## Table of Contents

### CH. 1: VARIABLES, EXPRESSIONS AND EQUATIONS
- Section 1.1 Constructing a Number Line ........................................ 1
- Section 1.2 Variables on the Number Line ...................................... 7
- Section 1.3 Variables and Expressions ......................................... 11
- Section 1.4 Solving Linear Equations ........................................... 15
- Section 1.5 Equivalent Expressions ............................................. 21
- Section 1.6 Equivalent Equations ............................................... 29
- Section 1.7 Formulas and Literal Equations ................................. 33

### CH. 2: EXPLORING FUNCTIONS
- Section 2.1 Functions ................................................................. 39
- Section 2.2 Functions and Their Graphs ....................................... 47
- Section 2.3 Patterns and Sequences ............................................ 55
- Section 2.4 Applications and Functions ....................................... 61

### CH. 3: STRAIGHT LINES
- Section 3.1 Horizontal and Vertical Lines ..................................... 65
- Section 3.2 Slope ........................................................................ 71
- Section 3.3 Slope and Proportions .............................................. 79
- Section 3.4 Slopes and Intercepts .............................................. 87
- Section 3.5 Functions vs. Equations .......................................... 95
- Section 3.6 Standard Form of a Line ......................................... 107
- Section 3.7 Perpendicular Lines .................................................. 115
CH. 4: SYSTEMS OF EQUATIONS 121
Section 4.1 A Graphical Approach ........................................ 121
Section 4.2 Substitution Method .......................................... 127
Section 4.3 Method of Elimination .................................... 131
Section 4.4 Applications .................................................. 137
Section 4.5 Consistent and Inconsistent Systems .................. 141

CH. 5: LINEAR INEQUALITIES 147
Section 5.1 Properties of Inequalities .................................. 147
Section 5.2 Solving Linear Inequalities ................................. 155
Section 5.3 Systems of Linear Inequalities .............................. 161

CH. 6: EXPONENTS 167
Section 6.1 Exponents ..................................................... 167
Section 6.2 Negative Exponents .......................................... 171
Section 6.3 Exponential Functions ....................................... 175
Section 6.4 Exponential Decay ........................................... 183
Section 6.5 Geometric Sequences ....................................... 187
Section 6.6 Scientific Notation ............................................ 193

CH. 7: POLYNOMIAL OPERATIONS AND FACTORING 199
Section 7.1 Polynomial Expressions ..................................... 199
Section 7.2 Polynomial Addition and Subtraction .................. 205
Section 7.3 Polynomial Multiplication ................................. 209
Section 7.4 Common Factors ............................................. 215
Section 7.5 Factoring $x^2 + bx + c$ .................................. 221
Section 7.6 Solving $x^2 + bx + c = 0$ ................................ 231
Section 7.7 Solving $ax^2 + bx + c = 0$ ............................... 235

CH. 8: QUADRATIC FUNCTIONS 239
Section 8.1 Quadratic Functions ........................................ 239
Section 8.2 More Quadratic Functions ................................. 247
Section 8.3 $x$-Intercepts of Quadratic Functions ................... 255
Section 8.4 Writing in Vertex Form ...................................... 261
Section 8.5 The Quadratic Formula .................................... 265
CH. 9: MODELING .......................................................... 275
  Section 9.1  Fitting a Line to Data ......................................... 275
  Section 9.2  Modeling Nonlinear Data .................................. 283

CH. 10: GEOMETRY .......................................................... 289
  Section 10.1  The Pythagorean Theorem ................................ 289
  Section 10.2  Square Roots and Irrational Numbers .................. 295
  Section 10.5  Distance on the Plane .................................... 305
  Section 10.6  Translations and Reflections ............................. 313
  Section 10.7  Rotations ................................................... 321
  Section 10.8  Dilations and Similarity .................................. 327

CH. 11: RADICAL EXPRESSIONS ...................................... 339
  Section 11.1  The Square Root Function ................................ 339
  Section 11.2  Operations with Radical Expressions .................. 345
  Section 11.3  Solving Radical Equations ............................... 351

CH. 12: RATIONAL EXPRESSIONS .................................... 355
  Section 12.1  Operations with Rational Expressions .................. 355
  Section 12.2  Direct and Inverse Variation ............................ 363
  Section 12.3  Rational Equations ....................................... 367

CH. 13: PERSONAL FINANCE .......................................... 371
  Section 13.1  Interest ..................................................... 371
  Section 13.2  Cost of Credit ............................................. 377
  Section 13.3  Planning for Future ....................................... 389

