

Understanding Functions and Function Notation

Grade 9 – Algebra 1 math · Worksheet · Standards: F-IF.A.1, F-IF.A.2, F-IF.B.5

Name: _____ Date: _____ Class: _____

These problems train the definition of a function, the vertical line test, evaluating $f(x)$ and reading domain and range from tables, graphs and contexts, covering F-IF.A.1, F-IF.A.2 and F-IF.B.5. Several problems ask for interpretation of $f(a) = b$ with units, and the last six are multi-step: tickets, population, a thrown ball and a comparison of two functions.

Standards: F-IF.A.1, F-IF.A.2, F-IF.B.5 · **Level:** Grade 9 Algebra 1

Problem 1 Repeated outputs (easy)

Is the relation $\{(1, 5), (2, 5), (3, 8), (4, 9)\}$ a function? Explain.

Problem 2 Repeated input (easy)

Is the relation $\{(2, 3), (2, 7), (5, 1)\}$ a function? Explain.

Problem 3 Evaluate a linear function (easy)

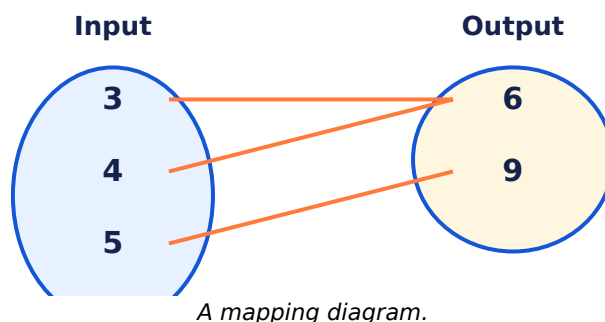
If $f(x) = 4x - 3$, find $f(5)$.

Problem 4 Evaluate a quadratic (easy)

If $g(x) = x^2 + 2$, find $g(-3)$.

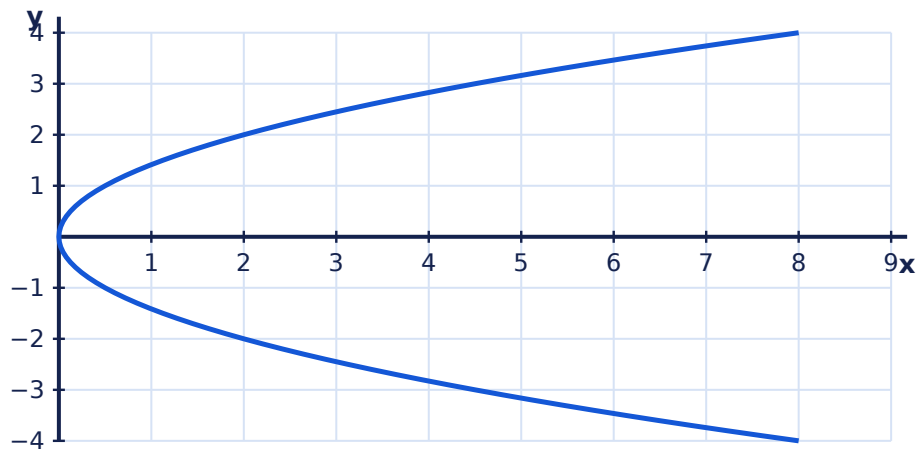
Problem 5 Mapping diagram (easy)

Is the mapping a function? State the domain and the range.



Problem 6 Vertical line test (medium)

Does the graph show y as a function of x ? Use the vertical line test.



The graph of a relation.

Problem 7 Evaluate with a square (medium)

A function is defined by $f(x) = 5x^2 - 2x + 9$. Compute $f(-4)$.

Problem 8 Find the input (medium)

If $f(x) = 5 - 3x$, find x when $f(x) = -10$.

Problem 9 Substitute an expression (medium)

If $f(x) = 2x + 5$, write $f(a + 1)$ in simplest form.

Problem 10 Table to rule (medium)

A function has the table:

x	0	1	2	3
f(x)	4	7	10	13

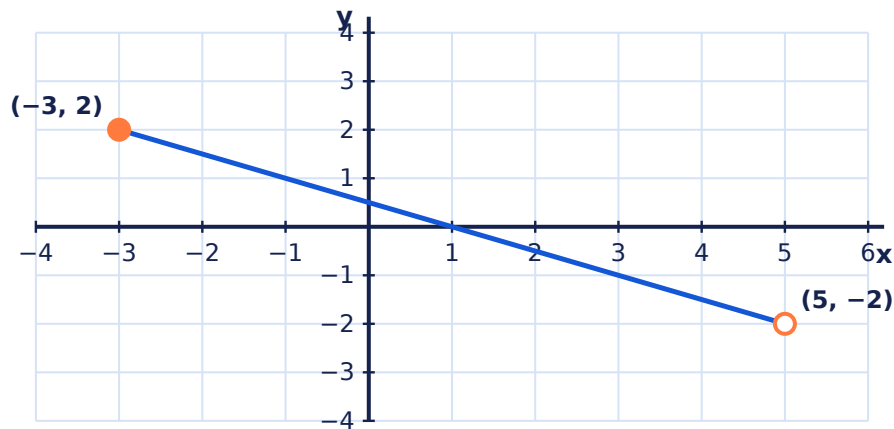
Write a rule for $f(x)$ and find $f(10)$.

Problem 11 Interpret $f(a) = b$ (medium)

Let $f(t)$ be the height in feet of a drone t seconds after takeoff. Interpret $f(8) = 120$ and $f(15) = 0$.

