

PreCalc Honors Summer Preparation

Please follow the below instructions to join **BOTH** Algebra 2 and PreCalc to use as resources while completing the summer work.



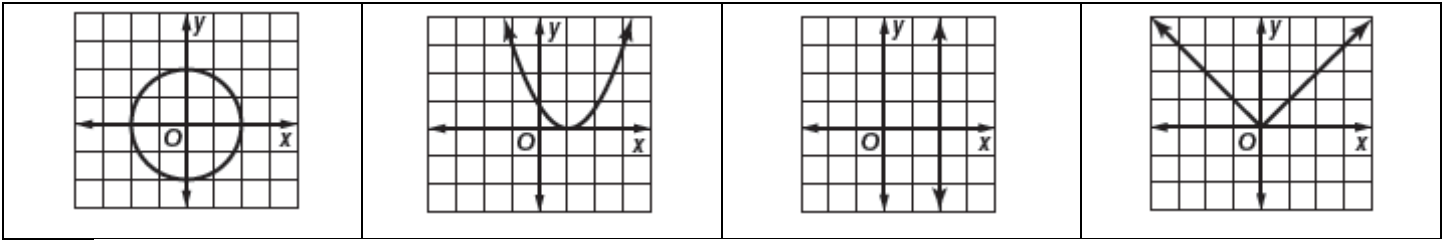
How to join your teacher's Khan Academy class

- 1 Sign up at khanacademy.org (or log in if you already have an account).
- 2 Visit khanacademy.org/coaches (the "Coaches" tab in your profile).
- 3 In the "Join a class" field, enter the class code.

Class code: Algebra 2 6487HJQ2
PreCalc 7V9C8P
- 4 You're set. Now click [Home](#) to start learning!

Chapter 1

1. Determine whether each relation is a function. Explain why or why not.



2. Find the zeros and intercepts of $f(x) = -\frac{2}{3}x - 8$

3. Find $f(-9)$ for $f(x) = \begin{cases} -3|x+5| & \text{if } x < 1 \\ -9 & \text{if } x \geq 1 \end{cases}$

4. Given $g(x) = -2\sqrt{x^2}$, find $g(8+x)$.

Name _____

Show all work. Circle your answers.

5. To what is the graph of an odd function symmetric? Explain.

A the x -axis

B the y -axis

C the line $y = x$

D the origin

6. Which function has an infinite discontinuity? How do you know?

$f(x) = \begin{cases} 2 & \text{if } x > 0 \\ 3 & \text{if } x \geq 0 \end{cases}$	$f(x) = \frac{x^2 - 49}{x - 7}$	$f(x) = \frac{1}{2x - 9}$	$f(x) = x^5 - x^3$
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7. Simon will make a box without a top by cutting out corners of equal size from a 22 inch by 15 inch sheet of cardboard and folding up the sides. What is the maximum volume of the box?

8. Describe the characteristics of $f(x) = |x|$. State the domain, range, intercepts, symmetry, continuity, end behavior, intervals that are increasing-decreasing-constant, and extrema.

Name _____

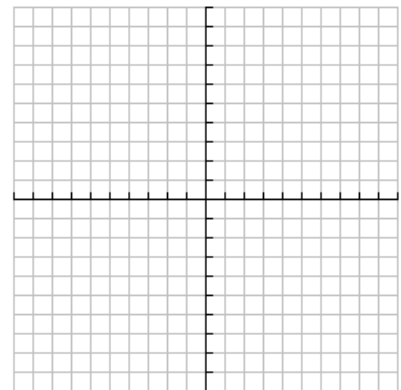
Show all work. Circle your answers.

9. Which of the following results in the graph of $f(x) = \sqrt{x}$ being compressed horizontally by a factor of 2, expanded vertically and reflected in the y-axis?

a. $f(x) = -2\sqrt{3x}$	b. $f(x) = -3\sqrt{2x}$	c. $f(x) = 2\sqrt{-3x}$	d. $f(x) = 3\sqrt{-2x}$
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10. Describe the transformations relating the graph of $g(x) = \frac{1}{2}(x - 3)^2$ to the graph of its parent function $f(x) = x^2$.

