

Math Placement - Level 6 Review

1. Factor the following expression completely:

$$z^2 + 14z + 45$$

3. Factor the following expression completely:

$$45w^2 + 12w - 9$$

5. Divide and simplify:

$$\frac{x^2 - 64}{x^2 + 1x - 72} \div \frac{4x}{x + 9}$$

7. Add and simplify:

$$\frac{9}{x-4} + \frac{x-76}{x^2-16}$$

9. Add. For answer, simplify numerator, but write denominator in factored form.

$$\frac{4x}{x^2 - 6x + 9} + \frac{3}{x - 3}$$

11. For the function $(x) = -2x^2 - 3x - 3$, evaluate and fully simplify each of the following.

$$f(x + h) =$$

$$\frac{f(x+h)-f(x)}{h} =$$

2. Factor the following expression completely:

$$z^2 - 6z - 40$$

4. Divide and simplify:

$$\frac{x^2 - 4x - 45}{x^2 - 81} \div \frac{x^2 + 8x + 15}{x^2 - 9}$$

6. A piece of cardboard measuring 10 inches by 11 inches is formed into an open-top box by cutting squares with side length x from each corner and folding up the sides.

Find a formula for the volume of the box in terms of x

$$V(x) =$$

8. Add and simplify:

$$\frac{4}{x-10} + \frac{x-90}{x^2-100}$$

10. For the function $(x) = -5x^2 + x + 1$, evaluate and fully simplify each of the following.

$$f(x + h) =$$

$$\frac{f(x+h)-f(x)}{h} =$$

12. Solve the equation: $\sqrt{8x + 4} - 2 = x$

13. Solve the equation: $8\sqrt{t} = \sqrt{3t + 4}$

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14. Solving Radical Equations

Solve each of the following equations algebraically. Check your answer graphically.

Write your answer as an equation using Integer Values or Reduced Fractions.

Original Equation

Equation solved for x .

$$8\sqrt{x+3} = 32$$

$$\sqrt{7x+3} - 5 = 0$$

$$8\sqrt{5x-3} = 32$$

$$\sqrt{13x+15} = \sqrt{9x-12}$$

15. Solving Radical Equations

Solve each of the following equations algebraically. Check your answer graphically.

Write your answer as an equation using Integer Values or Reduced Fractions.

Original Equation

Equation solved for x .

$$4\sqrt[3]{x+3} = 12$$

$$\sqrt[4]{4x+3} - 5 = 0$$

$$4\sqrt[6]{3x-3} = 12$$

$$\sqrt[3]{8x+14} = \sqrt[3]{7x-9}$$

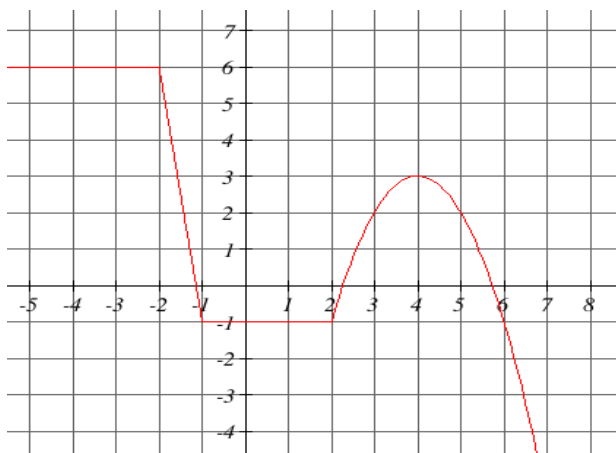
16. Solve: $4|3x - 1| + 11 \leq 19$

Give your answer as an interval. If no solutions exists - enter **No solutions**.

17. Solve: $|4x + 3| \geq 2$

Give your answer as using interval notation, with integers or fractions. Enter DNE if the inequality does not have a solution.

18. Consider the function graphed at right. Join multiple intervals with a union.



A) Give the interval(s) where the function is increasing.

B) Give the interval(s) where the function is decreasing.

C) Give the interval(s) where the function is constant.

D) Give the domain of the function using interval notation.

E) Give the range of the function using interval notation.

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19. Consider the function graphed to the right.

