### DAILY LESSON PLAN

**Week of:** March 25th  
**Date:** 3/27/07  
**Grade:** Algebra II  
**Subject:** Math

**General Topic:** Solving systems of linear equations
**Today's Topic:** Solving systems of linear inequalities

**Expected Student Learning Outcomes:**
A.2.P10

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**Standards Addressed:**

<table>
<thead>
<tr>
<th>Standards Addressed</th>
<th>Which learning standard from the MA Frameworks or WPS curriculum does today's lesson address?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number Sense</td>
<td>3. Geometry &amp; Measurement</td>
</tr>
<tr>
<td>2. Patterns, Relations &amp; Functions</td>
<td>4. Statistics &amp; Probability</td>
</tr>
</tbody>
</table>

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**School Improvement Plan:**

**Which (if any) literacy strategy does today's lesson address?**

**LEARN TO READ/READ TO LEARN**

- ____ Preview Text
- ____ Ask Questions
- ____ Activate Prior Knowledge

**Guided Reading**

- ____ Make connections
- ____ Visualize
- ____ Think aloud strategy

**Post Reading**

- ____ Low Stakes Writing
- ____ Projects
- ____ Presentations

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**LEARN TO WRITE/WRITE TO LEARN**

- ____ "I wonder" log entries
- ____ Letters
- ____ Exit slips
- ____ 2 Column notes

---

**Outline of Lesson Activities:**

- Discuss HW: pg 208 #33-38
- Review Ch 3 with Jeopardy
- Enrichment/Practice Work
- HW: pg 881 #39-41

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**Assessment:**

**How will you assess students' understanding of today's lesson?**

- Test
- Quiz
- Verbal Questioning
- Group Work
- Homework (written or reading)
- Project Presentation
- Portfolios
- Other:
Jeopardy

**Matrix:**

100 - Label each part of the matrix:

\[
\begin{array}{ccc}
1 & 2 & 3 \\
4 & 4 & 6 \\
7 & 3 & 5 \\
\end{array}
\]

X \quad Y \quad Z

\[
\begin{array}{ccc}
&B & C \\
D & E & F \\
G & H & I \\
\end{array}
\]

200 - Write a matrix for:

\[
\begin{align*}
x - 2y + 4z &= -8 \\
2x + 2y - z &= 11 \\
Z + 2y &= 10
\end{align*}
\]

\[
\begin{array}{ccc}
1 & -2 & 4 \\
2 & 2 & -1 \\
0 & 2 & 1 \\
\end{array}
\]

X \quad Y \quad Z

300 - Find the inverse of

\[
\begin{pmatrix}
3 & -1 \\
5 & -2
\end{pmatrix}
\]

400 - Solve the system of Equations using the matrix method.

\[
\begin{align*}
x - 2y + 3z &= -3 \\
2x - 3y - z &= 7 \\
3x + y - 2z &= 6
\end{align*}
\]

500 - Solve the system of Equations using the matrix method.

\[
\begin{align*}
\frac{2}{3}x + \frac{4}{3}y &= -7 \\
3x + y &= -9
\end{align*}
\]

**Graphing: (can use calculators)**

100 - Draw an example of a consistent, inconsistent, and (explain) dependent system?

200 - What is the solution to the system of equations? Is it consistent or inconsistent?

\[
\begin{align*}
y &= 3 + x \\
y &= -x + 7
\end{align*}
\]

300 - What is the solution to the system of equations? Is it consistent or inconsistent?

\[
\begin{align*}
y &= 2x + 5 \\
y &= 2x - 3
\end{align*}
\]

400 - Graph the Inequality.

\[
\begin{align*}
x - y &
\end{align*}
\]

500 - Graph the Inequality.

\[
\begin{align*}
x &> 0 \\
y &> 0 \\
x + y &< 8 \\
y &< 8 - x
\end{align*}
\]
3 Variable Systems:

100 – How many solutions are in a system of equations with 3 variables? =3

200 - Write the system of equations

A market sells 3 types of bread.

