STUDYWALKS · COURSE SYLLABUS

Precalculus — High School Course with CLEP Preparation

Precalculus is the bridge to calculus: algebra used with confidence, functions in every form, exponential and logarithmic models, trigonometry from the unit circle to identities and triangles, and the conic sections. This course works through each idea one lesson at a time, with every worked number checked by computer. Comes after: Algebra 2.

CREDIT LABEL	HOURS GOAL	STUDYWALKS LEARNING HOURS	SUGGESTED OFFLINE HOURS
1.0 credit	**120 h**	**43 h**	**77 h**
high school, with the study plan	the 1.0-credit convention	measured runtime plus assessment time	reading, review and writing

43 h StudyWalks (11.5 h of lessons, 22.2 h of lectures, 9.1 h of quizzes and exams) + **77 h** suggested offline study = **120 h**. 607 lessons in 27 units; prepares for the CLEP Precalculus exam.

High school credit is granted by the homeschool parent under the state's rules. StudyWalks supplies the record: hours, scores and this syllabus. The credit label is a suggestion; the parent makes the final call.

Course contents

Unit	Title and lecture topics	Lessons	Lecture
1	**Getting Ready: The Exam, Real Numbers and Intervals** The exam · Number sets · The order of operations · Exponents and scientific notation · Intervals and absolute value	20	36 min
2	**Polynomials, Factoring and Radicals** What a polynomial is · Adding and multiplying · Special products · Factoring · Finishing the factoring · Roots · Rationalizing · Rational exponents and the capstone	22	50 min (2 parts)
3	**Rational Expressions and Complex Numbers** Domain and simplifying · Multiplying and dividing · Adding and subtracting · Complex fractions and negative exponents · The imaginary unit and standard form · Complex arithmetic · Powers of i and roots of negatives · The capstone	22	49 min (2 parts)
4	**Linear and Absolute-Value Equations and Inequalities** Linear equations · Special cases and formulas · Linear inequalities · Absolute value · Absolute value equations · Absolute value inequalities · Word problems and the capstone	20	50 min (2 parts)
5	**Quadratic, Radical and Rational Equations** Standard form and factoring · Taking square roots · Completing the square · The quadratic formula and the discriminant · Choosing a method and quadratic form · Quadratic form and radical equations · Rational equations · Formulas and word problems · Every method together	24	56 min (2 parts)

Unit	Title and lecture topics	Lessons	Lecture
6	**Functions, Notation, Domain and Range** Relations and functions · Evaluating and solving · Words, tables and graphs · Line tests and one-to-one · The toolkit begins · The toolkit finished · Interval notation and domains from formulas · Graphs and piecewise functions · Functions from every angle	24	52 min (2 parts)
7	**Rates of Change, Graph Behavior and Combining Functions** Average rate of change · Rates from formulas · Increasing, decreasing and extremes · Reading behavior · Combining functions · Combinations and their domains · Composition and its order · Formulas, domains and decomposition · The unit in one problem	22	51 min (2 parts)
8	**Transformations, Symmetry and Absolute-Value Functions** Shifts · Reflections and tables · Stretches and compressions · Several transformations and writing formulas · Even and odd functions · The absolute value function · The capstone	22	49 min (2 parts)
9	**Inverse Functions** What an inverse is · Testing and reading inverses · When an inverse exists · Finding an inverse from a formula · Graphs and self-inverses · The capstone	16	34 min
10	**Linear Functions and Models** Slope as a rate of change · Writing the equation of a line · Graphs, intercepts and special lines · Parallel and perpendicular lines · Linear models · Lines fitted to data · The capstone	22	46 min (2 parts)
11	**Quadratic and Power Functions** The parabola and its vertex · Writing vertex form · Range and a parabola from its vertex · Intercepts and maximum area · The vertex at work · Power functions and end behavior · Polynomial functions · The capstone	22	49 min (2 parts)
12	**Polynomial Functions: Graphs, Division and Zeros** Zeros and factoring · Multiplicity and the shape of the graph · Locating zeros and reading a graph · Dividing polynomials · The Remainder and Factor Theorems · Rational zeros · Complex zeros · Solving completely	26	57 min (2 parts)
13	**Rational Functions, Radical Functions and Variation** Rational functions and the reciprocal graphs · Domain, asymptotes and holes · End behavior · Intercepts and the whole graph · Building rational functions · Radical functions · Variation	24	52 min (2 parts)
14	**Polynomial and Rational Inequalities** The sign chart · Polynomial inequalities · Rational inequalities · Graphs, domains and the capstone	14	30 min
15	**Exponential Functions and Their Graphs** What an exponential function is · Factors and models · Interest and the number e · Exponential graphs · Formulas, solutions and the capstone	22	37 min
16	**Logarithmic Functions and Their Properties** The logarithm as an exponent · Evaluating logarithms · The domain · The graph · The transformed graph · The three rules · Expanding and condensing · Change of base and the capstone	24	52 min (2 parts)
17	**Exponential and Logarithmic Equations, Inequalities and Models** Like bases · Taking logarithms of both sides · Solving logarithmic equations · Equal logs and extraneous roots · Graphs and inequalities · Growth, decay, half-life and doubling · Models that level off · Choosing a model, and the capstone	26	1 h (2 parts)

