

This packet must be completed in its entirety and submitted to your **Pre-Calculus Honors** teacher on the **first day of school**.

DIRECTIONS/INFORMATION:

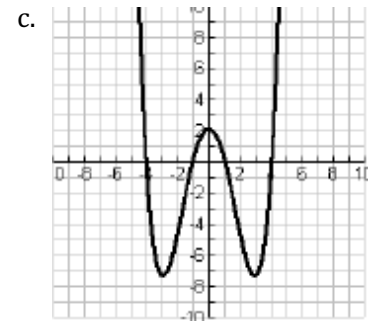
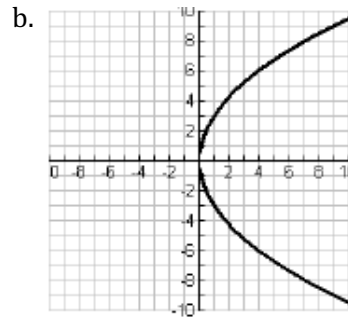
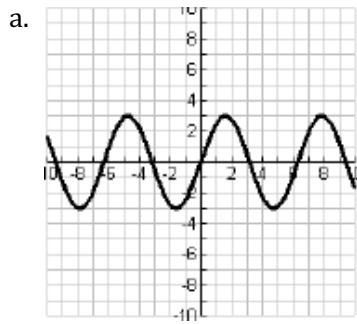
- This packet contains review problems from your most recent math classes and represents the types of mathematics knowledge your teacher expects you to have before entering Pre-Calculus Honors.
- The packet is divided into six subsections. Follow the directions given in each section of the packet. Show your work and give full explanations where necessary. If additional space is needed, complete the work on a separate sheet of paper and attach it to the packet.
- If you have difficulty with any of the problems in the packet, refer back to your classroom notes from the school year or use available online sources (https://lmsd.blackboard.com/webapps/blackboard/execute/modulepage/view?course_id=_37114_1&cmp_tab_id=_40312_1&editMode=true&mode=cpview)
- A diagnostic quiz will be given soon after school starts to assess the skills and concepts addressed in this packet.

Thank you in advance for completing this packet by the **first day of school**. We look forward to working with you in September.

Pre-Calculus Honors Teachers

Functions

1. Determine whether each of the following are graphs of functions.



2. Find the domain and range of the functions below. Use interval notation.

a. $f(x) = \frac{1}{x-4}$

b. $g(x) = \sqrt{2x-5}$

c. $h(x) = 2^x + 3$

d. $f(x) = \log(x)$

e. $g(x) = 9 - x^2$

f. $h(x) = |x - 2|$

3. If $f(x) = 3x - 1$ and $g(x) = x^2 + 2x$, evaluate the following.

a. $f(g(2))$

d. $g(f(x))$

b. $f(f(5))$

e. $f(a + 1)$

c. $f^{-1}(17)$

f. $g(x + h)$

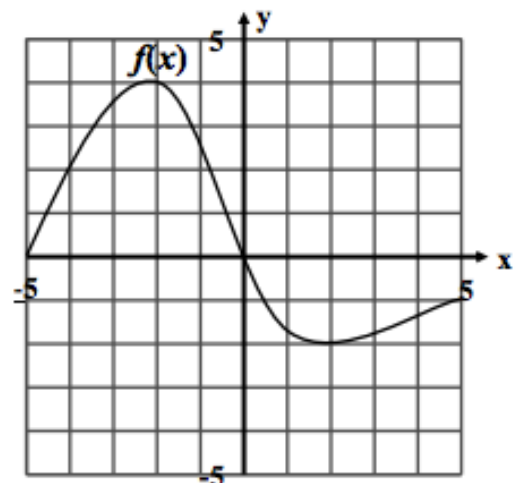
4. Use the graph at the right to answer the questions.

a. Find $f(-2)$

b. Find $f(5)$

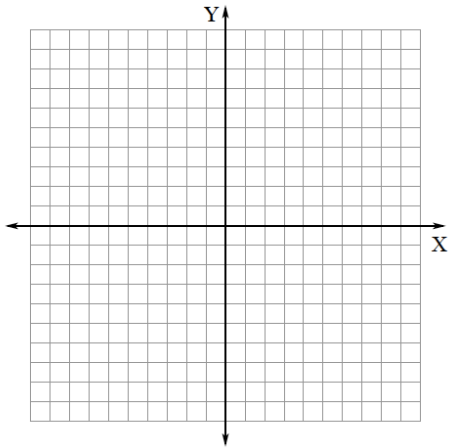
c. For which value(s) of x does $f(x) = -2$?

d. For which value(s) of x does $f(x) = 0$?

