

**Thank you for your interest in taking AP Calculus AB. When the school year begins, we will hit the ground running without time to review math skills that you should have previously acquired. To ready you for the intense pace/ depth of content that this course involves, please complete the following assignments in this order:**

**Step 1: Review your Precalculus skills**

- Take a look at the skills outlined on the attached page. You may want to review/refresh some of these skills before completing the placement test.
- [www.KhanAcademy.org](http://www.KhanAcademy.org) is an excellent resource with instructional videos and guided practice.

**Step 2: Complete the AP Calculus AB Placement Test**

- Find a quiet space where you can think and concentrate, and set aside a 50 minute block of time to complete this assignment.
- **Set a timer.** You should not spend more than 50 minutes working through the test.
- **No calculator, internet, or assistance of any kind** may be used.
- Show your work for every question. If you do not know how to complete a problem, do as much as you can.

- \*\*\*\*\*● **Scan and email your work to Mrs. Pisani ([carly.pisani@dma.k12.de.us](mailto:carly.pisani@dma.k12.de.us)) by July 1, 2018, at the latest.** \*\*\*\*\*
- If scanning is not available to you, a photo of your assignment is acceptable, as long as I am able to print and read your writing clearly.
  - You may also drop off a hard copy of your assignment at DMA's main office.

**Grading policy**

- **This placement test will count as a 15 point formative grade for marking period 1.**
- Your grade will be based on completion.
- Completion means you have made a valid attempt at solving each problem on the test. A nonsensical answer or writing "I don't know" does not count as an attempt at a problem.
- Each problem will be scored with 1 out of 15 points.

**What is the purpose of this assignment?**

- If you truly have never seen, or cannot confidently complete, the majority of the problems on this test, you may have not yet gained an adequate foundation to be successful in AP Calculus AB next year.
- **The results of this test may be used to reconsider your placement into AP Calculus AB or another appropriate course for the upcoming school year.**

**Disclaimers:**

1. If a cadet does not complete this assignment prior to July 1st, he/she may be reassigned to a different math class for the 2018-2019 school year.
2. Any cadet who requests a schedule change into AP Calculus AB after July 1st will be required to complete this assignment prior to having their schedule changed.



If you plan on taking AP Calculus AB next school year, you should review and be strong in the following topics:

- Function notation
  - Be able to evaluate complex expressions for a given value of a variable
  - For example: Evaluate when  $x = \pi/2$

$$\bullet f(x) = \frac{\cos(2x)}{2} - \sin^2 x$$

- Be able to compose functions and evaluate composite functions
- Exponent properties
  - Be able to rewrite expressions with and without negative exponents
  - Be able to multiply and divide powers with the same base
  - KNOW WHAT LIKE TERMS ARE!
- Rational exponents
  - Be able to convert between a rational exponent and a radical expression
  - For example: Rewrite without using rational exponents or negative exponents.

$$\bullet (2x - 1)^{\frac{1}{2}}(3x)^{-\frac{2}{3}}$$

- Rational expressions
  - Be able to find a common denominator to add/subtract rational expressions
  - Be able to simplify complex expressions
  - For example: Simplify. Write your answer as one fraction in simplest form.

$$\bullet \frac{\frac{3}{x} + \frac{3}{y}}{\frac{3}{x} - \frac{3}{y}}$$

- Families of functions
  - Be able to quickly sketch the shape of a graph given only the equation WITHOUT a calculator.
  - The key families of functions to know are: Linear, quadratic, cubic, polynomials in general (even vs. odd), exponential,  $y = \log x$ ,  $y = e^x$ , absolute value, square root, rational, and piecewise functions. Know what their equations and graphs look like.
  - Know how to find the domain and range of any of these function.
  - Know how to find an inverse of a function
  - Know how to determine if a function is even or odd given an equation or a graph

