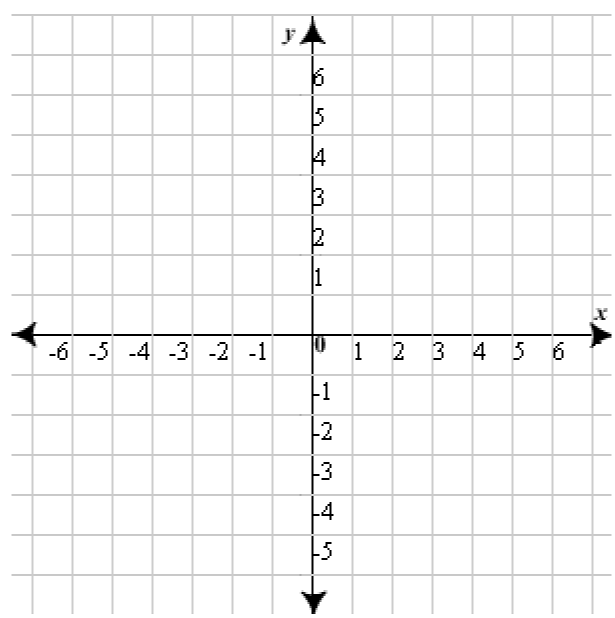
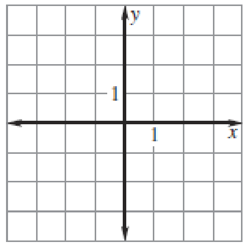
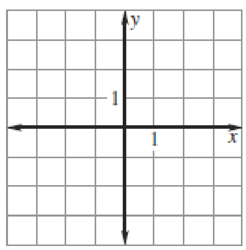
3.1	Solving Linear Systems by Graphing
Objectives	1. Graph and solve systems of linear equations in two variables.
Key Terms	System of linear equations Solution of a system of linear equations
Check whether the ordered pair is a solution to the system.	Is (5, 6) a solution to the system: $-2x + 4y = -14$ $3x + y = 21$
Solve the system of equations graphically.	Solve by graphing: $2x - y = 4$ $6x + 3y = 24$ 

Special System of Equations

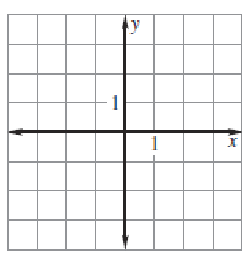
One Solution



No Solution



Infinite Solutions



3.2	Solving Linear Systems Algebraically
Objectives	1. Use algebraic methods to solve linear systems. 2. Use linear systems to model real life situations.
Key Terms	Substitution Linear Combination (Elimination)
The Substitution Method	1. Solve one of the equations for one of its variables. 2. Substitute the expression from **Step 1** into the other equation and solve for the other variable. 3. Substitute the value from **Step 2** into the revised equation form **Step 1** and solve. ***** All solutions are to be written as an ordered pair (x, y) *****
Solve for (x, y) using substitution.	$x + 3y = -2$ $-4x - 5y = 8$ $3x - y = 13$ $2x + 2y = -10$

The Linear Combination Method	1. Multiply one or both of the equations by a constant to obtain coefficients that differ only in sign for one of the variables. 2. Add the revised equations from **Step 1**. Combining like terms will eliminate one of the variables. Solve for the remaining variable. 3. Substitute the value obtained in **Step 2** into either of the original equations and solve for the other variable. ***** All solutions are to be written as an ordered pair (x, y) *****
Solve for (x, y) using elimination.	$5x - 2y = 12$ $-9x - 8y = 19$ $2x + 5y = 6$ $-3x - 2y = 2$
Special Systems of Equations	Solve the system: $x - 2y = 3$ $2x - 4y = 7$

	Solve the system: $6x - 10y = 12$ $-15x + 25y = -30$
Selling ice cream cones at the county fair you make $565 and use 250 cones. A single scoop costs $2 and a double scoop costs $2.50. How many of each type of cone did you sell?	