11. Graph the piece-wise function: $f(x) = \begin{cases} 4 & \text{if } x < 5 \\ x^3 & \text{if } -2 \leq x \leq 2 \\ \sqrt{x+3} & \text{if } x > 3 \end{cases}$

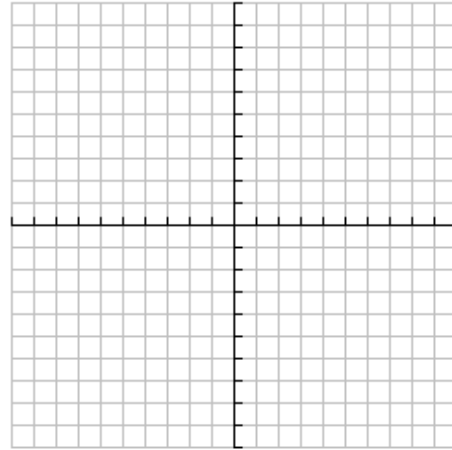


12. If $f(x) = \frac{x}{x-3}$ and $g(x) = 2x - 1$, find $(f + g)(x)$, $(f - g)(x)$, $(f \cdot g)(x)$, $(f/g)(x)$. State the domain for each.

Name _____

Show all work. Circle your answers.

13. Find the inverse of $f(x) = 2\sqrt{x} + 3$. State any domain restrictions. Sketch f and f^{-1} on the same coordinate plane.



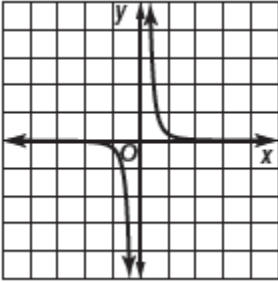
14. Which function is a one-to-one function? Explain.

a. $f(x) = 3 x - 4$	b. $f(x) = -3\sqrt{x+5}$	c. $f(x) = \frac{2x-2}{x^2}$	d. $f(x) = x^3 - 8x$
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15. $f(x) = x^2 + 1$ and $g(x) = \frac{1}{x}$, find $(f \circ g)(x)$ and $(g \circ f)(x)$.

Chapter 2

1. The graph of $f(x) = \frac{1}{4}x^{-3}$ is shown at the right. Analyze the function (domain, range, continuity, intervals that are increasing/decreasing/constant, symmetry, extrema, asymptotes, and end behavior)



2. Which is *not* a power function? Why?

a. $f(x) = 3x^5$	b. $f(x) = \frac{3}{x}$	c. $f(x) = x^{\frac{1}{3}}$	d. $f(x) = 3^x$
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3. Solve $\sqrt{6x-2} = \sqrt{4x+4}$.

4. Solve $\sqrt[3]{10x+2} - 3 = -5$.

Name _____

Show all work. Circle your answers.

5. What is the greatest possible number of real zeros of $f(x) = x^3 - 2x^2 - x + 1$?

6. Divide $(x^3 + 5x^2 + 5x - 2)$ by $(x + 2)$ using long division.

7. The height h in feet of a ball thrown into the air after t seconds is given by $h(t) = -16t^2 + 35t + 6$. Use synthetic substitution to find the height of the ball after 0.5 second.

8. Find the remainder when $2x^3 + 6x^2 + 3x - 1$ is divided by $x - 1$. Is the binomial a factor of the polynomial?

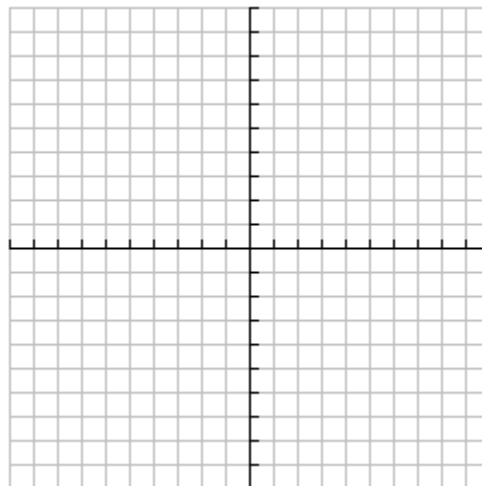
Name _____

Show all work. Circle your answers.

9. Find all the possible rational zeros of $f(x) = 4x^3 + 5x^2 - x + 2$?

10. Write the linear factorization of $x^4 - 6x^3 + 54x - 81$

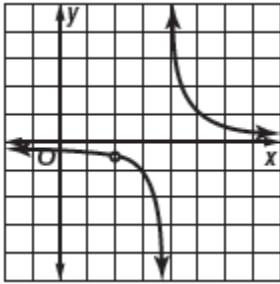
11. Determine the asymptotes and intercepts of $f(x) = \frac{x^2 - 4}{x^3 - 5x^2 + 6x}$. Sketch the graph.



Name _____

Show all work. Circle your answers.

