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FROM: Mrs. Jewell and Mrs. Rava

Attached you will find your summer packet. Unless otherwise stated, all questions should be done without a calculator! This packet is meant to help you refresh many of the math skills you will need to succeed in AP Calculus AB. **COMPLETED PACKETS ARE DUE THE FIRST DAY OF SCHOOL**. If you lose this copy, go to the Wakefield website for another copy.

All of the topics in this packet are important to understand before embarking on your study of Calculus. Many of the topics should be review. Others may be new to some of you due to the disruption caused by CoVid in the past school year. You will need to watch the videos on those particular topics and perhaps find additional videos as resources to solve the problems.

AP Calculus will be taught as a flipped classroom. We will use this same method throughout the year of watching videos prior to the lesson and then practicing problems during the lesson.

We are looking forward to a wonderful year with you! If you need to reach us over the summer, you can email us:

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Have a great summer!

Please purchase a TI-84 Calculator if you do not already own one. The best sales are usually at the end of July.

Topic 1: Slope of a Line

Rate and Slope: <https://www.youtube.com/watch?v=izsiAR4p4jk>

Find the slope of the line through (3, 4) and (-2, 5).	If 5 tickets to the movie cost \$75 and 9 tickets cost \$105, find the rate of change for movie tickets. Include the units of measure.								
Find the slope of the line that goes through the points given in the table. <table border="1"><tr><td>x</td><td>-1</td><td>0</td><td>1</td></tr><tr><td>f(x)</td><td>15</td><td>10</td><td>5</td></tr></table>	x	-1	0	1	f(x)	15	10	5	Find the slope of the linear function, $f(x)$ given that $f(-2) = 4$ and $f(3) = -6$
x	-1	0	1						
f(x)	15	10	5						

Difference Quotient: <https://www.youtube.com/watch?v=qQgVomi8lCc>

Find the slope of the line that goes through the points $(x, f(x))$ and $(x+h, f(x+h))$ when $f(x) = x - 2$	Simplify the difference quotient $\frac{f(x+h)-f(x)}{x}$ when $f(x) = x^2 + 1$.
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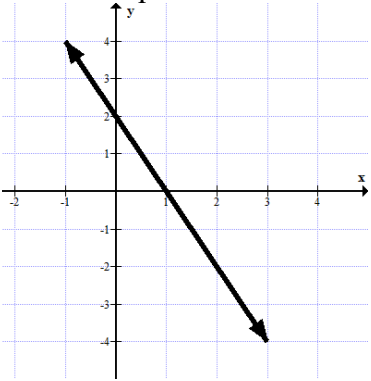
Topic 2: Writing Equations of Lines

In Calculus, we usually use the point-slope equation of a line, $(y - y_0) = m(x - x_0)$, instead of the slope intercept equation, $y = mx + b$. If you are unfamiliar with the point-slope equation, you should watch this video:

<https://www.youtube.com/watch?v=vut5b2fRQQ0>

Find the equation of the line with a slope of 3 that passes through (-2, 5).	If $f(x)$ is a linear, find the equation of the line that connects $f(3) = -4$ and $f(0) = 1$.								
If $f(x) = 2x^2 - x + 5$, find the slope of the line connecting $(0, f(0))$ and $(2, f(2))$.	Find the equation of the line that represents the values in the table: <table border="1"><tr><td>x</td><td>-1</td><td>1</td><td>3</td></tr><tr><td>f(x)</td><td>5</td><td>10</td><td>15</td></tr></table>	x	-1	1	3	f(x)	5	10	15
x	-1	1	3						
f(x)	5	10	15						

How to Use the Point Slope Form of a Line: <https://www.youtube.com/watch?v=yAwHC3OyY7c>

<p>If $f(x) = (x - 4)^2 + 1$, find the line that connects the points $(-1, f(-1))$ to $(3, f(3))$</p>	<p>Find the equation of a line in point-slope form</p> 
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Topic 3: Exact Values for Trigonometric Functions

Determine Trig Function Values Using the Unit Circle: <https://www.youtube.com/watch?v=i56P6xzsB5Y>

<p>Draw a picture of the unit circle.</p>	<p>Draw pictures of the two special right triangles.</p>
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Evaluate:

$\sin 0 =$	$\cos \frac{\pi}{2} =$	$\tan \pi =$	$\cos \frac{3\pi}{2} =$
$\cos \frac{\pi}{3} =$	$\sin \frac{\pi}{4} =$	$\sin \frac{\pi}{2} =$	$\cos 0 =$
$\sin \left(-\frac{\pi}{3}\right) =$	$\cos 3\pi =$	$\tan \frac{3\pi}{4} =$	$\sin \frac{7\pi}{6} =$

