

Assignment

Write

function notation
absolute maximum

increasing function
decreasing function

constant function
absolute minimum

Choose the term that best completes each statement.

- _____ is a way to represent equations algebraically that makes it more efficient to recognize the independent and dependent variables.
- When both the independent and dependent variables of a function increase across the entire domain, the function is called a(n) _____.
- A function has a(n) _____ if there is a point on its graph that has a y -coordinate that is greater than the y -coordinates of every other point on the graph.
- When the dependent variable of a function decreases as the independent variable increases across the entire domain, the function is called a(n) _____.
- If the dependent variable of a function does not change or remains constant over the entire domain, then the function is called a(n) _____.
- A function has a(n) _____ if there is a point on its graph that has a y -coordinate that is less than the y -coordinate of every other point on the graph.

Remember

A function is a relation that assigns to each element of the domain exactly one element of the range. The different function families include linear functions, exponential functions, quadratic functions, linear absolute value functions, and linear piecewise functions.

Practice

For each scenario, use graphing technology to determine the shape of its graph. Then identify the function family, whether it is increasing, decreasing, or a combination of both, has an absolute maximum or absolute minimum, and whether it is a smooth curve or straight line.

- A fitness company is selling DVDs for one of its new cardio routines. Each DVD will sell for \$15. Due to fixed and variable costs, the profit that the company will see after selling x DVDs can be represented by the function $P(x) = 11.5x - 0.1x^2 - 150$.
- The PARK SAFE commuter lot charges different rates depending on the number of hours a car is parked during the 5-day work week. The lot charges \$3 per hour for the first day, \$2 per hour for the next 2 days, and will charge \$1 per hour if the car is parked more than 3 days in the lot. The fees after x hours can be represented by the function shown.

$$f(x) = \begin{cases} 3x, & 0 \leq x \leq 24 \\ 72 + 2(x - 24), & 24 < x \leq 72 \\ x + 168 & 72 < x \leq 120 \end{cases}$$

- Shari is going to put \$500 into an account with The People's Bank. The bank is offering a 3% interest rate compounded annually. The amount of money that Shari will have after x years can be represented by the function $A(x) = 500(1.03)^x$.
- The Ace Calendar Company is going to buy a new 3D printer for \$20,000. In order to plan for the future, the owners are interested in the salvage value of the printer each year. The salvage value after x years can be represented by the function $S(x) = 20,000 - 2000x$.
- An underwater camera has been placed in the center of the 25-meter pool at the Grandtown Aquatic Center to take pictures of swimmers during a swim meet. The camera will go off at different times depending on the distance of the swimmer to the camera. If the swimmer is moving at a constant rate of 1.28 meters per second, then the distance the swimmer is from the camera after x seconds can be represented by the function $d(x) = 1.28|x - 9.77|$.

Stretch

Graph both functions on the same screen using graphing technology. Use reasoning to classify the second function as a new family. Then describe the similarities and differences between the shapes of the graphs in terms of intervals of increase and decrease, maximums or minimums, and whether they are curves or lines.

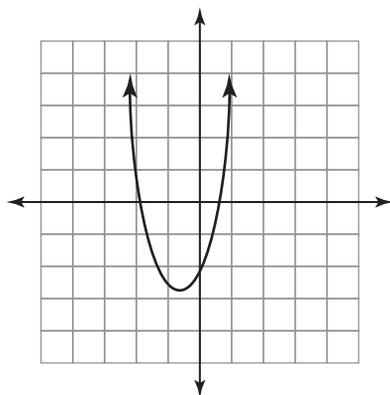
$$h(x) = x^2 + 9x + 14$$

$$p(x) = |x^2 + 9x| + 14$$

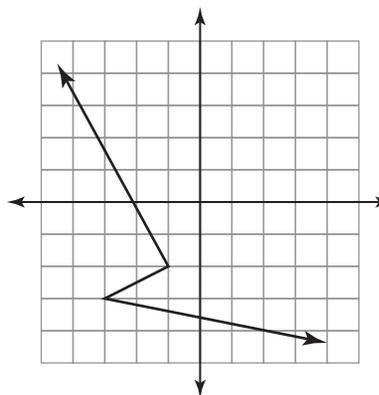
Review

- Identify the axis of symmetry each graph has, if any, and identify the number of quadrants it passes through.

a.



b.



- Solve the equation $2(9n - 6) + 52 = 2(7n + 8)$.

- Evaluate the expression $\frac{3x^2 - 8(y + 2)}{2y}$ for $x = 8$ and $y = -2$.