Algebra 1 Chapter 4 Notes

Name: ______________________________________

Chapter 4: Functions

Date: ______________________ Period: __________

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4.1 Notes Part 1

Graphing Relationships

Example 1: Relating Graphs to Situations

Graphs can be used to illustrate many different situations.

continuous graphs: ____

____

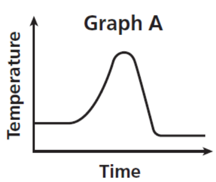
Read the graphs from _________ to ___________ to show time passing. List key words to help figure out if the line on the graph should go up, down, or stay the same.

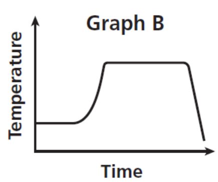
UP = ____________________, _________, _________, _________, etc.

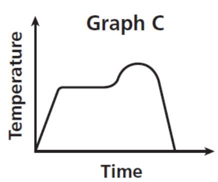
DOWN = ____________________, _________, _____________, etc.

HORIZONTAL = _____________ ______ _________, ___________, _____________ _____________, etc.

Ex: The air temperature was constant for several hours at the beginning of the day and then rose steadily for several hours. It stayed the same temperature for most of the day before dropping sharply at sundown. Choose the continuous graph that best represents this situation.







Key Words	Segment Description...	Graphs...
Was constant		
Rose steadily		
Stayed the same		
Dropped sharply		

Try it out! Choose the correct graph from the list above.

A. The air temperature increased steadily for several hours and then remained constant. At the end of the day, the temperature increased slightly again before dropping sharply. Choose the graph above that best represents this situation.

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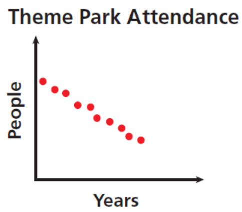
4.1 Notes Part 2

Graphing Relationships

discrete graphs: ____

____

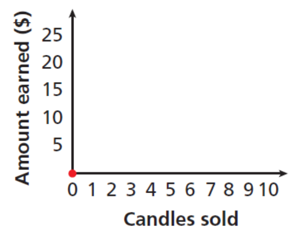
Example 2: Sketching Graphs for Situations



The graph on theme-park attendance is an example of a discrete graph because the people are counted in whole numbers only. For example, you can't have a ½ person!

Try it out! Sketch a graph for each situation. Tell whether the graph is continuous or discrete.

A. Simon is selling candles to raise money for the school dance. For each candle he sells, the school will get $5.00. He has 5 candles to sell.

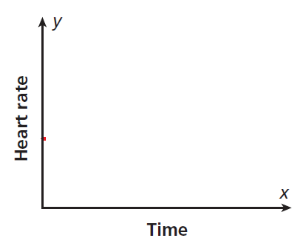


***when drawing continuous graphs, the ________________ of the lines matters.**

= slowly, gradually, less steep, etc.

= quickly, rapidly, steeply, etc.

B. Angelique's heart rate is being monitored while she exercises on a treadmill. While walking, her heart rate remains the same. As she increases her pace, her heart rate rises at a steady rate. When she begins to run, her heart rate increases more rapidly and then remains high while she runs. As she decreases her pace, her heart rate slows down and returns to her normal rate.



C. Jamie is taking an 8-week keyboarding class. At the end of each week, she takes a test to find the number of words she can type per minute. She begins at 28 words per minute and improves each week.

4.1 NOTES PART 3

GRAPHING RELATIONSHIPS

Example 3: Writing Situations for Graphs

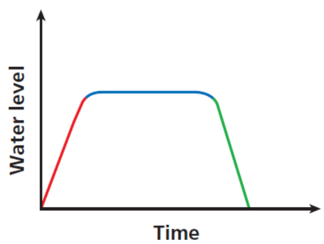
When given a graph, identify the labels to try and picture the situation.

Analyze the graph _______________ by _______________.

