

Functions Review

Answer key Final answers only. Try first, then check.

CORE SKILLS

- K1** a) $(-\infty, 3) \cup (3, \infty)$
 b) $f(x) = x + 2, x \neq 3; f(1) = 3; f(3)$ does not exist
 c) $(-\infty, -1) \cup (-1, 4]$
- K2** a) $(-5, 3)$
 b) $(-2, 6)$
 c) $(-3, 2)$
- K3** a) $f(-2) = 6, f(1) = 0, f(4) = -3$
 b) $D = (-\infty, \infty), R = (-\infty, 0] \cup [2, \infty)$
 c) Not continuous: the left piece approaches 3 but $f(1) = 0$, a jump of 3 units
- K4** a) $f^{-1}(-3) = 3; f^{-1}(7) = -2$
 b) $g^{-1}(x) = 1 + \sqrt[3]{\frac{x-5}{2}}$
 c) $h^{-1}(x) = (3-x)^2 - 2; D = (-\infty, 3], R = [-2, \infty)$
- K5** a) 2
 b) $2x + h - 3$
 c) 1

REAL WORLD

- A1** a) -9 percentage points per hour: on average, the battery lost 9 % of its charge each hour
 b) From $t = 4$ to $t = 6$: -11 percentage points per hour
 c) $22 - 3(10) = -8$ %, which is impossible: at 10 points per hour the battery reaches 0 % at about $t = 10.2$ h, so the model stops there
- A2** a) $d^{-1}(x) = \sqrt{200x}$; input: a braking distance in m; output: the speed in km/h
 b) 120 km/h: yes, 20 km/h over the limit
 c) On all real numbers $d(-120) = d(120) = 72$, so d fails the horizontal line test. A speed cannot be negative, so the model only applies for $v \geq 0$, where d is one-to-one.
- A3** a) $C(E) = 0.10E$ for $0 \leq E \leq 600$; $C(E) = 60 + 0.12(E - 600)$ for $E > 600$; \$96
 b) 800 kWh
 c) $0.10E = 66$ gives $E = 660 > 600$ and $0.12E = 66$ gives $E = 550 \leq 600$: neither piece works. Plan B jumps from \$60 at 600 kWh to above \$72, so no bill lies in $(60, 72]$.

THINK IT THROUGH

- T1** a) $p(-3) = 36$ but $p(3) = 0$, so $p(-x) \neq p(x)$; p is neither (also $p(-3) \neq -p(3)$)
 b) $q(-x) = \frac{x^2 + 1}{-x} = -q(x)$, so q is odd
 c) Both conditions give $f(-x) = f(x)$ and $f(-x) = -f(x)$, so $f(x) = -f(x), 2f(x) = 0$ and $f(x) = 0$ for every x .
- T2** a) The steps give $(5, -5)$, but at $x = 5$ the rule needs $\sqrt{-1}$, which is undefined
 b) $y = -2\sqrt{-(x-4)} + 1$: vertical stretch by 2, reflection in the x -axis, reflection in the y -axis, translation 4 right and 1 up; $(-5, -5)$
 c) $D = (-\infty, 4], R = (-\infty, 1]$

BOSS LEVEL

- Boss**
- a) $x = -2, 0, 4, 6$
 - b) $k = 3$ only (solutions $-4, 2, 8$)
 - c) 8
-

Free worksheet · vertexmath.ca · Free to print and share for classroom use

Free to print, copy, adapt and share for classroom use · CC BY-NC 4.0 · © VertexMath



vertexmath.ca

Hints, answers &
more worksheets