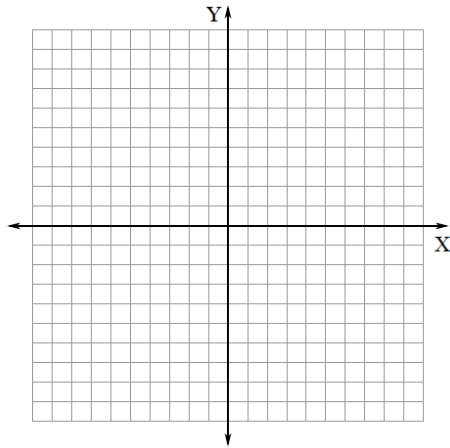


5. Sketch an accurate graph. Show at least 3 points. Name all intercepts and asymptotes.

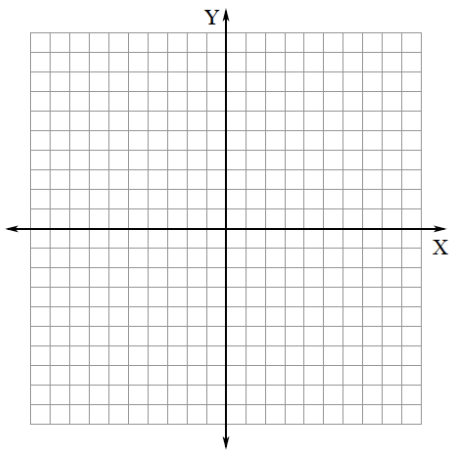
a. $f(x) = \sqrt{x - 2} + 3$



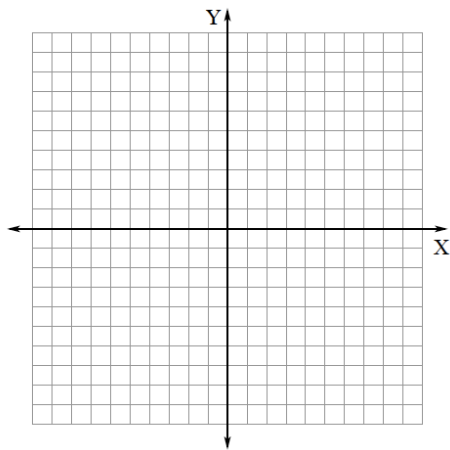
d. $f(x) = 4 - x^2$



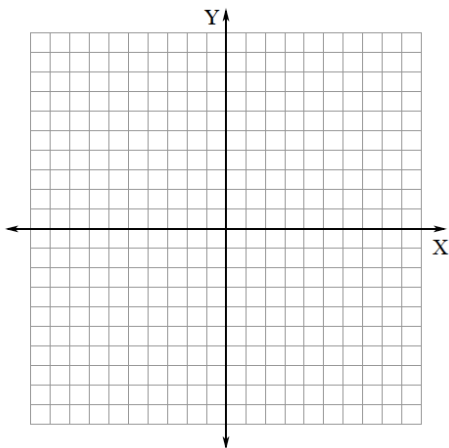
b. $f(x) = (x - 3)^3 + 2$



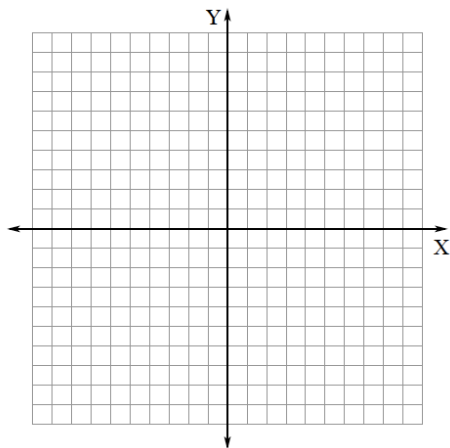
e. $f(x) = \log(x - 3)$



c. $f(x) = (x + 1)^2 - 5$



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



Exponentials and Logarithms

1. Solve for the given variable using a same bases technique.

a. $4^x = 32$

b. $9^{-x} = \sqrt{3}$

c. $125^{x+1} = \frac{1}{5}$

2. Solve for the given variable using logarithms, leaving your answers in exact form.

a. $3^x = 10$

b. $5^{x+3} = 9$

c. $2^{1-x} = 3^x$

3. Solve for the given variable.

a. $y = \log_2 256$

b. $3 = \ln(13x - 1)$

c. $2 = \log_b 324$

4. Rewrite as a single logarithm of a single argument and simplify.

a. $\frac{1}{2}\log_2 x + 2\log_2 y + 3\log_2 z$

b. $2\log_3 m + 5\log_2 n - 3\log_2(mn)$

5. Solve for x.

a. $\log_6(x) + \log_6(x + 5) = 1$

b. $\log_3(10x + 2) - \log_3(x + 1) = 2$

6. Given $\log_b 2 \approx 0.5$ and $\log_b 3 \approx 0.7$, evaluate the following.

a. $\log_b 12$

b. $\log_b 1.5$

Sequences and Series

Directions: Answer questions #1-4 using the sequences below.

a. 5, 12, 19, 26, 33, ...

c. 297, 99, 33, 11, ...

b. 3, 6, 12, 24, 48, ...

d. 3, -6, -15, -24, ...

1. Determine if the sequences above are arithmetic or geometric. If arithmetic, state the common difference. If geometric, state the common ratio.

