

Chapter 10

Study Guide

Math 104

1. Make time in your schedule to learn; you cannot take shortcuts.
2. Read each section in your textbook and answer the questions in the study guide before you go to class.
3. Take notes in class, trying to understand as the teacher presents examples and explains concepts.
4. Do your homework (It should be easier after the previous two steps). Make sure to understand what you are doing and be able to solve each problem completely and correctly by yourself.
5. Carry on a conversation with yourself as you work, asking as you start each problem, "What is this? What is my goal? What should my answer look like when I am done?" Then, as you work a problem ask, "What property allows me to take this step?" And at the end, " Does my answer make sense? How can I check it?"
6. Maintain a great attitude about learning Algebra; people who have a good attitude find it easier to learn, and those who learn algebra well usually enjoy it.
7. Go to the lab or your instructor's office and get help when you need it.

Section 10.1 Factoring and Extracting Square Roots

Read section 10.1, pages 568- 572 and answer the following questions as you read:

1. (You did this in chapter 6; it is review here.) Solve by factoring:

$$x^2 - 5x = 14$$

Explain your work in words:

2. Write the rule for extracting square roots:

3. Use the rule you wrote in #2 to solve:

$$(2x - 7)^2 - 8 = 0$$

Explain your work in words:

4. Solve by extracting square roots:

$$(x - 5)^2 + 3 = -9$$

5. What does your text call equations like $x^4 - 3x^2 + 2 = 0$?

Solve the equation using the method of example 4. Explain your steps.

Section 10.2 Completing the Square

Read section 10.2, pages 576 -579 and answer the following questions as you read:

1. Circle the letters of each trinomial that is a perfect square trinomial, then write each perfect square trinomial as a binomial squared:
 - a. $x^2 + 6x + 36$
 - b. $x^2 + 6x + 9$
 - c. $x^2 + 6x - 9$
 - d. $x^2 - 6x + 9$
 - e. $x^2 + 5x + \frac{25}{4}$
 - f. $x^2 - 14x + 49$
2. Explain what a perfect square trinomial is:

3. Write the rule to complete the square.

4. Add a term to each of the following expressions to create a perfect square trinomial, then write the expression in completed square form.
 - a. $x^2 - 12x$
 - b. $x^2 + 7x$

5. Solve the equation by completing the square:

$$x^2 - 7x + 3 = 0$$

Explain your work in words:

Section 10.3 The Quadratic Formula

Read section 10.3, pages 583 - 587 and answer the following questions as you read:

1. Write the quadratic formula:
2. What is the quadratic formula used for?
3. Solve by using the quadratic formula:
 $3x^2 - 5x = 9$ Explain your work in words:
4. What is the discriminant? What information does it give us about the solutions of a quadratic equation?
5. Explain why the quadratic equation must have two distinct rational solutions if the discriminant is a nonzero perfect square.
6. Explain why the quadratic equation must have two imaginary solutions if the discriminant is a negative number

7. I calculated the discriminant of a quadratic equation to be 16. How many and what types of solutions does the quadratic equation have?

8. You have learned four ways to solve quadratic equations:

- a. factoring
- b. extracting square roots
- c. completing the square
- d. quadratic formula

Which one cannot always be used?

How are (b) and (c) related?

How are (c) and (d) related?

Section 10.4 Graphs of Quadratic Functions

Read section 10.4, pages 592 - 598 and answer the following questions as you read:

1. What is the graph of a quadratic function called?

2. Write the standard form of the quadratic function.

3. What does symmetric mean?

4. For each of the following quadratic functions, give the point of the vertex of the graph and state whether the point is a minimum or maximum.

Function	Vertex	Opens up or down?	Minimum or maximum?
$f(x) = -2x^2$			
$g(x) = 3(x+3)^2$			
$h(x) = -(x-2)^2 + 5$			
$f(x) = 2(x+1)^2 - 1$			

5. There are two ways to find the vertex of a parabola. Find the vertex of $f(x) = x^2 - 8x + 1$ in each of the following ways and discuss which you think is easier.

a. Complete the square:

b. With the formula (Look at example 2).

6. For the function $h(x) = x^2 + 4x + 2$

a. Find the vertex

Graph:

b. Find the x-intercepts (if there are any)

c. Find the y-intercept

7. Write the equation of the parabola $y = a(x - h)^2 + k$ that has vertex (3, -1) and passes through the point (1, 2).

Section 10.5 Applications of Quadratic Equations

Read section 10.5, pages 603 - 608 then try to use tables and/or verbal models to organize and solve the following applications.

1. A manager of a computer store bought several computers of the same model for \$27,000. When all but three of the computers had been sold at a profit of \$750 per computer, the original investment of \$27,000 had been regained. How many computers were sold, and what was the selling price of each? (use only one variable)

	Number of computers	Price of each computer
What the store paid		
What the store charged		

Write a verbal model that describes the relationship between the price the store paid and the price the store charged.

Write a mathematical equation from the verbal model above, then solve and check.

3. Solve the quadratic inequality

$$x^2 - 4x = -3$$

Explain your work in words:

4. The graph of the equation $y = x^2 + 3x + 7$ is a parabola opening up with vertex at $\left(-\frac{3}{2}, 4\frac{3}{4}\right)$. Does the graph intersect the x-axis?

From the answer, solve the inequalities $x^2 + 3x + 7 \geq 0$ and $x^2 + 3x + 7 \leq 0$.

5. The graph of $y = -x^2 - 6x - 9$ is a parabola opening down whose vertex touches the x-axis in exactly one point, $(-3, 0)$. From this information solve the inequality $-x^2 - 6x - 9 < 0$.

6. What types of numbers make up the critical numbers of a rational inequality?

7. Solve the rational inequality $\frac{x}{x+4} > 2$ (Note the Study Tip in the margin of p. 618)

Explain in words