Unit	Title and lecture topics	Lessons	Lecture
18	**Angles, Radians and the Unit Circle** Angles and degrees · Radians · Coterminal angles · Arc length and sector area · Speed on a circle · The unit circle, sine and cosine · Exact values from reference angles · Domain, range, and one from the other · The capstone	26	52 min (2 parts)
19	**The Other Trigonometric Functions and Right Triangles** Four more functions · Identities, exact values and undefined points · Signs, symmetry and period · Working with identities · Into the right triangle · Six ratios from the sides · Special triangles and cofunctions · Solving right triangles · The capstone	23	50 min (2 parts)
20	**Graphs of the Trigonometric Functions** The two basic waves · The general form · Reading a whole wave · Rising, falling and writing · Sinusoids from tables, and equivalent forms · Tangent and cotangent · Secant, cosecant and the whole unit	24	54 min (2 parts)
21	**Inverse Trigonometric Functions** Restricting and defining the inverses · Graphs and values · Compositions · Right triangles and the whole unit	16	37 min
22	**Trigonometric Identities** What an identity is, and the fundamental set · Using the fundamentals · Simplifying and verifying · Sum and difference formulas · More from the sum and difference formulas · Double angles · Power reduction and half angles · Products, sums and the whole unit	27	1 h 2 min (2 parts)
23	**Trigonometric Equations, Periodic Models and Oblique Triangles** Basic equations · Equations that need algebra or identities · Multiple angles, counting, squaring and inequalities · Periodic models · The Ferris wheel model · The law of sines · The law of cosines and area · Bearings and navigation	28	1 h 4 min (2 parts)
24	**Systems of Equations and Inequalities** Systems, solutions and graphs · Substitution and elimination · Applications · Three variables · Three variables without one solution · Lines and parabolas · Circles and squared terms · Inequalities and regions · The capstone	24	50 min (2 parts)
25	**Lines, Distance, Circles and Parabolas** Distance and midpoint · Slopes and lines · Circles · The parabola's definition · Parabolas at the origin · Shifts and width · Reading and writing parabolas · The reflecting property and the capstone	23	51 min (2 parts)
26	**Ellipses and Hyperbolas** Conics and the ellipse's definition · The ellipse's standard forms · Working with ellipses · The hyperbola · Reading and writing hyperbolas · Telling the conics apart · The capstone	22	54 min (2 parts)
27	**Functions as Models, the Calculator Section and Capstone** Building linear models · Reading a table · Other shapes of models · Variation and periodic data · Sinusoidal models and reading a model · The calculator section · Mixed problems and the course capstone	22	48 min (2 parts)

Assessment and grading

- **Unit quizzes.** 27 quizzes, 10 questions each, checked as the student goes, each answer with the lesson to review. Untimed; retakes are unlimited.
- **Mid exam.** 50 questions on units 1–14, drawn fresh each time and scored at the end with a breakdown by content area. Untimed; retakes are unlimited.
- **Final exam.** 48 questions, 90 minutes, on the whole course. Scored 20–80; 50 passes (32 of 48 correct, about 67%). Retakes are unlimited with a 24-hour wait, each a fresh draw.

Suggested composite grade

Part	Weight
Unit quizzes (average of best scores)	20%
Mid exam (best score)	20%
Final exam (percent correct)	60%

Suggested letter scale

Letter	Composite
A	90–100
B	80–89
C	70–79
D	60–69
F	below 60

Suggested; the parent sets the grade. A passing final is the completion standard for the course record.

