

What students need to know for...

CALCULUS AB

NAME: _____

This is a **MANDATORY** assignment that will be **GRADED**. It is due the first day of the course. Your teacher will determine how it will be counted (i.e. homework, quiz, etc.)

Students expecting to take Calculus AB at Cambridge Rindge and Latin High School should demonstrate the ability to...

- keep an organized notebook
- complete homework every night
- work with others
- seek help outside of class if needed
- take good notes
- be active learners
- ask questions and participate in class
- reason with and without a calculator

Specific Math Skills

1) Algebra

- can manipulate with ease fractions, decimals and variables in a variety of settings including in equations and rational functions
- comfortable with all forms of factoring including quadratics, sum and difference of cubes, quartics and factoring by grouping
- add, subtract, multiply and divide radical expressions including rationalizing denominators
- solving equations involving logarithms and rational exponents

2) Graphing

- be familiar with the graphs of linear, absolute value, quadratic, cubic, quartic, logarithmic and exponential functions
- identify the domain and range of functions
- recognize end behaviors of graphs

3) Trigonometry

- work with the basic six trig functions including manipulating them to simplify expressions and solve equations by finding all solutions
- know the trig identities
- memorize the trig table of values
- know the graphs of the six basic trig functions including their domain and range

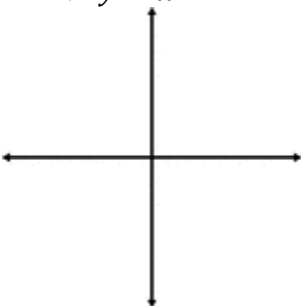
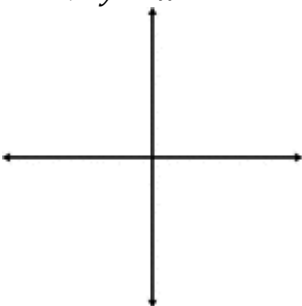
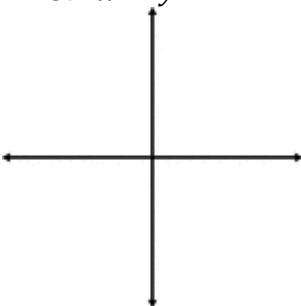
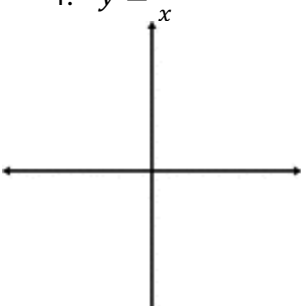
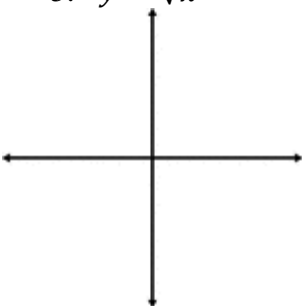
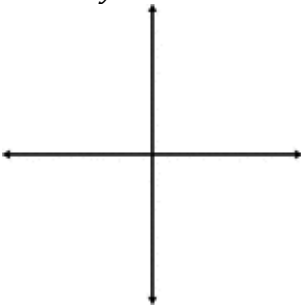
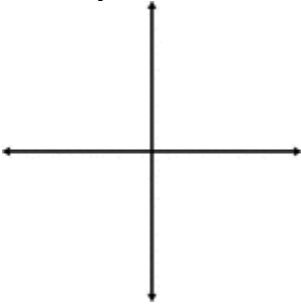
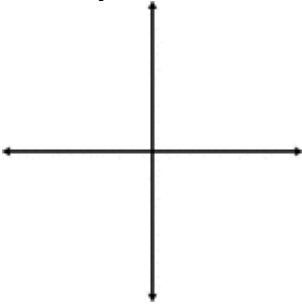
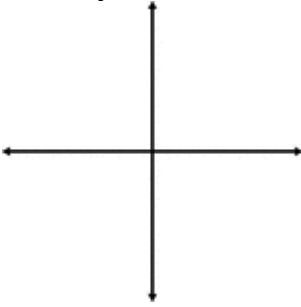
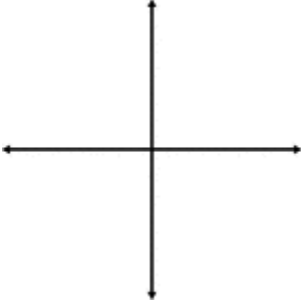
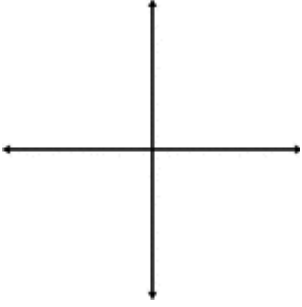
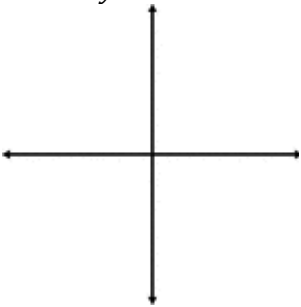
Welcome to Calculus! Calculus will be challenging as well as beautiful. This full year course requires that everyone work hard and study for the entirety of the class. You will need a large binder or notebook (you might take over 200 pages of notes), and a graphing calculator (the teachers can help you with TI-83 or 84 but with other models such as the TI-89 or HP or Casio, you will need your manual). Good luck – we look forward to a great year!

- The CRLS Math Department

Some Review Problems:

*NOTE: Show all of your work. Your teacher may count this packet as a quiz grade, a homework grade, or they may give a test or quiz on this material at the beginning of the year.

I. Graphing: Sketch the graph & state the domain and range of each. Put domain and range in interval notation.

<p>1. $y = x$</p>  <p>Domain:</p> <p>Range:</p>	<p>2. $y = x^2$</p>  <p>Domain:</p> <p>Range:</p>	<p>3. $x = y^2$</p>  <p>Domain:</p> <p>Range:</p>
<p>4. $y = \frac{1}{x}$</p>  <p>Domain:</p> <p>Range:</p>	<p>5. $y = \sqrt{x}$</p>  <p>Domain:</p> <p>Range:</p>	<p>6. $y = e^x$</p>  <p>Domain:</p> <p>Range:</p>
<p>7. $y = \ln x$</p>  <p>Domain:</p> <p>Range:</p>	<p>8. $y = \sin x$</p>  <p>Domain:</p> <p>Range:</p>	<p>9. $y = \cos x$</p>  <p>Domain:</p> <p>Range:</p>
<p>10. $y = x$</p>  <p>Domain:</p> <p>Range:</p>	<p>11. $x^2 = 16 - y^2$</p>  <p>Domain:</p> <p>Range:</p>	<p>12. $y = \sqrt{4 - x^2}$</p>  <p>Domain:</p> <p>Range:</p>

II. Algebraic Manipulation

A. Factor each of the following completely or state that it is prime.

13. $x^2 + 5x + 6$

14. $x^2 - 4x - 12$

15. $x^2 + 5x - 24$

16. $16x^2 - 81$

17. $x^3 + 4x^2 + 3x$

18. $x^4 + 6x^2 + 9$

B. Simplify

19. $\frac{(x+4)^2 - 16x}{x-4}$

20. $\frac{y+3}{(y+4)^2 - (8y+25)}$

21. $\frac{\frac{25}{a} - a}{5+a}$

22. $\frac{\frac{x}{x+1} - \frac{1}{x}}{\frac{x}{x+1} + \frac{1}{x}}$

C. Solve for x *without* a calculator or grapher:

23. $1 + \frac{x}{3} = \frac{4}{5}$	24. $\frac{2}{3} - \frac{5}{7} = x$	25. $\frac{3}{8} = \frac{4}{1-x}$
26. $\frac{6}{x} + \frac{x}{2} = 4$	27. $\ln(x-2) = 4$	28. $-3\ln(x+1) = 2$
29. $\ln(x-2) + \ln(3) = 5$	30. $4e^{3x-2} = 8$	31. $100 = 200e^{-0.06x}$
32. $\sin x = -\frac{\sqrt{2}}{2}$, for $0 \leq x \leq 2\pi$	33. $3x^2 + 7x + 3 = 0$	

D. Find the asymptotes (horizontal, vertical). Show work.

34. $y = \frac{1}{x-1}$

35. $y = \frac{1}{(x-1)^2}$

E. Equations of Lines

36. Use point-slope form to find the equation of the line passing through the point (0, 5) with a slope of $\frac{2}{3}$.

37. Using point slope form, find the equation of a line passing through the point (2, 8) and parallel to the line $y = \frac{5}{6}x - 1$.

38. Using point slope form, find the equation of a line perpendicular to the y- axis passing through the point (4, 7).

F. Function Notation

Let $f(x) = x^2$, $g(x) = 2x + 5$, and $h(x) = x^2 - 1$. Find each.

39. $h[f(-2)] = \underline{\hspace{2cm}}$

40. $f[g(x-1)] = \underline{\hspace{2cm}}$

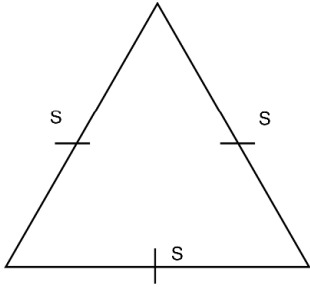
41. $g[h(x^3)] = \underline{\hspace{2cm}}$

G. Modeling Equations

42. Find two positive numbers such that their product is 192 and the sum of the first plus three times the second is a minimum.
43. The sum of the perimeters of an equilateral triangle and a square is 10. Let s be the side length of the equilateral triangle and let x be the side length of the square. Find the equation for the area of the square in terms of s .
44. A manufacturer makes a metal can in the shape of a cylinder that holds 1000cm^3 of oil. Write an equation for the Surface area of the can in terms of one variable.

III. Area/Geometry Questions

45. What is the area of an equilateral triangle with side length s ? Hint: use a 30-60-90 triangle!



46. What is the area of a semicircle with respect to diameter d ?

47. What's the area of an isosceles right triangle with base $(4-x^2)$?

VI. Calculator Questions

1. Use a calculator to solve $\sin(x) = e^{-x^2}$ when $0 < x < 1$. Your solution should have 5 decimals.

2. Solve the following equation using your calculator: $x^3 + 19x^2 + 90x + 52 = 0$

V. Limits (Pre-Calculus Review)

3. Use the figure to find the limit.

A. $\lim_{x \rightarrow 3} f(x)$

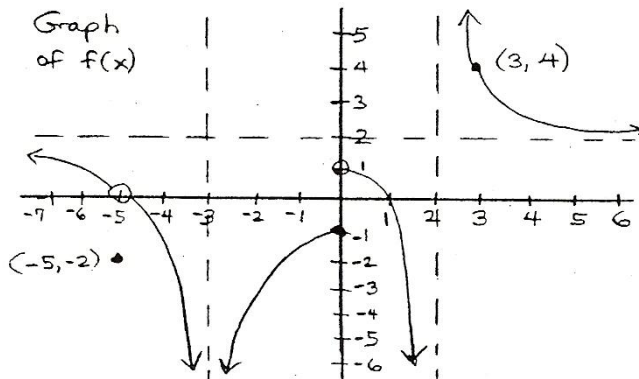
B. $\lim_{x \rightarrow \infty} f(x)$

C. $\lim_{x \rightarrow 2^+} f(x)$

D. $\lim_{x \rightarrow 0} f(x)$

E. $\lim_{x \rightarrow -\infty} f(x)$

F. $\lim_{x \rightarrow -5} f(x)$



VI. Trigonometric Functions

Trig Facts: You will need to know these as you know your multiplication tables.

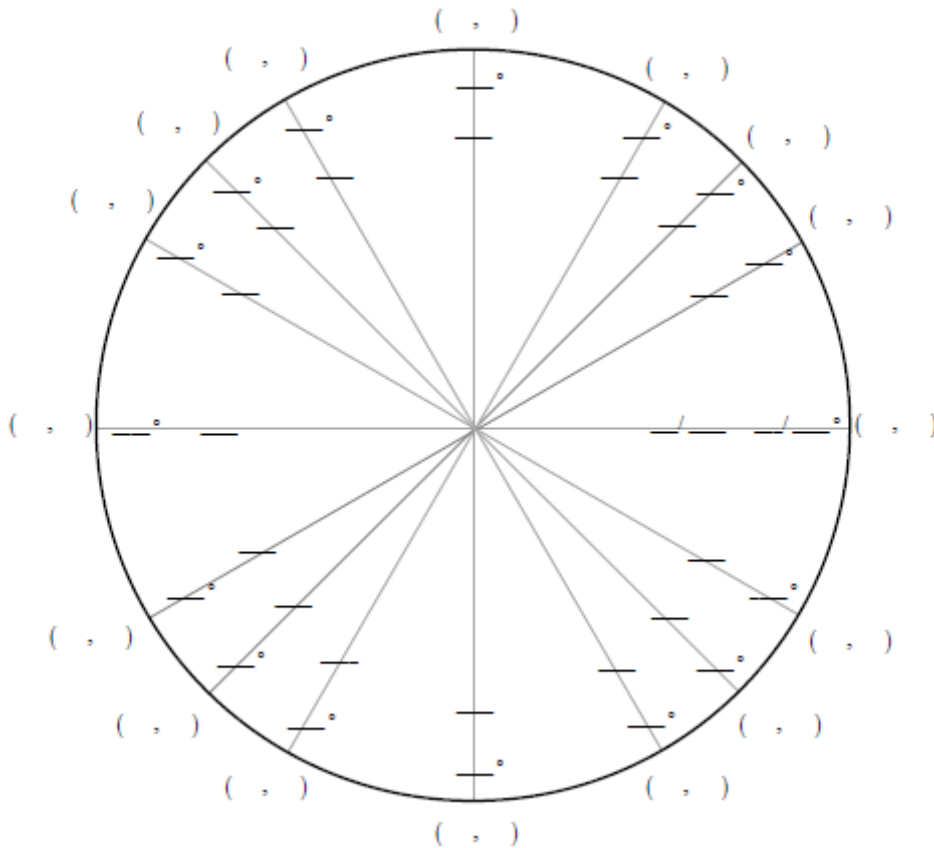
The values for sin, cos, and tan in Quadrant I should be *memorized cold*. The other Quadrants' values should not take you more than a few seconds to say when quizzed.

Every trig function takes an angle as input and returns a ratio as output.

So every inverse trig function takes a ratio as input and returns _____ as output.

III. Fill out the following 16 point unit circle by finding the following:

- 1) The measures for each angle in radian and in degree.
- 2) The coordinate pair for each angle.



Fonction <i>Angle</i>	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$
SIN					
COS					
TAN					