<table>
<thead>
<tr>
<th></th>
<th>Honey Wheat</th>
<th>Pumpernickel</th>
<th>French</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cust. 1</td>
<td>5 loaves</td>
<td>0</td>
<td>2</td>
<td>5.50</td>
</tr>
<tr>
<td>Cust 2.</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>6.75</td>
</tr>
<tr>
<td>Cust 3.</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>3.00</td>
</tr>
</tbody>
</table>

\[ x=2 \]
\[ 2x + 3z = 13 \quad = (2,5,3) \]
\[ x - 3y + z = -10 \]

\[ 400 \quad x=2 \]
\[ 2x + 3z = 13 \quad = (2,5,3) \]
\[ x - 3y + z = -10 \]

\[ 500 \quad \text{*DAILY DOuble*} \]
\[ x - y + z = 5 \]
\[ 3x + 2y - z = -2 \]
\[ 2x + y + 3z = 10 \quad = (1, -1, 3) \]
**DAILY LESSON PLAN**

**Week of:** March 25

**General Topic:** Solving systems of linear equations

**Today's Topic:** Solving systems of linear equations with 3 variables

**Expected Student Learning Outcomes:**
- What will students know and be able to do as a result of today's lesson?
- To solve systems of equations with 3 variables and review how to solve all systems and techniques

**Standards Addressed:** A-II P10

**School Improvement Plan**

**Which learning standard from the MA Frameworks or WPS curriculum does today's lesson address?**
- 1. Number Sense
- 2. Patterns, Relations & Functions
- 3. Geometry & Measurement
- 4. Statistics & Probability

**Which (if any) literacy strategy does today's lesson address?**

**LEARN TO READ/READ TO LEARN**
- Pre-Reading
  - Preview Text
  - Ask Questions
  - Activate Prior Knowledge
- Guided Reading
  - Make connections
  - Visualize
  - Think aloud strategy
- Post Reading
  - Low Stakes Writing
  - Projects
  - Presentations

**LEARN TO WRITE/WRITE TO LEARN**
- "I wonder" log entries
- Letters
- Exit slips
- 2 Column notes
- Metacognitive Logs

**Outline of Lesson Activities: (to be posted on classroom agenda)**

- Discuss HW pg. 8.1 # 39-41
- Individual work pg. 222 # 1-3 &
- Discuss/correct
- Group work pg. 224 #1-6 #7-13
- Discuss
- HW pg. 226 #1-8
- Tell them to be prepared to ask any questions tomorrow as review

**Assessment:** How will you assess students' understanding of today's lesson?
- Test - Quiz - Verbal Questioning - Group Work - Homework (written or reading)
- Project Presentation - Portfolios
- Other:
39. $x = 2$
   \[ x + y = 5 \quad (2, 3, 1) \]
   \[ x + y + z = 6 \]

   \[ 2 + y = 5 \]
   \[-2 \]
   \[ y = 3 \]

   \[ 2 + 2 + z = 6 \]
   \[ 5 + z = 6 \]
   \[-5 \]
   \[ z = 1 \]

40. $x + y = 2$
   \[ x + y + 3z = 0 \]
   \[ 2x + y = 3 \]

   \[ -(x + y = 2) \]
   \[ 2x + y = 3 \]
   \[-x - y = -2 \]

   \[ x = 1 \]

   \[ 1 + y = 2 \]
   \[-1 \]
   \[ y = 1 \]

   \[ 1 + 3z = 0 \]
   \[ 2 + 3z = 0 \]
   \[-2 \]
   \[ 3z = -2 \]
   \[ z = -\frac{2}{3} \]

   \[ (1, 1, -\frac{2}{3}) \]
   \[ z = -\frac{2}{3} \]

41. $x + y + z = 4$

   \[ 2(2x + y = 0) \]
   \[ 3x - 2y = 1 \]
   \[ 4x + 2y = 0 \]

   \[ \frac{7x}{7} = 1 \quad x = \frac{1}{7} \]

   \[ 2 \cdot \frac{1}{7} + y = 0 \]
   \[ \frac{2}{7} + y = 0 \]
   \[ -\frac{2}{7} \quad -\frac{2}{7} \quad y = -\frac{2}{7} \]
1. inconsistent

