Calculus Summer Packet

__Calculus AB__ is a very intense course. You will be learning many new concepts and there is little time for reviewing old concepts. Work on this review throughout the summer. Do not wait until the day before school starts. You should complete this entire review __without using a calculator__. However, you might want to check your work using a calculator. All answers should be exact. Show all your work. This will be collected the first day of class.

I. Factoring

Completely factor each expression below.

1. $6x^2+17x+10$
2. $12x^2+17x-5$
3. $x^2-11x+24$
4. $8x^3+27$
5. x^2-16
6. $4x^3+2x^2-42x$

II. Solving Polynomial Equations

1. $6x^2-4x-9=x^2+3$
2. $x^2+9x+5=x-5$
3. $x^3+5x=9x$
4. $x(x+8)=x^2+6x+9$

III. Simplifying Radical Expressions

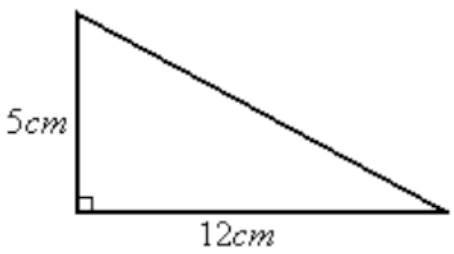
Completely simplify the expression below. All denominators should be rationalized.

1. $\sqrt{72}$
2. $\sqrt{150}$
3. $\left(\sqrt{6}\right)\left(\sqrt{3}\right)$
4. $\sqrt{3200}$
5. $\left(\sqrt{14}\right)\left(\sqrt{21}\right)$
6. $\sqrt{\frac{1}{4}}$
7. $\left(2\sqrt{6}\right)\left(3\sqrt{15}\right)$
8. $\frac{4}{\sqrt{6}}$
9. $3\sqrt{200}+2\sqrt{8}$
10. $\frac{\sqrt{12}}{\sqrt{3}}$
11. $\frac{6+\sqrt{3}}{5-\sqrt{3}}$
12. $\left(\frac{3\sqrt{8}}{\sqrt{5}}\right)\left(\frac{\sqrt{60}}{\sqrt{10}}\right)$
13. $\frac{5\sqrt{6}}{3+\sqrt{8}}$
14. $\frac{4+\sqrt{7}}{\sqrt{20}}$
15. $5\sqrt[3]{10}-4\sqrt[3]{270}$

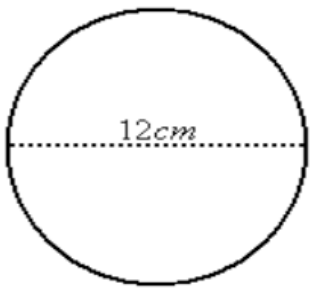
IV. Area and Perimeter/Circumference

Find the area and perimeter (or circumference in # 2) of each figure below.

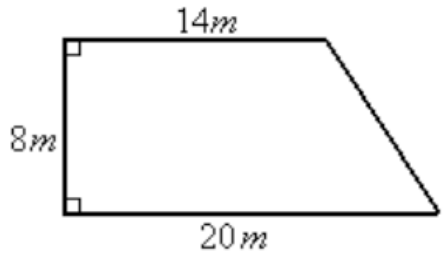
1. The figure is a triangle



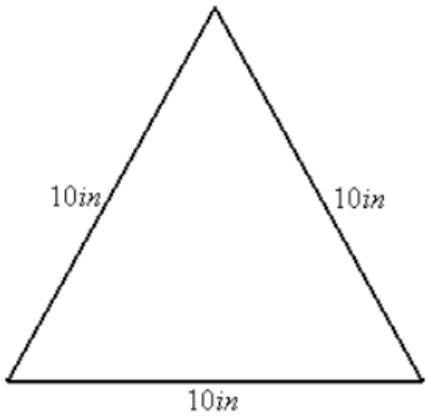
2. The figure is a circle



3. The figure is a trapezoid



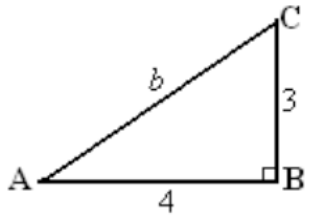
4. The figure is a triangle



V. Trigonometric Ratios

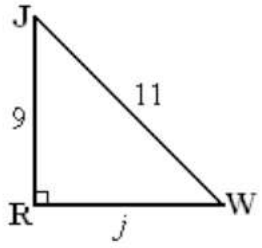
Find the unknown side. Then find the trigonometric ratios. Simplify all radicals and rationalize all denominators.