Topic 4: Trigonometric Identities

Use the following link to complete the table below:

<https://www.khanacademy.org/math/precalculus/x9e81a4f98389efdf:trig/x9e81a4f98389efdf:using-trig-id/a/trig-identity-reference>

Reciprocal Identities (the first three in the list)	Quotient Identities
Pythagorean Identities	Double Angle Identities

Topic 5: Simplifying Trig Expressions: <https://www.youtube.com/watch?v=oHOeJr11How>

$(\csc\theta)(\sin\theta)=$	$(\tan\theta)(\cos\theta)=$
$\frac{\cot\theta}{\csc\theta} =$	$\frac{\csc^2\theta - 1}{\csc^2\theta} =$

Topic 6: Factoring

<https://www.youtube.com/watch?v=v20tk0oS9NE&feature=youtu.be>

<https://www.youtube.com/watch?v=5KyxD6qg3g8>

Simplify:

$a^2 - 1$	$a^3x^3 + b^3$	$a^3x^3 - b^3$
$a^2 - 9$	$27x^3 + 8$	$\frac{9x^2 + 3x - 2}{9x^2 - 1}$
$\frac{x^2 - 3x}{x^2 - 6x + 9}$	$18s^3 - 50s$	$2(3x + 4)^2 - 7(3x + 4)$

Topic 7: Solving Trig Equations

<https://www.youtube.com/watch?v=qFLDHOgY7eA>

<https://www.youtube.com/watch?v=Wg5KFKDMfxo>

<p>Find all solutions for θ, $0 \leq \theta \leq 2\pi$.</p> $\sin^2\theta - \cos^2\theta = 0$	<p>Find all solutions for x, $0 \leq x \leq 2\pi$.</p> $\sin^2x + \cos x = 1$
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Topic 8: Inverse Trigonometric Functions

Introduction in Inverse sine, cosine and tangent functions: <https://www.youtube.com/watch?v=LUPa5nPskAc>

Examples: <https://www.youtube.com/watch?v=7Wd64tsv-O8>

	$y = \arcsin(x)$ $y = \sin^{-1}(x)$	$y = \arccos(x)$ $y = \cos^{-1}(x)$	$y = \arctan(x)$ $y = \tan^{-1}(x)$
Range			
Quadrant Restrictions			

Find the exact value.

$\sin^{-1}\left(-\frac{\sqrt{3}}{2}\right) =$	$\cos^{-1}(-1) =$	$\arctan(\sqrt{3}) =$	$\arccos\left(-\frac{1}{2}\right) =$
$\cos^{-1}(-7) =$	$\tan^{-1}\left(\frac{\sqrt{3}}{3}\right) =$	$\sin^{-1}\left(-\frac{1}{2}\right) =$	$\arccos\left(-\frac{\sqrt{2}}{2}\right) =$
$\arctan(-1) =$	$\sin^{-1}(-1) =$	$\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right) =$	$\cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) =$

Topic 9: Exponential and Logarithmic Expressions

<https://www.youtube.com/watch?v=SxF44olWTyk>

https://www.youtube.com/watch?v=L5Z_3RrrVjA&feature=youtu.be

<https://www.youtube.com/watch?v=vINRIRgeKqU&feature=youtu.be>

Evaluate

$\ln e =$	$\ln e^2 =$	$\log 1000 =$
$\log_6 \frac{1}{36} =$	$\left(\frac{1}{4}\right)^{\left(-\frac{3}{2}\right)} =$	$\ln 1 =$
$\log 1 =$	$e^{(\ln 16 + 3)} =$	$\left(\frac{1}{9}\right)^{\left(\frac{3}{2}\right)} =$
$\ln e^3 =$	$\log_4 \frac{1}{4} =$	$27^{\frac{2}{3}} =$

Simplify:

$\left(\sqrt{x^3}\right)^{\frac{1}{2}}$	$\sqrt{8} + \sqrt{32}$	$\frac{\sqrt{x}}{\sqrt{x+3}}$
$2e^{3x} \cdot 4e^x$	$\sqrt{x} \cdot \sqrt[3]{x}$	$\frac{4}{2 - \sqrt{x}}$

Topic 10: Properties of logarithms

<https://www.youtube.com/watch?v=bzV3lbfNhn8&feature=youtu.be>

Rewrite the expression as a single log – use the product, quotient, and power properties of logs