2. \[ y = 5x \]
\[ 2y = 10x \text{ infinite} \]
\[ \frac{y}{2} = \frac{5x}{2} \]
\[ y = 5x \]

3. Linear Combination

4. Inverse

7. \[ y = 2x + 5 \]
\[-(y = -7 + 2x) \] NO Solution
\[ y = -2x + 7 \]

\[ \text{No } 12 \]

8. \[ 2(-x + 6y = -1) \]
\[ 2x - 2y = 5 \]
\[ -2x + 12y = -2 \]
\[ 10y = 3 \]
\[ \frac{3}{10} \]
\[ y = \frac{3}{10} \]

\[ 2x - \frac{1}{2} \cdot \frac{3}{10} = 5 \]
\[ \frac{2x}{2} = \frac{28}{5} \cdot \frac{1}{2} = 14/5 \]
\[ 2x - \frac{3}{5} = 5 \cdot \frac{3}{5} + \frac{3}{5} \]
\[ x = 14/5 \]
13-15 - Write matrix

10. \[ \begin{align*}
3x + y - z &= 16 \\
-x - y + 2z &= 4 \\
-2x + 4y + 3z &= -6 \\
\hline
4x - z &= 20
\end{align*} \]

\[ 4 \left( \begin{array}{c}
-x - y + 2z = 4 \\
-2x + 4y + 3z = -6 \\
4x - z = 20
\end{array} \right) \]

\[ \begin{align*}
2x + 11z &= 10 \\
-2(2x + 11z = 10) \\
-4x - 22z &= -20
\end{align*} \]

\[ \begin{align*}
4x - y + 2z &= 4 \\
5 - y &= 4 \\
-5
\end{align*} \]

\[ \begin{align*}
-y &= -1 \\
-1
\end{align*} \]

\[ y = 1 \]

\[ (5, 1, -1) \]
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<th>Week of: March 25, 2007</th>
<th>Date: 3/29/07</th>
<th>Grade: 11</th>
<th>Subject: Alg II</th>
<th>MATH</th>
</tr>
</thead>
</table>

**General Topic:** Solving Systems of Equations
**Today's Topic:** Solving Systems with 2 Variables

**Expected Student Learning Outcomes:**
What will students know and be able to do as a result of today's lesson? Solve systems of linear equations with 2 variables using substitution & linear combination.

**Standards Addressed:**
- Which learning standard from the MA Frameworks or WPS curriculum does today's lesson address?
  - 3. Geometry & Measurement
  - 4. Statistics & Probability

**School Improvement Plan:**
Which (if any) literacy strategy does today's lesson address?

**LEARN TO READ/READ TO LEARN**
- Pre-Reading:
  - Preview Text
  - Ask Questions
  - Activate Prior Knowledge

- Guided Reading:
  - Make connections
  - Visualize
  - Think aloud strategy

- Post Reading:
  - Low Stakes Writing
  - Projects
  - Presentations

**LEARN TO WRITE/WRITE TO LEARN**
- "I wonder" log entries
- Exit slips
- 2 Column notes
- Letters
- Metacognitive Logs

☑ Solve problems using linear equations/inequalities
☑ Apply algebraic and graphical methods to solutions

**Outline of Lesson Activities:**
(to be posted on classroom agenda)
Correct HW pg. 226 #1-8 (SO MIN class)
Discuss Linear systems of Equations and how to solve them in many different ways before Chapter Test.
- Last minute questions.
HW pg. 881 #42-44

**Assessment:**
How will you assess students' understanding of today's lesson?
- Test
- Quiz
- Verbal Questioning
- Group Work
- Homework (written or reading)
- Project Presentation
- Portfolios
- Other:
March 29, 2004
Homework pg. 226 #1-8

