

COLLEGE IV



MATHEMATICS MODULE 57-20-21
QUADRATIC EQUATIONS AND INEQUALITIES*

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*See special instructions in Learning Sequence

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57-20-21

MATHEMATICS MODULE 57-20-21
QUADRATIC EQUATIONS AND INEQUALITIES

PREREQUISITE

Mathematics Module 57-20-17, "Linear Equations and Inequalities"

RATIONALE

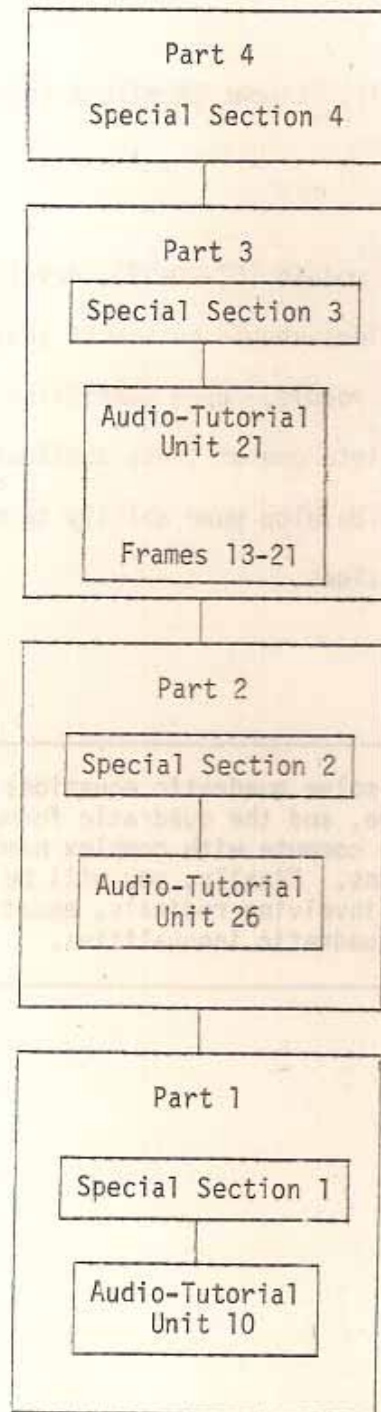
As stated in the previous module (57-20-17), developing the ability to solve application problems should be one of your purposes for studying each mathematics module. Upon completion of this module, you will be ready to complete one of these application modules. In addition, you continue to develop your ability to manipulate various types of algebraic expressions.

OBJECTIVE

You will be able to solve quadratic equations by factoring, completing the square, and the quadratic formula. You will also be able to compute with complex numbers and use them in your solutions. Finally, you will be able to solve quadratic equations involving radicals, equations in quadratic form and quadratic inequalities.

LEARNING SEQUENCE

Note: This is a 1 credit module.



EQUIPMENT REQUIRED

You need tapes for Units 10, 21, and 26 of Intermediate Algebra, the written material in this module, and the corresponding unit pages with this module number. The tapes can be checked out in the Audio-Visual Center, the unit pages can be checked out in the library, and your one set of exchange cassettes must be purchased in the bookstore.

This module may be taken wherever a cassette player can be found. It can also be completed in the Audio-Visual Center on campus using the Center's reel-reel tapes and players.

INSTRUCTIONS

The module is divided into parts.

For the first three parts you should have:

- 1) A tape from the A-V Center labeled with the same number as the unit,
- 2) The printed frames for the unit from the library, and
- 3) The practice exercises in this package for the part.

Part 4 does not use a tape.

The Module Self-Assessment Test should be used to determine whether you are ready for the mastery test for the module. The mastery test (for credit) can be obtained by contacting a tutor or mathematics instructor in College IV. Each module mastery test consists of problems similar to the Self-Assessment Test. You should get at least 90% of the questions correct.

Use the answers wisely: Look at them only after you work each test or exercise.

