

Understanding Functions and Their Graphs

Grade 8 math · Worksheet · Standards: 8.F.A.1, 8.F.A.2, 8.F.A.3

Name: _____ Date: _____ Class: _____

These 20 problems follow Standards 8.F.A.1, 8.F.A.2 and 8.F.A.3. They cover what a function is, how to test it in pairs, mappings, tables, graphs and equations, comparing functions given in different forms, and telling linear from nonlinear.

Begin with simple tests of the one-output rule, then move to rates of change, initial values and modeling.

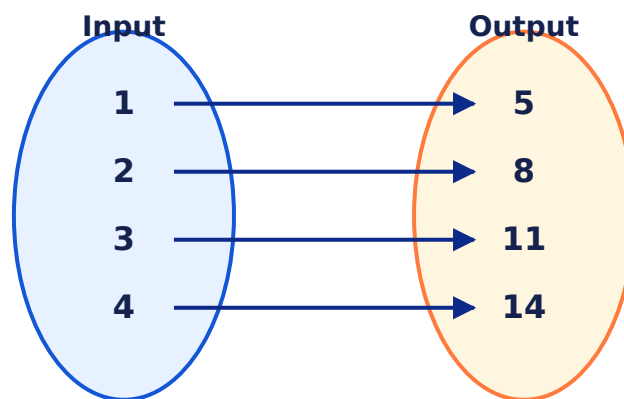
Standards: 8.F.A.1, 8.F.A.2, 8.F.A.3 · **Level:** Grade 8

Problem 1 Ordered pairs (easy)

Decide whether each set of ordered pairs is a function: (a) $\{(1, 4), (2, 7), (3, 10), (4, 13)\}$ (b) $\{(2, 5), (2, 8), (3, 9)\}$

Problem 2 Mapping diagram (easy)

Is the relation in the mapping diagram a function? If so, describe the rule.



Mapping diagram.

Problem 3 Table rule (easy)

The table shows a function. Find its rule.

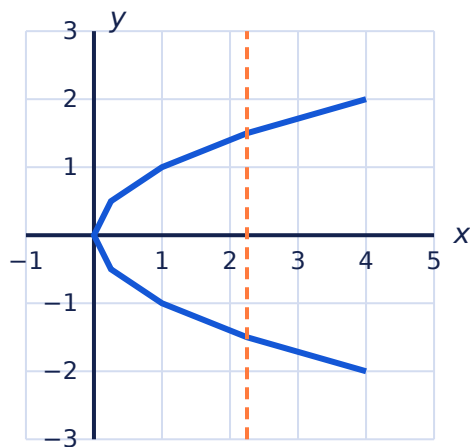
x	0	1	2	3
y	6	9	12	15

Problem 4 Function notation (easy)

Let $f(x) = 4x - 7$. Find $f(5)$, $f(-2)$ and $f(0)$.

Problem 5 Vertical line test (easy)

Slide an imaginary vertical line across this graph. Does the graph define a function?



A curve opening to the right.

Problem 6 Input and output (easy)

A function has the rule $y = 2x + 9$. Find the outputs for the inputs 3, 6 and 10.

Problem 7 Quadratic table (medium)

Let $g(x) = x^2 - 3$. Complete a table for $x = -2, -1, 0, 2, 4$. Does the output ever repeat?

Problem 8 Linear or nonlinear tables (medium)

Decide whether each table is linear.

Table 1

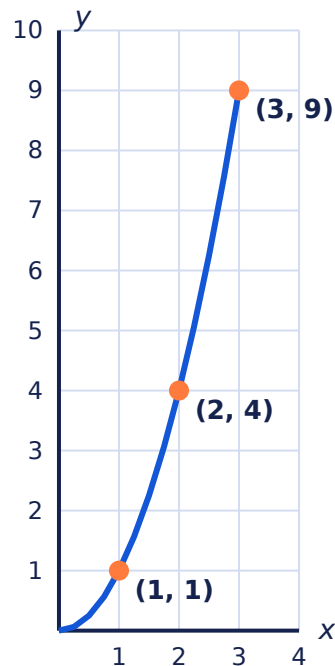
x	1	2	3	4
y	5	9	13	17

Table 2

x	1	2	3	4
y	2	5	10	17

Problem 9 Side and area (medium)

A graph plots the area of a square against its side length. Calculate the change in area per unit of side from side 1 to side 3, then from side 2 to side 3. The plotted points are (1, 1), (2, 4) and (3, 9). Does a straight line fit these points?



Area against side length.

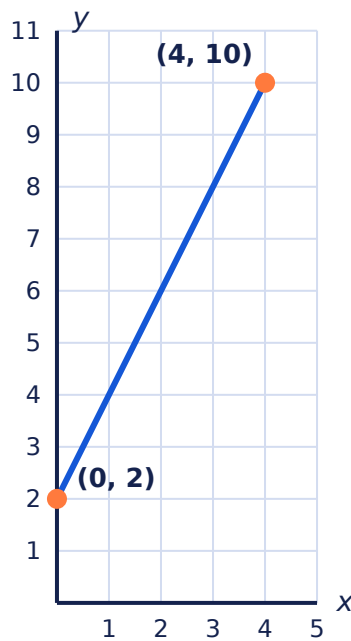
Problem 10 Compare two functions (medium)

Function A: $y = 2.5x + 4$. Function B is shown in the table. Which has the greater rate of change, and which has the greater initial value?

x	0	2	4
y	3	9	15

Problem 11 Graph versus equation (medium)

The graph shows Function C. Function D is $y = 3x - 1$. Compare their rates of change and their y-intercepts.



Function C.

Problem 12 Spot the linear equations (medium)

Which equations are linear? (a) $y = 7x - 2$ (b) $y = x^2$ (c) $y = 4 - x/2$

Problem 13 Find the rule (medium)

Write a rule for the function.

x	2	4	6	8
y	7	13	19	25

Problem 14 Repeated outputs (medium)

Is $\{(Ava, June), (Ben, June), (Cy, August)\}$ a function from names to birth months? Is the reverse pairing $\{(June, Ava), (June, Ben), (August, Cy)\}$ a function?

Problem 15 Pool water level (hard)

A wading pool holds 12 inches of water and a hose raises the depth by 4 inches per hour. Write the depth function $d(t)$, find $d(6.5)$, and find when the depth is 60 inches.

Problem 16 Two phone plans (hard)

Plan A: cost $C = 0.10m + 15$ for m minutes. Plan B: cost \$28 for 100 minutes, \$38 for 200

minutes and \$48 for 300 minutes. Compare the rates and the initial fees. Which plan costs less?

Problem 17 Perimeter and area (hard)

Make a table of $P = 4s$ and $A = s^2$ for sides 1 through 5. Decide which one is linear and find the side where the two values coincide.

Problem 18 Constant versus vertical (hard)

Explain why $y = 5$ is a function but $x = 5$ is not.

Problem 19 Points on a line (hard)

A function contains the points (1, 6), (3, 14) and (6, 26). Show that it is linear, write its rule and find $f(10)$.

Problem 20 Fence and seed (hard)

A square garden has side s feet. The fence cost is $C = 12s$ dollars, because it is priced per foot of side length. Seed costs \$0.50 per square foot: the cost is $S = 0.5s^2$. Find both costs for $s = 6$, find the side length where they match, and decide which cost is larger at $s = 30$.