____

10.

Number of Minutes	Cost of Phone Call
1	$.60
2	$.70
3	$.80
4	
5	

Function Rule: _____

Name _____ Class _____ Date _____

Reteaching 1-5

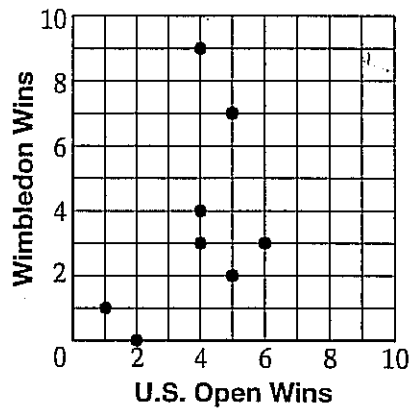
Scatter Plots

OBJECTIVE: Analyzing data using scatter plots

Example

Make a (U.S. Open wins, Wimbledon wins) scatter plot of the data in the table. Is there a *positive correlation*, a *negative correlation*, or *no correlation* between the two sets of data?

Player	U.S. Open	Wimble-don	French Open	Aust. Open
Andre Agassi	1	1	0	1
Jimmy Conners	5	2	0	1
Chris Evert	6	3	7	2
Steffie Graf	5	7	5	4
John McEnroe	4	3	0	0
Martina Navratilova	4	9	2	3
Pete Sampras	4	4	0	2
Monica Seles	2	0	3	4

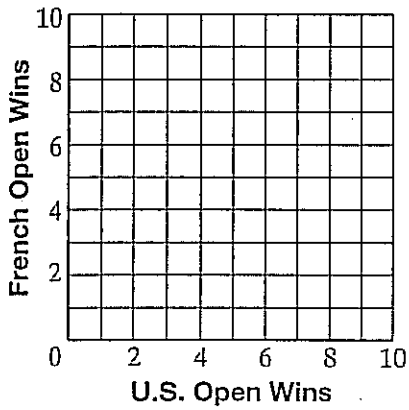


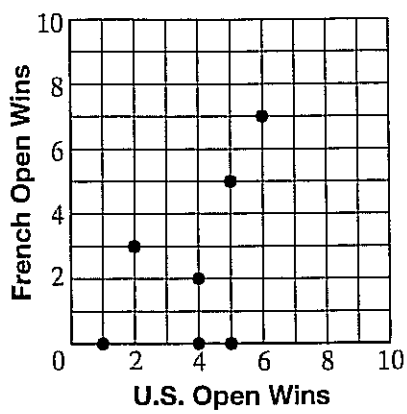
Plot each (U.S. Open wins, Wimbledon wins) ordered pair.

There does not seem to be a trend in the data. As the number of U.S. Open wins increases, the number of Wimbledon wins does not seem to increase or decrease. Thus, there is no correlation.

Exercises

Make a (U.S. Open wins, French Open wins) scatter plot using the data in the table above.

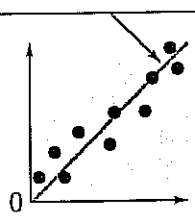




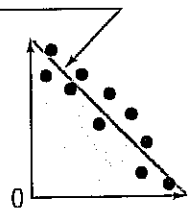
Analyzing Trends in Data

You use scatter plots to investigate trends relating two sets of data. These trends show positive, negative, or no correlation.

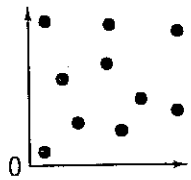
A **trend line** on a scatter plot shows a correlation more clearly.



Positive correlation
In general, both sets of data increase together.



Negative correlation
In general, one set of data decreases as the other set increases.



No correlation
Sometimes data sets are not related.

Name _____ Class _____ Date _____

Practice 1-5

Scatter Plots

Make a scatter plot for each set of data below.

1. **Height and Hourly Pay of Ten People**

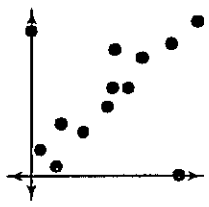
Height (inches)	Hourly Pay	Height (inches)	Hourly Pay
62	$6.00	72	$8.00
65	$8.50	72	$6.00
68	$6.50	73	$7.50
70	$6.00	74	$6.25
70	$7.50	74	$8.00

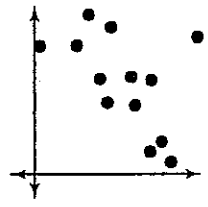
2. **Speed of Winds in Some U.S. Cities**

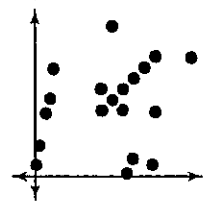
Station	Average Speed (mi/h)	Highest Speed (mi/h)
Atlanta, GA	9.1	60
Casper, WY	12.9	81
Dallas, TX	10.7	73
Mobile, AL	9.0	63
St. Louis, MO	9.7	60

Source: National Climatic Data Center

Describe the trend in each scatter plot below.