1. \( \frac{x+y}{9} = 3 \)
   \[ \begin{align*}
   6x & = 12 \\
   x & = 2
   \end{align*} \]
   \[ \begin{align*}
   2y & = 9 \\
   y & = 4.5
   \end{align*} \]

2. \( 4x - 3y = 7 \)
   \[ \begin{align*}
   12x - 9y & = 7 \\
   -12x + 9y & = -21
   \end{align*} \]
   \[ \begin{align*}
   0 & = -14 \\
   \text{No Solution}
   \end{align*} \]

3. \( 3x + y = 5 \)
   \[ \begin{align*}
   2y & = 10 - 6x \\
   y & = 5 - 3x
   \end{align*} \]
   \[ \begin{align*}
   6x + 2y & = 10 \\
   -2(3x + y) & = -6x - 2y = -10
   \end{align*} \]
   \[ \begin{align*}
   0 & = 0 \quad \text{Infinite Solutions}
   \end{align*} \]

4. \( 3x + 2y = 9 \)
   \[ \begin{align*}
   -x + 4y & = 17
   \end{align*} \]
   \[ \begin{align*}
   (-5, 3) \quad 3(-5) + 2(3) & = 9 \\
   -15 + 6 & = \boxed{-9}
   \end{align*} \]

5. \( a. \quad 3x + y = 5 \)
   \[ \begin{align*}
   6x + 7y & = 8 \\
   y & = -3x + 5
   \end{align*} \]
   \[ \begin{align*}
   7y & = -6x + 8 \\
   \text{Linear combo}
   \end{align*} \]
   \[ \begin{align*}
   -3x - \frac{2}{3} & = 5 + \frac{2}{3} \\
   x & = \frac{2}{5}
   \end{align*} \]
   \[ \begin{align*}
   \frac{5y}{5} & = \frac{9}{5} \\
   y & = \frac{9}{5}
   \end{align*} \]
   \[ \begin{align*}
   x & = \frac{9}{5}
   \end{align*} \]
   \[ \begin{array}{c|c|c}
   x & y & \boxed{z} \\
   \hline
   0 & \frac{5}{2} & \frac{2}{5} \\
   -\frac{4}{2} & 2 & \frac{2}{5}
   \end{array} \]

\[ C \]

\[ \frac{5x}{5} + \frac{2x}{2} = \frac{9}{5} + \frac{2}{5} \\
\frac{9x}{9} + \frac{2x}{2} = \frac{5}{5} + \frac{2}{2} \\
\]
7. \[ x + y \leq 4 \quad y \leq -x + 4 \]
\[ 2x - y > 0 \quad y \leq +2x - 6 \]
\[ x \geq -3 \quad x \geq -3 \]

\[
\begin{array}{c|c}
  \text{x} & \text{y} \\
  \hline
  0 & 4 \\
  3 & 1 \\
  \hline
\end{array}
\quad
\begin{array}{c|c}
  \text{x} & \text{y} \\
  \hline
  1 & -4 \\
  2 & -2 \\
\end{array}
\]

8. \[ x \geq 0 \]
\[ y \geq 0 \]
\[ x + y \leq 9 \quad y \leq -x + 9 \]
\[ y \geq 1.5x \]

\[
\begin{array}{c|c}
  \text{x} & \text{y} \\
  \hline
  0 & 0 \\
  1 & 1.5 \\
\end{array}
\]

March 29, 2007
HW pg. 226 #1-8
# DAILY LESSON PLAN

**Week of:** March 25, 2007  
**Date:** 3/30/07  
**Grade:** 11  
**Subject:** Alg II  
**Math**

## General Topic:
Solving Systems of Linear Equations  
Solving System with 3 variables (HW)

## Today's Topic:
What will students know and be able to do as a result of today's lesson?  
Being able to solve linear equations systems with 2 & 3 variables using graphing substitution, linear combination and solving linear inequalities (Ch. 3 Test)