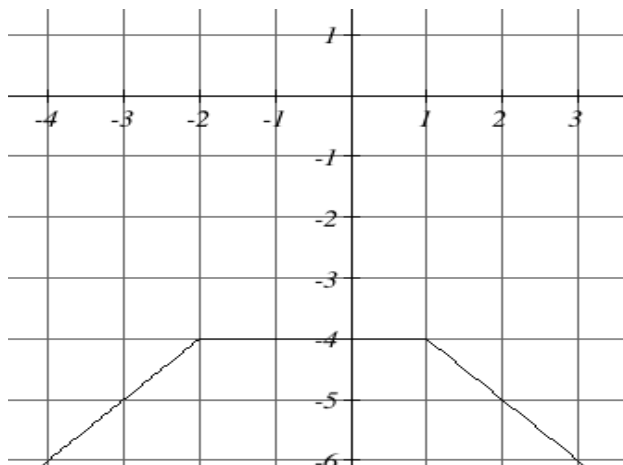
The function is increasing on the interval(s):

The function is decreasing on the interval(s):

The function is constant on the interval(s):

The domain of the function is:

The range of the function is:



20. Rationalize the denominator: $\frac{5}{6+\sqrt{2}}$

21. Rationalize the denominator: $\frac{-4}{1+\sqrt{x}}$

22. Given the function $m(x) =$

$$\begin{cases} x + 5 & x \leq -5 \\ -2x^2 + 8x + 7 & -5 < x < 4 \\ -3x - 2 & x \geq 4 \end{cases}$$

Calculate the following values:

$$m(-5) \quad m(-1) \quad m(8)$$

$$m(-7) \quad m(-3) \quad m(4)$$

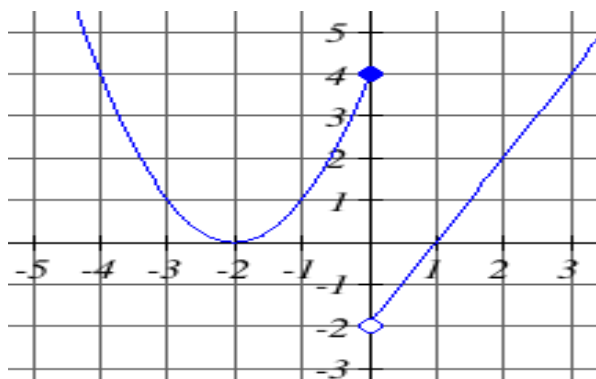
23. Given $f(x) = \begin{cases} (x+2)^2 & \text{if } x \leq 0 \\ 2x-2 & \text{if } x > 0 \end{cases}$, find the following and graph.

a.) $f(0) =$

b.) $f(-2) =$

c.) $f(1) =$

d.) Graph (x) .



24. Solve and Check: $\log_2(x) + \log_2(x-6) = 4$

25. Solve for x in the equation below. It may be helpful to convert the equation into exponential form. Write answer as an integer or reduced fraction.

$$4 \cdot \log_6(x) - 7 = -15$$

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26. Find the solution of the exponential equation

$$3^{-\frac{x}{16}} = 4$$

in terms of logarithms, or correct to four decimal places.

28. Find the solution of the exponential equation $e^{2x+1} = 47$

in terms of logarithms, or correct to four decimal places.

31. Divide: $\frac{x^2+6x+7}{x+4}$, using synthetic division. Give your answer in the form

$$\text{quotient} + \frac{\text{remainder}}{\text{divisor}}$$

33. Solve the triangle if $a = 25$ m, $b = 49$ m and $c = 26$ m.

$$\angle A^\circ$$

$$\angle B^\circ$$

$$\angle C^\circ$$

Assume $\angle A$ is opposite side a , $\angle B$ is opposite side b , and $\angle C$ is opposite side c .

Enter your answer as a number; answer should be accurate to 2 decimal places.

35. Consider the right. Give your answers as whole numbers or completely reduced fractions.

Give the length of the missing leg.

$$\cos(A) =$$

$$\cot(A) =$$

27. Solve for x : $5^x = 38$

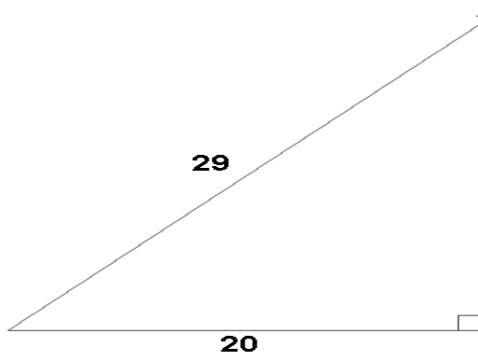
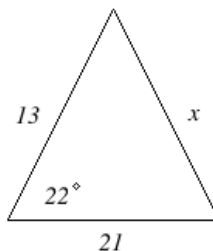
You may enter the exact value or round to 4 decimal places.

