The summer assignment reviews essential skills for a successful start to either AP Calculus course. We recommend you do not do this at one time, but rather do a little bit throughout summer. This will keep your math skills fresh for August. These skills review Algebra 1 through Pre-Calculus because they are all skills needed for a successful year of Calculus.

If you have forgotten a topic there are some excellent resources online to review from. One suggestion is: http://www.mathispower4u.com/

It is **crucial** that you complete the following worksheets by **the first Friday after you come back**.

We will make ourselves available to you so that you have a head start for the demands of an AP Calculus class.

Please contact Mr. Joe Garcia for AP Calculus AB and Mrs. Anna Bathgate for AP Calculus BC questions:

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EQUATION OF A LINE

Slope intercept form: $y = mx + b$

Point-slope form: $y - y_1 = m(x - x_1)$
* LEARN! We will use this formula frequently!

Vertical line: $x = c$ (slope is undefined)

Horizontal line: $y = c$ (slope is 0)

Example: Write a linear equation that has a slope of ½ and passes through the point (2, -6)

Slope intercept form

$y = \dfrac{1}{2}x + b$ Plug in ½ for m

$-6 = \dfrac{1}{2}(2) + b$ Plug in the given ordered

$b = -7$ Solve for b

$y = \dfrac{1}{2}x - 7$

Point-slope form

$y + 6 = \dfrac{1}{2}(x - 2)$ Plug in all variables

$y = \dfrac{1}{2}x - 7$ Solve for y

29. Determine the equation of a line passing through the point (5, -3) with an undefined slope.

30. Determine the equation of a line passing through the point (-4, 2) with a slope of 0.

31. Use point-slope form to find the equation of the line passing through the point (0, 5) with a slope of 2/3.

32. Use point-slope form to find a line passing through the point (2, 8) and parallel to the line $y = \dfrac{5}{6}x - 1$.

33. Use point-slope form to find a line perpendicular to $y = -2x + 9$ passing through the point (4, 7).

34. Find the equation of a line passing through the points (-3, 6) and (1, 2).

35. Find the equation of a line with an x-intercept (2, 0) and a y-intercept (0, 3)

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UNIT CIRCLE

You can determine the sine or the cosine of any standard angle on the unit circle. The x-coordinate of the circle is the cosine and the y-coordinate is the sine of the angle. Recall tangent is defined as sin/cos or the slope of the line.

Examples:

$$\sin\frac{\pi}{2}=1 \qquad \cos\frac{\pi}{2}=0 \qquad \tan\frac{\pi}{2}=und$$

*You must have these memorized OR know how to calculate their values without the use of a calculator.

36. a.) $\sin\pi$ b.) $\cos\dfrac{3\pi}{2}$ c.) $\sin\left(-\dfrac{\pi}{2}\right)$ d.) $\sin\left(\dfrac{5\pi}{4}\right)$

e.) $\cos\dfrac{\pi}{4}$ f.) $\cos(-\pi)$ g) $\cos\dfrac{\pi}{3}$ h) $\sin\dfrac{5\pi}{6}$

i) $\cos\dfrac{2\pi}{3}$ j) $\tan\dfrac{\pi}{4}$ k) $\tan\pi$ l) $\tan\dfrac{\pi}{3}$

m) $\cos\dfrac{4\pi}{3}$ n) $\sin\dfrac{11\pi}{6}$ o) $\tan\dfrac{7\pi}{4}$ p) $\sin\left(-\dfrac{\pi}{6}\right)$