## Expected Student Learning Outcomes:
Which learning standard from the MA Frameworks or WPS curriculum does today's lesson address?  
1. Number Sense  
2. Patterns, Relations & Functions  
3. Geometry & Measurement  
4. Statistics & Probability

## Standards Addressed:
Which (if any) literacy strategy does today's lesson address?

### LEARN TO READ/READ TO LEARN
- Pre-Reading
  - Preview Text
  - Ask Questions
  - Activate Prior Knowledge
- Guided Reading
  - Make connections
  - Visualize
  - Think aloud strategy
- Post Reading
  - Low Stakes Writing
  - Projects
  - Presentations

### LEARN TO WRITE/WRITE TO LEARN
- "I wonder" log entries
- Letters
- 2 Column notes
- Metacognitive Logs

- Solve problems using linear equations/inequalities
- Apply algebraic and graphical methods to solutions

## Outline of Lesson Activities:
(to be posted on classroom agenda)

Correct HW pg. 801 #42-44  
Last Minute Questions on Solving Systems of Linear Equations  
Test on Chapter 3  
HW pg. 230 #1-27

## Assessment:
How will you assess students' understanding of today's lesson?  
- Test  
- Quiz  
- Verbal Questioning  
- Group Work  
- Homework (written or reading)
- Project Presentation  
- Portfolios
- Other:
\[ 4x + y + 2z = 3 \\
2x + 3y + z = 6 \\
x - 3z = -12 \]

\[ 2x + 3y + z = 0 \\
-2(2x + 3y + z = 6) \]

\[ -4x - 6y - 2z = -12 \]

\[ -4y = -9 \]

\[ \frac{-4y}{-4} = \frac{-9}{-4} \]

\[ y = \frac{9}{4} \]

\[ 3y + 4z = 18 \]

\[ 3 \left( \frac{9}{4} \right) + 4z = 18 \]

\[ \frac{27}{4} + 4z = 18 \]

\[ 4z = \frac{27}{4} \cdot 4 \]

\[ z = \frac{27}{4} \]

\[ 4x + \frac{9}{5} + 2 \cdot \frac{18}{5} = 3 \]

\[ 4x + \frac{9}{5} + \frac{36}{5} = 3 \]

\[ 4x + \frac{45}{5} = 3 \]

\[ 4x + 9 = 3 \]

\[ -9 -9 \]

\[ \frac{4x = -6}{4} \]

\[ x = -\frac{3}{2} \]

\[ 4 \left( -\frac{3}{2} \right) + \frac{9}{5} + 2 \left( \frac{18}{5} \right) \]

\[ -\frac{12}{2} + \frac{9}{5} + \frac{36}{5} \]

\[ -6 + \frac{45}{5} \]

\[ -6 + 9 = 3 \]
43. \[2x + 2y - 2 = 2\]
\[3x + y + 2z = 22\]
\[x - y + 2z = 10\]
\[3x + y + 2z = 22\]
\[x - y + 2z = 10\]
\[4x + 4z = 32\]
\[2x + 2y - 2 = 2\]
\[2(x - y + 2z = 10)\]
\[2x - 2y + 4z = 20\]
\[4x + 3z = 22\]
\[4x + 30 = 22\]
\[-30\]
\[4x = -8\]
\[\frac{4x}{4} = \frac{-8}{4}\]
\[x = -2\]
\[-2 - y + 2(10) = 10\]
\[-2 - y + 20 = 10\]
\[-20 - 20\]
\[-2 - y = -10\]
\[+2\]
\[-y = -8\]
\[\frac{-y}{-1} = \frac{-8}{-1}\]
\[y = 8\]
\[4x + y + 2z = 3\]
\[2x + 3y + z = 6\]
\[2x - 3z = -12\]
\[2\times \frac{3.123}{20}\]
\[\frac{-12}{20}\]
\[\frac{-12 + 18.9}{20}\]
\[\frac{6.9}{20}\]
\[\frac{6.9}{20} = \frac{51}{20}\]
\[x = \frac{51}{20}\]
\[\frac{4x + 4z = 32}{4}\]
\[\frac{42}{4} = \frac{10.5}{3.6}\]
Name: ________________________________  
Chapter 3 Test  
Systems of Linear Equations  

1. A system of consistent linear equations in two variables has __________ solutions.  
   (a) 0    (b) 1    (c) 2    (d) at least 1  
   answer: __________

2. A system of inconsistent linear equations in two variables has __________ solutions.  
   (a) 0    (b) 1    (c) 2    (d) at least 1  
   answer: __________

Solve each system of linear equations if possible.  

