

Introduction to Functions Review

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

CORE SKILLS

- K1** a) $D = \{-2, -1, 1, 2\}$, $R = \{1, 4\}$; a function
 b) $D = \{3, 5, 7\}$, $R = \{1, 2, 4\}$; not a function: $x = 3$ gives $y = 1$ and $y = 4$
 c) $D = [-2, \infty)$, $R = (-\infty, \infty)$; not a function: e.g. $x = 2$ gives $y = -1$ and $y = 3$
- K2** a) 5
 b) $x^2 - 4$
 c) $x^2 - 2x - 2$
- K3** a) A: $y = |x|$; B: $y = \sqrt{x}$; C: $y = x^2$; D: $y = \frac{1}{x}$
 b) $y = x^2$: $D = (-\infty, \infty)$, $R = [0, \infty)$; $y = \sqrt{x}$: $D = [0, \infty)$, $R = [0, \infty)$; $y = \frac{1}{x}$: $D = R = (-\infty, 0) \cup (0, \infty)$; $y = |x|$: $D = (-\infty, \infty)$, $R = [0, \infty)$
 c) At $x = 3$: 9 and 3. At $x = \frac{1}{2}$: $\frac{1}{4}$ and $\frac{1}{2}$.
- K4** a) $D = (-\infty, 5]$, $R = [0, \infty)$
 b) $D = (-\infty, -4) \cup (-4, \infty)$, $R = (-\infty, -1) \cup (-1, \infty)$
 c) $D = [-3, 3]$, $R = [-2, 1) \cup [3, 5]$
- K5** a) $f^{-1}(x) = \frac{5x-1}{2}$
 b) $f^{-1}(3) = 7$; $\frac{1}{f(3)} = \frac{5}{7}$
 c) $q^{-1}(x) = x^2 - 3$; $D = [0, \infty)$, $R = [-3, \infty)$

REAL WORLD

- A1** a) $t = 4$ s; $D = [0, 4]$, $R = [0, 31.25]$ (metres)
 b) $t = 0$: the moment it is tossed. $t = 3$: back at balcony height on the way down.
 c) Nothing: $t = -1$ is before the toss, outside the domain $[0, 4]$.
- A2** a) $F^{-1}(x) = \frac{x-32}{1.8}$; input: a temperature in °F; output: the same temperature in °C
 b) 30 °C
 c) $D = [-273.15, \infty)$, $R = [-459.67, \infty)$; $F^{-1}(-500) \approx -295.6$ °C, colder than absolute zero, so -500 °F is impossible: it is not in the range of F .
- A3** a) $C(h) = 4h$ for $0 \leq h \leq 5$; $C(h) = 20$ for $5 < h \leq 24$; $R = [0, 20]$
 b) $4h = 14$, so 3.5 hours
 c) No: every h in $[5, 24]$ costs \$20, so C fails the horizontal line test and has no inverse on $[0, 24]$. The inverse $C^{-1}(x) = \frac{x}{4}$ exists only on $[0, 5]$.

THINK IT THROUGH

- T1** a) $f(0) = f(-4) = 3$, so the inverse pairs 3 with both 0 and -4 : it is not a function.
 b) The square root step: $y + 2 = \pm\sqrt{x+1}$, so $y = -2 \pm \sqrt{x+1}$.
 c) $x \geq -2$: $f^{-1}(x) = -2 + \sqrt{x+1}$; $x \leq -2$: $f^{-1}(x) = -2 - \sqrt{x+1}$ (both inverses have domain $[-1, \infty)$)
- T2** a) e.g. $y = \frac{1}{x-3} - 2$
 b) e.g. $y = \sqrt{4-x} + 1$
 c) e.g. $f(x) = \frac{1}{x}$: $f(f(x)) = \frac{1}{1/x} = x$; or $f(x) = 5 - x$: $f(f(x)) = 5 - (5 - x) = x$

BOSS LEVEL

- Boss**
- a) 9 (use $x = 1$)
 - b) $f(x) = x^2 - x + 3$
 - c) $R = \left[\frac{11}{4}, \infty\right); k = \frac{11}{4}$
-

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