Name _____ Date_____

Properties of Inequalities

1. Given the initial inequality $-4 < 7$, state possible values for c that would satisfy the following inequalities.
   a. $c(-4) < c(7)$

   b. $c(-4) > c(7)$

   c. $c(-4) = c(7)$

2. Given the initial inequality $2 > -4$, identify which operation preserves the inequality symbol and which operation reverses the inequality symbol. Write the new inequality after the operation is performed.
   a. Multiply both sides by -2.

   b. Add -2 to both sides.

   c. Divide both sides by 2.

   d. Multiply both sides by $-\frac{1}{2}$.

   e. Subtract -3 from both sides.

1. For each problem, use the properties of inequalities to write a true inequality statement.
   The two integers are -2 and -5.

   a. Write a true inequality statement.

   b. Subtract -2 from each side of the inequality. Write a true inequality statement.

   c. Multiply each number by -3. Write a true inequality statement.

2. On a recent vacation to the Caribbean, Kay and Tony wanted to explore the ocean elements. One day they went in a submarine 150 feet below sea level. The second day they went scuba diving 75 feet below sea level.

   a. Write an inequality comparing the submarine's elevation and the scuba diving elevation.

   b. If they only were able to go one-fifth of the capable elevations, write a new inequality to show the elevations they actually achieved.

   c. Was the inequality symbol preserved or reversed? Explain.

3. If a is a negative integer, then which of the number sentences below is true? If the number sentence is not true, give a reason.

   a. $5 + a < 5$

   b. $5 + a > 5$

   c. $5 - a > 5$

   d. $5 - a < 5$

   e. $5a < 5$

   f. $5a > 5$

   g. $5 + a > a$

   h. $5 + a < a$

   i. $5 - a > a$

   j. $5 - a < a$

   k. $5a > a$

   l. $5a < a$

1. Given the initial inequality $-4 < 7$, state possible values for c that would satisfy the following inequalities.

   a. $c(-4) < c(7)$

   $c > 0$

   b. $c(-4) > c(7)$

   $c < 0$

   c. $c(-4) = c(7)$

   $c = 0$

2. Given the initial inequality $2 > -4$, identify which operation preserves the inequality symbol and which operation reverses the inequality symbol. Write the new inequality after the operation is performed.

   a. Multiply both sides by -2.

   Inequality symbol is reversed.

$$\begin{gathered} 2 > -4 \\ 2(-2) < -4(-2) \\ -4 < 8 \end{gathered}$$

   b. Add -2 to both sides.

   Inequality symbol is preserved.

$$\begin{gathered} 2 > -4 \\ 2 + (-2) > -4 + (-2) \\ 0 > -6 \end{gathered}$$

   c. Divide both sides by 2.

   Inequality symbol is preserved.

$$\begin{gathered} 2 > -4 \\ 2 \div 2 > -4 \div 2 \\ 1 > -2 \end{gathered}$$

   d. Multiply both sides by $-\frac{1}{2}$.

   Inequality symbol is reversed.

$$\begin{gathered} 2 > -4 \\ 2\left(-\frac{1}{2}\right) < -4\left(-\frac{1}{2}\right) \\ -1 < 2 \end{gathered}$$

e. Subtract -3 from both sides.

Inequality symbol is preserved.

$$2 > -4$$
$$2 - (-3) > -4 - (-3)$$
$$5 > -1$$

1. For each problem, use the properties of inequalities to write a true inequality statement.
The two integers are -2 and -5.

   a. Write a true inequality statement.

   $-5 < -2$

   b. Subtract -2 from each side of the inequality. Write a true inequality statement.

   $-7 < -4$

   c. Multiply each number by -3. Write a true inequality statement.

   $15 > 6$

2. On a recent vacation to the Caribbean, Kay and Tony wanted to explore the ocean elements. One day they went in a submarine 150 feet below sea level. The second day they went scuba diving 75 feet below sea level.

   a. Write an inequality comparing the submarine's elevation and the scuba diving elevation.

   $-150 < -75$

   b. If they only were able to go one-fifth of the capable elevations, write a new inequality to show the elevations they actually achieved.

   $-30 < -15$

   c. Was the inequality symbol preserved or reversed? Explain.

   The inequality symbol was preserved because the number that was multiplied to both sides was NOT negative.

3. If a is a negative integer, then which of the number sentences below is true? If the number sentence is not true, give a reason.

   a. $5 + a < 5$

   True.

   b. $5 + a > 5$

   False because adding a negative number to 5 will decrease 5, which will not be greater than 5.

c. $5 - a > 5$

True.

d. $5 - a < 5$

False because subtracting a negative number is adding a number to 5, which will be larger than 5.

e. $5a < 5$

True.

f. $5a > 5$

False because a negative number multiplied by a positive number is negative, which will be less than 5.

g. $5 + a > a$

True.

h. $5 + a < a$

False because adding 5 to a negative number is greater than the negative number itself.

i. $5 - a > a$

True.

j. $5 - a < a$

False because subtracting a negative number is the same as adding the number, which is greater than the negative number itself.

k. $5a > a$

False because a negative number multiplied by a 5 is negative and will be 5 times smaller than a.

l. $5a < a$

True.