CH. 14: STATISTICS ....................................................... 395
  Section 14.1  Measure of Center ......................................... 395
  Section 14.2  Shape and Measures of Spread .......................... 403
  Section 14.3  Sampling .................................................... 411

INDEX ................................................................. 421
# Variables, Expressions, and Equations

## Section 1.1 Constructing a Number Line

Name: ______________________ Date: ______ Period: ______

### Vocabulary

<table>
<thead>
<tr>
<th>Definition</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integers</td>
<td></td>
</tr>
<tr>
<td>Natural Numbers</td>
<td></td>
</tr>
<tr>
<td>Whole Numbers</td>
<td></td>
</tr>
<tr>
<td>Rational Numbers</td>
<td></td>
</tr>
<tr>
<td>Linear Model</td>
<td></td>
</tr>
</tbody>
</table>
More Vocabulary

<table>
<thead>
<tr>
<th>DEFINITION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elements</td>
<td></td>
</tr>
<tr>
<td>Sets</td>
<td></td>
</tr>
<tr>
<td>Subset</td>
<td></td>
</tr>
<tr>
<td>Set Notation</td>
<td></td>
</tr>
<tr>
<td>Absolute Value</td>
<td></td>
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EXPLORATION 1

Build a number line.

1. Make a number line on a large piece of paper. Put the number 1 in the middle of the line. Locate and label the first twenty natural numbers.
2. Plot and label 0 on the number line. If we include 0 and the natural numbers, what do we call the set of numbers?
3. Using a red marker, plot and label the negative integers from $-1$ to $-20$.
4. Using a different colored marker, plot and label 3 fractions between each of the following pairs of integers:
   
   $2$ and $3$  
   $4$ and $5$  
   $-1$ and $0$  
   $-3$ and $-2$
EXAMPLE 1

Create a Venn Diagram to show the relationship between the following sets of numbers:

- rational numbers
- whole numbers
- integers
- natural numbers

EXPLORATION 4

1. Use the number line to illustrate the sum $3 + (-4)$ and the difference $3 - 4$. Explain how you arrived at your answer and location for each problem. Then, using the same pattern, explain how you compute the sum $38 + (-63)$ and the difference $38 - 63$ without a detailed number line.

2. Use the number line to illustrate the difference $3 - (-5)$ and sum $3 + 5$. Then explain how you compute the difference $38 - (-63)$ without a detailed number line.

3. Summarize the rules for addition and subtraction of integers.

4. Use the number line to illustrate the product $3(-4)$ and $-3(4)$. Explain how you arrived at your answer and location for each problem. Then using the same pattern, explain how you compute the products $18(-6)$ and $-5(12)$ without a detailed number line.

5. Use the number line to illustrate the product $-3(-4)$. Explain how you arrived at your answer and location for each problem. Then using the same pattern, explain how you compute the product $-28(-3)$.

6. Summarize the rules for multiplication of integers.
EXPLORATION 5

1. Use the number line to illustrate the sums $1\frac{3}{4} + 2\frac{3}{4}$ and $\frac{4}{5} + \frac{3}{5}$.

2. Starting at the point representing 3, determine and locate on the number line the following numbers. Explain how you arrived at your answer.
   a. The number that is 5 more than this number.
   b. The number that is 5 less than this number.
   c. The number that is 3 times this number.
   d. The number that is half as big as this number.

3. Locate and label three numbers that are greater than $-5$. Locate and label three numbers that are less than $-6$. 
EXPLORATION 6

Use your number line to determine the distance between 6 and 13. How did you arrive at your answer?

1. What is the distance from 12 to 4? Explain how you got your answer.

2. What is the distance from $-3$ to $-11$? From $-9$ to $-2$? Explain how you got your answers.

3. What is the distance from $-7$ to 4? What is the distance from 5 to $-7$? Explain how you got your answers.

4. Find the distance between $\frac{1}{2}$ and $3\frac{1}{2}$.

5. Find the distance between $\frac{1}{2}$ and $\frac{3}{4}$.

6. Find the distance between $\frac{3}{4}$ and $3\frac{1}{2}$.

7. What is the distance from $-\frac{1}{2}$ to $\frac{7}{8}$?

8. What is the distance between $4\frac{2}{3}$ and $1\frac{1}{2}$?
PROBLEM 2
Compute the distance between the following pairs of numbers.
1. $-12$ and $6$
2. $-52$ and $27$
3. $-23$ and $-35$
4. $1.75$ and $-1.25$
5. $\frac{3}{4}$ and $-\frac{1}{3}$

SUMMARY (What I learned today)