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AP® Precalculus: Polynomial and Rational Functions

T3IC Virtual Conference
September 30, 2023

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Ohio University

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Teays Valley High School

Texas Instruments

Agenda

- Welcome & introductions
- AP® Precalculus: Overview of polynomials and rational functions
- Resources
- AP® Precalculus sample question and TI technology
- Q&A

Expected Outcomes

- Recognize change in emphasis or structure from traditional precalculus courses
- Consider some distinctive features of AP ® Precalculus
- Consider structure of assessment and what this means for instruction
- Identify available resources

Overview of Polynomials and Rational Functions

UNIT 1 Polynomial and Rational Functions

6–8 weeks | **30–40%** AP Exam Weighting

2, 3	1.1 Change in Tandem
2, 3	1.2 Rates of Change
3	1.3 Rates of Change in Linear and Quadratic Functions
2, 3	1.4 Polynomial Functions and Rates of Change
1, 2	1.5 Polynomial Functions and Complex Zeros
3	1.6 Polynomial Functions and End Behavior
1, 3	1.7 Rational Functions and End Behavior
1	1.8 Rational Functions and Zeros
2	1.9 Rational Functions and Vertical Asymptotes
3	1.10 Rational Functions and Holes
1, 3	1.11 Equivalent Representations of Polynomial and Rational Expressions
1, 3	1.12 Transformations of Functions
2, 3	1.13 Function Model Selection and Assumption Articulation
1, 3	1.14 Function Model Construction and Application

Questions:

- » What do you notice?
- » What do you wonder?
- » How does this compare to what you've taught previously in Precalculus?

MATHEMATICAL PRACTICES

- 1 Procedural and Symbolic Fluency
- 2 Multiple Representations
- 3 Communication and Reasoning

Progress Check Unit 1 Part 1: Topics 1.1–1.6

Multiple-choice: 18
Free-response: 2

Progress Check Unit 1 Part 2: Topics 1.7–1.14

Multiple-choice: 24
Free-response: 2

Source: AP® Precalculus CED by College Board, p. 18

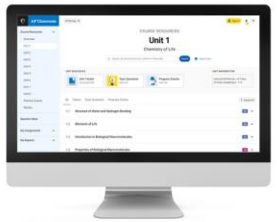
Resources: AP Central

AP Central

Home | About AP | AP Courses & Exams | Exam Ordering, Administration & Scores | Instructional Resources

AP Classroom Support

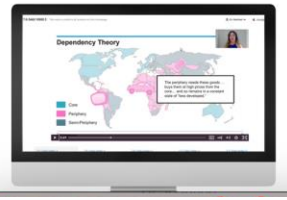
AP Classroom offers helpful instructions and tips for how to use each of these resources.



Unit Guides

Explore course unit guides to get both an overview and a deep dive of the content and skills covered on the AP Exam.

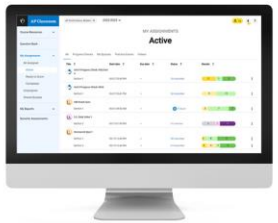
Discover How Courses Are Structured



AP Daily Videos

Assign these short, on-demand videos led by experienced AP teachers to help students understand essential course concepts.

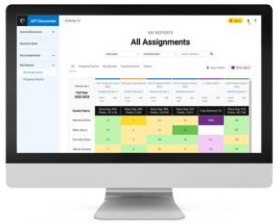
Learn How to Use AP Daily Videos



My Assignments

Manage assigned videos, quizzes, progress checks, and practice exams, and view student progress and results.

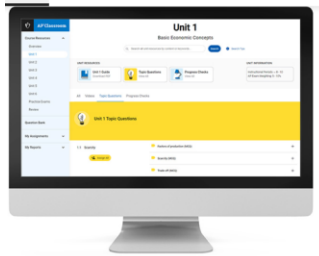
Learn How to Manage All Assignments



My Reports

Use this gradebook-style view of all student assignments to analyze class performance, progress, and assignment results.

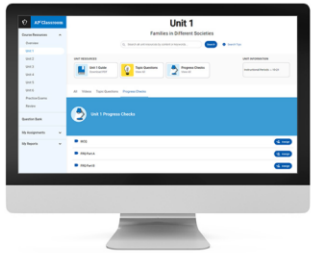
Learn How to Review Your Reports



Topic Questions

Check student understanding as you teach each course topic by assigning these formative assessment questions.

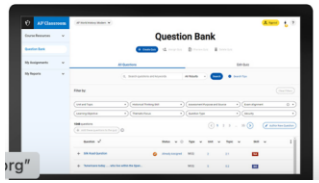
Learn How to Assign Topic Questions



Progress Checks

Periodically gauge student understanding of all topics and skills by assigning these multiple-choice and free-response formative assessments by unit.

Learn How to Assign Progress Checks



Question Bank

Create and assign customized practice tests using a searchable database of real AP questions indexed by course content and skills.