$\frac{1}{5} \ln(x^2) - 2 \ln(x+2)$	$(5 \ln x - 4 \ln 3) + 3 \ln 2$	$\log 5 + 6 \log w$
$2 \log x + 3 \log(x-2) - 4 \log y$	$\frac{1}{2} \log a - \frac{1}{3} \log b$	$5(\ln x - \ln y^2)$
<p>Solve: $e^x + e^{-x} = 2$ Hint: let $e^x = u$</p>		

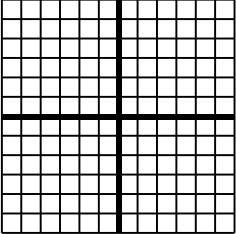
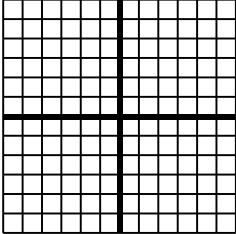
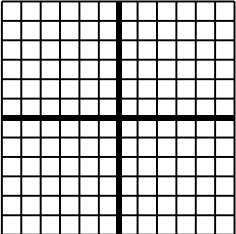
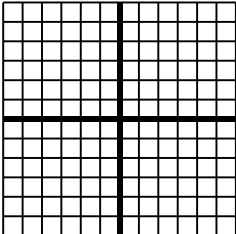
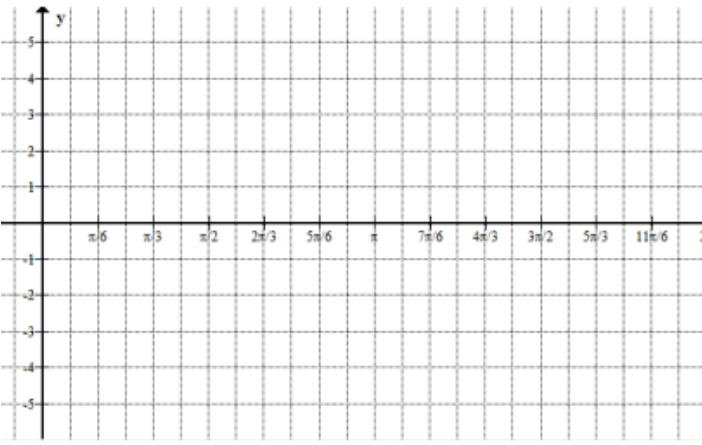
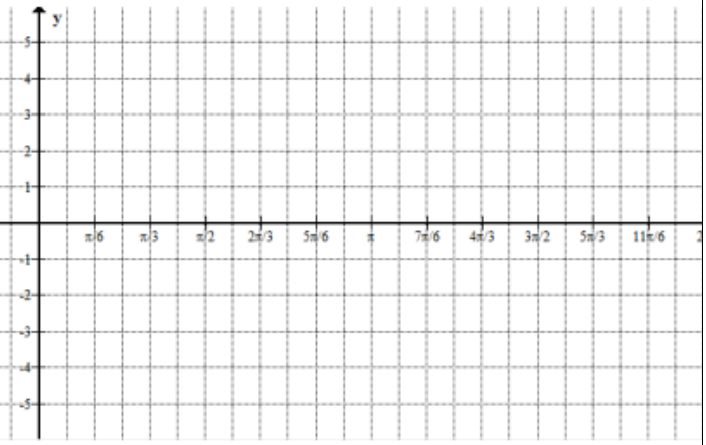
Topic 11: Rational Functions

<https://www.youtube.com/watch?v=wBZxVxiJS9I>

$\frac{x^2 - 3x - 4}{x^2 - 9}$	$\frac{x^2 + 3x - 10}{x - 1}$	$\frac{x^2 + 7x + 12}{x^3}$
Find the zeros:	Find the zeros:	Find the zeros:
Write the equation(s) of the vertical asymptote(s):	Write the equation(s) of the vertical asymptote(s):	Write the equation(s) of the vertical asymptote(s):
Write the equation of the horizontal asymptote:	Write the equation of the horizontal asymptote:	Write the equation of the horizontal asymptote:

Topic 12: Graphs Parent Functions

There are no videos for this section. You may use the internet for help.

<p>Quadratics: $y = x^2$</p> <p>Domain: _____ Range: _____</p> 	<p>Exponential Function: $y = e^x$</p> <p>Domain: _____ Range: _____</p> 
<p>Logarithmic Functions: $y = \ln x$</p> <p>Domain: _____ Range: _____</p> 	<p>Square Root Functions: $y = \sqrt{x}$</p> <p>Domain: _____ Range: _____</p> 
<p>Sine Function: $y = 3\sin x$</p> 	<p>Cosine Function: $y = 3\cos x$</p> 
<p>Rational Function: $y = \frac{1}{x-1}$</p> <p>Domain: _____ Range: _____</p> 