1.



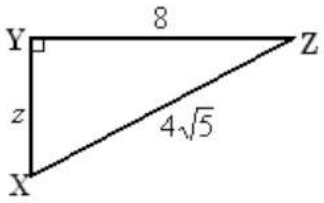
$\sin A =$	$\sin C =$
$\cos A =$	$\cos C =$

2.



$\sin J =$	$\sin W =$
$\cos J =$	$\cos W =$
$\tan J =$	$\tan W =$

3.

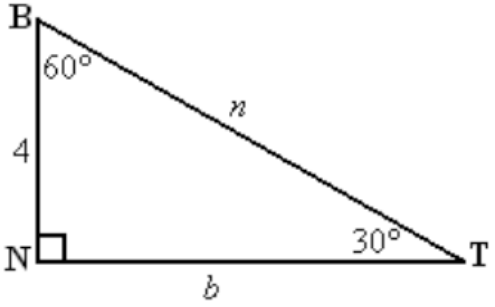


$\sin X =$	$\sin Z =$
$\cos X =$	$\cos Z =$
$\tan X =$	$\tan Z =$

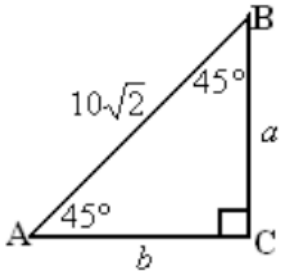
VI. Special Right Triangles

Find the exact length of the unknown sides in each triangle below.

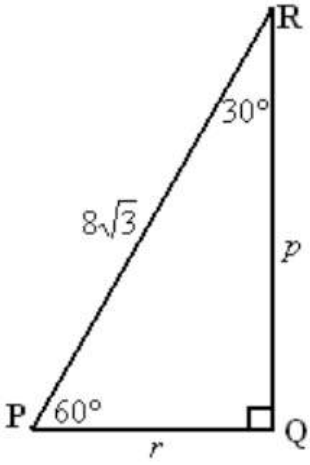
1.



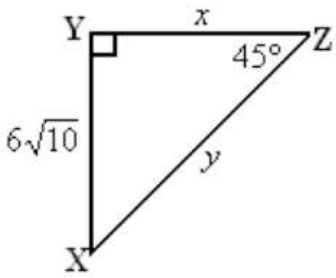
2.



3.



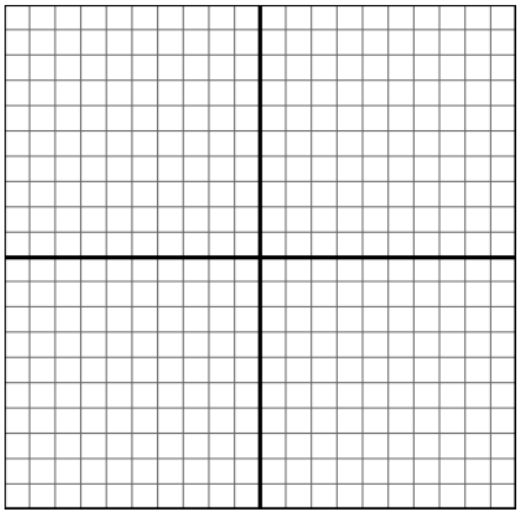
4.