1. Are the following statements true? If not, explain in a complete sentence why not.

a. $\dfrac{2k}{2x+h} = \dfrac{k}{x+h}$

b. $\dfrac{1}{p+q} = \dfrac{1}{p} + \dfrac{1}{q}$

c. $\dfrac{x+y}{2} = \dfrac{x}{2} + \dfrac{y}{2}$

d. $3\left(\dfrac{a}{b}\right) = \dfrac{3a}{3b}$

e. $3\left(\dfrac{a}{b}\right) = \dfrac{3a}{b}$

f. $3\left(\dfrac{a+b}{c}\right) = \dfrac{3a+b}{c}$

2. Simplify

a. $\dfrac{\frac{x}{2}}{\frac{x}{4}}$

b. $\dfrac{\sqrt{x-2} + \dfrac{5}{\sqrt{x-2}}}{x-2}$

3. Solve for y'

a. $xy' + y = 1 + y'$

b. $3y^2 y' + 2yy' = 5y' + 2x$

c. $3x^2 yy' + 2xy^2 = 2yy'$

4. Solve the quadratic equation.

a. $x^2 - 16x + 15 = 0$

b. $x^2 - 2x - 15 = 0$

c. $4x^2 - 21x - 18 = 0$

d. $2x^2 - 3x + 3 = 0$

e. $x^4 - 9x^2 + 8 = 0$

5. Write as a single fraction with the denominator in factored form.
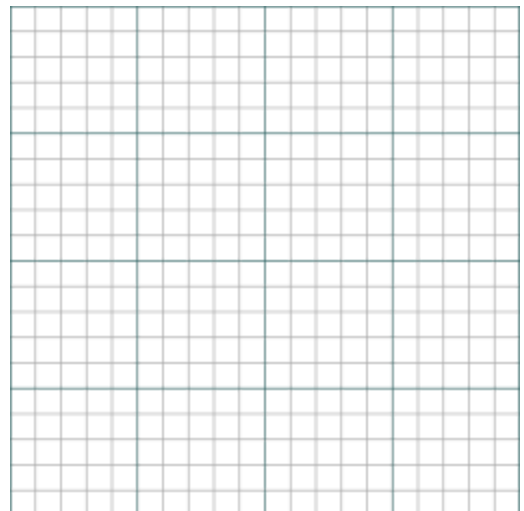
a. $\dfrac{2}{3} - \dfrac{1}{4}$

b. $\dfrac{3}{x(x+1)} + \dfrac{2}{x+1}$

c. $\dfrac{7x^2 + 5x}{x+3} - \dfrac{5x}{x^2 - 9}$

d. $20\left(\dfrac{2}{x+1} - \dfrac{3}{x}\right)$

6. Graph the equation $y = x^3 - x$ and answer the following questions.

   a. Is the point (3,2) on the graph?

   b. Is the point (2,6) on the graph?

   c. Is the function even, odd, or neither?

   d. Find the x-intercepts.

7. Find f(1)-f(5) given $f(x) = |x - 3| - 5$

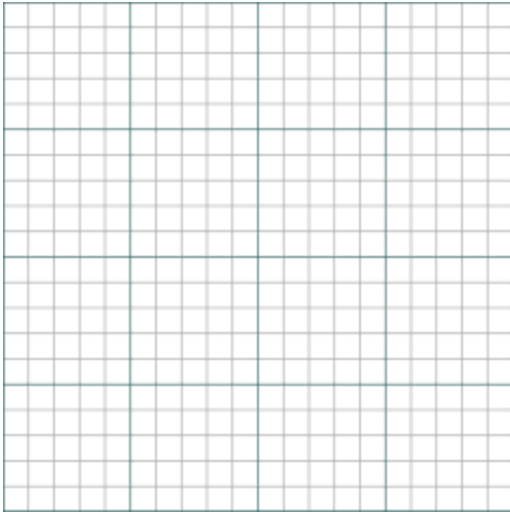**8. Find f(x+2)-f(2) given** $f(x) = x^2 - 3x + 4$

9. Find $f(x + \Delta x)$ **for** $f(x) = x^2 - 2x - 3$

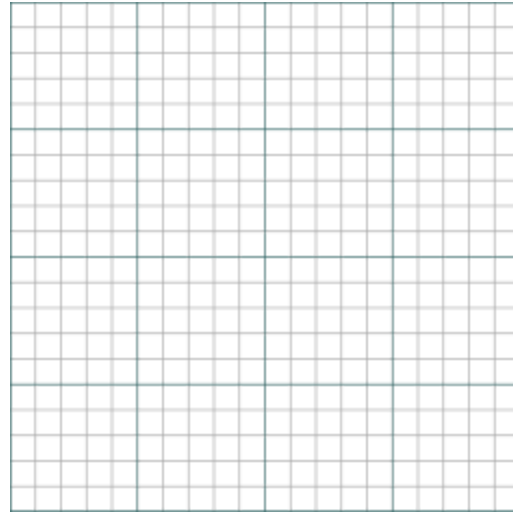**10. Find** $\dfrac{f(x + \Delta x) - f(x)}{\Delta x}$ **if** $f(x) = 8x^2 + 1$

