Lesson 17

Foundations of College Algebra

# Graph Inequalities on the Number Line

## Review

The inequality symbols are:

* means “less than”
* means “greater than”
* means “less than or equal to”
* means “greater than or equal to”

## How To: Graphing Inequalities

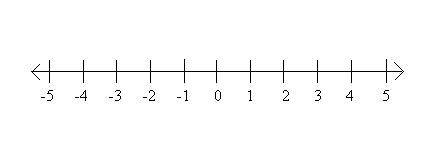
To graph an inequality in one variable, e.g. , on a number line:

1. Put a filled-in circle for “or equal to” over or an open circle over otherwise.
2. Shade to the left of the circle for “less than” or to the right for “greater than”.

## Examples

Graph on the number line.

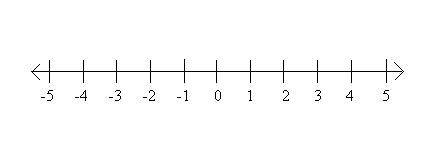
1. , ,



## You Try It

Graph on the number line.

1. , ,



# Use the Properties of Inequality

## Addition Property of Inequality

For any numbers , , and , if then .

* Subtraction is covered by this rule too.
* This works for all inequality symbols.

## Example

Solve the inequality. Graph the solution set. Write the answer in set notation.



## You Try It

Solve the inequality. Graph the solution set. Write the answer in set notation.



## Multiplication Property of Inequality

For any real numbers , , :

* if and , then and
* If and , then and

When we divide or multiply an inequality by a:

* **positive** number, the inequality **stays the same**.
* **negative** number, the inequality **reverses**.

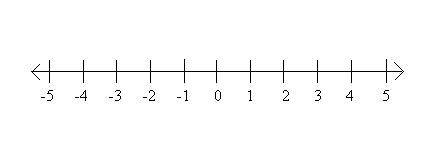
## Example

Solve the inequality. Graph the solution set. Write the answer in set notation.



## You Try It

Solve the inequality. Graph the solution set. Write the answer in set notation.



# Solve Inequalities That Require Simplification

## Examples

Solve the inequality. Write each answer using set notation.

## You Try It

Solve the inequality. Write each answer using set notation.

# Use Interval Notation

## Definition – Interval Notation

* An **interval** is a set of numbers between two numbers (possibly or ) called **endpoints**.
* Brackets denote that an endpoint is included in the interval.
* Parentheses indicate that an endpoint is not included in the interval.

## Interval Notation Rosetta Stone

|  |  |
| --- | --- |
| Set | Interval |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
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## Examples

Graph the solution set of each inequality on a number line and then write it in interval notation.







## You Try it

Graph the solution set of each inequality on a number line and then write it in interval notation.

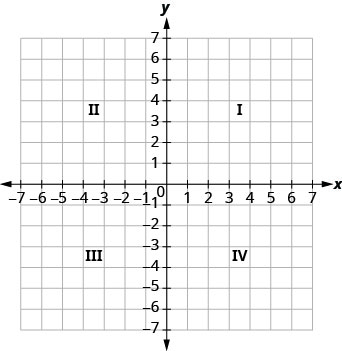




# The Rectangular Coordinate System

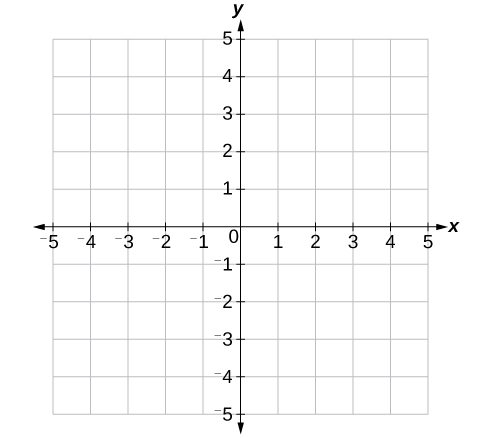
## Definitions

* The **rectangular coordinate system** is shown on the right.
* The horizontal number line is called the **-axis**.
* The vertical number line is called the **-axis***.*
* These axes divide a plane into four regions, called **quadrants**.
* An **ordered pair**, , gives the coordinates of a point in a rectangular coordinate system.
* The first number is the -coordinate.
* The second number is the -coordinate.
* The point is called the **origin**. It is the point where the *x*-axis and *y*-axis intersect.



## Examples

Plot each point in the rectangular coordinate system and identify the quadrant in which the point is located:



## You Try It

Plot each point in the rectangular coordinate system and identify the quadrant in which the point is located:

