

It doesn't look
too tricky, and
it's a good basic
review



AP Calculus Summer Review Packet

This packet
consists of 10
worksheets,
covering topics
from Algebra and
Precalculus.



Lots of graphs;
this will be
fun.



SUMMER PREP FOR FALL AP[®] CALCULUS

Topic

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AP Calculus – Summer Packet

The purpose of this summer packet is to make sure that you have the opportunity to brush up on your mathematics skills. The included topics are skills that are necessary for success in AP Calculus. The time that you spend thoughtfully completing this packet will help you to prepare.

Each problem should be thoughtfully completed with all work shown. You may attach additional paper **but must number the problems**.

A rubric and error analysis sheets have been provided in the packet. Please take the time to analyze your errors in process and reasoning.

You are encouraged to use the resources below as reference material. Additional resources can be found by searching for the specific topic at www.khanacademy.org.

Resources

Difference Quotient

<https://www.purplemath.com/modules/1cnot2.htm>

Polynomial Division

<https://www.purplemath.com/modules/polydiv2.htm>

Natural Logarithms

<https://www.purplemath.com/modules/solvexpo2.htm>

Logarithms

<https://www.khanacademy.org/math/algebra2/x2ec2f6f830c9fb89:logs/x2ec2f6f830c9fb89:log-intro/v/logarithms>

Solving Trigonometric Equations

<https://brownmath.com/trig/trigsol.htm>

Find the Inverse of a Function

<https://www.mathsisfun.com/sets/function-inverse.html>

Graphing Piecewise Functions

[Introduction to piecewise functions | Algebra \(video\) | Khan Academy](#)

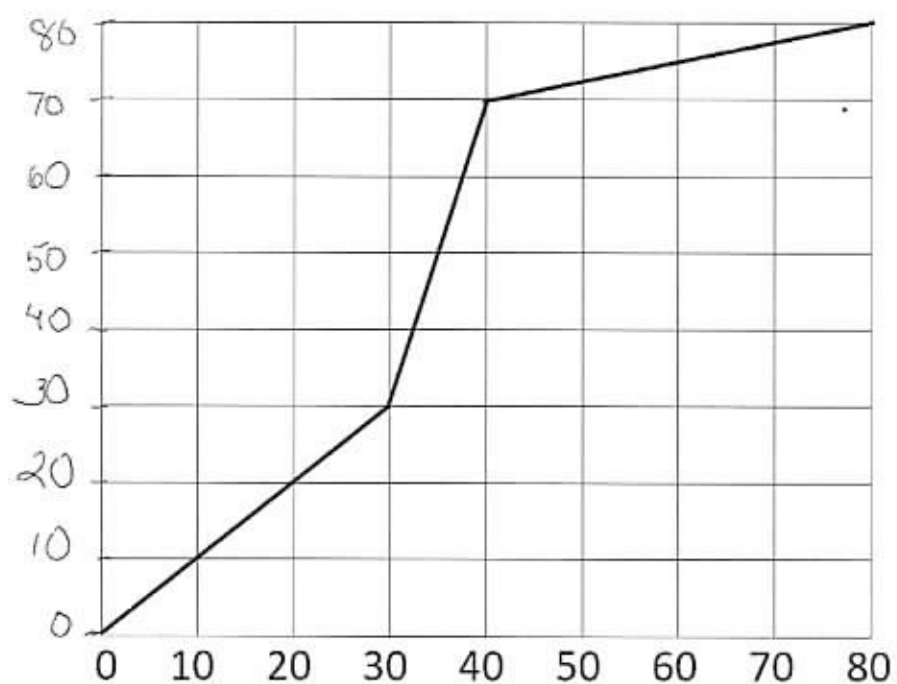
Verifying Trigonometric Identities

<https://www.purplemath.com/modules/proving.htm>

This packet is due on the first day of school at the end of the summer. Please do not rely on a calculator. Only a fraction of the AP Calculus course requires the use of a graphing calculator. Please use pencil and paper techniques only for this summer work. The work must be your own.