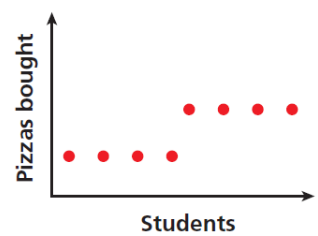
Ex: Both graphs show a relationship about a child going down a slide. **Graph A** represents the child's *distance from the ground* related to time. **Graph B** represents the child's *speed* related to time.

Try it out! Write a possible situation for the given graph.

A.



B.



4.2 NOTES PART 1

RELATIONS AND FUNCTIONS

Example 1: Showing Multiple Representations of Relations

relation: ____

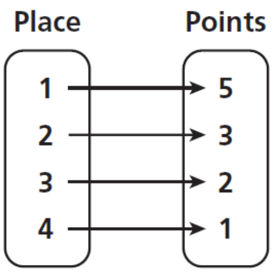
In a track meet, first place gets 5 points, second place gets 3 points, third place gets 2 points, and fourth gets 1.

There are ________ different ways we could describe this situation.

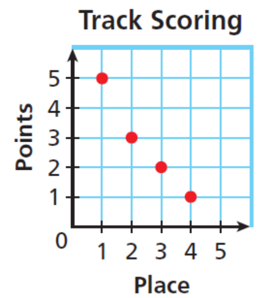
RELATIONS **TABLES**

Track Scoring	
Place	**Points**
1	5
2	3
3	2
4	1

MAPPING DIAGRAMS



GRAPHS



4.2 NOTES PART 2

RELATIONS AND FUNCTIONS

Example 2: Finding the Domain and Range of a Relation

domain: ____

____

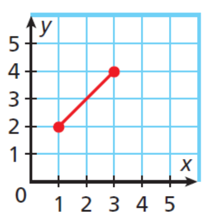
range: ____

____

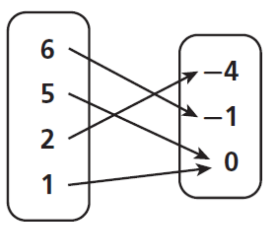
***You do not repeat values for the domain or range. (C example see)

Try it out! Give the domain and range of each relation.

A.



B.



C.

x	*y*
1	1
4	4
8	1

4.2 NOTES PART 3

RELATIONS AND FUNCTIONS

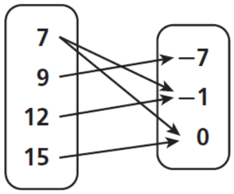
Example 3: Identifying Functions

function: ____

____

Try it out! Give the domain and range of each relation. Tell whether the relation is a function. Explain.

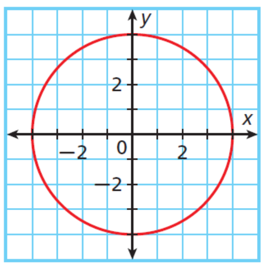
A.



B.

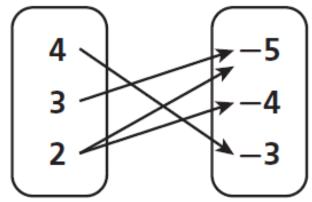
Field Trip	
Students x	Buses y
75	2
68	2
125	3

C.



D. $\{(8, 2), (-4, 1), (-6, 2), (1, 9)\}$

E.



4.3 Notes Part 1

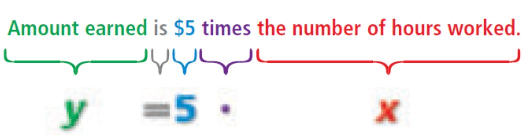
Writing Functions

Introduction

Suppose Trisha baby-sits and charges $5 per hour.

Time Worked (h) x	1	2	3	4
Amount Earned ($) y	5	10	15	20

The amount of money Trisha earns is $5 times the number of hours she works. Write an equation using two different variables to show this relationship.



Trisha can use this equation to find out how much money she will earn for any number of hours she works.

4.3 Notes Part 2

Writing Functions

Example 1: Using a Table to Write an Equation

To find the relationship between x and y values in a table, look at the very first values. Ask yourself, “If I start with this x value, what operation can I use to get this y value?” Test the hypothesis with all the other values!

