



James W. Robinson, Jr. Secondary School

FAIRFAX COUNTY
PUBLIC SCHOOLS

5035 Sideburn Road
Fairfax, Virginia 22032

Dear Advanced Math Student,

We commend you on your initiative to challenge yourself. Whether you are taking Math Standard Level I or II, Math Studies, or AP Calculus, you will benefit from setting aside time to review the included topics over the summer. Upper level math courses offer a multi-representational approach to a variety of topics such as; calculus, statistics, trigonometry, logarithms, rational functions, and radical functions, with concepts, results, and problems being expressed graphically, numerically, analytically, and verbally. In order to be successful in this course you need the proper foundation (i.e., knowledge of algebra, geometry, trigonometry, analytic geometry, and elementary functions). You will have to be very familiar with the basic families of functions, and all of their representations, in order to be successful in your study of upper level mathematics.

You will also need to be able to carry out certain computational tasks (i.e., algebra skills) with efficiency and accuracy if you are going to be successful. These include manipulations of functional symbolism, solving algebraic equations involving the functions mentioned above, interpreting numerical values given by formulas, graphs, and tables, using and manipulating data, and knowing how, and when to use your calculator.

These are rigorous college-prep courses. The curriculum and pace of the course is intense and all enrolled students are required to take the AP exam or the IB exam at the conclusion of their senior year. Since this is a *college-prep class* you can expect to spend approximately 1-2 hours completing homework or studying for every hour that you are in class learning.

While this is not a formal “packet” for you to complete over the summer, please be advised that during the **first week** of class you will be assessed on pre-requisite material for the course that you are enrolled in. Moreover, **you will be tested on this material throughout the entire year**, so it is in your best interest to review the sample questions provided on the subsequent pages, and prepare yourself prior to the first day of school. Again, while you are not required to complete any of these problems (this will not be graded), be advised that these are the skills that we expect you to possess prior to the first day of school. Therefore, if you are unable to answer some of these questions, start studying!

Feel free to contact us with any questions or concerns that you or your parents may have. Have a restful summer and be ready for an exciting time in your advanced math class next year!

Sincerely,

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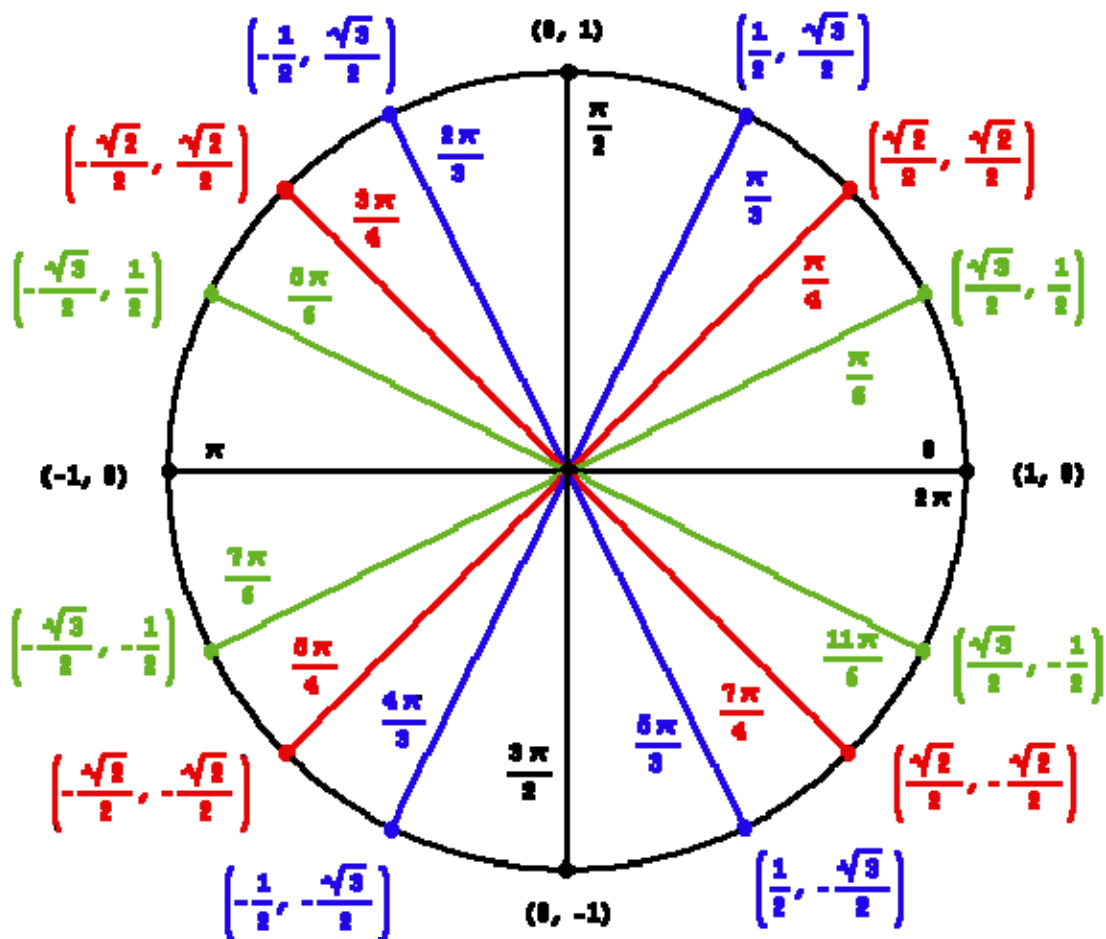
For IB SL 2, and AP Calc AB:
The following Trigonometric Identities **MUST** be
memorized

