Secondary 4 Mathematics · Practice Worksheet · tutorinmontreal.ca

Functions — Properties, Inverses and Piecewise

Name: _____ Date: _____

Concepts

- Algebra — Relations and Functions
- Periodic Functions
- The Inverse of a Function
- The Piecewise Function
- The Properties of Functions
- The Role of Parameters a, b, h, and k of a Function in Standard Form

Algebra — Relations and Functions

1. Five rules are listed below.

a) Name the function family of each one (linear, quadratic, square root, exponential, logarithmic, step), or write "not a function" where appropriate.

b) Exactly one of the five is a relation that is *not* a function of x. Identify it and justify your choice with one specific value of x.

$$y^2 = x + 5, \qquad f(x) = 3(2)^x, \qquad g(x) = \left\lfloor \tfrac{1}{2}x \right\rfloor, \qquad h(x) = -2\sqrt{x+1}, \qquad k(x) = \log_5 x$$

Periodic Functions

2. A shuttle boat runs a closed loop, so its distance d (in km) from the terminal is a periodic function of the time t (in minutes) with period 50 minutes. On one cycle, $d(0) = 0$, $d(15) = 6$, $d(25) = 8$ and $d(40) = 3$.

a) Find $d(115)$ and $d(90)$.

b) If the smallest distance reached is 0 km and the greatest is 8 km, give the amplitude of the function.

The Inverse of a Function

3. A weather station records the function $f = \{(-2, 5),\ (0, 1),\ (3, -4),\ (6, 1)\}$.

a) Write the inverse relation f^{-1} as a set of ordered pairs.

b) Is f^{-1} a function? Justify.

The Piecewise Function

4. A function f is defined on $[-5, 5]$ by

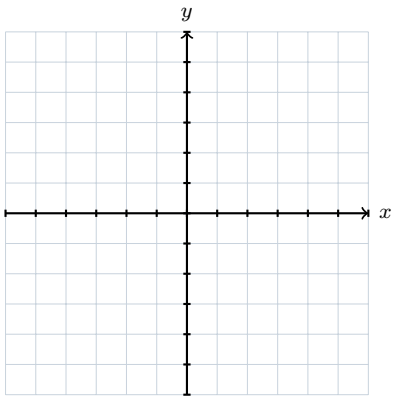
$$f(x) = \begin{cases} -2x - 4 & \text{if } -5 \le x < -1, \\ x^2 - 2 & \text{if } -1 \le x < 2, \\ 2 & \text{if } 2 \le x \le 5. \end{cases}$$

a) Compute $f(-4)$, $f(-1)$, $f(0)$ and $f(3)$.

b) Find all the zeroes of f.

c) Sketch the graph of f on the grid below.

d) Is f continuous at $x = -1$? At $x = 2$? Justify.



The Properties of Functions

5. The graph of a function g is made of three segments: from $(-6, 4)$ to $(-2, -4)$, then from $(-2, -4)$ to $(1, -4)$, then from $(1, -4)$ to $(5, 6)$. Give the domain, the range, the zeroes, the initial value, the extrema, the intervals of variation and the sign of g.

The Role of Parameters a, b, h, and k of a Function in Standard Form

6. The function $g(x) = -3|2(x + 4)| - 1$ is obtained from the base function $f(x) = |x|$.

a) Give the values of a, b, h and k.

b) Describe, in order, the transformations applied to f.

c) Give the vertex and the range of g.