

Lesson 3.4: Linear Inequalities

By the end of the lesson, you will be able to:

- ~ Determine whether an ordered pair is a solution to a linear inequality.
- ~ Graph linear inequalities.
- ~ Solve problems involving linear inequalities.

Lesson 3.4: Linear Inequalities

Linear Inequalities in two variables are in one of the following forms:

$$Ax + By < C$$

$$Ax + By > C$$

$$Ax + By \leq C$$

$$Ax + By \geq C$$

If we replace the inequality sign with an equal sign, we obtain the equation of a line, $Ax + By = C$. The line separates the xy -plane into two regions called **half planes**.

Lesson 3.4: Linear Inequalities

A linear inequality in two variables x and y is satisfied by an ordered pair (a, b) if, when x is replaced by a and y is replaced by b , a true statement results.

For Example:

$$x + y < 10 \text{ for } (3, 5)$$

We replace x with 3 and y with 5.

$$3 + 5 < 10 ?$$

$8 < 10$ TRUE. The point $(3, 5)$ satisfies the inequality.

Lesson 3.4: Linear Inequalities

Ex 1: Determine which of the following ordered pairs are solutions to the linear inequality.

$$3x + y < 7$$

a.) $(2, 4)$

b.) $(-3, 1)$

c.) $(1, 3)$

Lesson 3.4: Linear Inequalities

To graph an inequality:

- ~ We treat the inequality like a line (=) to graph.
- ~ A **nonstrict** inequality (\leq , \geq) will be a solid line
- ~ A **strict** inequality ($<$, $>$) will be a dashed line.

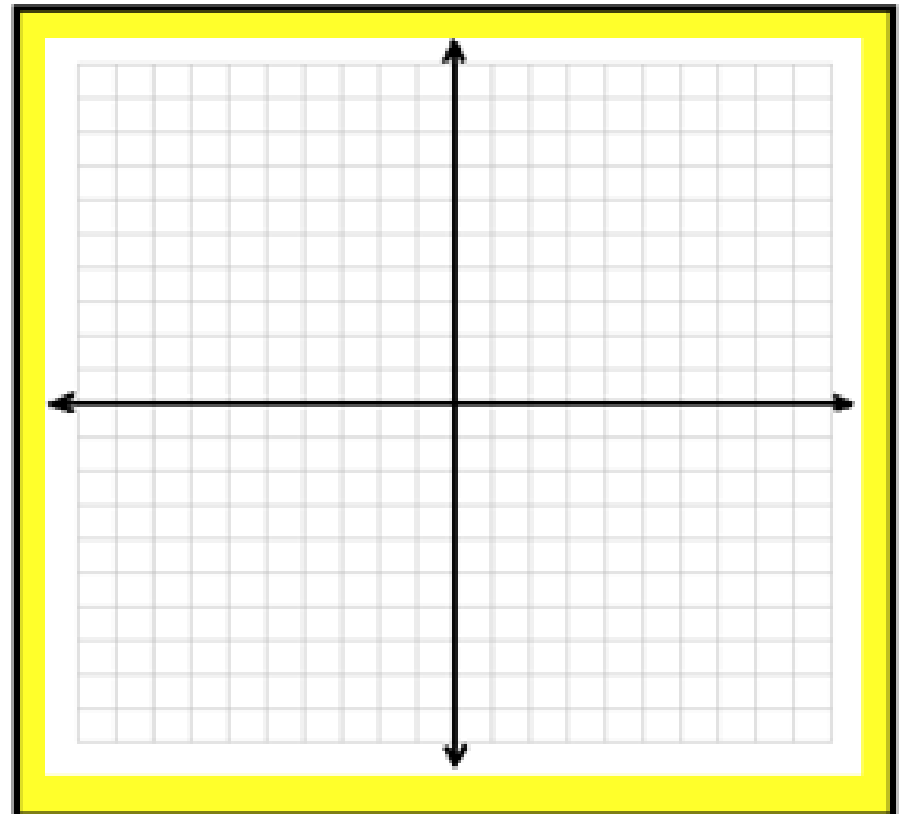
Lesson 3.4: Linear Inequalities

When we graph an inequality, we follow these steps:

1. Graph the boundary (the line) - Determine whether it's a solid line (\leq , \geq) or dashed line ($<$, $>$).
2. Test a point in each region (half-plane).
3. Shade the region whose ordered pair result in a true inequality.