29. Solve the given equation for: $5^{3x-4} = 34$

30. Solve for x : $2^{7x-5} = 6^{5x-4}$

32. Find the quotient and remainder using long or synthetic division for $\frac{x^2-3x-41}{x+5}$. Give your answer in the form: quotient + $\frac{\text{remainder}}{\text{divisor}}$

34. Given the triangle find the length of side x using the Law of Cosines. Round your final answer to 4 decimal places.



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36. In a right triangle, suppose $\angle C$ is the right angle and is opposite side c and $\angle A$ is opposite side a and $\angle B$ is opposite side b .

Suppose $a = 4$ and $c = 9$.

Find an exact value for each of the following trig functions.

$$\sin(B) =$$

$$\cos(B) =$$

$$\tan(B) =$$

$$\sec(B) =$$

$$\csc(B) =$$

$$\cot(B) =$$

42. Find all solutions to $2\sin(\theta) = -\sqrt{3}$ on the interval $0 \leq \theta < 2\pi$

44. Solve $2\sin^2(t) - 3\sin(t) + 1 = 0$ for all solutions on the interval $0 \leq t < 2\pi$. Your solutions must be exact, that is, in terms of π .

46. Convert the point with polar coordinates $(5, \frac{5\pi}{6})$ to Cartesian coordinates. Enter exact values.

48. Match the name of the conic to its graph.

Formulas of Conics

- $y - 2 = (x - 1)^2$
- $\frac{x^2}{4} + \frac{y^2}{36} = 1$
- $\frac{x^2}{16} - \frac{y^2}{36} = 1$
- $x^2 + y^2 = 16$

37. Give a fully simplified expression for $\sin\left(\tan^{-1}\left(\frac{x}{7}\right)\right)$.

38. Give a fully simplified expression for $\cos\left(\sin^{-1}\left(\frac{a}{9}\right)\right)$.

39. Evaluate $\sin\left(\cos^{-1}\left(-\frac{12}{13}\right)\right)$, giving an exact answer.

40. Simplify $\frac{\sec(t) - \cos(t)}{\sin(t)}$

41. Simplify the expression to a term with a single trigonometric function: $\frac{2 + \tan^2(x)}{\sec^2(x)} - 1$

43. Solve the equation $\tan(t) = -1$ on the interval $0 \leq \theta < 2\pi$

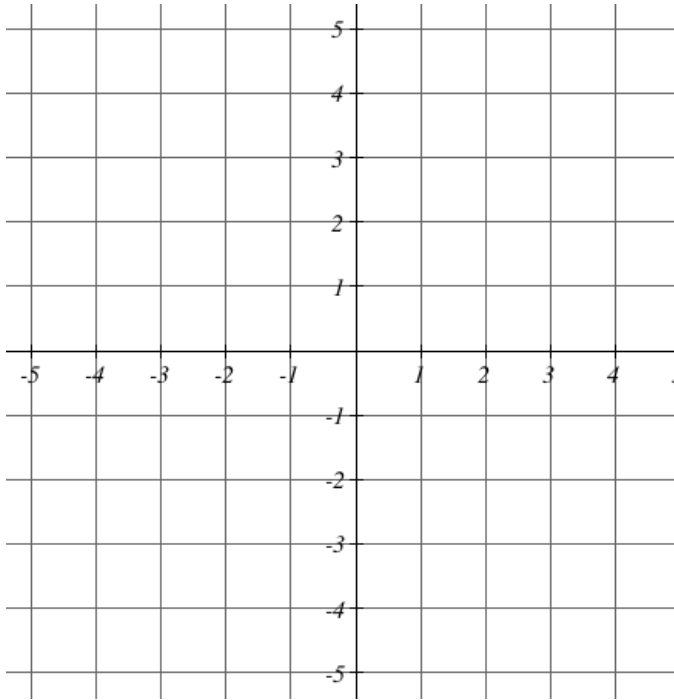
45. Find all solutions of the equation $\cos x(2\sin x + 1) = 0$ on the interval $[0, 2\pi)$.