Try it out! Determine a relationship between the *x* and *y* values. Write an equation.

A.

x	1	2	3	4
y	−2	−1	0	1

B. {(1, 3), (2, 6), (3, 9), (4, 12)}

4.3 Notes Part 3

Writing Functions

Example 2: Identifying Independent and Dependent Variables

independent variable: ____

____

dependent variable: ____

____

Try it out! Identify the independent and dependent variables in each situation.

A. In the winter, more electricity is used when the temperature goes down, and less is used when the temperature rises.

Independent = *Dependent =*

B. The cost of shipping a package is based on its weight.

Independent = *Dependent =*

C. The faster Ron walks, the quicker he gets home.

Independent = *Dependent =*

4.3 Notes Part 4

Writing Functions

Example 3: Writing Functions

function rule: ____

function notation: ____

____

The dependent variable	is	a function of	the independent variable.
y	is	a function of	x.
y	$=$	f	(x)

Using the function from the example with Trisha's babysitting I can use the equation $y = 5x$.

I could use _____________ and ask, "What is the value of y when x equals 2?"

I could use _____________ and ask, " What is $f(2)$?"

*****They both mean the same thing, but it is often easier to use function notation!!!**

Try it out! Identify the independent variables. Write a rule in function notation for each situation.

A. A lawyer's fee is $150 per hour for her services.

B. The admission fee to a local carnival is $9.00. Each ride costs $2.00.

C. Steven buys apples that costs $1.47 per pound.

4.3 NOTES PART 5

WRITING FUNCTIONS

Example 4: Evaluating Functions

When asked to evaluate a function for certain values of the variable, all you need to do is substitute the numbers into the variable.

Try it out! Evaluate each function for the given input values

A. For $f(x) = 5x$, find $f(x)$ when $x = 4$ and $x = –9$

B. For $m(x) = 2x - 9$, find $m(x)$ when $x = 0$ and $x = -3$

C. For $g(t) = \frac{1}{4}t + 20$, find $g(-9)$ and $g(200)$

4.4 Notes Part 1

Graphing Functions

Example 1: Graphing Solutions Given a Domain

In the following problems, you will be asked to graph a function based on a list of domain values.

Step 1: Solve for ______. In other words, get ______ all by itself.

Step 2: Substitute each input / domain (x) value into the equation to find each output / range (y) value.

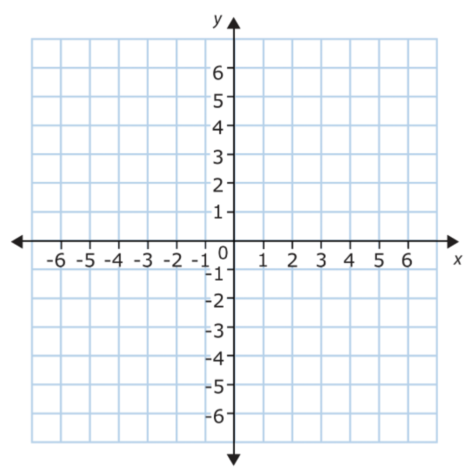
Step 3: Create a list of ordered pairs ______________ for each domain and range value pair.

Step 4: Graph the ____________________ ______________.

Try it out! Graph each function for the given domain.

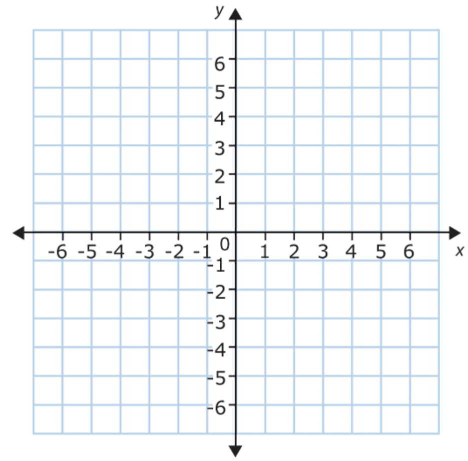
A. $-x + 2y = 6$; Domain = $\{-4, -2, 0, 2\}$

x	y



B. $3x + y = 1$; Domain = {– 2, – 1, 0, 1, 2}

x	y



4.4 Notes Part 2

Graphing Functions

Example 2: Graphing Functions

These problems are the same ones as those from the 4.4 notes part 1, the only difference being that you get to choose your domain! Lucky you! The trickiest part is determining which values to use for the domain.

