

# 4.4 Greater Than?

## A Develop Understanding Task



For each situation you are given a mathematical statement and two expressions beneath it.

1. Decide which of the two expressions is greater, if the expressions are equal, or if the relationship cannot be determined from the statement.
2. Write an equation or inequality that shows your answer.
3. Explain why your answer is correct.

Watch out—this gets tricky!

Example:

Statement:  $x = 8$

Which is greater?  $x + 5$  or  $3x + 2$

Answer:  $3x + 2 > x + 5$  because if  $x = 8$ ,  $3x + 2 = 26$ ,  $x + 5 = 13$  and  $26 > 13$ .

$$\begin{array}{r} x+5 \\ 8+5 \\ 13 \end{array}$$

$$\begin{array}{r} 3x+2 \\ 3(8)+2 \\ 26 \end{array}$$

$3x+2$  is greater

Try it yourself:

$$y=1 \quad x=4$$

Let's pick two numbers that make the original statement true.

1. Statement:  $y < x$

Which is greater?  $x - y$  or  $y - x$

$$\begin{array}{r} 4-1 \\ 3 \end{array} \quad \begin{array}{r} 1-4 \\ -3 \end{array}$$

Now test it out.

$x - y$  b/c positive is greater than negative

2. Statement:  $2x - 3 > 7$

Which is greater? 5 or  $x$

$x \rightarrow$  b/c any # greater than 5

$$\begin{array}{r} 2x-3 > 7 \\ +3 \quad +3 \end{array}$$

Solve for  $x$

Try to get  $x$  alone.

$$\frac{2x}{2} > \frac{10}{2}$$

$$x > 5$$

6, 7, 10, 21

3. Statement:  $10 - 2x < 6$

Which is greater?  $x$  or 2

$x \rightarrow$  b/c any # greater than 2

$$\begin{array}{r} 10-2x < 6 \\ -10 \quad -10 \end{array}$$

$$\begin{array}{r} -2x < -4 \\ +2 \quad +2 \end{array}$$

$$x > 2$$

4. Statement:  $4x \leq 0$

Which is greater? 1 or  $x$

$1 \rightarrow$  greater than

$$\begin{array}{r} 4x \leq 0 \\ /4 \quad /4 \end{array}$$

$$x \leq 0$$

-1, -2, any neg # and 0

0 and any neg #

5. Statement:  $n$  is an integer  
Which is greater?  $n$  or  $-n$

$n = -4$   $-n$  greater b/c  
 $-n = 4$  2 negatives multiply to make positive

List out what an integer is.

$1, 2, 3, \dots -1, -2, -3, \dots$

$n = 4$

$-n = -4$

What about 0?

$n = 0$   
 $-n = 0$  > equal

$n$  is bigger b/c positive #

6. Statement  $x > y$

Which is greater?  $x + a$  or  $y + a$

$7 + a$   $2 + a$   
 $17$   $12$

$x = 7$   $y = 2$   $x + a$  is bigger b/c  $x$  is bigger than  $y$

7. Statement:  $x > y$

Which is greater?  $x - a$  or  $y - a$

$7 - a$   $2 - a$

$x = 7$   $y = 2$

$x - a$  is bigger b/c  $x$  is bigger than  $y$

8. Statement:  $5 > 4$

Which is greater?  $5x$  or  $4x$

$5(1) = 5$   $4(1) = 4$

$5(-6) = -30$   $4(-6) = -24$

$x = 1$

$x = -6$

What about 0?

When  $x$  positive,  $5x$  greater

When  $x$  neg,  $4x$  greater

9. Statement:  $5 > 4$

Which is greater?  $\frac{5}{x}$  or  $\frac{4}{x}$

$\frac{5}{1} = 5$   $\frac{4}{1} = 4$   
 $\frac{5}{-6}$   $\frac{4}{-6}$

$x = 1$

$x = -6$

What about 0?

$x$  positive,  $\frac{5}{x}$

$x$  neg,  $\frac{4}{x}$  bigger  $\rightarrow$  closer to 0

10. Statement:  $0 < x < 10$  and  $0 < y < 12$

Which is greater?  $x$  or  $y$

$y$  @ 10 and 11

all others, toss up, it could change

Between what two numbers can  $x$  be?

1, 2, 3, 4, 5, 6, 7, 8, 9

Between what two numbers can  $y$  be?

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

Are they the same? Where is  $y$  greater?

1-9

@ 10 and 11

11. Statement:  $3^{n+2} \geq 27$

Which is greater?  $n$  or 1

~~$n+2$~~   $\geq$   ~~$3$~~

~~$n+2$~~   $\geq 3$   
 ~~$-2$~~   $-2$

27

$\wedge$   
9 3  
 $\wedge$   
3 3

How many 3's make up 27?

3

Equal that number to  $n + 2$ . Solve for  $n$ .

What about when  $n$  is negative?

they could be = when they = 1

otherwise  $n$  is bigger b/c # greater than 1

$n \geq 1$