

TABLE OF CONTENTS

Sample Screen

CHAPTER 1: *Sets and the Real Numbers*

1.1	Sets: Basic Terms and Notations	1-11
1.2	Equalities and Inequalities	12-17
1.3	Operations on Real Numbers	18-31
1.4	Properties of Real Numbers	32-39
1.5	Chapter Summary	40-43
1.6	Review Exercises	44-47
1.7	Self Test	47-48

CHAPTER 2: *Linear Equations and Inequalities*

2.1	Simplifying Expressions	49-53
2.2	Linear Equations In One Variable	54-60
2.3	Applications of Linear Equations	61-68
2.4	Literal Equations	69-73
2.5	Ratios and Proportions	74-79
2.6	Applications (Continued)	80-87
2.7	Linear Inequalities in One Variable	87-95
2.8	Set Operations	95-104
2.9	Equations and Inequalities involving Absolute Values	104-111
2.10	Chapter Summary	111-115
2.11	Review Exercises	115-117
2.12	Self Test	118

CHAPTER 3: *Exponents, Polynomials, and Factoring*

3.1	Exponents and Scientific Notations	119-132
3.2	Polynomials	133-138
3.3	Multiplication of Polynomials and Special Products	139-146
3.4	Quotient of Polynomials	146-152
3.5	Factoring Polynomials	153-171
3.6	Solving Quadratic Equations by Factoring	172-176
3.7	Applications of Quadratic Equations	176-180
3.8	Chapter Summary	181-186
3.9	Review Exercises	186-188
3.10	Self Test	188-189

Objective: Subsets and Notations

Pictorially, a non-empty set is represented by a circle-like closed figure inside a bigger rectangle. This is called a **Venn diagram**.

In figure, the set represented by a circle marked **A** is a **subset** of the set represented by the larger circle marked **B**.

In figure, the set **A** is **not a subset** of **B**.

Special Properties :

- $A \subseteq A$ for any set A . A set is always a subset of itself.
- $\phi \subseteq A$ for any set A . The null set is a subset of every set.
- If two sets A and B are equal, then $A \subseteq B$ and $B \subseteq A$.

Objective: Solve Linear Inequalities

Solve the inequality. Graph the solution.

$3 + 4x < 3x + 11$

Solution :

$$3 + 4x < 3x + 11$$

$$-x + 4x < -3 + 3x + 11 \quad \text{Add } -3 \text{ to both sides.}$$

$$4x < 3x + 8$$

$$-3x + 4x < -3x + 3x + 8 \quad \text{Add } -3x \text{ to both sides.}$$

$$x < 8$$

The graph of the solution is:

Objective: Factor Special Types of Polynomials

The difference of two cubes can be factored with the help of the following formula.

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

The result may be verified by expanding the product on the right.

For example,

$$x^3 - 125$$

$$= (x^3) - 5^3 \quad \text{Difference of two cubes.}$$

$$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$$

$$= (x - 5) [(x)^2 + 5(x) + (5)^2]$$

$$= (x - 5) (x^2 + 5x + 25)$$

Table of Contents

CHAPTER 4: *Rational Expressions*

4.1	Simplify, Multiply, and Divide Rational Expressions	191-202
4.2	Addition and Subtraction of Rational Expressions	203-219
4.3	Equations Containing Rational Expressions	220-224
4.4	Applications of Rational Expressions	225-233
4.5	Chapter Summary	234-237
4.6	Review Exercises	238-241
4.7	Self Test	241-242

CHAPTER 5: *Roots, Radicals, and Complex Numbers*

5.1	Finding Roots	243-249
5.2	Multiplication and Division of Radicals	250-256
5.3	Addition and Subtraction of Radicals	256-260
5.4	Rational Exponents	260-266
5.5	Rationalizing the Denominator	267-270
5.6	Equations with Radicals	271-276
5.7	Complex Numbers	277-284
5.8	Chapter Summary	285-288
5.9	Review Exercises	288-290
5.10	Self Test	291

CHAPTER 6: *Quadratic Equations and Inequalities*

6.1	Solutions by Completing Squares	293-302
6.2	Solutions by Using Quadratic Formula	303-310
6.3	Solutions of Equations Reducible to Quadratic Form and Applications	310-321
6.4	Solving Quadratic Inequalities	322-331
6.5	Chapter Summary	332-336
6.6	Review Exercises	336-338
6.7	Self Test	338

Sample Screen

Objective: Complex Fractions
Simplify the complex fraction.

Solution:

$$\frac{\frac{3}{x-1} + \frac{4}{x+2}}{\frac{1}{x} - \frac{9x+4}{x+5}}$$

Solution:

$$\frac{\frac{3}{x-1} + \frac{4}{x+2}}{\frac{1}{x} - \frac{9x+4}{x+5}} = \frac{\frac{7x+2}{(x-1)(x+2)}}{\frac{-9x^2-3x+5}{x(x+5)}}$$

Step 3: Divide the numerator by the denominator.

$$\frac{7x+2}{(x-1)(x+2)} \div \frac{-9x^2-3x+5}{x(x+5)} = \frac{7x+2}{(x-1)(x+2)} \cdot \frac{x(x+5)}{-9x^2-3x+5}$$

$$= \frac{x(7x+2)(x+5)}{(x-1)(x+2)(-9x^2-3x+5)}$$

Objective: Finding Square Roots and Higher Roots

If n is odd, then for any real number a there is only one real n th root, which is denoted by $\sqrt[n]{a}$.

Anatomy of a root symbol:

n is called the **root index**.

$\sqrt{\quad}$ is called the **radical sign**.

a is called the **radicand**.

$\sqrt[n]{a}$ is called the **radical expression**.

Objective: Solving Quadratic Inequalities

Consider the equation: $x^2 - 5x + 4 = 0$
Its solution are $x = 4$ and $x = 1$.

The points 1 and 4 divide the number line into three regions.

Region I: The set of all numbers less than 1
Region II: The set of all numbers between 1 and 4
Region III: The set of all numbers greater than 4

Sample Screen

CHAPTER 7: *Linear Equations/Inequalities in Two Variables*

7.1	Linear Equations in Two Variables	339-356
7.2	Slope of a Line	357-364
7.3	Equation of a Line	365-372
7.4	Graphing Linear Inequalities in Two Variables	372-376
7.5	Chapter Summary	376-378
7.6	Review Exercises	379-381
7.7	Self Test	381-382

CHAPTER 8: *System of Linear Equations and Inequalities in Two Variables*

8.1	System of Linear Equations in Two Variables	383-391
8.2	System of Linear Inequalities in Two Variables	392-395
8.3	System of Linear Equations in More Than Two Variables	395-405
8.4	Gauss-Jordan Method of Solving System of Linear Equations	406-416
8.5	Determinants and its use for solution of the system	417-427
8.6	Chapter Summary	428-431
8.7	Review Exercises	432
8.8	Self Test	433

CHAPTER 9: *Functions*

9.1	Introduction to Functions	435-450
9.2	Domain and Range of a Function	451-456
9.3	Operations on Functions	456-463
9.4	Graphical Representation of a Function	464-475
9.5	Chapter Summary	476-480
9.6	Review Exercises	481-484
9.7	Self Test	484-485

Objective: Slope of Parallel and Perpendicular Lines

Verify Skill | Discussion | Example

Parallel lines | **Perpendicular lines** ✓

Next, consider the graphs of $-2y = x + 1$, and $y = 2x$.
Solving for y , we get
 $y = -\frac{1}{2}x - \frac{1}{2}$ and $y = 2x$

Notice that their slopes are respectively $-\frac{1}{2}$ and 2 .
Product of their slopes is -1 .

The two lines as shown in Figure (ii) are **perpendicular**.

Any two lines, neither of which is horizontal or vertical, are perpendicular if and only if the product of their slopes is -1 .

Figure (ii)

Copyright © 2005 Edwoo International, Inc.

Objective: System of Inequalities in Two Variables

Discussion | Example

Graphing the following linear system:
 $x + y \leq 2$
 $2x - y > 3$

Step 1: Graph the inequality $x + y \leq 2$.
[Show steps](#)

Step 2: Graph the inequality $2x - y > 3$ in the same coordinate plane.
[Show steps](#)

Step 3: The solution of the system is given by the **overlapping** region.

Copyright © 2005 Edwoo International, Inc.

Objective: Interpreting a Graph

New Version | Draw the graph

$f(x) = \begin{cases} 2 - x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 4 & \text{if } x > 1 \end{cases}$

Solution:

Step 1: All inputs are acceptable.
Step 2: Evaluate the function at each x value.

Let $y = \begin{cases} 2 - x & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 4 & \text{if } x > 1 \end{cases}$

x	-1	0	1	2	3
y	3	2	3	4	4

Step 3: Plot the ordered pairs of the table.
Step 4: Join the point and draw the graph of each piece of the function.

Plot five points to draw the graph:
→ Select two points for $x < 1$,
→ one point for $x = 1$ and
→ two points for $x > 1$.

Reset | **Done** | Click on Reset to clear the graph. Click on Done after plotting five points.

Copyright © 2005 Edwoo International, Inc.

Sample Screen

CHAPTER 10: *Variation and Conic Sections*

10.1	Variation	487-494
10.2	Circle	495-499
10.3	Parabola	500-509
10.4	Ellipse	510-519
10.5	Hyperbola	520-534
10.6	Chapter Summary	535-545
10.7	Review Exercises	545-547
10.8	Self Test	547

CHAPTER 11: *Exponential and Logarithmic Functions*

11.1	Inverse Functions	549-559
11.2	Exponential Functions	559-564
11.3	The Meaning of Logarithms	564-570
11.4	The Properties of Logarithms	570-575
11.5	Exponential Equations	575-578
11.6	Logarithmic Equations	579-583
11.7	Applications	584-589
11.8	Chapter Summary	589-596
11.9	Review Exercises	596-598
11.10	Self Test	598

CHAPTER 12: *Sequences, Series, and Binomial Expansion*

12.1	Sequences	599-604
12.2	Arithmetic Sequences	605-611
12.3	Geometric Sequences	611-618
12.4	Arithmetic Series	618-623
12.5	Geometric Series	624-627
12.6	Pascal's Triangle and Binomial Theorem	628-634
12.7	Chapter Summary	635-638
12.8	Review Exercises	639-640
12.9	Self Test	640

Answers A.1 - A.37

Index I.1 - I.4

Objective: To find the equation of a Hyperbola from its definition

1 Circle

2 Ellipse

3 Parabola

4 One side of Hyperbola

Standard form of the equation of a circle is :
 $(x - h)^2 + (y - k)^2 = r^2$
 Where, $C(h, k)$ is the center of the circle,
 $Q(x, y)$ is any point on the circle and
 r is the radius.

Objective: One-to-One Function

New Version! Determine whether or not the graph represents a one-to-one function.

One-to-One Function
 Not One-to-One Function

Solution :

No vertical line intersects the graph in more than one point. Hence, the graph is a function.
 The horizontal line test fails, because at least one horizontal line meets the graph in two points.

Conclusion:
 Therefore, the graph **does not** represent a One-to-One function.

Horizontal Line Test

Objective: General Term of an Arithmetic Sequence

Formula for the n^{th} term of an arithmetic sequence :
 For an arithmetic sequence with first term a_1 and common difference d , the general term or the n^{th} term a_n is given by

$$a_n = a_1 + (n - 1)d$$

Example Find the general term of the arithmetic sequence $-7, -2, 3, 8, \dots$

Solution : Here, $a_1 = -7$ and $d = -2 - (-7) = 5$
 Therefore,
 $a_n = a_1 + (n - 1)d$
 $= -7 + (n - 1)5$
 $= -7 + 5n - 5$
 $= 5n - 12.$