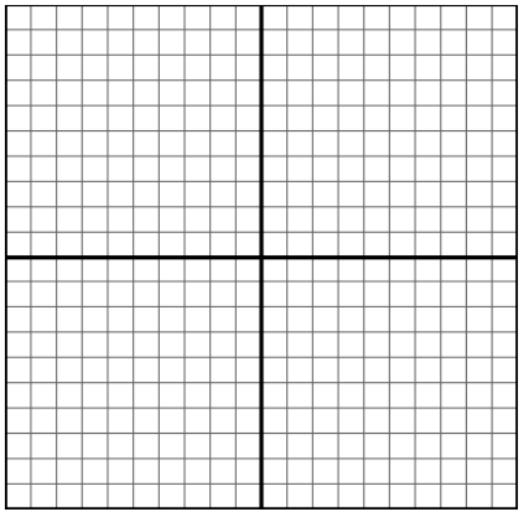
VII. Radicals and Rational Exponents

Graph the functions below

1. $f(x)=\sqrt{x+3}-2$



2. $g(x)=\sqrt[3]{x-1}+4$



Solve the equations below. ***Check for extraneous solutions.***

3. $\sqrt[3]{4x-2}=2\sqrt[3]{x+6}$

4. $\sqrt{x+7}=x+5$

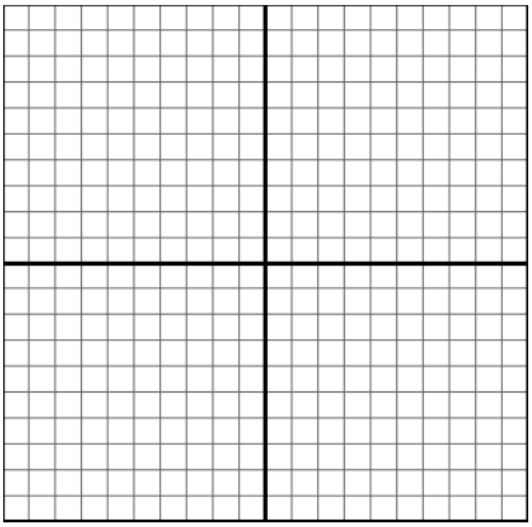
5. $3x^{\frac{4}{3}}-7=41$

6. $4(x-3)^{\frac{3}{2}}+12=120$

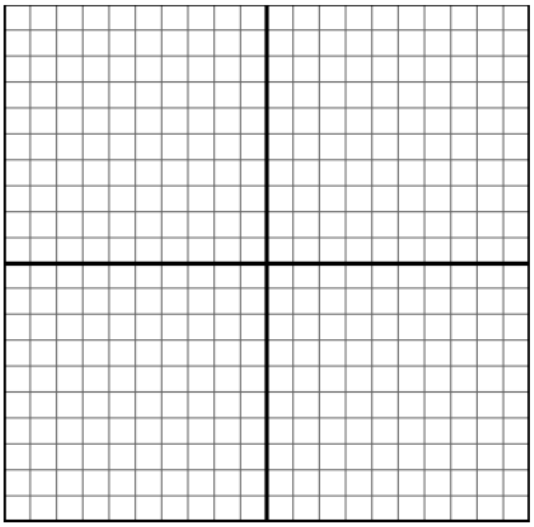
VIII. Rational Functions

Graph the functions below

1. $f(x)=\frac{1}{x}+3$



2. $g(x)=\frac{2x+4}{x-1}-3$



Solve the equations below. ***Check for extraneous solutions.***

3. $\frac{10}{x+4}=\frac{15}{4x+4}$

4. $\frac{x}{x-2}+\frac{1}{x-4}=\frac{2}{x^2-6x+8}$

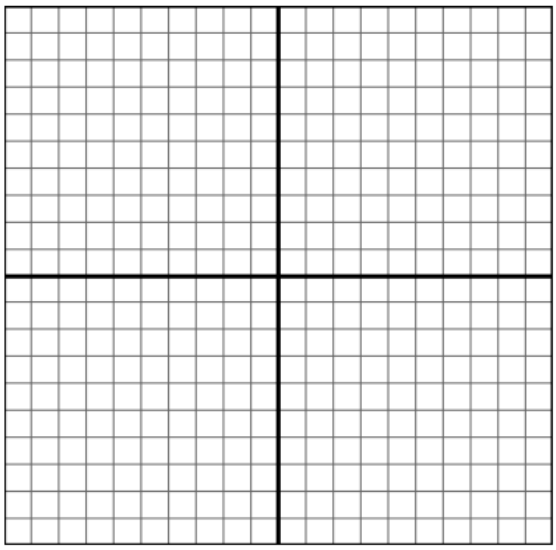
5. $\frac{10}{x^2-2x}+\frac{4}{x}=\frac{5}{x-2}$

6. $\frac{x-6}{x^2+4x-5}+\frac{x}{x^2-4x+3}=\frac{2}{x^2+2x-15}$

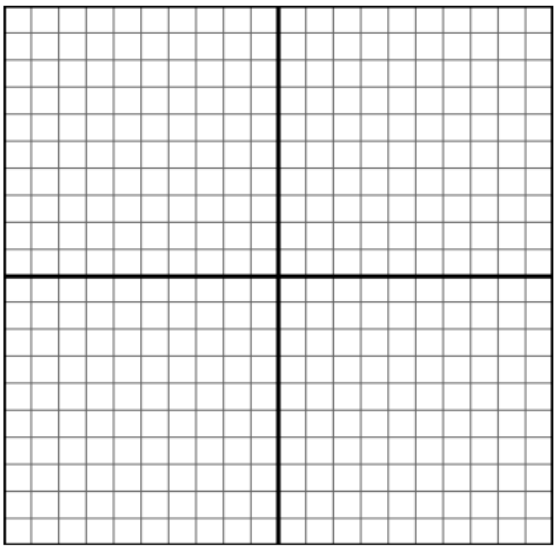
IX. Quadratic Equations and Vertex Form

Graph the functions below

1. $f(x) = -3x^2 - 6x + 7$



2. $g(x) = (x+5)^2 + 3$



Rewrite the quadratic equations in vertex form, $f(x) = a(x-h)^2 + k$, by completing the square.