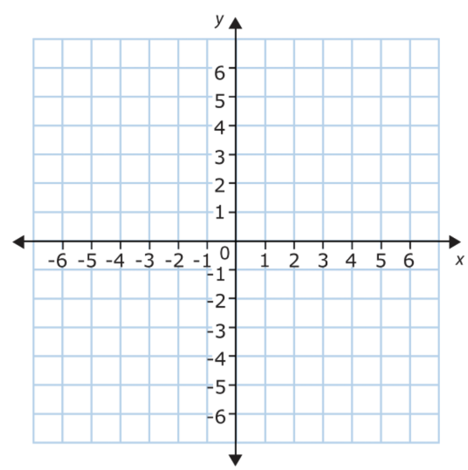
I would always choose 0 and two numbers on either side of 0. Either _____ and _____ or _____ and _____.

It's good to have about 5 points, so the next two numbers you get to choose. Make sure they are on the graph!

Try it out! Graph each function.

A. $y = x^2$

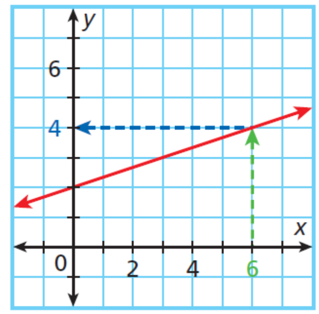
x	y
-1	
0	
1	



4.4 NOTES PART 3

GRAPHING FUNCTIONS

Example 3: Finding Values Using Graphs



To the right is a graph of the function $f(x) = \frac{1}{3}x + 2$.

One way we learned to find $f(x)$ when $x = 6$ is to substitute 6 for x.

Another way is to look at the graph.

1. Find _____ on the _____________.
2. Follow ___________ until you hit the function.
3. Measure over to the _____________ to see what y is when ___________.

REMEMBER: y is the same as $f(x)$

4. So, $f(6)$ = _____. This means that when ___________, ___________.

4.5 NOTES PART 1

SCATTER PLOTS AND TREND LINES

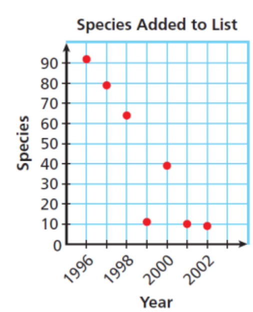
Example 1: Graphing a Scatter Plot from Given Data

scatter plot: ____

____

When given a table, we can make a scatter plot. When given a scatter plot, we can make a table.

Try it out! Complete the table below using the scatter plot data.

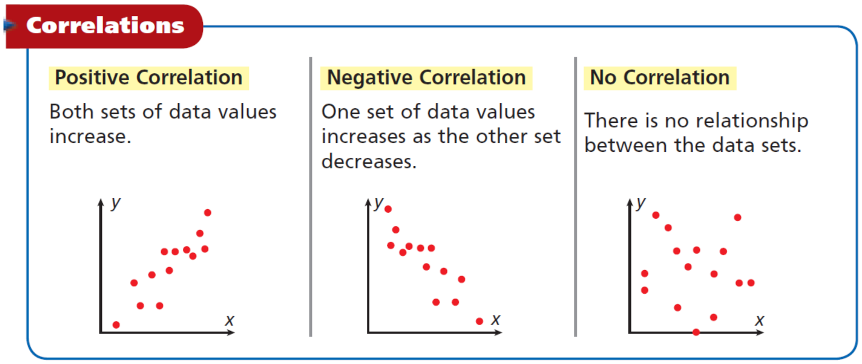


4.5 NOTES PART 2

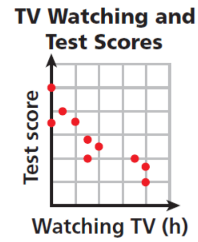
SCATTER PLOTS AND TREND LINES

Example 2: Describing Correlations from Scatter Plots

correlation: ____



Try it out! Describe the correlation illustrated by the scatter plot below.



