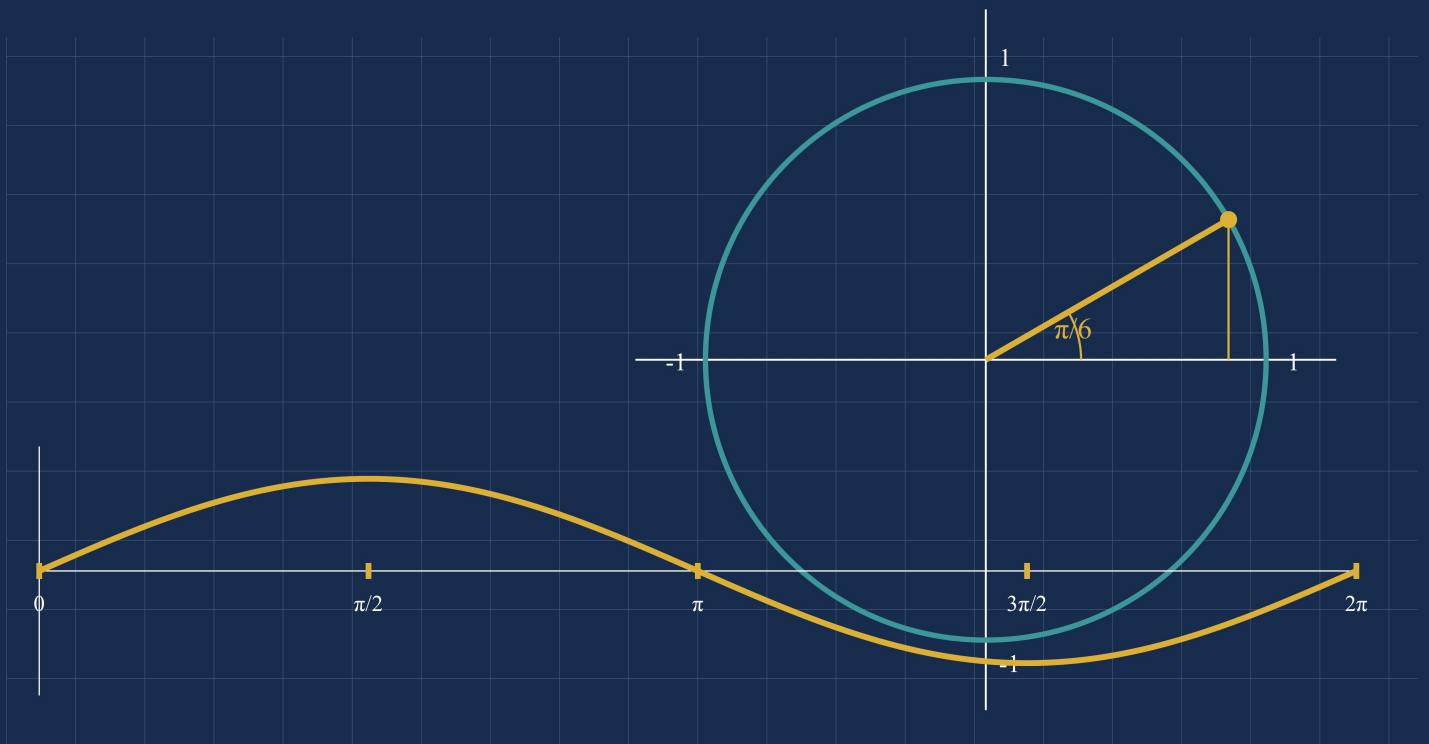


TRIGONOMETRY

FOR COLLEGE



A Complete Course in
Trigonometric Functions,
Identities, Equations,
Graphs, and Applications

Dr. Kam Berenji

Trigonometry for College

A Complete Course in Trigonometric Functions, Identities,
Equations, Graphs, and Applications

Dr. Kam Berenji

Mathlibros.com

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This independent educational workbook is designed to help college students and adult learners study and practice trigonometry. It is not affiliated with, sponsored by, or endorsed by any college, university, testing organization, or textbook publisher.

The examples, exercises, answer keys, and worked solutions in this book are original instructional materials prepared for this publication. Topic coverage has been reviewed for standard college-trigonometry scope and sequence without affiliation or endorsement by any outside publisher.

How to Use This Book

This book is organized as a complete college trigonometry course. Each chapter begins with core concepts, continues through worked examples, and ends with practice problems and detailed solutions.