Have a good summer and see you at the beginning of the school year.

Piecewise Defined Graph



1. Describe the graph using piecewise defined notation.
2. Where does the graph have the greatest rate of change?
3. What is the range of the graph?

4. The length of a rectangle is twice its width. If the length is increased by 2 and the width is decreased by 1, the new rectangle has an area of 30 square feet.

a. Find the dimensions of the original rectangle.

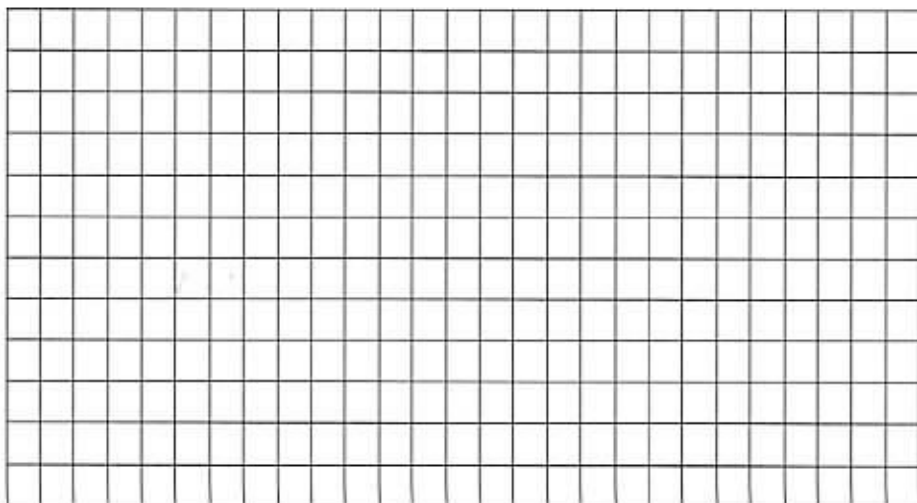
5. The function $f(x) = -0.03x^2 + x + 6$ models the relationship between the height of the soccer ball and the horizontal distance in feet that the ball travels. .

a. Find the maximum height of the ball.

b. Find the horizontal distance the ball has traveled when it hits the ground.

c. Indicate the domain and range of the function.

d. Graph the function.



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Complete the Square: Challenge Problem

Directions: Show all steps for the procedure in the left column to equal the value at the bottom of the page. Explain each step in the right column.

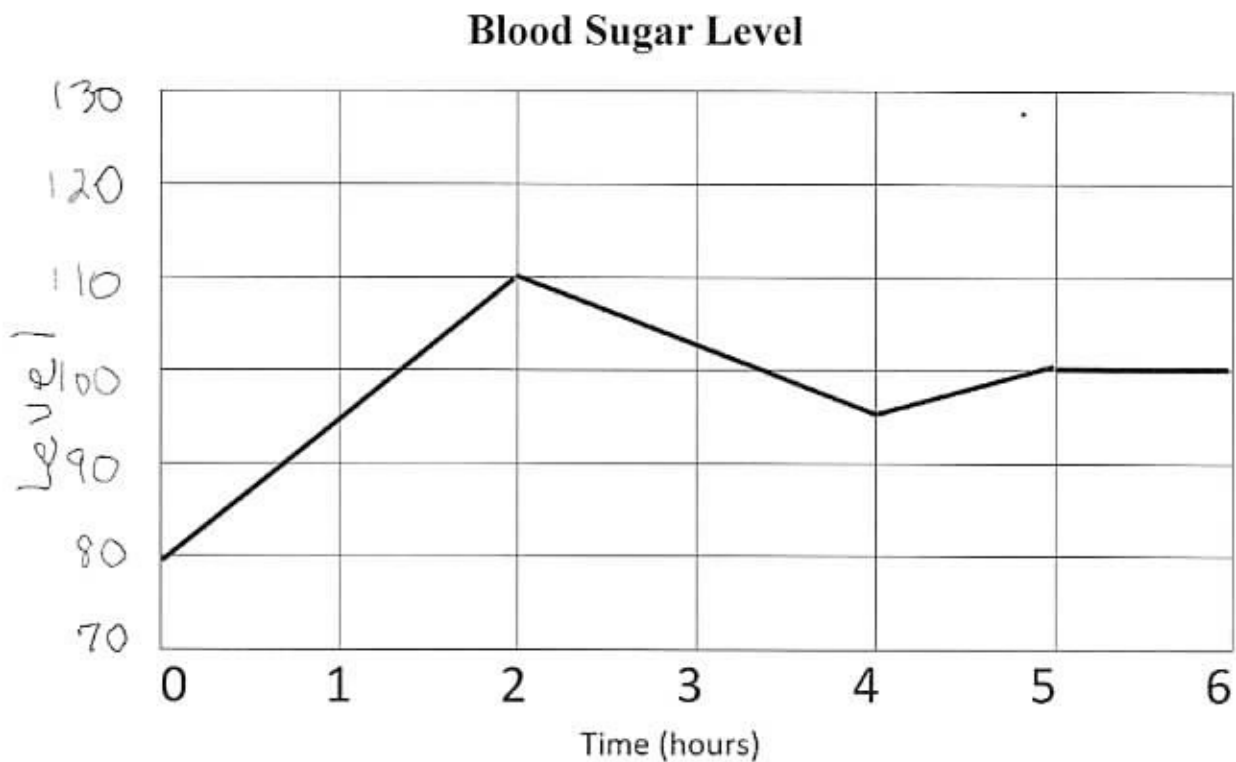
$$y = ax^2 + bx + c$$

Start with the quadratic equation.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

End with the quadratic formula.

7.



A mountain biker is competing in a 6 hour endurance race. His blood sugar level is being monitored. The graph represents the biker's blood sugar level over the 6 hour period. It is a continuous function.

- Describe the graph using piecewise defined notation.
- When did the biker's blood sugar level increase the most?
- When did the biker's blood sugar level decrease the most?

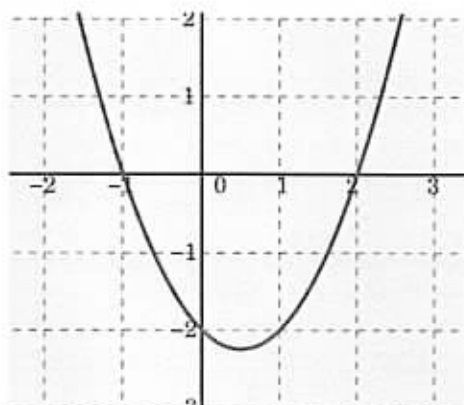
8.

a. What is the maximum value of $f(x) = \frac{\sin x^3 \cos x}{\tan x^2 + 1}$?

b. Solve for all values of θ that satisfy the equation $\frac{\sin^2 \theta}{1 + \cos \theta} = 1$, $[0^\circ, 360^\circ]$.

9.

Use a system of equations to find the equation of this graph. Write the equation in standard form. Hint: Use the y-intercept as one of your coordinates.



10.

Solve using u-substitution.

