1. What is the distance between $\frac{-7}{4}$ and 2?

2. $\left(\frac{81x^{-8}}{16y^2z^{-4}}\right)^{\frac{3}{4}} =$

3. Fully factor $2x^4 - 6x^3 - 2x + 6$.

4. $\dfrac{1+\frac{2}{x}}{\frac{x}{5}-1} =$

5. $\left|\left(\overline{2i-4}\right)\left(i^2-9i\right)\right| =$

6. Solve $\sqrt{36-x} = 24-x$.

7. Solve $\dfrac{3x^2-13x+8}{5-x} \geq 4$

8. Find the standard equation of the circle whose center is the midpoint of the line segment whose endpoints are $(6,-3)$ and $(12,-8)$ and whose diameter is 7.

9. Test $5xy-6x^3y^4=30x$ for $y$-axis symmetry.

10. Find the slope-intercept form of the line that passes through point $(-8,4)$ and that is perpendicular to the line $5x-6y=20$.

11. If $f(x)=\dfrac{2x^2}{3x-5}$, evaluate and simplify the difference quotient.

12. A full 200-ml beaker contains a 38% concentration of saline solution. How much of the mixture should be poured off and replaced with pure water to reduce the salinity concentration to 25%?

13. Where is the function *f* increasing, decreasing, and constant? What is its minimum value? Evaluate $f(-8)$.

$$f(x)=\begin{cases}5, x<-8\\ -2x, -8\le x<-3\\ \sqrt{x+4}, x\ge 0\end{cases}$$

14. $\sqrt{x^2}=$

15. Write $f(x)=-5x^2+15x-\frac{53}{4}$ in standard form. Identify the vertex and zeros (real and complex) of $f$, and the transformations of $g(x)=x^2$ needed to obtain the graph of $f$.

16. If $f(x)=\frac{-2}{x^2-1}$, $g(x)=3\sqrt{x}$ and $h(x)=x+1$, evaluate $((f\circ g)-h)(x)$ and find its domain.

17. If $f(x)=2\log_3\left[\frac{1}{4}(x-5)\right]$, find its inverse function (complete with domain and range).

18. Describe the end behavior of the polynomial $f(x)=-99x^{34}+78x^{27}-5x^2+2$.

19. Find the domain, holes (if any), intercepts, vertical asymptotes and horizontal asymptotes of the function $f(x)=\frac{(4x+12)(x^2-1)}{(x-5)(x+1)^2}$.

20. Solve the equation $6e^{8-2x}-3=9$ for $x$.

21. (2 ways to solve) $\log_3 1 - \log_3 81 =$

22. What is the domain, in interval notation, of the function $f(x) = \dfrac{\sqrt{x^2 - 9}}{\log_2(12 - x)}$?

23. Solve $\log_2(5 - x) = 3 - \log_2(x + 4)$ for *x*.

24. A radioactive sample decayed 40% after 3 years. What is its half-life, both exact and as an approximation to 2 decimal places? How much of a 10 gram sample will remain after 2 years, both exact and as an approximation to 2 decimal places?

25. Algebraically solve the system of equations.

$$5x+6y=30$$
$$6y=2x+9$$

26. Algebraically solve the system of equations.

$$y-20=-(x-5)^2$$
$$2(x-5)^2+y^2=64$$

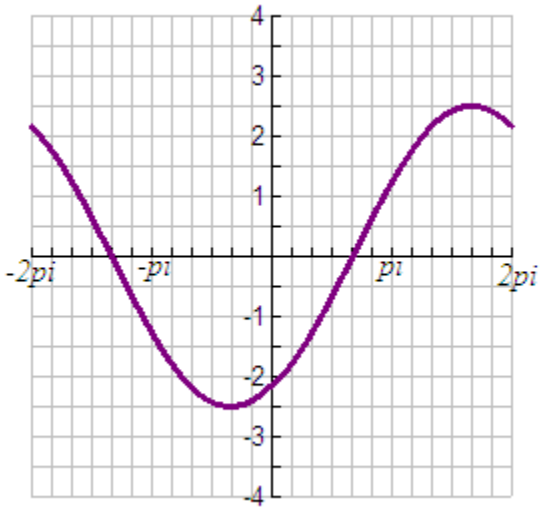
27. If a circle has a 16-meter diameter, find the exact arc length and sector area subtended by a central angle of $\frac{5\pi}{6}$.