For best results:

1. Read the concept summary before attempting the examples.
2. Cover each worked solution and try the example independently.
3. Complete the practice set in order before checking the answer key.
4. Review the detailed solutions for any problem that felt uncertain.
5. Return to the chapter summary before beginning mixed review or exams.

Course Scope

This course covers trigonometric functions, identities, equations, graphs, and applications. The sequence is designed for college students who need a full review of trigonometry for coursework, placement preparation, precalculus readiness, or independent study.

Area	Included Skills
Functions	Right-triangle ratios, unit-circle values, reciprocal functions, inverse functions
Identities	Reciprocal, quotient, Pythagorean, sum, difference, double-angle, and half-angle identities
Equations	Basic, factored, quadratic-form, identity-based, and general-solution equations
Graphs	Sine, cosine, tangent, reciprocal graphs, transformations, asymptotes, amplitude, period, and phase shift
Applications	Modeling, right-triangle applications, oblique triangles, vectors, polar coordinates, and mixed review

Contents

How to Use This Book	iii
Course Scope	iv
1 Angles, Radians, and Circular Measure	1
1.1 Chapter Goals	1
1.2 Angles in Standard Position	1
1.3 Degrees and Radians	2
1.3.1 Conversion Formulas	2
1.4 Coterminal Angles	3
1.5 Reference Angles	3
1.6 Arc Length and Sector Area	4
1.7 Guided Practice	5
1.8 Independent Practice	5
1.9 College Mastery Review	6
1.10 Answer Key	7
1.11 Detailed Solutions	8
1.12 College Extension: Angle Fluency and Circular Motion	9
1.12.1 Additional Worked Examples	10
1.12.2 Error Clinic	11
1.12.3 Extended College Practice	11
1.12.4 Method-Choice Drill	15
1.12.5 Answer and Solution Sketches	17

8	Inverse Trigonometric Functions	110
8.1	Chapter Goals	110
8.2	A Working View	110
8.3	Worked Examples	111
8.4	Guided Practice	111
8.5	Independent Practice	112
8.6	College Mastery Review	113
8.7	Answer Key	113
8.8	Detailed Solutions	115
8.9	College Extension: Inverse Trig Ranges and Triangles	115
8.9.1	Additional Worked Examples	116
8.9.2	Error Clinic	117
8.9.3	Extended College Practice	117
8.9.4	Method-Choice Drill	121
8.9.5	Answer and Solution Sketches	123
9	Solving Trigonometric Equations	125
9.1	Chapter Goals	125
9.2	A Working View	125
9.3	Worked Examples	126
9.4	Guided Practice	126
9.5	Independent Practice	127
9.6	College Mastery Review	128
9.7	Answer Key	128
9.8	Detailed Solutions	130
9.9	College Extension: Equation Solving and General Solutions	130
9.9.1	Additional Worked Examples	131
9.9.2	Error Clinic	132
9.9.3	Extended College Practice	132
9.9.4	Method-Choice Drill	137
9.9.5	Answer and Solution Sketches	138

Example 1.4: Find a reference angle

Find the reference angle for 225° .

The angle 225° is in Quadrant III. For Quadrant III:

$$\theta_{\text{ref}} = \theta - 180^\circ$$

$$225^\circ - 180^\circ = 45^\circ$$

The reference angle is 45° .

1.6 Arc Length and Sector Area

Radians make circular formulas simple. If θ is measured in radians, then:

$$s = r\theta$$

$$A = \frac{1}{2}r^2\theta$$

where s is arc length and A is sector area.

Example 1.5: Find arc length

A circle has radius 8 cm. Find the arc length subtended by a central angle of $\frac{3\pi}{4}$ radians.

$$s = r\theta = 8 \left(\frac{3\pi}{4} \right) = 6\pi$$

The arc length is 6π cm.

Example 1.6: Find sector area

A circle has radius 10 ft and central angle $\frac{2\pi}{5}$ radians. Find the sector area.

$$A = \frac{1}{2}r^2\theta = \frac{1}{2}(10)^2 \left(\frac{2\pi}{5} \right) = 50 \cdot \frac{2\pi}{5} = 20\pi$$

The sector area is 20π square feet.

-
12. Find sector area when $r = 8$ and $\theta = \pi/3$.
13. A wheel of radius 18 in. turns through $4\pi/9$. Find the distance traveled along the rim.
14. A gear rotates 15π radians. How many full rotations is that?
15. A point on a circle travels 24 cm along a radius-6 cm circle. Find the central angle in radians.