12. Which of the following could be the function represented by the graph?



a. $f(x) = \frac{1}{x-4}$	b. $f(x) = \frac{x+2}{x-4}$	c. $f(x) = \frac{x-2}{(x-2)(x-4)}$	d. $f(x) = \frac{x-2}{(x-2)(x+4)}$
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13. Solve $5x^3 - 7x^2 - 19x - 15 = 0$

14. Solve $\frac{1}{x+4} = \frac{1}{x^2 + 3x - 4} + \frac{4}{x-1}$.

Name _____

Show all work. Circle your answers.

15. Which of the following is the solution to $(x + 3)(x - 2) \leq 0$?

a. $(-\infty, \infty)$	b. $(-\infty, 3)$ or $(2, \infty)$	c. $(-2, 3)$	d. $[-3, 2]$
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16. Solve $\frac{6}{q} + 4 \geq \frac{3}{q}$.

17. Solve $\frac{14}{x^2 - 3x} - \frac{8}{x} < \frac{-10}{x - 3}$

18. Find the polynomial function of least degree with real coefficients in standard form that has the zeros -1 , 3 , and $\pm 3i$.

Name _____

Show all work. Circle your answers.

19. **TEMPERATURE** The low temperature for a city every other day is shown. Which function best models the data?

x	0	2	4	6	8	10	12	14	16	18	20
f(x)	2	5	5	4	2	0	-2	-2	0	5	14

- a. $f(x) = 0.2x^3 - 0.4x^2 + 2.2x + 2$
- b. $f(x) = 2x^3 - 40x^2 + 217x + 199$
- c. $f(x) = 0.02x^3 - 0.4x^2 + 2.17x + 1.99$
- d. $f(x) = 0.02x^3 - 4x^2 + 2.17x - 1.99$

20. The elevation above ground for a rider on the Big Monster roller coaster is given in the table.

Time (seconds)	5	10	15	20	25
Elevation (feet)	85	62	22	4	17

- a. Determine a polynomial function to represent the data.

- b. Use the model to estimate a rider's elevation at 17 seconds.

- c. Use the model to determine approximately the first time a rider is 50 feet above the ground.

Name _____

Show all work. Circle your answers.

Chapter 3

1. In 2008, the bird population in a certain area was 10,000. The number of birds increases exponentially at a rate of 9% per year. Predict the population in 2013.

a. 15,386	b. 15,683	c. 15,489	d. 15,771
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2. A scientist has 86 grams of a radioactive substance that has a half life of 12 hours. How many grams of radioactive substance remain after 5 days?

3. Determine a formula for the exponential function

x	f(x)
-2	144
-1	72
0	36
1	18
2	9

4. Write $3^{-2} = \frac{1}{9}$ in logarithmic form.

a. $\log_3(-2) = \frac{1}{9}$	b. $\log_3 \frac{1}{9} = -2$	c. $\log_{-2} \frac{1}{9} = 3$	d. $\log_{-2} 3 = \frac{1}{9}$
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5. Evaluate $\log_9 \frac{1}{27}$.

Name _____

Show all work. Circle your answers.

6. Solve $\log_4 x + \log_4 (x - 2) = \log_4 15$.

7. Find the value of $\log_6 27.5$.

a. 0.661	b. 1.439	c. 1.850	d. 2.232
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8. Solve $5^x = 3^{x+2}$

9. Solve $e^{0.2x} = 21.2$.

Name _____

Show all work. Circle your answers.

10. Solve $8e^{2x} + e^x + 9 = 3 + 15e^x$

11. Condense $3\log x + \log 7 - 2\log y$.

a. $\log \frac{7x^3}{y^2}$	b. $\log \frac{21x}{2y}$	c. $\log \frac{21x}{y^2}$	d. $\log 7x^3y^2$
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12. Expand $\ln \frac{5x^6}{11y^7}$.

a. $6\ln 5x - 7\ln 11y$	b. $\ln 6 + \ln 5x - \ln 7 - \ln 11y$	c. $\ln 5 + 6\ln x - \ln 11 - 7\ln y$	d. $6\ln 5x + 7\ln 11y$
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13. Express $\log \frac{125}{81}$ in terms of $\log 3$ and $\log 5$

Name _____

Show all work. Circle your answers.

14. Solve $\ln x + \ln (x - 4) = \ln 12$.

15. Find the amount of time required for an investment to double at a rate of 12.3% if the interest is compounded continuously.

16. The number of students infected with the flu on a college campus after t days is modeled by the function

$$P(t) = \frac{320}{1 + 39e^{-0.3t}}$$

What was the initial number of infected students? What is the maximum number of students that can be infected with the flu?