

# Properties of Inequality Handout

## Inequality Symbols :

$>$  **Greater Than**

$\geq$  **Greater Than or Equal To**

(The line underneath the Greater Than sign indicates also Equal To.)

$<$  **Less Than**

$\leq$  **Less Than or Equal To**

(The line underneath the Less Than sign indicates also Equal To.)

## Graphing Inequality Symbols :

 **Greater Than**

(The open circle indicates that this is **NOT EQUAL TO** the number that is graphed.)

 **Greater Than or Equal To**

(The closed circle indicates that this is **EQUAL TO** the number that is graphed.)

 **Less Than**

(The open circle indicates that this is **NOT EQUAL TO** the number that is graphed.)

 **Less Than or Equal To**

(The closed circle indicates that this is **EQUAL TO** the number that is graphed.)



# Properties of Inequality Handout

## Addition Property :

If  $x < y$  , then  $x + z < y + z$

### Example :

Tom has three dollars and Bill has six dollars.

They both earned five dollars for mowing the lawn.

Tom still has less money than Bill.

$$\$3 < \$6 \text{ then } \$3 + \$5 < \$6 + \$5 \text{ then } \$8 < \$11$$

If  $x > y$  , then  $x + z > y + z$

### Example :

Jim has ten dollars and Sam has seven dollars.

They both earned twenty dollars shoveling snow.

Jim still has more money than Sam.

$$\$10 > \$7 \text{ then } \$10 + \$20 > \$7 + \$20 \text{ then } \$30 > \$27$$



# Properties of Inequality Handout

## Subtraction Property :

If  $x < y$  , then  $x - z < y - z$

### Example :

Mark has fourteen dollars and Dan has sixteen dollars.

They both spent five dollars at the mall.

Mark still has less money than Dan.

$$\$14 < \$16 \text{ then } \$14 - \$5 < \$16 - \$5 \text{ then } \$9 < \$11$$

If  $x > y$  , then  $x - z > y - z$

### Example :

Mike has fifteen dollars and Benny has nine dollars.

They both spent six dollars at the fair.

Mike still has more money than Benny.

$$\$15 > \$9 \text{ then } \$15 - \$6 > \$9 - \$6 \text{ then } \$9 > \$3$$



# Properties of Inequality Handout

## Multiplication Property :

If  $x < y$  , and  $z > 0$  then  $x * z < y * z$

### Example :

Suppose  $3 < 6$  , and  $z = 10$

then  $3 * 10 < 6 * 10$  or  $30 < 60$

If  $x > y$  , and  $z > 0$  , then  $x * z > y * z$

### Example :

Suppose  $20 > 10$  , and  $z = 5$

then  $20 * 5 > 10 * 5$  or  $100 > 50$

**Whenever you multiply by a negative number,  
you must reverse the inequality sign.**

If  $x < y$  , and  $z < 0$  then  $x * z > y * z$

### Example :

Suppose  $2 < 4$  , and  $z = -2$

then  $2 * -2 > 4 * -2$  or  $-4 > -8$

If  $x > y$  , and  $z < 0$  , then  $x * z < y * z$

### Example :

Suppose  $6 > 3$  , and  $z = -8$

then  $6 * -8 < 3 * -8$  or  $-48 < -24$



# Properties of Inequality Handout

## Division Property :

If  $x < y$  , and  $z > 0$  then  $x \div z < y \div z$

### Example :

Suppose  $15 < 20$  , and  $z = 5$

then  $15 \div 5 < 20 \div 5$  or  $3 < 4$

If  $x > y$  , and  $z > 0$  , then  $x \div z > y \div z$

### Example :

Suppose  $20 > 10$  , and  $z = 5$

then  $20 \div 5 > 10 \div 5$  or  $4 > 2$

**Whenever you divide by a negative number,  
you must reverse the inequality sign.**

If  $x < y$  , and  $z < 0$  then  $x \div z > y \div z$

### Example :

Suppose  $12 < 24$  , and  $z = -2$

then  $12 \div -2 > 24 \div -2$  or  $-6 > -12$

If  $x > y$  , and  $z < 0$  , then  $x \div z < y \div z$

### Example :

Suppose  $16 > 12$  , and  $z = -4$

then  $16 \div -4 < 12 \div -4$  or  $-4 < -3$



# Properties of Inequality Handout

## Transitive Property :

If  $x > y$  and  $y > z$ , then  $x > z$

### Example :

Suppose  $18 > 9$  and  $9 > 3$  then  $18 > 3$

If  $x < y$  and  $y < z$ , then  $x < z$

### Example :

Suppose  $4 < 8$  and  $8 < 15$  then  $4 < 15$

## Comparison Property :

If  $x = y + z$  and  $z > 0$  then  $x > y$

### Example :

Suppose  $12 = 7 + 5$ , then  $12 > 7$

