

For questions 1-2, perform the given operation. Leave your answers as factored as possible.

1.
$$\frac{6x^2 + 5x - 4}{2x^2 - 17x + 8} \cdot \frac{x^2 - 4x - 32}{12x^2 - 5x - 2}$$

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

For questions 3-5, find all the zeros (real & imaginary) of each function.

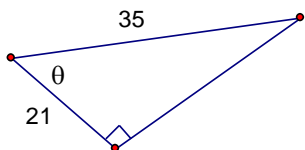
3. $f(x) = 2x^3 - 3x^2 - 11x + 6$

4. $f(x) = x^4 - 2x^3 - 5x^2 + 8x + 4$

5. $f(x) = x^3 + 7x^2 + x + 7$

6. Write the polynomial function of least degree & with integer coefficients if the zeros occur at 6 and $-5 + 2i$.

7. Find the value of each of the six trig functions of θ .



8. Find the values of the missing trig functions given $\sin \theta = -\frac{8}{17}$ and $\cos \theta = \frac{15}{17}$.

For questions 9- 15, find the exact value of each expression.

9. $\tan \frac{9\pi}{2}$

10. $\sec \frac{-11\pi}{4}$

11. $\sin \frac{-35\pi}{6}$

12. $\cot \frac{19\pi}{6}$

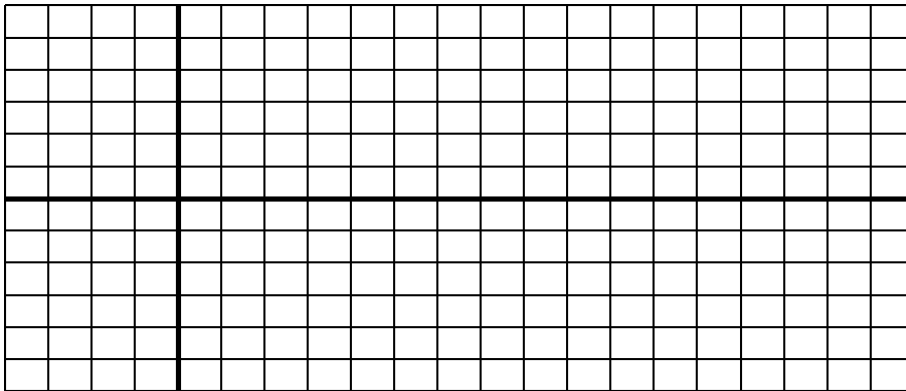
13. $\sec 510^\circ$

14. $\sin \frac{3\pi}{2} \tan \left(-\frac{8\pi}{3} \right) + \cos \left(-\frac{5\pi}{6} \right)$

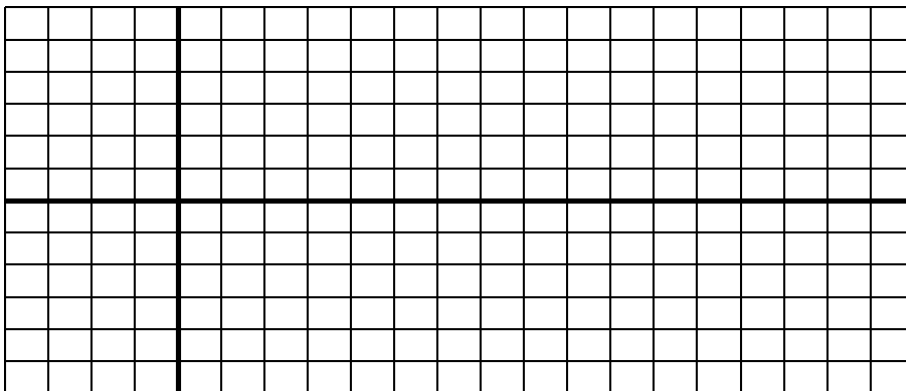
15. $\frac{\tan 150^\circ \csc 240^\circ}{\cos 135^\circ - \sin 300^\circ}$

For questions 16-19, graph one period of each function. Fully label your axes!! Use color for your final function!

