Lesson 14: Solving Inequalities

Classwork

Exercise 1

Consider the inequality $x^{2}+4x\geq 5.$

* 1. Sift through some possible values to assign to $x$ that make this inequality a true statement. Find at least two positive values that work and at least two negative values that work.

**For the following identify a property that gives the reason why**.

|  |  |
| --- | --- |
| Should your four values also be solutions to the inequality $x(x+4)\geq 5$? Explain why or why not.  | Should your four values also be solutions to the inequality $4x+x^{2}\geq 5$? Explain why or why not.  |
| Should your four values also be solutions to the inequality $4x+x^{2}-6\geq -1$? Explain why or why not. | Should your four values also be solutions to the inequality $12x + 3x^{2} \geq 15$? Explain why or why not. |

**Example 1**

What is the solution set to the inequality $5q + 10 > 20$? Express the solution set in words, in set notation, and graphically on the number line.

WORDS:

SET NOTATION:

GRAPHICALLY:

|  |
| --- |
| Remember: A closed circle means that the endpoint **IS** a solution (use for ≥, ≤) An open circle means that the endpoint **IS NOT** a solution (use for >,  |

Exercise 2

Find the solution set to each inequality. Express the solution in set notation and graphically on the number line.

|  |  |
| --- | --- |
| 1. $x + 4 \leq 7$
 |  |
| $$b. 8y + 4< 7y-2$$ |  |
| $$c. \frac{m}{3}+8\ne 9$$ |  |
| $$d. 4\left(x-3\right)> 2\left(x-2\right)$$ |  |

Exercise 3

|  |  |
| --- | --- |
| *Multiplying through by a negative number*: Do $5-C>2$ and $-5 + C > -2$ have the same solution set? If not, give an example of a number that is in one solution set but not the other. | *Multiplying through by a negative number*: Do $-q\geq -7$ and$ q \geq 7$ have the same solution set? If not, give an example of a number that is in one solution set but not the other. |

All the rules of solving equations are true for solving inequalities.

BUT if you **DIVIDE** or **MULTIPLY** by a **NEGATIVE NUMBER** you must **SWITCH** the symbol.

Find the solution set to each inequality.

a. $-2f<-16$ b. $-\frac{x}{12}\leq \frac{1}{4}$ c. $6 – a \geq 15$ d. $-3(2x + 4) > 0$

Exercise 4

Solve $-4+2t-14-18t> -6 -100t$, for $t$ in two different ways.

Problem Set

1. Find the solution set to each inequality. Express the solution in set notation and graphically on the number line.
	1. $2x<10$ b. $-15x\geq -45$

c. $\frac{2}{3}x\ne \frac{1}{2}+2$ d. $-5\left(x-1\right)\geq 10$

e. $13x<9\left(1-x\right) $ f. 5m – 8 > 12

g. 12 – 3a > 18 h. $4-\frac{c}{6}<1$

1. Find the mistake in the following set of steps in a student’s attempt to solve $5x+2\geq x+\frac{2}{5}$, for $x$. What is the correct solution set?

$$5x+2\geq x+\frac{2}{5}$$

$5(x+2/5)\geq x+\frac{2}{5} $ (factoring out a 5 on the left side)

$5\geq 1$ (dividing by $\left(x+\frac{2}{5}\right)$)

So the solution set is the empty set.

1. Solve $-\frac{x}{16}+1\geq -\frac{5x}{2}$, solve by multiplying through by $-16$.
2. Lisa brought half of her savings to the bakery and bought $12$ croissants for $\$14.20$. The amount of money she brings home with her is more than $\$2$. Use an inequality to find how much money she had in her savings before going to the bakery. (Write the inequalities that represents the situation and solve it.)