You should stop and replay any part of the tape you do not understand. Sometimes replaying part of a tape several times will make the words more meaningful, and thus will help you understand more difficult concepts. If you already understand the material presented on a section of the tape, advance the tape to the next section. It is also possible that you may not want to complete this module in one sitting; if this is the case, modules may easily be stopped or started after each unit.

You are encouraged to take notes on any part of the module you purchased. Please do not write on any other part of the module. Remember, you are encouraged to contact (in person or by phone) a College IV mathematics tutor or instructor if you have any questions, or if you need help on a Self-Assessment Test after you have completed the material.

Part 1

Solutions of Quadratic Equations

Objectives for Part 1

Upon completion of this part you will be able to:

1. Solve quadratic equations by factoring,
2. Given the roots of a quadratic equation, determine the equation,
3. Solve quadratic equations of the form $x^2=a$,
4. Solve quadratic equations by completing the square,
5. Solve quadratic equations using the quadratic formula, which is to be memorized, and
6. Use the discriminant to classify the roots of a quadratic equation.

Special Section 1

Here are some additional exercises to help you determine your understanding of Part 1. Selected solutions appear on page 22. Exercises like these will be on the mastery test. Notice that each type of question is keyed to frame numbers in Unit 10.

1. Solve by Factoring: Frames 1-12

a) $(x+1)(3x-1)=0$	b) $(2x-a)(x+2a)=0$	c) $x^2=x$
d) $2x^2-18=0$	e) $3x(2x-4)=0$	f) $6=-x(x+5)$
g) $x(3x+2)=(x+2)^2$	h) $10x^2+x-2=0$	i) $2y^2-y-3=0$
j) $x(x-2)=9-2x$	k) $x^2-2ax=15a^2$	l) $(x-2)(x+1)=4$
m) $\frac{x}{x-1} - \frac{x}{x+1} = \frac{4}{3}$	n) $12x^2=8x+15$	o) $3 = \frac{10}{x^2} - \frac{7}{x}$

These equations are not quadratic but can be solved using the factoring method.

p) $x^3-5x^2+6x=0$	q) $4x^3+11x^2=-6x$	r) $x^3+2x^2=3x$
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2. For each part determine a quadratic equation with integer coefficients that has the given solution set. Frames 13-15.

a) $\{0, -5\}$	b) $\{a, 2a\}$	c) $\{\frac{1}{2}, -3\}$
d) $\{a, -a\}$	e) $\{\frac{1}{2}, \frac{1}{4}\}$	f) $\{4, c\}$

3. Solve each equation by extracting roots. Frames 16-24.

a) $7x^2-63=0$	b) $3x^2=15$	c) $(x+1)^2=4$
d) $(y-4)^2=16$	e) $\frac{ax^2}{b} - c=0$	f) $\frac{2}{3}x^2=4$
g) $2(ax-b)^2=32$	h) $(x+\frac{1}{4})^2=3$	i) $(2x-a)^2=9$

4. Solve each equation by completing the square. Frames 25-34.

- a) $x^2=6x$ b) $x^2-12x=-35$ c) $2x^2+x-1=0$
d) $2x^2+4x=-3$ e) $x^2-2x+1=0$

5. Write the quadratic formula and use it to solve each equation.

Frames 35-39.

- a) $x^2-3x+1=0$ b) $x^2+2x=3$ c) $0=2x^2+3x-2$
d) $2x^2=x+3$ e) $\frac{x^2}{4} = \frac{5}{4} - x$ f) $\frac{x^2}{4} = 3 - \frac{x}{4}$
g) $\frac{x^2-3}{2} + \frac{x}{4} = 1$ h) $x^2+2x=-(c+3)$ i) $2x^2-kx+3=0$

6. Use the discriminant to classify the roots of each equation without solving the equation.

- a) $-3x=-x^2-1$ b) $x^2-4x+4=0$ c) $x^2-3x=-35$
d) $x^2=12x+4$ e) x^2-x-3