3. 

4. 

5. 

6. In Exercise 1, is there a *positive correlation*, a *negative correlation*, or *no correlation* between height and hourly pay?

7. In Exercise 2, is there a *positive correlation*, a *negative correlation*, or *no correlation* between average wind speed and highest wind speed?

Name _____ Class _____ Date _____

Reteaching 1-6

Mean, Median, Mode, and Range

OBJECTIVE: Finding measures of central tendency

In working with statistical data, it is often useful to determine a single quantity that best describes the set of data. The best quantity to choose is usually one of the most popular measures of central tendency: the mean, the median, or the mode.

	Definitions
Mean	The **mean** is the sum of the data items in a set divided by the number of data items in the set.
Median	The **median** is the middle value in a set of data when the numbers are arranged in numerical order. If the set has an even number of data items, the median is the mean of the two middle data values.
Mode	The **mode** is the data item that occurs most often in a data set.
Range	The **range** of a set of data is the difference between the greatest and least data values.

Example

Find the mean, median, and mode of the set of data: 34 46 31 40 33 40.

Mean: $\frac{34 + 46 + 31 + 40 + 33 + 40}{6} = \frac{224}{6} = 37.\overline{3}$ ← **Add the data items and divide by the number of data items in the set.**

Median: 31 33 34 40 40 46 ← **Arrange the data items in increasing order.**

$\frac{34 + 40}{2} = 37$ ← **Since there is an even number of data values, find the mean of the two middle data values.**

Mode: The mode is 40 since it occurs most often.

Range: $40 - 34 = 6$ The range is 6.

Exercises

Find the mean, median, and mode of each set of data. mean, median, mode, range

1. daily sales of a store: \$834 \$1099 \$775 \$900 \$970 # 915.60; #900; no mode; 324
2. number of points scored in 8 soccer games: 0 10 4 11 7 6 3 2 5.375; 5; no mode; 11
3. number of days above 50°F in the last five months: 6 8 15 22 9 12; 9; no mode; 16
4. heights of players on a basketball team in inches: 72 74 70 77 76 72 73.5; 73; 72; 7
5. resting heart rates in beats per minute: 76 70 64 70 72 68 70; 70; 70; 12

Name _____ Class _____ Date _____

Practice 1-6

Mean, Median, Mode, and Range

Find the mean, median, and mode. Which measure of central tendency best describes the data?

1. number of cars sold in the past 10 days
   1 5 3 2 1 0 4 2 6 1

2. utility bills for the past 6 months
   $90 $120 $140 $135 $112 $126

3. prices of a sweater in 5 different stores
   $31.25 $27.50 $28.00 $36.95 $32.10

4. scores on a 10-point quiz
   7 9 10 8 4 2 6 10 8

Find the range.

5. hourly wages
   $7.25 $6.75 $8.10 $9.56 $7.10 $7.75

6. ages of students on the quiz team
   15 15 14 16 17 16 16 15

Write and solve an equation to find the value of x.

7. 4.8, 1.6, 5.2, x; mean 3.7

8. 40, 98, 94, 102, 21, x; mean 88

9. 100, 172, 85, 92, x; mean 115

10. 25.6, 19.3, 19, x, mean 24

11. A coffee machine is considered reliable if the range of amounts of coffee that it dispenses is less than 2 fluid ounces (fl oz). In eight tries, a particular machine dispensed the following amounts: 7.1, 6.8, 7.6, 7.1, 7.4, 6.8, 7, and 6.7 fl oz. Is the machine reliable? Explain

12. To test the exhaust fumes of a car, an inspector took six samples. The exhaust samples contained the following amounts of gas in parts per million (ppm): 8, 5, 7, 6, 9, and 5. If the maximum allowable mean is 6 ppm, did the car pass the test? Explain.

13. Randy had grades of 85, 92, 96, and 89 on his last four math tests. What grade does he need on his next test to have an average of 92?

Name:_____ **Summer Packet: *Answer Sheet*** **Pre-Algebra 7 → Algebra 8**

Use the examples from the Reteaching pages to answer the Practice pages. Record your answer only on the lines provided for the selected questions. Please attach all completed work on loose leaf.