- Solving equations
  - Be able to solve a linear, quadratic or higher degree polynomial equation both by hand and on a calculator.
- Inequalities
  - Have an understanding of the inequalities symbols, how to read them, and how to describe an open or closed interval using inequalities
  - Be able to solve an inequality using inverse operations, including compound inequalities
- Logarithms/ $e^x$ 
  - Be able to rewrite expressions using log rules.
  - Know the domain/range restrictions and end behavior of both functions
  - Be able to solve equations using logarithms or exponentiation.
- Trigonometric Ratios
  - KNOW YOUR UNIT CIRCLE!!!! If you don't know what that is, study it before the school year begins.
  - Know the exact values of the trig ratios of special angles:  
 $0, \pi/6, \pi/4, \pi/3, \pi/2, \pi, 3\pi/2$
  - Know the graphs of the three basic trig functions:  $y=\sin x, y=\cos x, y=\tan x$
- Rational equations
  - Be able to solve rational equations, graph rational functions, and find asymptotes
- Linear Functions
  - Be able to find the slope of a line given two points
  - Be able to graph a line using slope and a given point
  - Be able to write an equation of a line in point-slope form, given a point and a slope
  - Be able to write the equations of lines that are parallel and perpendicular
- Area/Volume Formulas
  - Know the area formulas, and be able to find the area of a triangle, square, rectangle, trapezoid, circle, semi-circle, quarter-circle, and an equilateral triangle
  - Know the volume formulas, and be able to find the volume of a rectangular prism, cone, sphere, and cylinder
  - Be able to rearrange a formula to solve for a different variable
  - Be able to use dimensional analysis to correctly identify units!

Name: \_\_\_\_\_ Precalculus teacher: \_\_\_\_\_ Period: \_\_\_\_\_

**AP Calculus Placement Test**

Directions: Time limit 50 minutes, no exceptions! No calculators! Do your best! Score \_\_\_\_\_/15

1) Let  $L$  represent the line  $5x - 4y = -20$ . Write the equation for the line through  $P(6, -3)$  that is perpendicular to  $L$ . 1) \_\_\_\_\_

2) Let  $f(x) = \frac{1}{x^2} + 7$  and  $g(x) = \frac{1}{x}$ . Find  $f(g(x))$  and simplify completely. 2) \_\_\_\_\_

3) Solve for  $x$ .  $(x^2 - 9)^2 - x^2 + 10 = 1$  3) \_\_\_\_\_

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4) Let  $f(x) = 4x - 5$ . Evaluate and simplify  $\frac{f(3+h)-f(3)}{h}$ .

4) \_\_\_\_\_

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5) Solve for  $t$  and simplify.  $\frac{1}{4} = \frac{e^{3t}}{3 + e^{3t}}$

5) \_\_\_\_\_

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6) Let  $g(x) = x^2 + bx + c$ . If  $g(3) = 0$  and  $g(-4) = 0$ , find  $b + c$ .

6) \_\_\_\_\_

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7) Find the solution set of  $\frac{x+5}{x} < 8$

7) \_\_\_\_\_

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8) Solve for  $x$ .  $\ln(x - 3) - 2 \ln 3 = 2$

8) \_\_\_\_\_

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9) Simplify. Use only radicals and/or natural number exponents.

9) \_\_\_\_\_

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

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10) Simplify. Use only positive exponents.

$$\frac{(b-a)a^{-1}}{a^{-1}-b^{-1}}$$

10) \_\_\_\_\_

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11) If  $r = 3h$  and  $V = \frac{1}{3}\pi r^2 h$ , solve for  $r$  in terms of  $V$ .

11) \_\_\_\_\_

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12) Determine whether  $h(x) = \frac{2x^3}{x^2+1}$  is even, odd, or neither.  
Justify your answer.

12) \_\_\_\_\_



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13) Find the horizontal and vertical asymptotes of

$$g(x) = \frac{2x^2 - 7x + 6}{x^2 + 3x - 10}$$

13) \_\_\_\_\_

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14) Simplify.  $e^{(3+\ln x^2)}$

14) \_\_\_\_\_

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15) Let  $f(x) = \sqrt{x} + 3$ . Graph and label  $f(x)$  and  $f^{-1}(x)$ .

15)