Study plan

The 77 offline hours are spread over the units in proportion to each unit's StudyWalks time. For each unit: read the matching sections of *Precalculus 2e (OpenStax); Precalculus*, review the unit quiz misses, and write a one-page unit summary. Log the time as you go.

Unit	Title	StudyWalks	Offline, suggested	Unit total
1	Getting Ready: The Exam, Real Numbers and Intervals	59 min	2 h 15 min	3 h 14 min
2	Polynomials, Factoring and Radicals	1 h 15 min	2 h 50 min	4 h 5 min
3	Rational Expressions and Complex Numbers	1 h 14 min	2 h 50 min	4 h 4 min
4	Linear and Absolute-Value Equations and Inequalities	1 h 12 min	2 h 45 min	3 h 57 min
5	Quadratic, Radical and Rational Equations	1 h 24 min	3 h 10 min	4 h 34 min
6	Functions, Notation, Domain and Range	1 h 19 min	3 h	4 h 19 min
7	Rates of Change, Graph Behavior and Combining Functions	1 h 16 min	2 h 55 min	4 h 11 min
8	Transformations, Symmetry and Absolute-Value Functions	1 h 14 min	2 h 50 min	4 h 4 min
9	Inverse Functions	52 min	2 h	2 h 52 min
Lessons and lectures		**33 h 41 min**	**77 h**	**110 h 41 min**
Quizzes, mid exam and final (stated time)		**9 h 6 min**	**—**	**9 h 6 min**

Unit	Title	StudyWalks	Offline, suggested	Unit total
10	Linear Functions and Models	1 h 11 min	2 h 40 min	3 h 51 min
11	Quadratic and Power Functions	1 h 14 min	2 h 50 min	4 h 4 min
12	Polynomial Functions: Graphs, Division and Zeros	1 h 26 min	3 h 15 min	4 h 41 min
13	Rational Functions, Radical Functions and Variation	1 h 19 min	3 h	4 h 19 min
14	Polynomial and Rational Inequalities	46 min	1 h 45 min	2 h 31 min
15	Exponential Functions and Their Graphs	1 h 2 min	2 h 20 min	3 h 22 min
16	Logarithmic Functions and Their Properties	1 h 19 min	3 h	4 h 19 min
17	Exponential and Logarithmic Equations, Inequalities and Models	1 h 29 min	3 h 25 min	4 h 54 min
18	Angles, Radians and the Unit Circle	1 h 22 min	3 h 10 min	4 h 32 min
19	The Other Trigonometric Functions and Right Triangles	1 h 16 min	2 h 55 min	4 h 11 min
20	Graphs of the Trigonometric Functions	1 h 21 min	3 h 5 min	4 h 26 min
21	Inverse Trigonometric Functions	56 min	2 h 10 min	3 h 6 min
22	Trigonometric Identities	1 h 33 min	3 h 35 min	5 h 8 min
23	Trigonometric Equations, Periodic Models and Oblique Triangles	1 h 35 min	3 h 35 min	5 h 10 min
24	Systems of Equations and Inequalities	1 h 18 min	3 h	4 h 18 min
25	Lines, Distance, Circles and Parabolas	1 h 17 min	2 h 55 min	4 h 12 min
26	Ellipses and Hyperbolas	1 h 19 min	3 h	4 h 19 min
27	Functions as Models, the Calculator Section and Capstone	1 h 13 min	2 h 45 min	3 h 58 min
Lessons and lectures		**33 h 41 min**	**77 h**	**110 h 41 min**
Quizzes, mid exam and final (stated time)		**9 h 6 min**	**—**	**9 h 6 min**

Unit times are the unit's lecture runtime plus its lessons at the course's measured average lesson length; totals can differ from the learning hours by rounding.

Sources

- **Anchor:** Jay Abramson et al. *Precalculus 2e*. OpenStax, Rice University. CC BY-NC-SA 4.0
- **Witness:** Carl Stitz and Jeff Zeager. *Precalculus*, 4th edition. CC BY-NC-SA

StudyWalks finals are modeled on the CLEP exam blueprint in scope, format, and rigor. Scores are StudyWalks scores, not CLEP scores, and are not affiliated with or recognized by the College Board.

StudyWalks is a private educational site and is not affiliated with, endorsed by, or connected to any government agency, the College Board, DSST, ACT, Inc., the National Center for Competency Testing (NCCT), or any testing or licensing body.

College credit for CLEP and DSST exams is set by each college. CLEP is administered by the College Board; DSST is administered by Prometric.

studywalks.com/c/precalculus/syllabus/