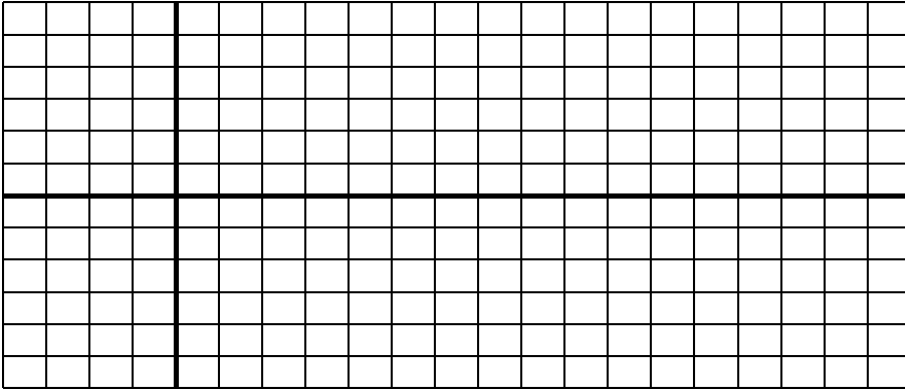
16. $f(x) = 2 - 3\sec 4(x - \pi)$



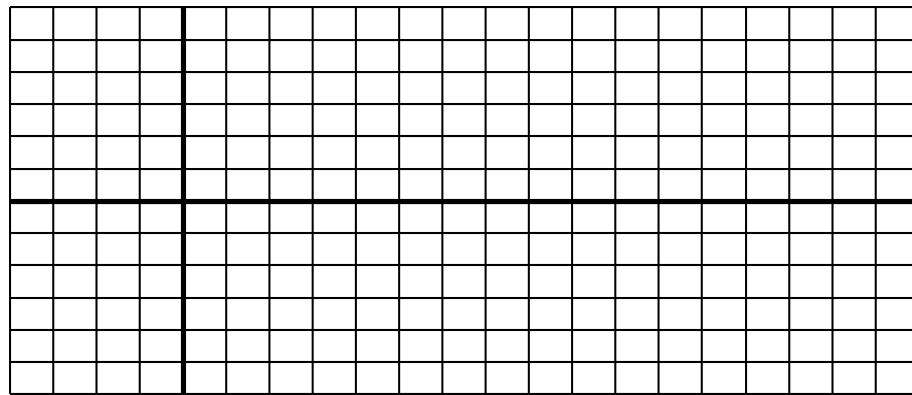
17. $f(x) = -1 + 4\sin \frac{1}{2}(\theta + 45^\circ)$



18. $f(x) = 2 \tan 3(\theta - 30^\circ)$



19. $f(x) = \frac{1}{2} \cot 2\left(x + \frac{\pi}{3}\right)$



For questions 20-23, prove each identity.

20. $\frac{1}{1 - \sin x} = \sec^2 x + \sec x \tan x$

21. $\frac{\sec^3 x - \cos^3 x}{\sec x - \cos x} = \sec^2 x + 1 + \cos^2 x$

$$22. \tan\left(x + \frac{\pi}{4}\right) + 1 = \sqrt{2} \cos x \sec\left(x + \frac{\pi}{4}\right)$$

$$23. (1 + \tan x) \tan 2x = \frac{2 \tan x}{1 - \tan x}$$

For questions 24-27, solve each equation in the indicated domain.

$$24. 2 \cot^2 x + 2 \cot x = 0, \text{ Domain: } (-\infty, \infty)$$

$$25. 4 \csc^2 \theta + 4 \csc \theta + 1 = 0, \text{ Domain: } [0^\circ, 360^\circ)$$

$$26. 1 - \cos \theta = -\sin \theta, \text{ Domain: } [-180^\circ, 180^\circ)$$

$$27. \frac{\tan 10\theta + \tan 50^\circ}{1 - \tan 10\theta \tan 50^\circ} = \frac{\sqrt{3}}{3}, \text{ Domain: } (0^\circ, 90^\circ)$$

For triangle questions 28-31, find the specified side or angle. Round your answers to 2 decimal places.

28. In $\triangle HJK$, $h = 8$, $j = 6$, $m\angle K = 172^\circ$, find k .

29. In $\triangle BAD$, $a = 2.897$, $d = 5.921$, $m\angle B = 119^\circ$, find b .

30. In $\triangle PEG$, $p = 12$, $e = 20$, $g = 16$, find $m\angle E$.

31. In $\triangle ABC$, $m\angle A = 40^\circ$, $m\angle B = 60^\circ$, $a = 4$, find c .

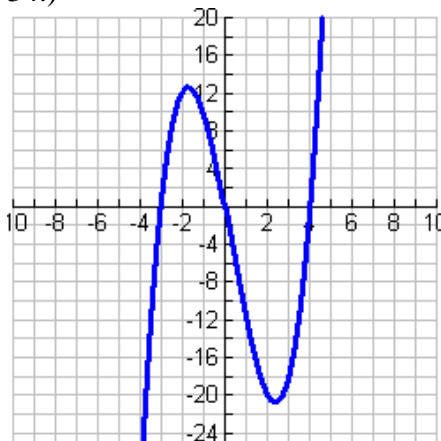
For questions 32-33, find the area of each triangle. Round your answers to 2 decimal places.

32. $c = 24$ meters, $a = 10$ meters, $T = 62^\circ$

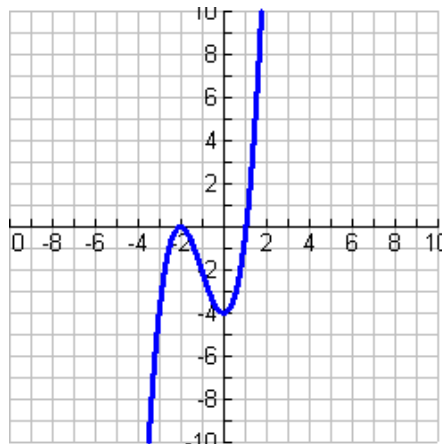
33. $m = 6$ feet, $d = 16$ feet, and $b = 18$ feet.

For #34-35, write the equation of the polynomial function graphed with lowest degree possible and leading coefficient of 1.

34.)



35.)



For questions 36-40, find all the zeros of the polynomial function.

36. $f(x) = 2x^3 - 2x^2 + 16x + 120$

37. $f(x) = x^4 - 3x^3 - 2x^2 - 6x - 8$

38. $f(x) = 216x^3 + 64$

39. $f(x) = x^3 + 12x^2 + 21x + 10$

40. $f(x) = x^4 + x^3 - x^2 + x - 2$

Write a rational function with the given characteristics.

41.

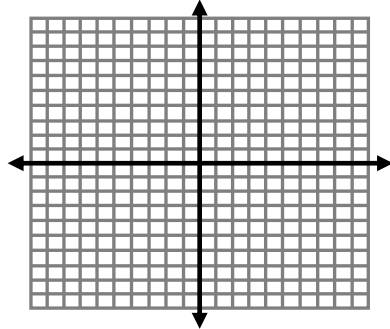
There are no zeros, a hole exists at $x = -3/2$, vertical asymptote is at $x = 1$, and horizontal asymptote is at $y = 0$.

42. There is a zero at 6, a hole exists at $x = -3$, no vertical asymptotes, and horizontal asymptote at $y = x - 6$.

43. The zeros are at -1 and 3 and the vertical asymptote is at $x = 0$.

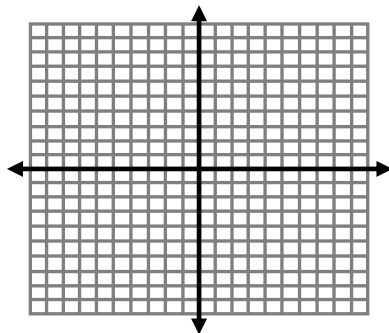
Graph the function and label the following information. Horizontal Asymptotes can include slant asymptotes.

44. $y = \frac{x^2 + 4x - 5}{x + 1}$



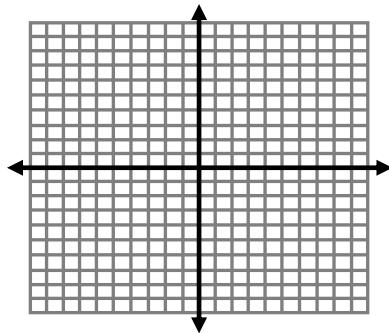
| | |
|------------------------|--|
| Zeros: | |
| Vertical Asymptotes: | |
| Horizontal Asymptotes: | |
| Holes: | |
| Y-Intercept(s): | |
| Domain: | |
| range | |

45. $y = \frac{x^2 + 5x + 6}{x^2 - 9}$



| | |
|------------------------|--|
| Zeros: | |
| Vertical Asymptotes: | |
| Horizontal Asymptotes: | |
| Holes: | |
| Y-Intercept(s): | |
| Domain: | |
| range | |

46. $y = \frac{x^2 - 4}{3x^2 - 15x + 18}$

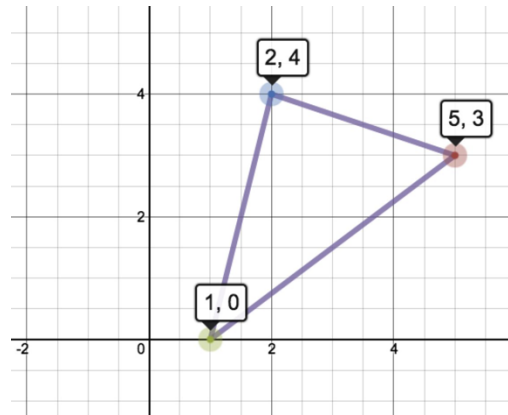


| | |
|------------------------|--|
| Zeros: | |
| Vertical Asymptotes: | |
| Horizontal Asymptotes: | |
| Holes: | |
| Y-Intercept(s): | |
| Domain: | |
| range | |

47. Find the volume of the solid formed when the rectangle shown is rotated about

a. $x = -3$

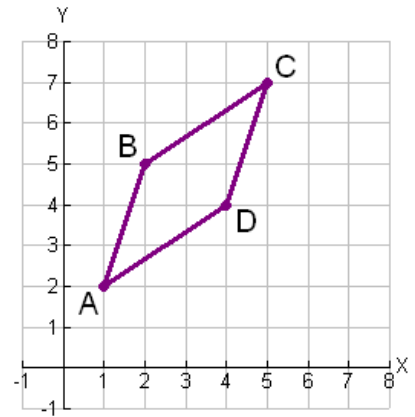
b. $y = -2$



48. Find the volume of the solid formed when the triangle is rotated about

a. $x = -1$.

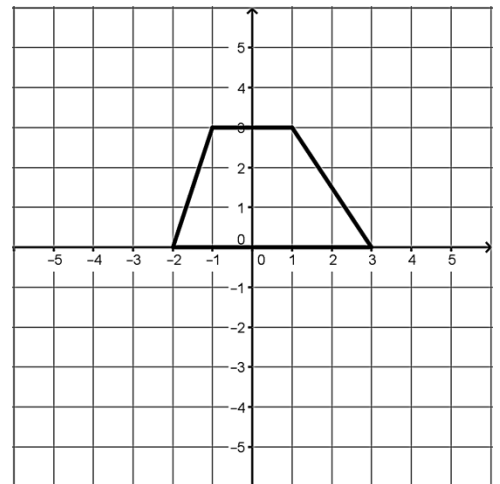
b. $y = 5$.



49. Find the volume of the solid formed when the trapezoid is rotated about

a. $y = 4$

b. $x = -3$



50. Find the volume of a hollow sphere, where the outer diameter is 15cm and the length of the inner diameter is 7cm.

51. Find the volume of the frustum with $r_1 = x + 3$, $r_2 = 2x - 1$, and $h = 4x$.

52. Is $3 - i$ a zero to the function $g(x) = x^3 - 10x^2 + 34x - 40$?

53. At 1:00pm (13:00) high tide was at 4 feet, at 8:00 pm (20:00) low tide was -1 feet. Find the period of the trigonometric function that would model the tides.

54. Simplify

$$\frac{3 + \frac{x}{2-x}}{\frac{1}{x} - 4}$$

55. Factor the following polynomial: $125x^3 - 8y^6$

56. Expand the binomial: $(5y - x^3)^5$

57. Divide using long division or unboxing method:

$$\frac{2x^3 - 4x + 5 \quad 12x^3 - 11x^2 + 22x - 15}{x^2 - 4x + 5}$$