3. $f(x) = x^2 + 6x + 12$

4. $g(x) = x^2 - 7x + 9$

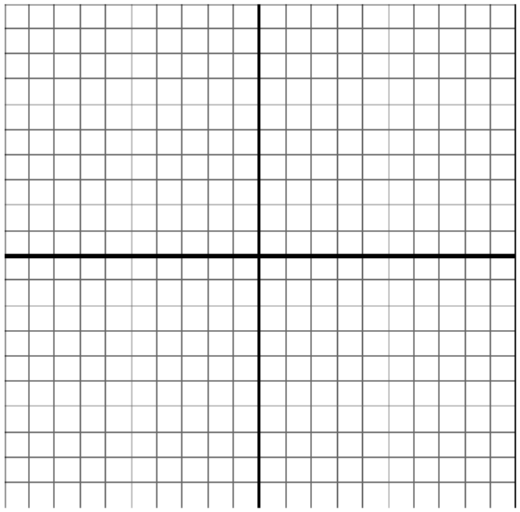
5. $h(x) = 3x^2 + 6x - 14$

6. $j(x) = 2x^2 - 11x - 18$

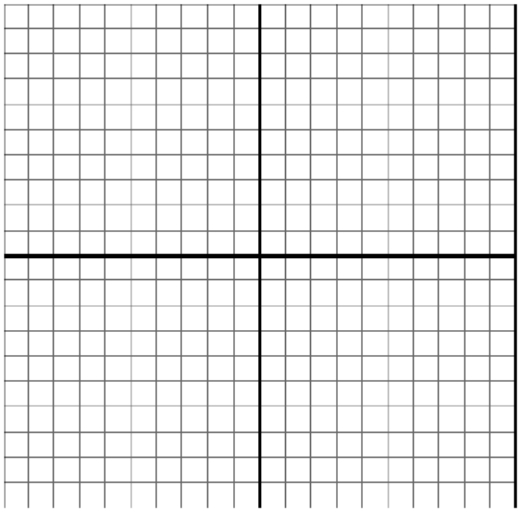
X. Piecewise Functions

In 1-3, graph the functions below. In 4, write the rule of the function.

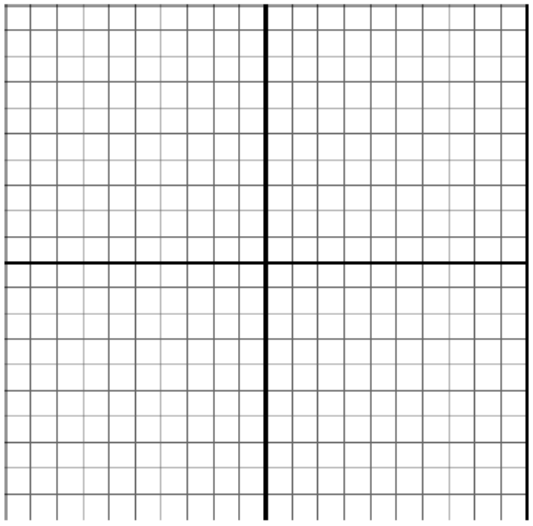
1. $f(x)=\begin{cases} -\frac{1}{2}x+1 & -8 \le x < -4 \\ 5 & -4 \le x \le 4 \\ \frac{3}{4}x+2 & x > 4 \end{cases}$



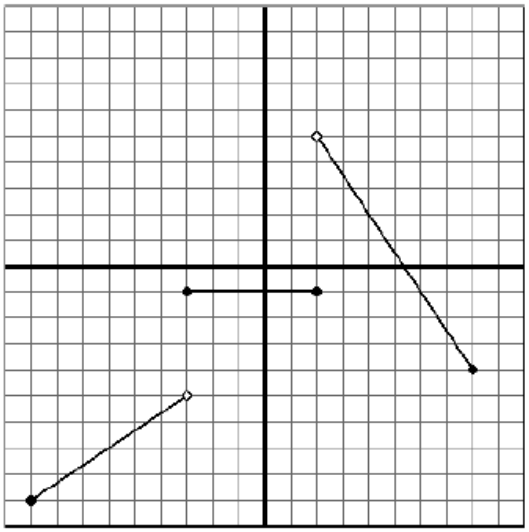
2. $g(x)=\begin{cases} x & -9 \le x < -3 \\ (x+2)^2-6 & -3 \le x < 2 \\ \sqrt{x-2}+1 & 2 \le x \le 6 \end{cases}$