4.5 Notes Part 3

Scatter Plots and Trend Lines

Example 3: Identifying Correlations

You will need to say whether each problem represents a positive, negative, or no correlation.

Positive = as one variable __________________, the other also __________________

Negative = as one variable __________________, the other __________________

No correlation = ____

Try it out! Identify the correlation you would expect to see between each pair of data sets. Explain.

A. How hungry a person is and how much food they eat.

B. The number of times you use an eraser and the length of the eraser.

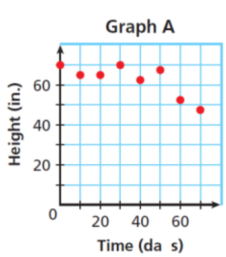
C. The number of movies you own and the temperature in March.

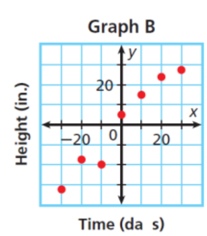
4.5 Notes Part 4

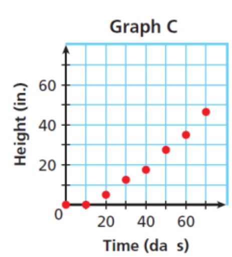
Scatter Plots and Trend Lines

Example 4: Matching Scatter Plots to Situations

Try it out! Choose the scatter plot that best represents the relationship between the number of days since a sunflower seed was planted and the height of the plant. Explain.







4.6 Notes Part 1

Arithmetic Sequences

Introduction

sequence: ____

term: ____

Time (s)	1	2	3	4	5	6	7	8
Distance (mi)	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6

$+0.2$ $+0.2$ $+0.2$ $+0.2$ $+0.2$ $+0.2$ $+0.2$

arithmetic sequence: ____

common difference: ____

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4.6 Notes Part 2

Arithmetic Sequences

Example 1: Identifying Arithmetic Sequences

If the numbers are ____________________, then the common difference will be ________________.

If the numbers are ____________________, then the common difference will be ________________.

To find the ________ __________, continue the pattern by adding the common difference again.

REMEMBER: For a sequence to be arithmetic, the difference between successive terms MUST be the same!!!

Try it out! Determine whether each sequence appears to be an arithmetic sequence. If so, find the common difference and the next three terms in the sequence.

A. 15, 11, 7, 3, …

B. 2, 4, 8, 16, …

C. 3, 0, -3, -6, … D. $\frac{3}{4}, \frac{1}{2}, \frac{1}{4}, 0\ldots$

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4.6 Notes Part 3

Arithmetic Sequences

Example 2: Finding the *n*th Term of an Arithmetic Sequence

The variable a is often used to represent terms in a sequence.

The variable a_5 is read as ________________ and represents the ___________ term in a sequence.

The variable a_n represents the nth term, where n can be ______ ____________.

The pattern in the table below shows that to find the nth term, add the first term to the product of (n – 1) and the common difference.

Finding the *n*th Term of an Arithmetic Sequence

The nth term of an arithmetic sequence with **common difference d** and **first term a_1** is

$$a_n = a_1 + (n - 1)d.$$

When asked to find a certain term in an arithmetic sequence, you need to:

1. Substitute the first term into _______.
2. Substitute the number of the term you're looking for into _______.
3. Substitute the common difference into _______.

Let's try it! Find the indicated term of each arithmetic sequence.

A. 22^{nd} term: 5, 2, -1, -4, … B. 15^{th} term; $a_1 = 7$ and $d = 3$

C. 30^{th} term: -15, -10, -5, 0, …

D. 18^{th} term; $a_1 = -23$ and $d = -10$

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