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Resources

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  - Exponential and Logarithmic Functions
  - Trigonometric Functions
  - Trigonometric Laws and Identities
  - Applications of Trigonometry
  - Other Topics: Matrices, Sequences, and Series
  - Analytic Geometry (Conics)
- Statistics
- Calculus
- Mathematical Modeling
- Explorations with Coding

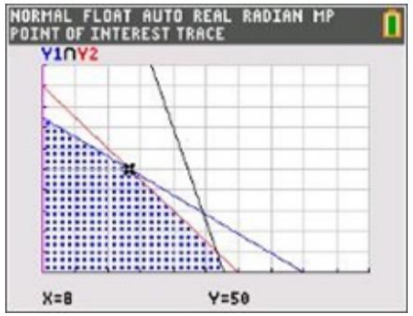
Precalculus

Find activities that support your lesson plans

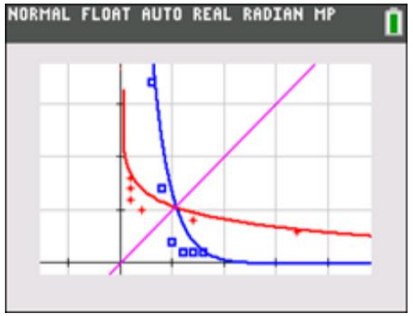
Challenge students to use and think about how technology can be used to model, analyze and explain math with standards-aligned activities in eight precalculus topics.

Activities can be used as is or edited to support specific objectives, align with popular text books and include technology tips to help you focus the learning and address student misconceptions.

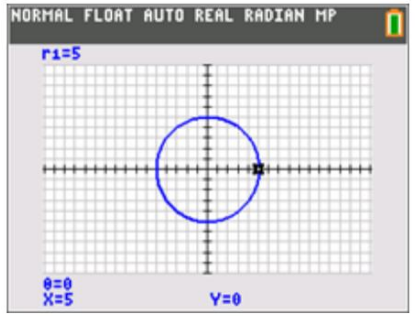
Featured Activities



How Many?



Coin Toss



Transitions

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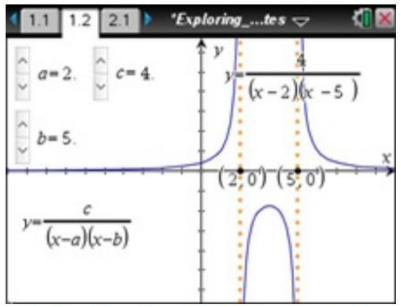
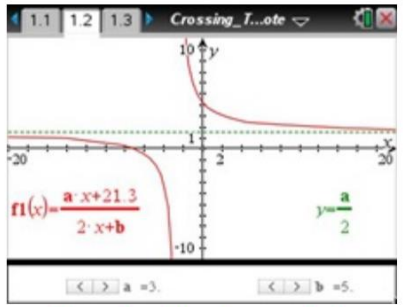


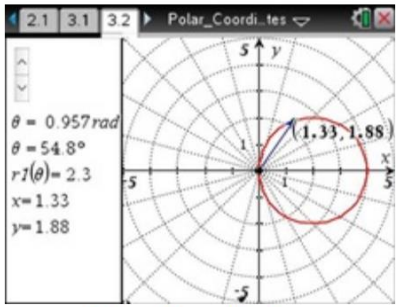
Exploring Vertical Asymptotes

This lesson involves observing how



Crossing the Asymptote

This lesson involves the graph of a



Polar Coordinates

This lesson involves a brief

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Philosophy for Teaching AP® Precalculus

- Multiple representations
- Power of visualization
- Seeing the content outside of silos
- The importance of language and communication
- Celebrating and elevating the Mathematical Practices
- A broader view of what *fluency* means

Sample AP® Precalculus Exam Question

Section II: Free-Response

The following are examples of the kinds of free-response questions found on the exam.

PART A

A graphing calculator is required for these questions.

x	1	2	3	4	5
$f(x)$	-10	-5	4	17	34

1. Let f be an increasing function defined for $x \geq 0$. The table gives values of $f(x)$ at selected values of x. The function g is given by $g(x) = \dfrac{x^3 - 14x - 27}{x + 2}$.

   (A) (i) The function h is defined by $h(x) = (g \circ f)(x) = g(f(x))$. Find the value of $h(5)$ as a decimal approximation, or indicate that it is not defined.

   (ii) Find the value of $f^{-1}(4)$, or indicate that it is not defined.

   (B) (i) Find all values of x, as decimal approximations, for which $g(x) = 3$, or indicate there are no such values.

   (ii) Determine the end behavior of g as x decreases without bound. Express your answer using the mathematical notation of a limit.

   (C) (i) Use the table of values of $f(x)$ to determine if f is best modeled by a linear, quadratic, exponential, or logarithmic function.

   (ii) Give a reason for your answer based on the relationship between the change in the output values of f and the change in the input values of f.

Source: AP® Precalculus CED by College Board, p. 166

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Questions?

Thanks for coming!

Please reach out if you have any questions in the future.

Check out great resources like AP® Classroom and education.ti.com.

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