3. $h(x)=\begin{cases} |x+4| & -8 \le x < -3 \\ -\frac{2}{3}x+2 & -3 \le x \le 6 \end{cases}$



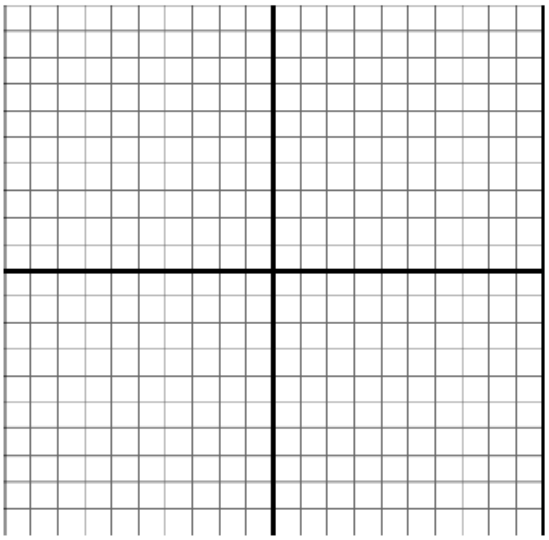
4. $j(x)=$



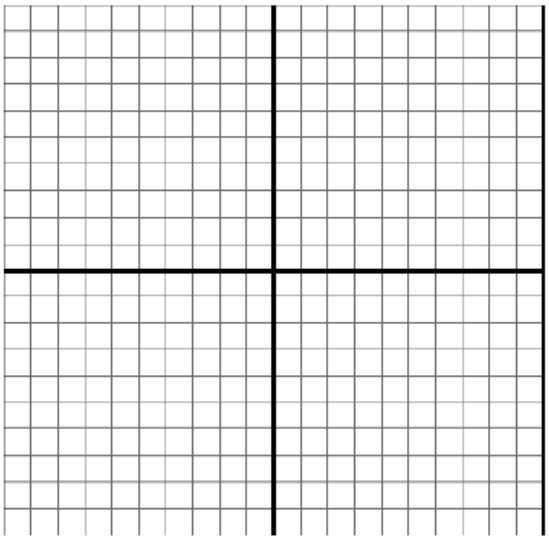
XII. Logarithmic and Exponential Functions

Graph the functions below

1. $f(x)=6\left(\frac{1}{3}\right)^{x-4}-8$



2. $g(x)=\log_3(x+4)-2$



Evaluate

3. $\log_5 25$

4. $\ln 1$

5. $\log_8 32$

6. $\log_2\left(\frac{1}{8}\right)$

Find the inverse of each function below.

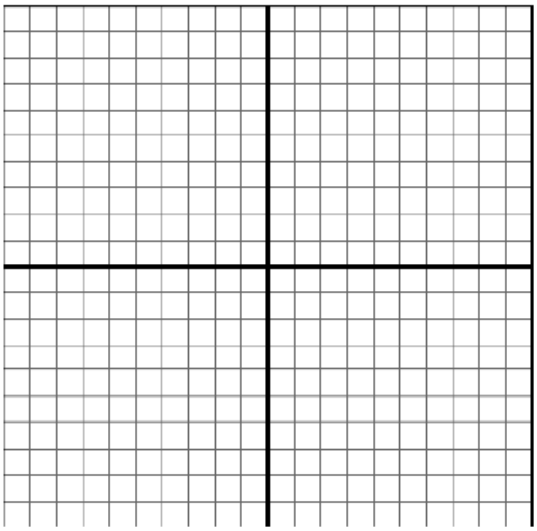
7. $f(x)=\log_4(x-5)+3$

8. $g(x)=3\left(\frac{1}{2}\right)^{x-1}+6$

XIII. Imaginary Numbers

Graph the complex number below in the complex plane and find its magnitude.

1. $4-3i$



Simplify.

2. $(4-5i)+(2-6i)$

3. $(4-5i)-(2-6i)$

4. $(4-5i)(2-6i)$

5. $\dfrac{4-5i}{2-6i}$

Solve the equation over the complex numbers

6. $x^2-6x+11=0$