

1. Name the family of functions to which the following equations belongs:

a) $f(x) = -3|x-2|-1$ b) $f(x) = 3x^2 - 4$ c) $f(x) = \frac{1}{2}x + 8$
 $y = |x|$ Absolute Value $y = x^2$ Quadratic $y = x$ Linear

2. Solve the equation: $5 - \frac{2}{3}m = 23$
 $-\frac{2}{3}m = 18$ $m = \frac{18}{-\frac{2}{3}} = 18 \cdot \frac{-3}{2} = -27$

3. Solve the inequality: $-4(2w-1) \geq 12$
 $\frac{-4(2w-1)}{-4} \geq \frac{12}{-4}$ $\frac{2w-1 \leq -3}{+1 \quad +1}$ $\frac{2w \leq -2}{2} \Rightarrow w \leq -1$

4. Solve the equation: $3|2x-5|-6=9$
 $\frac{3|2x-5|}{3} = \frac{9+6}{3}$ $|2x-5| = 5$ $|2x-5| = 5$ $2x-5=5$ or $2x-5=-5$
 $2x=10$ $2x=0$
 $x=5$ or $x=0$

5. 158 decreased by five times a number is 4 less than the number increased by 20. Write an equation to find the number.
 $158 - 5x = x + 20 - 4$

6. Simplify: $(8x - 2x^2 + 7x^3) - (x^3 - 2x^2 + 3x)$
 $6x^3 + 5x$

7. Multiply: $(2x-3)^2 = (2x-3)(2x-3) = 4x^2 - 6x - 6x + 9 = 4x^2 - 12x + 9$

8. Multiply: $(x-5)(3x+4) = 3x^2 + 4x - 15x - 20 = 3x^2 - 11x - 20$

9. Solve: $2\sqrt{x-5} + 20 = 4$ $2\sqrt{x-5} = -16$ $\sqrt{x-5} = -8$ $x-5 = 64$ $x = 69$ No Solution

10. Solve for x: $(x+3)^{\frac{1}{4}} = 2$ $x+3 = 2^4$ $x+3 = 16$ $x = 13$

11. Factor completely: $49x^2 + 28x + 3$
 $(7x+3)(7x+1)$

12. Divide the following: $(3x^3 - 7x^2 + 5x + 1) \div (x+2)$
 $\begin{array}{r} 3x^3 - 7x^2 + 5x + 1 \\ -6x^2 - 10x + 10 \\ \hline 3x^2 - 5x - 9 \end{array}$ $3x^3 - 6x^2 + 5x - 5 + \frac{11}{x+2}$

13. Find the solution of $2x^2 + 11x + 14 > 0$ in interval notation
 $(2x+7)(x+2) > 0$ $(-\infty, -\frac{7}{2}) \cup (-2, \infty)$

14. Find the solutions of the equation: $4x^3 - 12x^2 - x + 3 = 0$
 $4x^2(x-3) - 1(x-3) = 0$
 $(4x^2-1)(x-3) = 0 \rightarrow (2x+1)(2x-1)(x-3) = 0$ $x = -\frac{1}{2}, \frac{1}{2}, 3$

15. Find all the roots of the polynomial: $P(x) = x^3 - 4x^2 + 3x + 2$
 $\begin{array}{r} 2 \ 1 \ -4 \ 3 \ 2 \\ 2 \ 1 \ -4 \ -3 \\ \hline 1 \ -2 \ -1 \ 0 \end{array}$ $x^2 - 2x - 1 = 0$ $x = \frac{2 \pm \sqrt{2^2 - 4(1)(-1)}}{2} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$ $x = 2, 1+\sqrt{2}, 1-\sqrt{2}$

16. Use synthetic division to find the quotient and the remainder
 $\begin{array}{r} 4 \ 2 \ -5 \ -10 \ -6 \\ 2 \ 3 \ 2 \ 2 \\ \hline 2 \ 3 \ 2 \ 2 \end{array}$ $2x^2 + 3x + 2 + \frac{2}{x-4}$

17. Simplify: $\frac{x^2 + 5x + 4}{x^2 + 2x + 1} \cdot \frac{2x+2}{x+4} = \frac{(x+4)(x+1)}{(x+1)(x+1)} \cdot \frac{2(x+1)}{(x+4)} = 2$