Problem 12 Domain and range from a graph (medium)

Find the domain and the range of the function graphed. Use inequalities.



A segment with one closed and one open end.

Problem 13 Discrete domain (medium)

A food truck sells burritos for \$7 each and can make at most 40 per day, so $C(n) = 7n$. Describe the domain and the range. Is the domain discrete or continuous?

Problem 14 Continuous domain (medium)

A tank fills at 12 gallons per minute for 25 minutes, so $V(t) = 12t$ with $0 \leq t \leq 25$. State the domain and range and whether the domain is discrete or continuous.

Problem 15 Ticket pricing (hard)

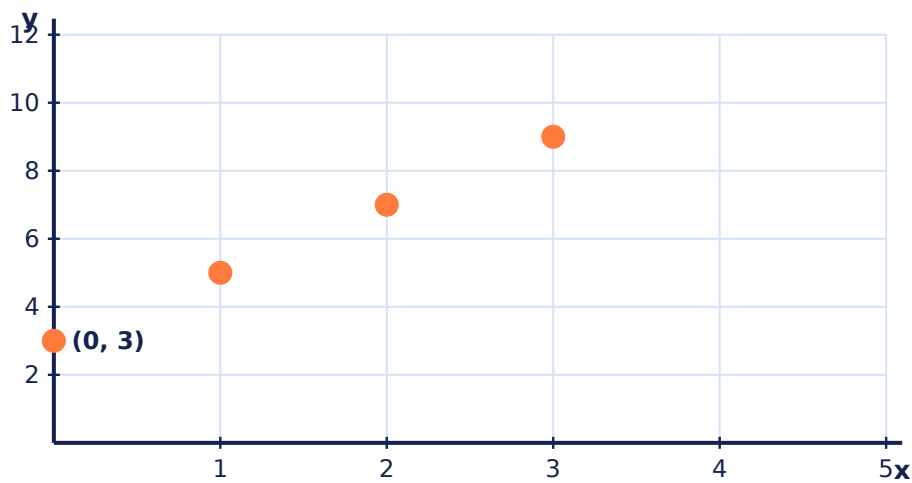
The cost in dollars of n concert tickets is $A(n) = 8.50n + 3$, which includes a \$3 service fee. Find $A(6)$, find n when $A(n) = 88$, and interpret both results.

Problem 16 Town population (hard)

A town's population is $P(t) = 12,000 + 350t$ people t years after 2020. Find $P(10)$, find when the population reaches 17,600 and interpret the 350.

Problem 17 Points to a rule (hard)

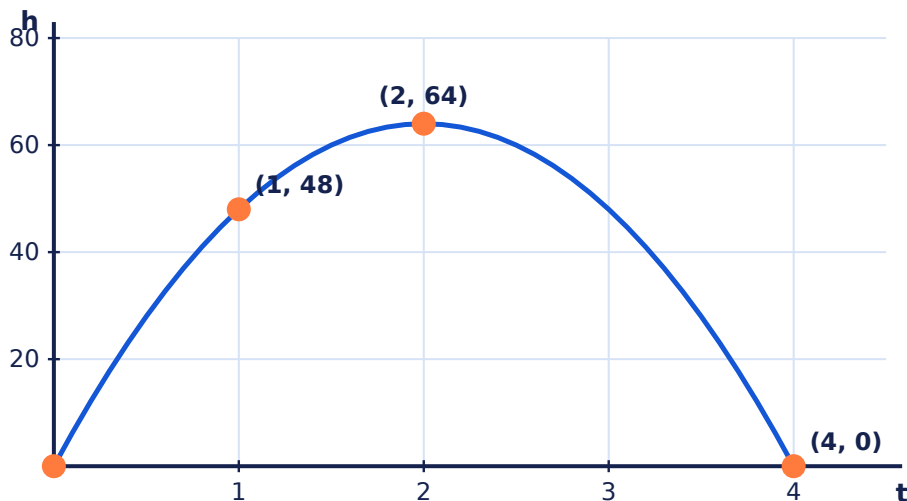
The graph shows four points of a function. Write a rule, state the domain and range of these points and predict $f(4)$.



Four points of a function.

Problem 18 Thrown ball (hard)

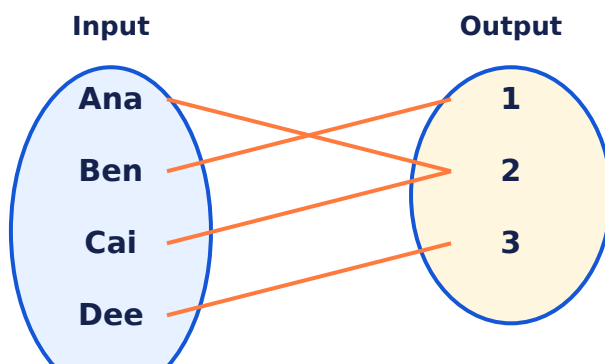
The height in feet of a ball t seconds after it is thrown is $h(t) = -16t^2 + 64t$. Find $h(1)$, $h(2)$ and $h(4)$, interpret $h(4) = 0$ and give a sensible domain and range.



Height of the ball in feet.

Problem 19 Students and buses (hard)

The diagram pairs students with the bus they ride. (a) Is it a function from students to buses? (b) Is the reverse relation, from buses to students, a function? Explain.



Problem 20 Compare two functions (hard)

Let $f(x) = 3x - 5$. A second function g has $g(1) = 2$, $g(2) = 5$ and $g(3) = 8$, with outputs continuing the same pattern. Which function has the larger value at $x = 10$, and by how much?