$$u = \sqrt{x}$$

$$2x - 5\sqrt{x} + 3 = 0$$

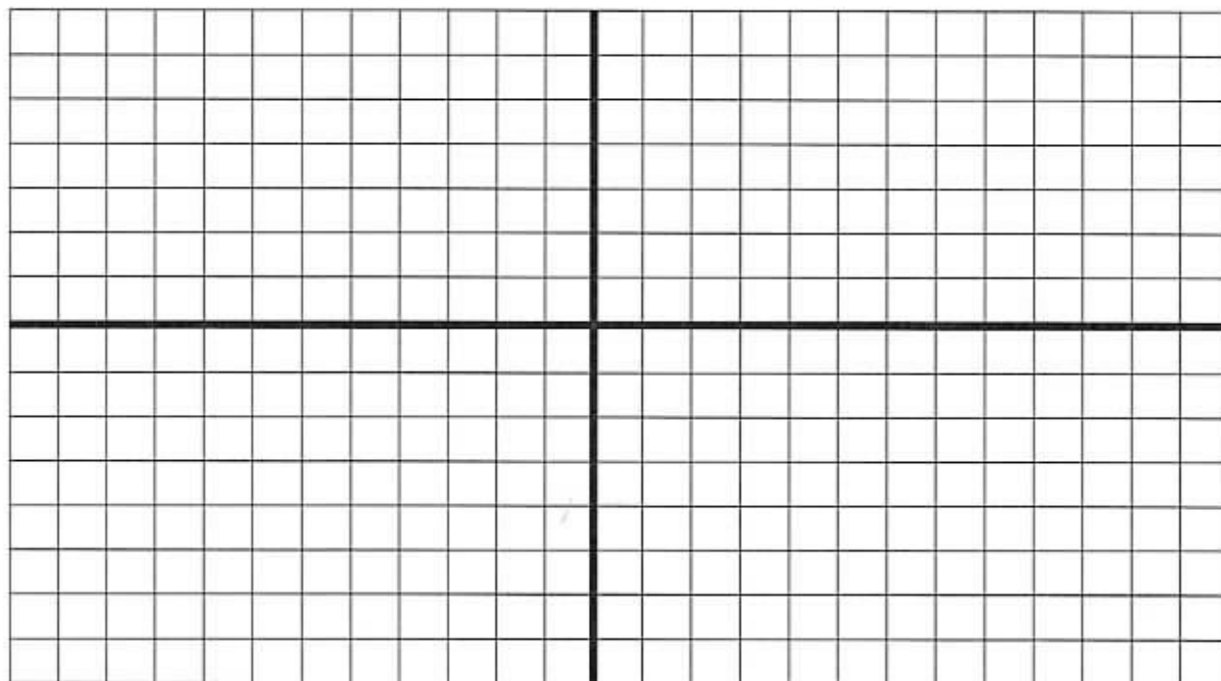
11.

a. Find all vertical asymptotes, horizontal asymptotes, and/or holes in the following function.

$$f(x) = \frac{x^2 - 4x - 21}{2x^2 - 18}$$

b. Describe the domain of the function using interval notation.

c.) Sketch a graph of the function.



12.

Use the difference quotient formula, found below, to solve for the slope of the secant line if $f(x) = x^2 + 5x - 6$.

13.

What are the points (x, y) at which the parabola $y = x^2$ intersects the graph of the function $f(x) = \frac{1}{1+x^2}$?

14.

Use polynomial division. Write your answer in fraction form.

a. $(6x^3 - 18x^2 - 18x + 1)/(x - 3)$

b. $(3x^3 - 6x^2 + 3)/(2x - 2)$

c. $(6x^2 - 4)/(x + 1)$

15.

Find the intervals on which the following functions are continuous.

Identify the type of discontinuity.

a.

$$f(x) = \begin{cases} -3, & x < 5 \\ -x^2 + 8x - 15, & x \geq 5 \end{cases}$$

b.

$$f(x) = -\frac{x^2 + x}{x + 1}$$

c.

$$f(x) = \frac{x}{x^2 - 4x}$$

15.

Find the intervals on which the following functions are continuous.

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c.

$$f(x) = \frac{x}{x^2 - 4x}$$

16.

Solve each equation with exact solutions.

a.

$$8e^{3p+1} + 1 = 12$$

b.

$$-3e^{8b+3} - 8 = -105$$

c.

$$-9e^{4x+2} + 8 = -64$$

17.

Solve each equation with exact solutions.

a.

$$\log_3 (x^2 - 4) - \log_3 4 = 1$$

b.

$$\log_3 (x + 4) - \log_3 x = \log_3 29$$

c.

$$\log_8 3 - \log_8 (x + 2) = \log_8 36$$

18.

Find the inverse of each function. Write the inverse using the correct notation.

a.

$$g(x) = \sqrt[3]{\frac{x-3}{2}}$$

b.

$$g(x) = -2(x-2)^3$$

c.

$$f(x) = \sqrt[3]{x+2}$$