3. \[5x + 2y = -4\]  
   \[5x - 2y = -6\]

4. \[y = 2x + 4\]  
   \[x - 4y = -7\]
**Weekly Lesson Plan**

<table>
<thead>
<tr>
<th>Week of:</th>
<th>Date</th>
<th>Grade</th>
<th>Subject</th>
</tr>
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<tbody>
<tr>
<td>April 1, 2007</td>
<td>4/2/2007</td>
<td>11</td>
<td>Alg.II</td>
</tr>
<tr>
<td><strong>General Topic:</strong></td>
<td><strong>Arithmetic Series</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Today's Topic:</strong></td>
<td><strong>Rational and Irrational Numbers</strong></td>
<td></td>
<td></td>
</tr>
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<td><strong>Expected Student Learning Outcomes:</strong></td>
<td>What will students know and be able to do as a result of today's lesson?</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>To simplify square root expressions and examine mathematical structures within Real #'s.</td>
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<td>Visualize</td>
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<td>Think aloud strategy</td>
<td>Presentations</td>
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<td>LEARN TO WRITE/WRITE TO LEARN</td>
<td>I wonder” log entries</td>
<td>Letters</td>
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<td>Exit slips</td>
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<td>Solve problems using linear equations/inequalities</td>
<td>Apply algebraic and graphical methods to solutions</td>
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**Outline of Lesson Activities:** (to be posted on classroom agenda)

**SAT QUESTIONS**

Discuss HW pg. 230 #1-27

Notes: Real #'s, Rational, Irrational, Integers

Pythagorean Theorem
Perfect Squares
Rules for simplifying square roots
- add, subtract, multiply, divide

Do pg. 281 Try 21, 4, 77

HW pg. 285 #59-63

**Assessment:** How will you assess students' understanding of today's lesson?

Test - Quiz - Verbal Questioning - Group Work - Homework (written or reading) -
Project Presentation - Portfolios -
Other:
April 2, 2007
Algebra II

SAT Question
Discuss HW: pg. 230 # 1-27

Notes:
**Real #s:** Any number that you would expect to find on the number line. Decimal numbers or all the numbers on the number line. (6, -7.2, π)

**Integers:** Whole numbers and their opposites. (13, -4, 0, 500)

**Rational:** Whole numbers, fractions, mixed numbers, and decimals; together with their negative images.

As a fraction \( \frac{a}{b} \) where \( a \) and \( b \) are integers \((b \neq 0)\).

- Their ratio can always be named. Hence the term, *rational* number
- Now a fraction can always be expressed as a decimal.
- Either the decimal will terminate -- as \( \frac{1}{4} = .25 \); or
- the decimal will have a predictable pattern -- as \( \frac{1}{11} = .090909 \ldots \)
- A rational number, then, can always be expressed as such a decimal.

Now you might say well then what number is not rational?

An example of such a number is \( \sqrt{2} \) ("Square root of 2").

There is no whole number, no fraction, and no decimal whose square is 2.
\( \sqrt{2} \approx 1.414 \).

Have students put it in their calculators. Find the square root of 2 then multiply it by itself and it does not equal 2.

But it should be clear that no decimal squared will ever produce exactly 2.

So the \( \sqrt{2} \) is an irrational number.