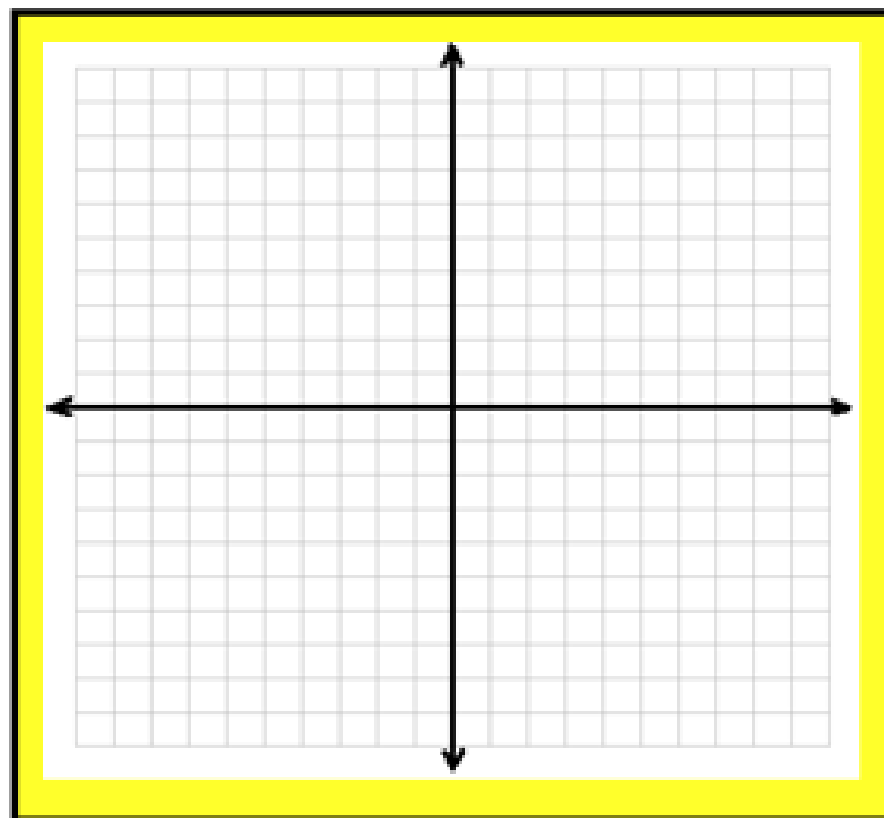
Lesson 3.4: Linear Inequalities

Ex 2: Graph $2y - 3x < 3$



Lesson 3.4: Linear Inequalities

Ex 3: Graph $4x + 3y > 0$



Lesson 3.4: Linear Inequalities

Solving problems involving Linear Inequalities:

Randy really enjoys Wendy's Junior Cheeseburger and Biggie French Fries. However, he knows that his intake of saturated fat during lunch should not exceed 16 grams. Each Junior Cheeseburger contains 6 grams of saturated fat and each Biggie Fries contains 3 grams of saturated fat.

a.) Write a linear inequality that describes Randy's options for eating at Wendy's. That is, write an inequality that represents all the combinations of Junior Cheeseburgers and Biggie Fries that Randy can order.

Lesson 3.4: Linear Inequalities

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That is, write an inequality that represents all the combinations of Junior Cheeseburgers and Biggie Fries that Randy can order.

Lesson 3.4: Linear Inequalities

Linear Inequality: _____

- b.) Can Randy eat 2 Junior Cheeseburgers and 1 Biggie Fry during lunch and stay within his allotment of saturated fat?

Lesson 3.4: Linear Inequalities

Linear Inequality: _____

- c.) Can Randy eat 3 Junior Cheeseburgers and 1 Biggie Fry during lunch and stay within his allotment of saturated fat?

Homework:

Pg. 229: #'s 1-7 all, 9, 13, 19,
23, 29, 31

Graphs must be neat and
accurate!