47. Convert the point with polar coordinates $(6, \frac{5\pi}{4})$ to Cartesian coordinates. Enter exact values.

Names of Conics

- Parabola
- Circle
- Ellipse
- Hyperbola

49. Sketch a graph of $\frac{x^2}{25} + \frac{y^2}{4} = 1$

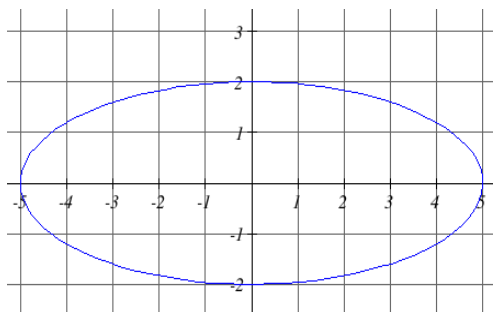


50. Expand the expression:

$$(x - 2)^3 =$$

Key

1. $(z + 9)(z + 5)$
2. $(z + 4)(z - 10)$
3. $3(3w - 1)(5w + 3)$
4. $x - 3 \sim x + 9$
5. $x + 8 \sim 4x$
6. $x(10 - 2x)(11 - 2x)$
7. $\frac{10}{x+4}$
8. $\frac{5}{x+10}$
9. $\frac{7x-9}{(x-3)^2}$
10. $-5x^2 - 10xh - 5h^2 + x + h + 1 \sim -10x - 5h + 1$
11. $-2x^2 - 4xh - 2h^2 - 3x - 3h - 3 \sim -4x - 2h - 3$
12. 4,0
13. $\frac{4}{61}$
14. $x = 13 \sim x = \frac{22}{7} \sim x = \frac{19}{5} \sim x = -\frac{27}{4}$
15. $x = 24 \sim x = \frac{311}{2} \sim x = 244 \sim x = -23$
16. $|3x - 1| \leq 2$
 $\left[-\frac{1}{3}, 1\right]$
17. $\left(-\infty, -\frac{5}{4}\right] \cup \left[-\frac{1}{4}, \infty\right)$
18. $(2,4) \sim (-2,-1) \cup (4,\infty) \sim (-\infty,-2) \cup (-1,2) \sim (-\infty,\infty) \sim (-\infty,6]$
19. $(-\infty,-2) \sim (1,\infty) \sim (-2,1) \sim (-\infty,\infty) \sim (-\infty,-4]$
20. $\frac{30-5\sqrt{2}}{34}$
21. $\frac{-4+4\sqrt{x}}{1-x}$
22. $0 \sim -3 \sim -26 \sim -2 \sim -35 \sim -14$
23. $4 \sim 0 \sim 0 \sim$
24. 8
25. $\frac{1}{36}$
26. -20.189752114287
27. 2.2601593585085
28. 1.425073800855
29. 2.063683661932
30. 0.90126902743924
31. $x + 2 - \frac{1}{x+4}$
32. $x - 8 - \frac{1}{x+5}$
33. 15.777806100458 ~
147.79577249604 ~
16.426421403555
34. 10.186148212476
35. $21 \sim \frac{21}{29} \sim \frac{21}{20}$
36. $\frac{\sqrt{65}}{9} \sim \frac{4}{9} \sim \frac{\sqrt{65}}{4} \sim \frac{9}{4} \sim \frac{9\sqrt{65}}{65} \sim \frac{4\sqrt{65}}{65}$
37. $\frac{x}{\sqrt{49+x^2}}$
38. $\frac{\sqrt{81-a^2}}{9}$
39. $\frac{5}{13}$
40. $\tan(t)$
41. $\cos^2(x) \sim$
42. $\frac{4\pi}{3}, \frac{5\pi}{3}$
43. $\frac{3\pi}{4}, \frac{7\pi}{4}$
44. $\frac{\pi}{6}, \frac{5\pi}{6}, \frac{\pi}{2}$
45. $\frac{\pi}{2}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}$
46. $\left(-\frac{5\sqrt{3}}{2}, \frac{5}{2}\right)$
47. $(-3\sqrt{2}, -3\sqrt{2})$
48. a c d b
- 49.



50. $x^3 - 6x^2 + 12x - 8$