28. $\tan\frac{2\pi}{3}=$

29. $\csc\dfrac{3\pi}{2} =$

30. If $\cot\theta = \dfrac{3}{10}$ and $\csc\theta < 0$, exactly evaluate $\sin 2\theta$.

31. Write a function of the form (a) $f(x) = a\sin k(x-b)$ and then (b) $f(x) = a\cos k(x-b)$ whose graph is shown below, where $a$, $k$, and $b$ are positive and $b$ is as small as possible.




32. Exactly evaluate $\cos\dfrac{13\pi}{12}$.

33. $\sin\left(\sin^{-1}\left(\frac{1}{2}\right)+\sin^{-1}\left(\frac{4}{5}\right)\right)=$

34. $\cos^{-1}\left(\cos\frac{5\pi}{4}\right)=$

35. If $B = 45^{o}$, $c$ = 40 meters, and $b$ = 64 meters, solve the triangle.

36. Find the three angles of a triangle whose sides have length of 3 meters, 6 meters, and 8 meters.

37. Solve $\sin 2x - 2\sin x + \cos x - 1 = 0$ on the interval $[0, 2\pi)$.

38. Represent the vector from $P(-1, 3, 0)$ to $Q(9, -6, -5)$.

39. $\langle -3, 7, -1 \rangle - 2\langle 8, -4, -3 \rangle =$

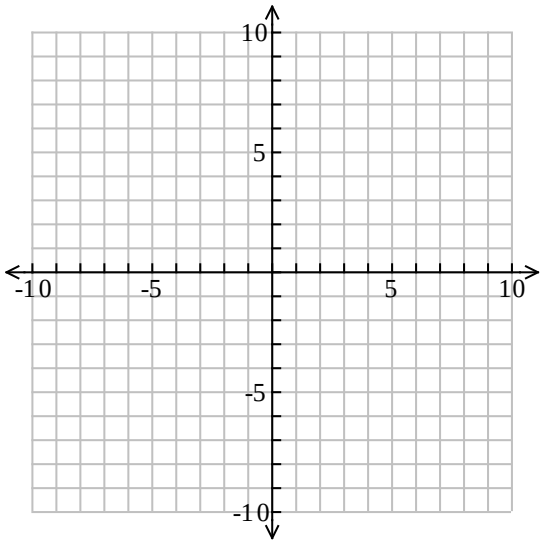
40. Find the unit vector in the direction of $\langle -3, 7 \rangle$.

41. $2\langle -3, 7, -1 \rangle \bullet \langle 8, -4, -3 \rangle =$

42. Find the angle between $\langle 2, -8 \rangle$ and $\langle -4, 5 \rangle$.

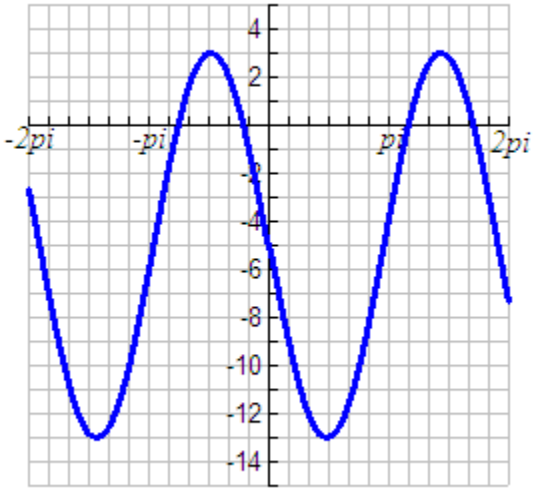
43. Find the center and radius of the circle $-5x^2-5y^2+4x-15y+12=0$.

44. Sketch an even function that satisfies ***all*** of the following: is decreasing on the interval $(2,7)$; is increasing on the intervals $(0,1)$, $(1,2)$ and $(7,\infty)$; has *x*-intercepts at 4 and 8; has a *y*-intercept of 5; has a minimum value of $-9$ and is undefined at $x=1$.



45. If $\log_n 2 = p$, $\log_n 3 = q$, and $\log_n 5 = r$, find the value of $\log_n \frac{144}{1500}$ in terms of *p*, *q*, and *r*.

46. Below is the graph of a sine function that has no phase shift. Use the graph to find each of the following.




a. Amplitude:

b. Period:

c. Vertical Shift:

d. Reflection about the (circle one): x-axis y-axis line y = x

e. Equation for this Sine Function: