**Brick Math**

**Pre-Algebra**

**Chapter Assessment Answer Key**

**Chapter 1**

1.The distance a number is from zero is its *absolute value*.

2. Answers will vary. One example of -4 and +4 is shown. Make sure that the bricks clearly show negative and positive values placed the same distance from the center of the number line.

**A group of lego bricks

Description automatically generated**

-4 0 +4

3. Answers will vary. One example of -4, +4, and |4|is shown. Make sure that the bricks clearly show negative and positive values placed the same distance from the center of the number line. Also be sure the absolute value is shown using the correct symbols.

**A group of lego bricks

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-4 0 +4

**Chapter 2**

1. An integer is a whole number, and its value can be positive, negative, or zero.

2. The problem is +125 - 45.

Model both numbers using the place value method of modeling:

A green and red toy blocks on a gray baseplate

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125

-45

Match all the zero pairs:

A row of lego blocks

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Remove the matched zero pairs:

A group of lego blocks on a grey baseplate

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100

-20

Decompose the 100 into 10 tens:

A group of lego blocks on a grey surface

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100

-20

Match all the zero pairs:

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Remove the matched zero pairs:

A close-up of a green block

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80

The solution to the problem is +80 yards. Martin ended the game with an overall gain of 80 yards, having lost 45 yards but gaining 125 yards.

3. Start with the brick at -4, then count up 20 to reach the solution at +16.

A white and blue lego blocks

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The temperature changed from-4 degrees to +16 degrees from Monday to Tuesday.

**Chapter 3**

1. The exponent in 34 is 4. It means to multiply three 4 times (3 x 3 x 3 x 3)

The exponent in 52 is 2. It means to multiply five 2 times (5 x 5)

The exponent in 104 is 4. It means to multiply ten 4 times (10 x 10 x 10 x 10)

2. 64

3. 3 x 102 means 3 multiplied by the quantity (10 x 10), or 3 (10 x 10) = 3(100) = 300

**Chapter 4**

1. 3 x 10-2 means 3 x 0.01 = 0.03

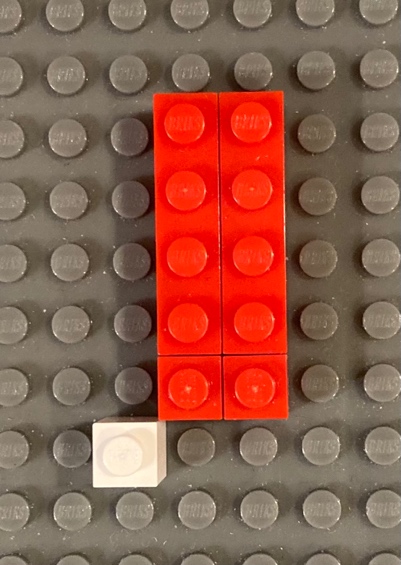
3 x 102 means 3 x (10 x 10) = 3 x 100 = 300

The negative exponent, -2, means that the decimal point is moved 2 places to the left of the ones place to convert from scientific to standard notation. The positive exponent, 2, means that the decimal point is moved two places to the right of the ones place to convert from scientific to standard notation.

2. Answers will vary. Example: The**multiplicative inverse** of -5 is the reciprocal of -5 or

-(1/5). When the two are multiplied together you will always get 1. (-5/1 x -1/5 = 5/5)

3. 2 x 10-4



2 x 10-4 = 2 x (.0001) = 0.0002

2 x 10-4 = 2 x (1/10000) = 2/10000

**Chapter 5**

1. (-2) x 8 means taking away 2 sets of 8

Use zero pairs to remove negative numbers. Start with 2 zero pairs of 8. A group of lego blocks on a grey surface

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Then remove the two sets of 8, leaving 2 sets of -8, or -16.

A close up of a toy

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2. a. positive

b. positive

c. positive

d. negative

**Chapter 6**

1. Monomial expressions have only one term. Binomial expressions have two unlike terms. Polynomial expressions have two or more of the same terms.

2. 2x2 – x + 2:

A red and green lego blocks on a grey baseplate

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2x2  - x + 2

3. a. Coefficients: 5 Variables: x Constants: 3 and 13

b. Coefficients: 3 and 2 Variables: x2 and x Constants: -2 and 83

**Chapter 7**

1. 2x2 - x2 + y2 + 2y - y+ 1

2. 2x2 - x2 + y2 - 2y + 2- 1

Simplified: x2 + y2 – 2y +1

3. 3x2 - 2xy + xy - 3y2 + 5 - 2

A group of colorful building blocks

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3x2 - 2xy + xy - 3y2 + 5 - 2

Simplified: 3x2 - xy - 3y2 + 3

A group of colorful building blocks

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3x2 - xy - 3y2 + 3

Steps:

Combine like variables taking into account negative coefficients.

There are no x2s found after 3x2 so 3x2 stays.

One red and one green xy make a zero pair and are cancelled out, which leaves -xy.

There are no y2s found after -3y2 so -3y2 stays.

+5 and -2 make 2 zero pairs, leaving +3.

**Chapter 8**

1. Any number raised to the power of zero is 1, based on the zero-exponent rule.

2. 4-2 = 1/(4)2 = 1/16

This is based on the Negative Property of an exponent: Any non-zero number raised to a negative is the same as 1 over that number raised to that positive exponent.

3. 102 x 106 = (10 x 10) x (10 x 10 x 10 x 10 x 10 x 10) = 100 x 1,000,000 = 100,000,000

This can also be shown by Product Property, which says that when multiplying exponential numbers that have the same base, add the exponents. 10(2 + 6) = 108 = 100,000,000

4. 104 ÷ 102 = (10 x 10 x 10 x 10) ÷ (10 x 10) = 10,000 ÷ 100 = 100

This can also be shown with the Quotient Property, which says that when dividing exponential numbers that have the same base, subtract the exponents. 10(4 - 2) = 102 = 100

5. (33)2 =3(3 x 2) = 36 = 3 x 3 x 3 x 3 x 3 x 3 = 729

This is based on the Power to a Power Property, which says that when raising an exponent to an exponent, multiply the exponents.

6. Rule 6 says that when the product of two numbers is raised to an exponent, distribute the exponent to each of those numbers and then multiply. For this example:

(-3 x 2)2 = (-3)2 x 22 = 9 x 4 = 36

This is the same as (-3 x 2)2 = (-6)2 = 36

7. Rule 7 says that when the quotient of two numbers is raised to an exponent, distribute the exponent to each of those numbers and then divide. For this example:

(6/2)2  = 62/22 = 36/4 = 9

This is the same as (6/2)2 = 32 = 9

**Chapter 9**

1. 3x -2 < 8

A group of lego blocks on a grey surface

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2. Inequality is a mathematical expression that includes special signs to indicate which side is larger or smaller, or to show that the two sides are not equal.

3. Solutions will vary.

**Chapter 10**

1. -2x ≥ 24 - 6

Model:

A group of lego blocks on a grey baseplate

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Match and remove zero pairs, leaving -2x ≥ 18

A group of lego blocks on a grey surface

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Divide bricks equally into two groups:

A group of lego blocks on a grey baseplate

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To eliminate the negative variable, create zero pairs for the x value. Add bricks that show 2x to both sides of the inequality:

A group of lego blocks on a grey baseplate

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Remove the zero pairs. To isolate the x values on one side of the inequality, make zero pairs by adding -18 on both sides.

A group of colorful building blocks

Description automatically generated

Remove the zero pairs.

A group of lego blocks

Description automatically generated

Flip the model to show the x value on the left. Reverse the sign of the inequality.

A group of colorful building blocks

Description automatically generated

The model shows the solution of x ≤ -9

2. The rule for solving an inequality with a negative coefficient is to use the inverse operation to make the coefficient positive. When multiplying or dividing both sides of an inequality by a negative number, the sign must be reversed for the statement to hold true.

3. a. open circle

b. closed circle

c. closed circle

4. Solutions will vary. Responses should be similar to the complete solution for #1, with the addition of a number line graph that starts with a closed circle at -9 and moves left with values such as -10, -11, etc.

**Chapter 11**

1. Slope shows how much to change expect in y as x changes.

2. Slope is determined by rise over run. The values x1, x2, y1, and y2 are needed to calculate slope.

3. The slope is -½

The points shown are (0,3) and (4,1)

x1 = 0x2 = 4y1 = 3y2 = 1

m = y2 – y1 = 1 - 3 = -2 -2/4 = -½

x2 – x1 = 4 - 0 = 4