a.

c.

b.

d.

2. Determine an explicit equation for each of the sequences above.

a.

c.

b.

d.

3. Find the 10th term in each of the sequences above.

a.

c.

b.

d.

4. Find the sum of the first 10 terms in each of the sequences above.

a.

c.

b.

d.

5. A bouncy ball is dropped from the top of the Sears Tower (listed at 1450 feet tall). Each time it strikes the ground, it bounces up to 75% of the previous height.

a. How high will the ball bounce after it strikes the ground for the 3rd time?

b. How high will the ball bounce after it strikes the ground for the nth time?

c. How many times does it strike the ground before its bounce is less than 6 inches high?

6. Determine the explicit equation for an arithmetic sequence with $t_2 = 10$ and $t_{29} = 91$.

7. Determine sums of the following infinite geometric series.

a. $4 + 2 + 1 + \frac{1}{2} + \dots$

b. $12 + 4 + \frac{4}{3} + \dots$

8. Evaluate the series (sums).

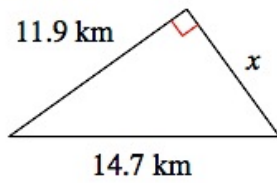
a. $\sum_{k=1}^5 2(3^{k-1})$

b. $\sum_{k=1}^{10} 4k + 2$

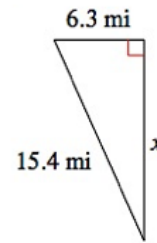
Geometry

1. Solve for the missing sides in the triangle using the Pythagorean Theorem or Special Right Triangles.

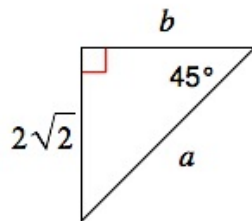
a.



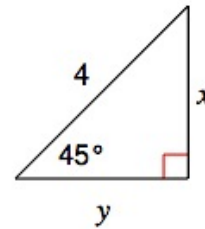
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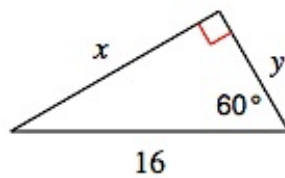
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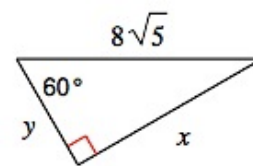
d.



e.



f.