Practice 1-1 (page 2)

1._____
2._____
3._____
4._____
5._____
6._____
7._____
8._____
9._____
10._____
11._____
12._____
13._____
14._____
15._____
16._____
17._____
18._____
19._____
20._____
21._____
22._____
23._____
24._____
25._____
26._____
27._____
28._____

Practice 1-2 (page 4)

1._____
2._____
3._____
4._____
5._____
6._____
7._____
8._____
9._____
10._____
11._____
12._____
13._____
14._____
15._____
16._____
17._____
18._____
19._____
20._____
21._____
22._____
23._____
24._____
25._____
26._____
27._____
28._____
29._____
30._____
31._____
32._____
33._____
34._____
35._____
36._____
37._____
38._____
39._____
40._____
41._____
42._____
43._____
44._____
45._____

Practice 1-3 (page 6)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Practice 1-4 (page 8)

1. _____
2. _____
3. _____
4. _____
5. Independent: _____

   Dependent: _____
6. Independent: _____

   Dependent: _____
7. Independent: _____

   Dependent: _____
8. Independent: _____

   Dependent: _____
9. _____
10. _____

Number of Minutes	Cost of Phone Call
1	$.60
2	$.70
3	$.80
4	
5	

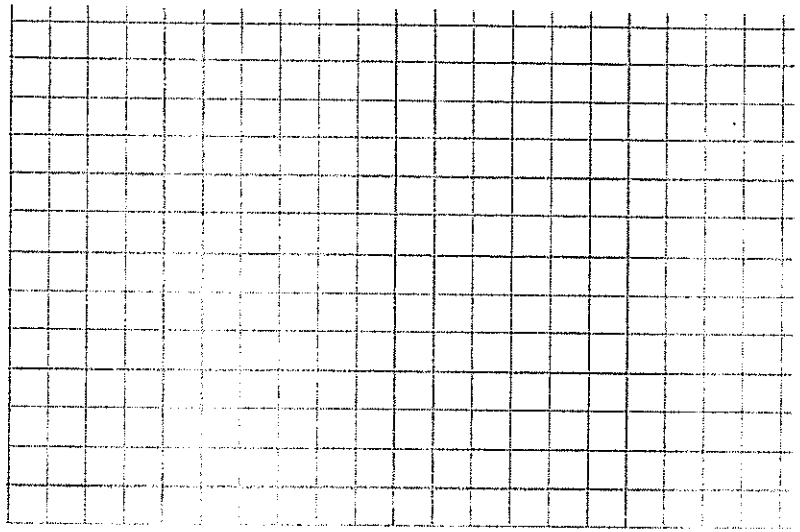
Function Rule: _____

Number of Cases of Water	Number of Bottles of Water
1	24
2	48
3	72
4	
5	

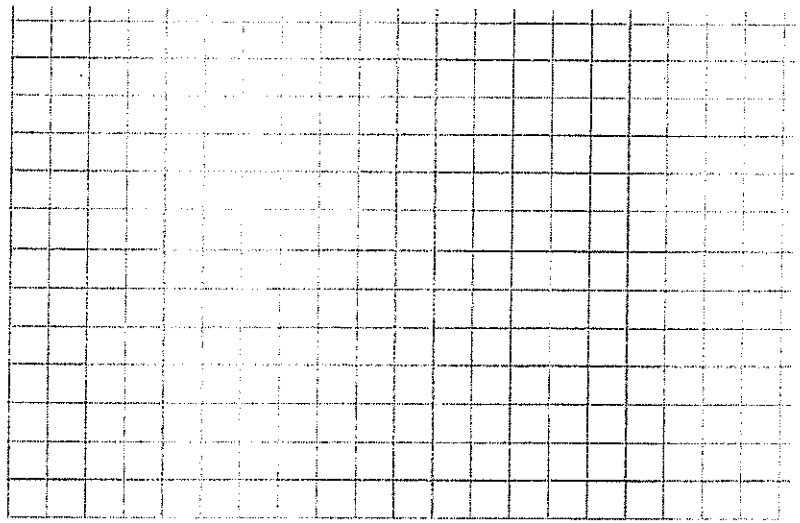
Function Rule: _____

Practice 1-5 (page 10)

1.



2.



3. _____

4. _____

5. _____

6. _____

7. _____

Practice 1-6 (page 12)

1. Mean:_____ Median:_____ Mode:_____

   Which best describes the data?_____

2. Mean:_____ Median:_____ Mode:_____

   Which best describes the data?_____

3. Mean:_____ Median:_____ Mode:_____

   Which best describes the data?_____

4. Mean:_____ Median:_____ Mode:_____

   Which best describes the data?_____

5. Range:_____

6. Range:_____

7. Equation:_____ x =_____

8. Equation:_____ x =_____

9. Equation:_____ x =_____

10. Equation:_____ x =_____

11. _____

_____

12. _____

_____

13. _____