Chapter 7

Systems of

Linear Equations

&

Inequalities

**Section 7.1 Solving Linear Systems by Graphing**

*System of Linear Equations*

*Solution of a System of Linear Equations*

**\*\*\* Solving a Linear System Using Graph-and-Check**

1. Write each equation in a form that is easy to graph.

2. Graph both equations in the same coordinate plane.

3. Estimate the coordinates of the point of intersection.

4. Check the coordinates algebraically by substituting into each equation of the

original linear system.

**EXAMPLES**

1. Decide whether the ordered pair is a solution of the system of linear equations.

a. , (1, 13) b. , (6, 1)

2. Solve the linear system graphically.

 a. 

 b. 

 c. 

**Section 7.2 Solving Linear Systems by Substitution**

**\*\*\* Solving a Linear System by Substitution**

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 from Step 1 and solve.

4.  **Check** the solution in each of the original equations.

**EXAMPLES**

1.  2. 

3.  4. 

5.  6. 

7. A quilt maker sews both large and small quilts. A large quilt requires 8 yards of fabric while a small quilt requires 3 yards. How many of each size quilt did she make if she used a total of 90 yards of fabric to make 15 quilts?

**Section 7.3 Solving Linear Systems by Linear Combinations**

\*\*\* **Solving a Linear System by Linear Combinations**

1. **Arrange** the equations with like terms in columns.

2. **Multiply** one or both of the equations by a number to obtain coefficients that

are opposites for one of the variables.

3. **Add** the equations from Step 2. Combining like terms will eliminate one

variable. Solve for the remaining variable.

4. **Substitute** the value obtained in Step 3 into either of the original equations and

solve for the other variable.

5. **Check** the solution in each of the original equations.

**EXAMPLES**

1.  2. 

3.  4. 

5. A toy maker produces wooden trains and wooden planes. Each train requires 3 ounces of paint and each plane requires 5 ounces of paint. The toy maker has 64 ounces of paint. If he wants to use it to paint 14 toys, how many of each can he paint?

**Section 7.4 Applications of Linear Systems**

**\*\*\* Ways to Solve a System of Linear Equations**

1. **Graphing:** A useful method for approximating a solution, checking the reasonableness of a solution, and providing a visual model.

2. **Substitution:** A useful method when one of the variables has a coefficient of 1 or -1.

3. **Linear Combinations:** A useful method when none of the variables has a

coefficient of 1 or -1.

**EXAMPLES**

1. A health food store mixes granola and raisins to make 20 pounds of raisin granola. Granola costs them $4 per pound and raisins that cost them $5 per pound. How many pounds of each should they include if they want the mixture to cost them a total of $85?

2. An owner of two stores buys five large delivery vans and five small delivery vans. One store receives 3 of the large delivery vans and two of the small delivery vans for a total cost of $161,000. The other store receives the rest of the vans for a total cost of $154,000. What is the cost of each type of van?

**Section 7.5 Special Types of Linear Systems**

**Number of Solutions of a Linear System**

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One Solution No Solution Infinitely Many Solutions

**EXAMPLES**

1. Show that this linear system has *no solution*.



2. Show that this linear system has *infinitely many solutions*.



**Section 7.6 Solving Systems of Linear Inequalities**

*System of Linear Inequalities*

*Solution of a System of Linear Inequalities*

*Graph of a System of Linear Inequalities*

**EXAMPLES**

1. Solve the linear system graphically.

 a. 

b. 

c. 