**Irrational:** when an irrational number is stated as a decimal there will not be a predictable pattern of digits.
\( \sqrt{3} \)
\( \sqrt{5}, \sqrt{6}, \sqrt{7}, \sqrt{8} \) *Irrational*

Only the square roots of square numbers are rational. Ex \( \sqrt{4} = 2 \) *Rational*

By recalling the *Pythagorean theorem*, we can see that these irrational numbers are necessary. For if the sides of an *isosceles right triangle* are called 1, then we will have \( 1^2 + 1^2 = 2 \), so that the hypotenuse is \( \sqrt{2} \). There really is a length that
logically deserves the name, "√4." Insofar as numbers name the length of lines, then √2 is a number.

**Pythagorean Theorem:** \(a^2 + b^2 = c^2\)

```
In figure a), the hypotenuse is unknown. We have
\[x^2 = 2^2 + 3^2\]
\[= 4 + 9\]
\[= 13\]
\[x = \sqrt{13}\]
```

```
In figure b), it is the side that is unknown:
\[x^2 + 5^2 = 13^2\]
\[x^2 = 169 - 25\]
\[= 144\]
\[x = \sqrt{144} = 12\]
```

**Perfect Square:** A whole number which is the square of some other whole number. 0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100 which are the squares of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

**Rules for Simplifying Square Roots**

When adding or subtracting you must have the same number in the radical.

**Examples:**
\[2\sqrt{3} + 3\sqrt{3} = 2\sqrt{3} + 3\sqrt{3} = 5\sqrt{3}\]
\[\sqrt{12} - 5\sqrt{7} + 6\sqrt{3} = \sqrt{3^2 \cdot 4} - 5\sqrt{7} + 6\sqrt{3} = 2\sqrt{3} - 5\sqrt{7} + 6\sqrt{3} = 8\sqrt{3} - 5\sqrt{7}\]

**When multiplying:** \(\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}\)

Example:
\[\sqrt{3x} \times \sqrt{6x} = \]
\[2\sqrt{3x} \times \sqrt{6x} = \]

**When Dividing:** \(\frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{a}}{\sqrt{b}}\)

Example:
\[\frac{\sqrt{36}}{\sqrt{4}} = \frac{6}{2} = 3\]
\[\frac{\sqrt{45}}{\sqrt{4}} = \frac{\sqrt{9} \times \sqrt{5}}{2} = \frac{3\sqrt{5}}{2}\]

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d. \( \sqrt{18} \div 100 = \frac{\sqrt{9 \cdot 2}}{10} = \frac{3\sqrt{2}}{10} \)

e. \(-2 \sqrt{3w^2} = -2w\sqrt{3} \)

f. \(8\sqrt{11} + 7\sqrt{5} - 2\sqrt{44} = 8\sqrt{11} + 7\sqrt{5} - 2\cdot 2\sqrt{11} \cdot 2\sqrt{11} \cdot 2 = 8\sqrt{11} + 7\sqrt{5} - 4\sqrt{11} \)

9. \(3\sqrt{5k} \cdot 4\sqrt{15k} = 12\sqrt{75k^2} = 12 \cdot 5\sqrt{k} \cdot \sqrt{3} \cdot 5\cdot 3 \cdot k^2 = 600k\sqrt{3} \)

\[ \boxed{83 \quad 17} \quad \sqrt{4p^2} = 2p \quad \boxed{18} \quad \sqrt{52} + 9\sqrt{2} = 5\sqrt{4 \cdot 13} + 9\sqrt{2} = 14\sqrt{2} \]

\[ \boxed{19} \quad \frac{\sqrt{72} - \sqrt{50}}{\sqrt{36} \cdot 2 - 25 \cdot 2} = \frac{6\sqrt{2} - 5\sqrt{2}}{36 \cdot 2 = 25 \cdot 2} \]

\[ \boxed{20} \quad \sqrt{18} \sqrt{8} = 144 = 12 \]

\[ \boxed{21} \quad \boxed{22} \quad (7\sqrt{3})^2 = 49 \cdot 3 = 147 \quad 12\sqrt{75} \cdot 0.5 \sqrt{24y^2} = \sqrt{900y^2} = 30y \cdot 6 = 180y \]