3.3 Graphing and Solving Systems of Linear Inequalities

Objectives

1. Graph a system of linear inequalities to find the solution to the system.

2. Use systems linear inequalities to solve real life problem.

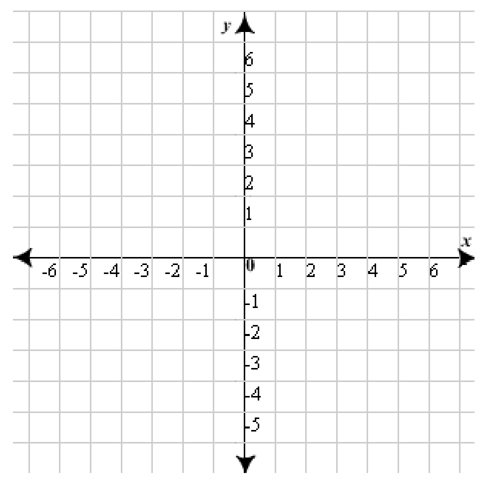
Steps for Graphing

1. Graph the boundary line for each inequality.
   - $<$ or $>$ dashed line
   - $\leq$ or $\geq$ solid line
2. Shade the area that makes all the inequalities true.

Graphing a System of Two Inequalities

Graph the system: $y \geq x - 1$

$y < -2x + 1$

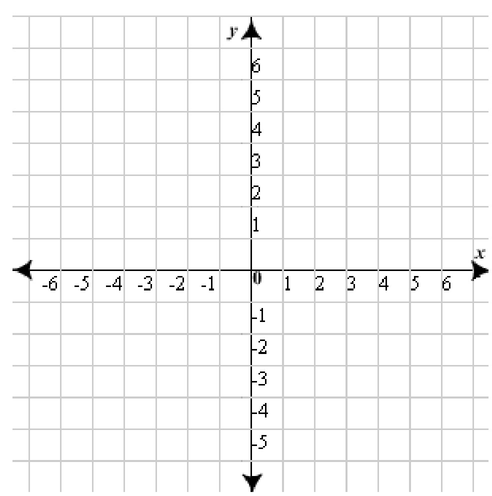


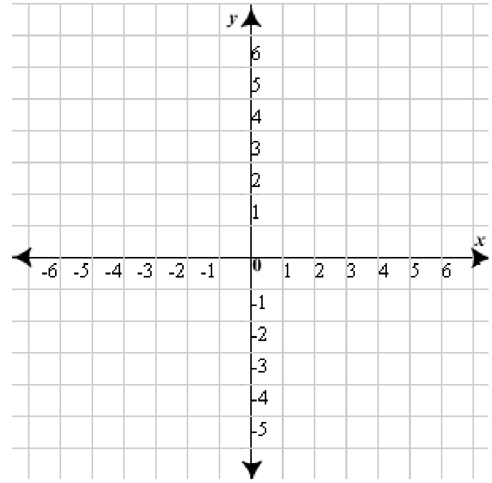
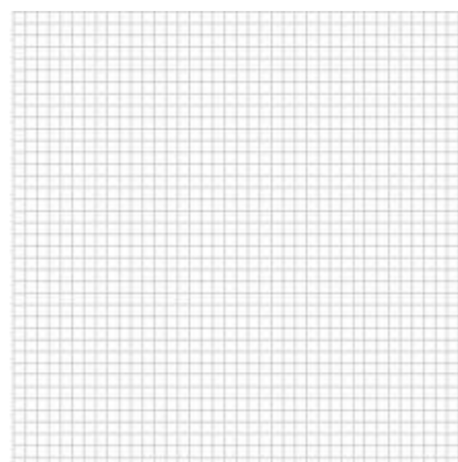
Graph the system of Inequalities.

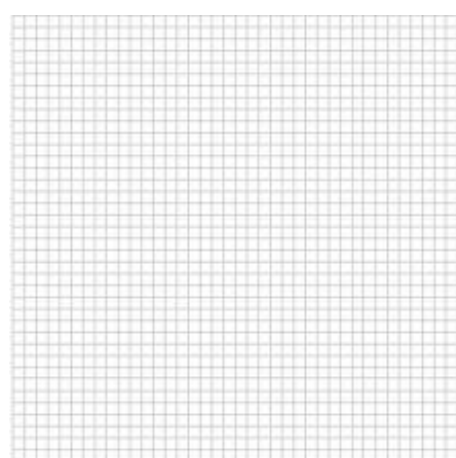
$x \geq 0$

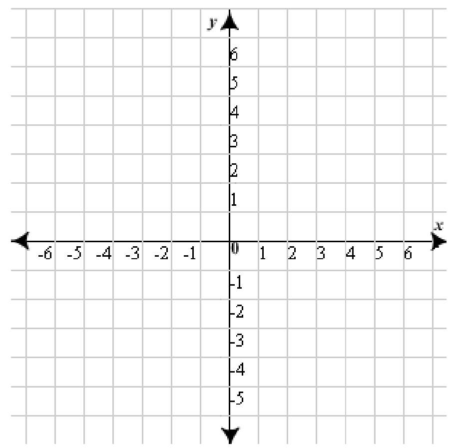
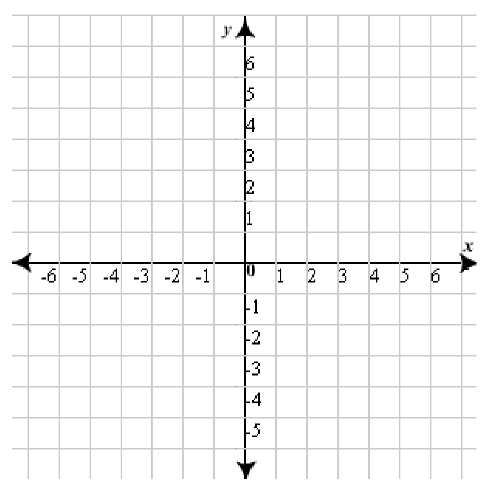
$y \geq 0$

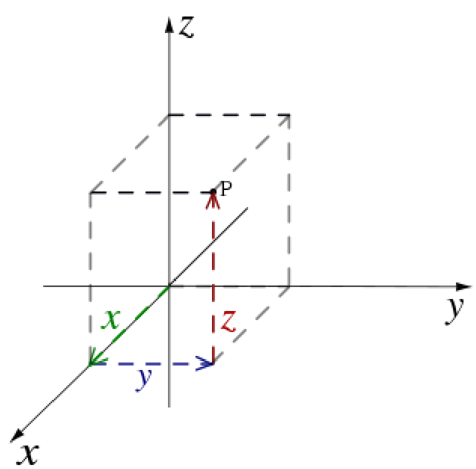
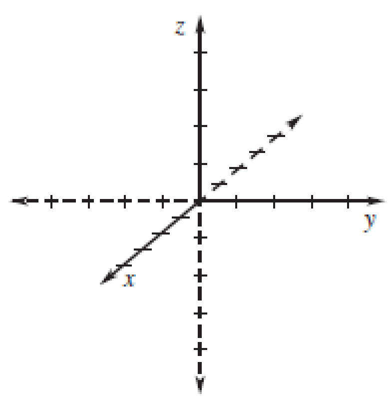
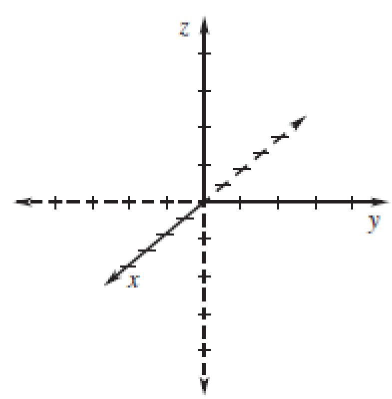
$4x + 3y \leq 24$

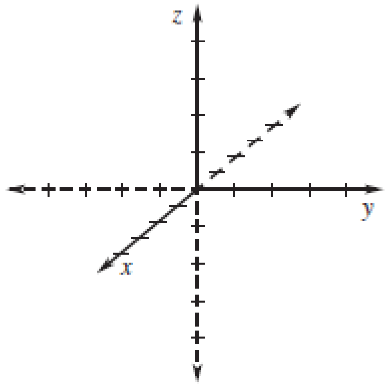
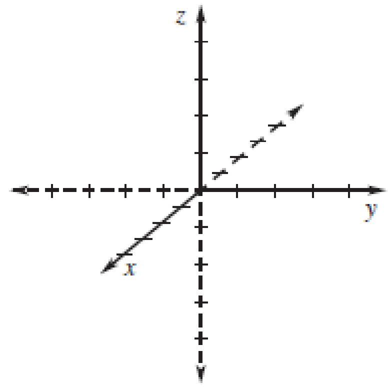


Graph the systems of Inequalities.	$x > 1$ $y \geq 2$ $y \geq 5 - x$ 
You are selling tickets for a school play. Adult tickets are $5 and student tickets are $3. You want to sell at least $1800 worth of tickets. Write a system of linear inequalities for this situation and then graph the solution.	

3.4	**Linear Programming**
Objectives	1. Solve linear programming problems. 2. Use linear programming to solve real life problems.
Key Terms	Linear Programming Optimization Objective Function Constraints Feasible Region
Your club plans to raise money by selling two sizes of fruit baskets. The plan is to buy small baskets for $10 and sell them for $16 and buy large baskets for $15 and sell them for $25. The club president estimates that you will not sell more than 100 baskets. Your club can afford to spend $1200 to buy the baskets. Find the number of small and large baskets you should buy to maximize your profit.	Objective Function Constraints Graph of Feasible Region 

	Vertices of feasible region Calculate maximum profit.
Find the maximum and minimum value of the function.	C = 3x + 2y Objective Function Constraints $x \le 2$ $y \ge 1$ $y - x \le 3$ 
Unbounded Region **Find the maximum and minimum value of the function.**	C = y + 2x Objective Function Constraints $x \ge 0$ $y \ge 0$ $2y + 3x \ge 8$ $3y + x \ge 5$ 

3.5	**Graphing Linear Equations in Three Variables**
Objectives	1. Graph linear equations in three variables and evaluate linear functions of two variables. 2. Use functions of two variables to model real life situations.
Key Terms	Three dimensional coordinate system Ordered Triple Octants
Plotting Points in Three Dimensions	
Plot the ordered triple.	(-4, 3, 2)  (3, -4, 2) 

Graph a linear equation in three variables.	Graph: $3x + 2y + 4z = 12$  Graph: $2x - 3y - 3z = 6$ 
Write the linear function as a function of x and y. Then evaluate the function for the given values.	$3x + 2y + 4z = 12$ $f(5, -2)$
You are painting the inside of your house. The primer costs \$25 a gallon and the paint costs \$30 a gallon. Your painting supplies cost \$15. Write a function in three variables to represent this. **Evaluate the cost of 3 gallons of primer and 2 gallons of paint.**	

3.6	**Solving Systems of Linear Equations in Three Variables**
Objectives	1. Solve system of linear equations in three variables. 2. Use linear systems in three variables to model real life situations.
Key Terms	System of three equations Solution of a system of 3 equations.
	Linear Combination 1. Use the linear combination method to rewrite the linear system in three variables as a linear system in **two** variables. 2. Solve the new linear system for both of its variables. 3. Substitute the values found in **Step 2** into one of the original equations and solve for the remaining variable.
Solve the linear system using linear combination	$4x + 2y - z = 1$ $x - 3y + 2z = 14$ $-x + y + z = -1$

Solve the system.	$x + 3y - 4z = -3$ $-2x + 2y + z = 0$ $3x - 2y + 2z = 8$
	No Solution – If you obtain a FALSE statement while solving, then the system has no solution. **Many Solutions** – If you obtain a TRUE statement while solving and all variables cancel, then the system has many solutions.
Solve the system.	$x + y + z = 2$ $x + y - z = 2$ $2x + 2y + z = 4$

The swim team dominated a meet with 24 individual placers scoring 56 points. First place is worth 5 points, second place is worth 3 points and third place is worth 1 point. The team had as many 3rd place finishers as first and second place. How many swimmers finished in each place?	