Reciprocal Identities	Quotient Identities	Pythagorean Identities										
$\sin x = \frac{1}{\csc x} \quad \csc x = \frac{1}{\sin x}$ $\cos x = \frac{1}{\sec x} \quad \sec x = \frac{1}{\cos x}$ $\tan x = \frac{1}{\cot x} \quad \cot x = \frac{1}{\tan x}$	$\tan x = \frac{\sin x}{\cos x}$ $\cot x = \frac{\cos x}{\sin x}$	$\sin^2 x + \cos^2 x = 1$ $\tan^2 x + 1 = \sec^2 x$ $1 + \cot^2 x = \csc^2 x$										
Co-Function Identities	Odd/Even Identities											
$\sin\left(\frac{\pi}{2} - \theta\right) = \cos \theta$ $\cos\left(\frac{\pi}{2} - \theta\right) = \sin \theta$ $\csc\left(\frac{\pi}{2} - \theta\right) = \sec \theta$ $\sec\left(\frac{\pi}{2} - \theta\right) = \csc \theta$ $\tan\left(\frac{\pi}{2} - \theta\right) = \cot \theta$ $\cot\left(\frac{\pi}{2} - \theta\right) = \tan \theta$	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; width: 50%;"><u>Odd</u></td> <td style="text-align: center; width: 50%;"><u>Even</u></td> </tr> <tr> <td style="text-align: center;">$\sin(-\theta) = -\sin \theta$</td> <td style="text-align: center;">$\cos(-\theta) = \cos \theta$</td> </tr> <tr> <td style="text-align: center;">$\csc(-\theta) = -\csc \theta$</td> <td style="text-align: center;">$\sec(-\theta) = \sec \theta$</td> </tr> <tr> <td style="text-align: center;">$\tan(-\theta) = -\tan \theta$</td> <td></td> </tr> <tr> <td style="text-align: center;">$\cot(-\theta) = -\cot \theta$</td> <td></td> </tr> </table>		<u>Odd</u>	<u>Even</u>	$\sin(-\theta) = -\sin \theta$	$\cos(-\theta) = \cos \theta$	$\csc(-\theta) = -\csc \theta$	$\sec(-\theta) = \sec \theta$	$\tan(-\theta) = -\tan \theta$		$\cot(-\theta) = -\cot \theta$	
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Double Angle Identities	Half Angle Identities											
$\sin 2x = 2 \sin x \cos x$ $\cos 2x = \cos^2 x - \sin^2 x$ $\cos 2x = 2 \cos^2 x - 1$ $\cos 2x = 1 - 2 \sin^2 x$	$\sin^2 x = \frac{1 - \cos 2x}{2}$ $\cos^2 x = \frac{1 + \cos 2x}{2}$											