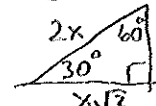
18. Simplify: $\frac{d^2}{d+4} \div \frac{d^2-4d}{d^2+8d+16} = \frac{d^2}{d+4} \cdot \frac{d^2+8d+16}{d^2-4d} = \frac{d^{\cancel{2}}}{(d+4)} \cdot \frac{(d+4)(d+4)}{\cancel{d}(d-4)} = \frac{d(d+4)}{d-4} = \frac{d^2+4d}{d-4}$

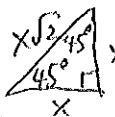
19. Simplify: $\frac{(\sqrt{3}+5)(\sqrt{3}+5)}{(\sqrt{3}-5)(\sqrt{3}+5)} = \frac{3+5\sqrt{3}+5\sqrt{3}+25}{3+5\sqrt{3}-5\sqrt{3}-25} = \frac{28+10\sqrt{3}}{-22} = \frac{14+5\sqrt{3}}{-11} = \frac{-14-5\sqrt{3}}{11}$

20. Simplify: $\frac{12m^6t^{-5}}{15m^2t^{-2}} = \frac{4m^4t^{-3}}{5} = \frac{4m^4}{5t^3}$

21. Simplify: $(3w^5)(-m)^4 = 3w^5 \cdot m^4 = 3w^5m^4 = 3m^4w^5$

22. Simplify: $-5\sqrt{6} - 2\sqrt{64} - 9\sqrt{54} = -5\sqrt{6} - 16 - 27\sqrt{6} = -32\sqrt{6} - 16 = -16 - 32\sqrt{6}$

23. Find the exact value of $\cos 30^\circ$.  $\cos 30^\circ = \frac{x\sqrt{3}}{2x} = \frac{\sqrt{3}}{2}$

24. Find the exact value of $\sin \frac{\pi}{4}$. $\frac{\pi}{4} \cdot \frac{180}{\pi} = 45^\circ$  $\sin 45^\circ = \frac{x}{x\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

25. A flagpole casts a shadow 15 ft long. The angle of elevation to the sun from the end of the shadow is 58° . How tall is the flagpole? $\tan 58^\circ = \frac{x}{15}$ $15 \cdot \tan 58^\circ = x = 24.005 \text{ ft}$

26. A ladder 10.4 meters long makes an angle of 68° with the ground as it leans against a building. How far is the foot of the ladder from the base of the building? $\cos 68^\circ = \frac{x}{10.4}$ $10.4 \cdot \cos 68^\circ = x = 3.896 \text{ m}$

27. In $\triangle ABC$, $\angle A = 63^\circ$, $a = 2.4$, and $b = 1.7$, find $\angle B$ to the nearest tenth of a degree. $\frac{\sin 63^\circ}{2.4} = \frac{\sin B}{1.7}$ $\sin B = \frac{1.7 \cdot \sin 63^\circ}{2.4} = \text{Ans}$ $\angle B = \sin^{-1}(\text{Ans}) = 39.1^\circ$

28. In $\triangle ABC$, $\angle A = 60^\circ$, $b = 2.55$, and $c = 10$, find $\angle C$ to the nearest tenth of a degree. $a = \sqrt{2.55^2 + 10^2 - 2 \cdot 2.55 \cdot 10 \cdot \cos 60^\circ} = 9.000$ $\angle C = \cos^{-1}\left(\frac{a^2 + 2.55^2 - 10^2}{2 \cdot a \cdot 2.55}\right) = 105.8^\circ$

29. Two submarines starting from the same point cruise for an hour, one traveling 20 mph and the other at 35 mph. If their courses diverge by 71° , how far apart are they at the end of the hour? $x = \sqrt{20^2 + 35^2 - 2 \cdot 20 \cdot 35 \cdot \cos 71^\circ} = 34.194 \text{ mi}$

30. The angle of depression from the top of a cliff to the base of a log cabin is 38° . If the base of the log cabin is 750 meters from the base of the cliff, how high is the cliff to the nearest hundredth of a meter? $\tan 38^\circ = \frac{x}{750}$ $750 \cdot \tan 38^\circ = x = 585.96 \text{ m}$

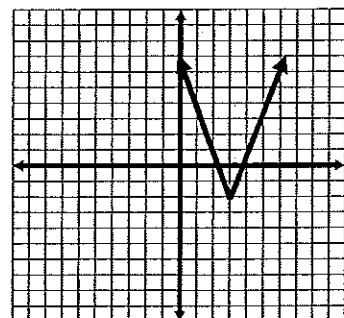
31. Find the area of a triangular plot if the dimensions are 16 km., 10 km., and 8 km. Round your answer to the nearest tenth of a square kilometer. $s = \frac{16+10+8}{2} = 17$ $A_A = \sqrt{17(17-16)(17-10)(17-8)} = 32.7 \text{ km}^2$

32. A parking lot shaped like a triangle is between two streets that intersect at an angle that measures 39° . The shortest side of the lot is 75 feet long and is opposite that angle. Determine the length of the longest side of the lot if the angle opposite that side measures 84° . Round your answer to the nearest tenth of a foot. $\frac{\sin 39^\circ}{75} = \frac{\sin 84^\circ}{x}$ $x = \frac{75 \cdot \sin 84^\circ}{\sin 39^\circ} = 118.5 \text{ ft}$

33. List the transformations of the parent function $y = x^2$ represented by the following function:

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

- V. Stretch by 2
- H. Slide Right 3
- V. Slide Up 3



34. List the transformations for the graph at the right?

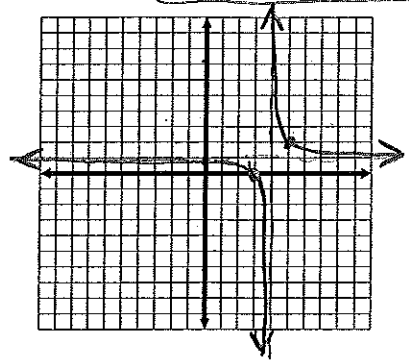
- V. Stretch by 3
- H. Slide Right 3
- V. Slide Down 2

35. List the domain and range of $f(x) = |x+2|$. $D: (-\infty, \infty)$ $R: [0, \infty)$

36. State the horizontal asymptote for the graph of: $y = \frac{x+1}{x-4}$ $y=1$

37. List the x-intercepts and y-intercept of $f(x) = (x+3)^2 - 4$. $(-5, 0)$ $(-1, 0)$ $(0, 5)$

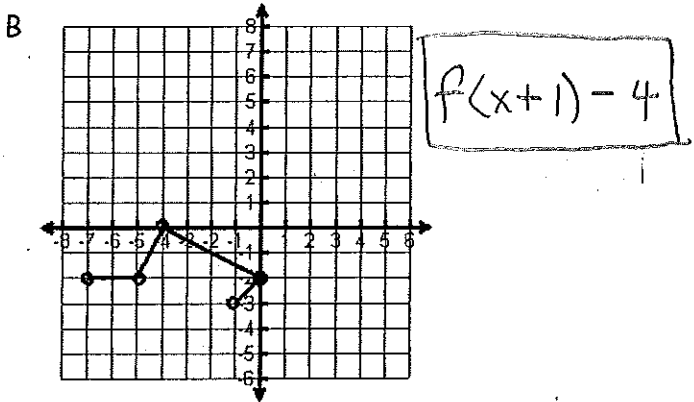
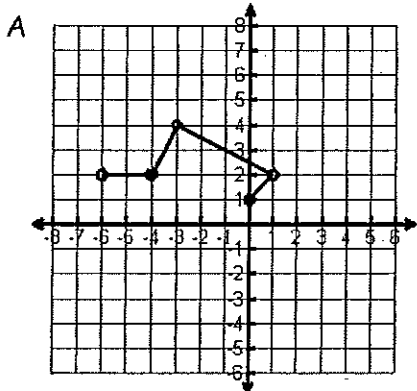
38. List the domain and range of $f(x) = \sqrt{x-2}$.
 $D: [2, \infty)$ $R: [0, \infty)$



39. Graph the function: $f(x) = \frac{x-3}{x-4}$

40. What is (are) the vertical asymptote(s) for the following rational function: $f(x) = \frac{x+1}{x^2-9}$
 $x = -3; x = 3$

41. If graph A represents the parent function $f(x)$, list the equation of graph B.



$f(x+1) - 4$

42. What is the range of $y = -5\sin(x) + 1$? $[-4, 6]$

43. What is the period of the function $y = -2\sin(x) + 4$? 2π

44. What is the amplitude of $y = -5\sin(3x) + 1$? 5

45. Draw the graph of $y = 3\sin x + 2$.