11. Find $\dfrac{f(x + h) - f(x)}{h}$ **if** $f(x) = \dfrac{1}{x}$
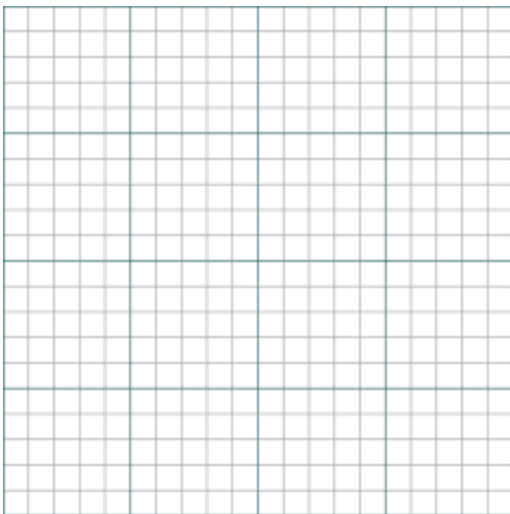
12. Graph the function

a. $f(x) = \begin{cases} 1 & : x \le 0 \\ -1 & : x \ge 0 \end{cases}$

b. $f(x) = \begin{cases} 2x & : (-\infty, -1) \\ 2x^2 & : [-1, 2) \\ -x + 3 & : (2, \infty) \end{cases}$

c. $f(x) = \sqrt{(16 - x^2)}$

13. Let $f(x) = 2x - 2$. Complete the following.

   a. Graph f.

   b. Determine whether f has an inverse function.

   c. Graph f^{-1}.

   d. Give the equation for f^{-1}.

14. If $f(x) = |x|$ **describe in words what the following would do to the graph of** $f(x)$.

a. f(x)-4   b. f(x-4)   c. -f(x+2)

d. 5f(x)+3   e. f(2x)   f. |f(x)|

15. Find the outside surface area of a box of height h **whose base dimensions are** p **and** q **, and satisfies the following condition:**
a. The box is closed.

b. The box has an open top.

c. The box has an open top and a square base with side length p.

16. A seven foot ladder, leaning against a wall, touches the wall x **feet above the ground. Write an expression in terms of** x **for the distance from the foot of the ladder to the base of the wall.**

17. A piece of wire 5 inches long is to be cut into two pieces. One piece is x **inches long and is to be bent into the shape of a square. The other piece is to be bent into the shape of a circle. Find an expression for the total area made up by the square and the circle as a function of** x.

18. Evaluate and answer in radians.

a. $tan^{-1}(-1) = arctan(-1) =$

b. $sin^{-1}\left(\frac{\sqrt{3}}{2}\right) = arcsin\left(\frac{\sqrt{3}}{2}\right) =$

c. $cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = arccos\left(\frac{\sqrt{3}}{2}\right) =$

19. Find the solution of the equation for $0 \le \theta < 2\pi$

a. $2sin^2\theta = 1 - sin\theta$

b. $2tan\theta - sec^2\theta = 0$

c. $sin2\theta + sin\theta = 0$

20. Which of the following expressions are identical?

a. $cos^2\theta$

b. $(cos\theta)^2$

c. $cos\theta^2$

21. Which of the following expressions are identical?

a. $(sin\,x)^{-1}$

b. $arcsin\,x$

c. $sin\,x^{-1}$

d. $\frac{1}{sin\,x}$

23. Solve for x.

a. $\ln e^3 = x$

b. $\ln e^x = 4$

c. $\ln x + \ln x = 0$

d. $e^{\ln 5} = x$

e. $\ln 1 - \ln e = x$

f. $\ln 6 + \ln x - \ln 2 = 3$