For IB SL 2, AP Calc AB:
 The Radian Measures and Coordinates **MUST** be
memorized

Remember: $\sin \theta = \frac{y}{r} = y\text{-coordinate}$, $\cos \theta = \frac{x}{r} = x\text{-coordinate}$, and

$$\tan \theta = \frac{y}{x} = \frac{y\text{-coordinate}}{x\text{-coordinate}}$$



Here are some sample questions for you to look over and review. You are not required to complete any of these problems (this will not be graded) but be advised that these are the skills that we expect you to possess prior to the first day of school. Additional practice problems and activities can be found at <http://teachers.henrico.k12.va.us/math/>. Use the algebra 2 and advanced algebra and trig tab. On the left side of the web page is a list of the topics you will find below. You can play interactive game, create worksheets, and take practice quizzes and review lecture notes.

**ALL of these questions are to be completed
without the use of a calculator**

I. Algebraic Manipulation – All Classes

Simplify the expression – Vocabulary: polynomial, radical, & rational expressions

- | | |
|--|------------------------------------|
| 1. $x(2x + 3(x - (2x + 1)))$ | 2. $\frac{\sqrt{x}}{\sqrt{x} + 3}$ |
| 3. $\frac{(9x^2 + 3x - 2)}{(9x^2 - 1)} \cdot \frac{(3x^2 + 13x + 4)}{(27x^3 + 8)}$ | 4. $x + \frac{1}{y + \frac{1}{x}}$ |

II. Solving Equations – All Classes

Solve the equation – Vocabulary: rational, & polynomial equations

- | | |
|------------------------------------|--|
| 5. $1 - \frac{3}{x} = \frac{4}{5}$ | 6. $\frac{x+1}{3x-1} + \frac{2x+1}{3x-2} = -1$ |
| 7. $x^4 - 13x^2 + 37 = 7$ | 8. $x^3 - 4x^2 + x + 6 = 0$ |

III. Exponents and Logarithms - All except MMSL1

Solve the Equation. – Vocabulary: Exponential and Logarithmic Equations

- | | |
|--|--|
| 9. Solve for x: $\log_3(x - 1) = 2$ | 10. Solve for x: $3^x \cdot 3^{x+1} = 9$ |
| 11. Evaluate: $2\log_2 4 + \frac{1}{2}\log_2 5 - \frac{1}{2}\log_2 20$ | 12. Graph: $y = \log_2(x - 1) + 3$ |

IV. Functions and Graphs – All Classes

Vocabulary: Evaluating Functions, Graphing Polynomial, Rational, Logarithmic, Radical, Piecewise and Exponential Functions

13. If $f(x) = \frac{x}{1-x}$, find $f\left(\frac{1}{x}\right)$

14. If $f(x) = \frac{x}{1-x}$, find $f(1-x)$

15. Sketch the graph of $y = x^2 - 2x$

16. Sketch the graph of $y = \frac{3x}{x-1}$

17. Sketch the graph of $f(x) = \ln(x-1)$

18. Sketch the graph of

$$2y = \sqrt{36-9x^2}$$

19. Sketch the graph of $f(x) = \begin{cases} \sqrt{4-x} & x \leq 0 \\ 2-3x & 0 < x \leq 2 \\ x^2 & x > 2 \end{cases}$

20. Sketch the graph of $f(x) = e^x$

V. Trigonometry - All Classes except IBMMSL1

Vocabulary – Graph Trigonometric Functions, Evaluate Trigonometric Expressions, Solve Trigonometric Equations

21. Graph $y = 2 \cos 3\theta - 1$

22. Find $\sin\left(\frac{7\pi}{6}\right)$

23. Evaluate $\tan\left(-\frac{5\pi}{3}\right)$

24. Evaluate $\cos^{-1}(-1)$

25. Solve: $\tan x = 2 \sin x$

26. Solve: $2 \sin^2 \theta - \cos \theta = 1$