2. Determine the area of the indicated shape.

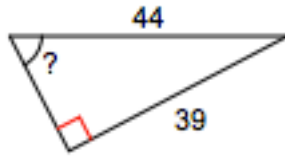
a. A circle with a circumference of 24π

b. An equilateral triangle with perimeter 18

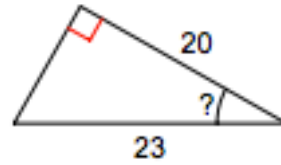
c. A square with a diagonal of 60

3. Solve for the missing sides or angles in the triangle using sine, cosine, or tangent ratios (SOHCAHTOA).

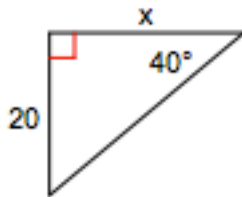
a.



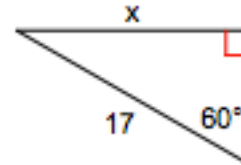
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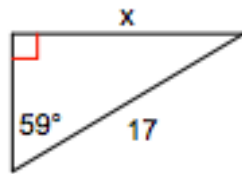
c.



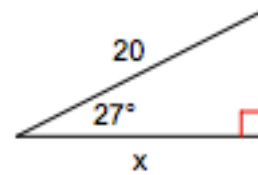
d.



e.



f.



4. Find the volume and surface area of the indicated shape.

a. A cylinder with a radius of 5 and a height of 12

b. A sphere with a radius of 9

c. A rectangular prism with dimensions $3 \times 7 \times 11$

Quadratic and Polynomial Functions

1. Factor each polynomial completely. That is ... write each as a product of prime polynomials.

a. $3x^2 + 7x + 4$

e. $x^3 - 125$

b. $3x^3 + x^2 + 12x + 4$

f. $9x^2 - 24x + 16$

c. $t^4 - 22t^2 + 40$

g. $6x^3 + 48$

d. $64x^8 - 16y^4$

h. $6x^2y - 21x^2 - 4y + 14$

2. Solve. Find both real and complex solutions.

a. $5x^2 - x = 0$

b. $x^2 - 4x + 5 = 0$

c. $3(x - 2)^2 + 48 = 0$

d. $3x^3 - 12x^2 - 36x = 0$

Radical Functions

1. Rewrite with a common denominator and simplify.

a. $\frac{x}{x-4} - \frac{3}{x+2}$

b. $\frac{5a}{2b} + \frac{6b}{5} + \frac{3}{a}$

2. Simplify the complex fractions.

a. $\frac{\frac{x^2-y^2}{2xy}}{\frac{1}{x} + \frac{1}{y}}$

b. $\frac{\frac{2}{x+h} - \frac{2}{x}}{h}$

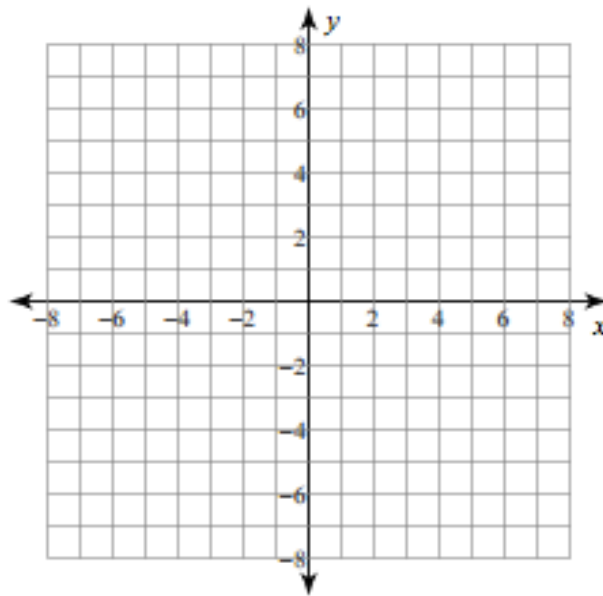
3. Solve.

a. $\frac{1}{x-8} - 1 = \frac{7}{x-8}$

b. $\frac{x+5}{x^2+x} = \frac{1}{x^2+x} - \frac{x-6}{x+1}$

4. Graph the rational function in the space provided. Show all the intercepts, holes, and horizontal & vertical asymptotes.

a. $f(x) = \frac{2x^2+10x+12}{x^2+2x+1}$



b. $g(x) = \frac{x^3-16x}{-4x^2+4x+24}$

