

Interpreting and Comparing Functions in Context

Grade 11 – Algebra 2 math · Worksheet · Standards: F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C.8a, F-IF.C.9

Name: _____ Date: _____ Class: _____

These problems train reading features of functions in context, average rate of change from equations, tables and graphs, completing the square, and comparing functions, matching standards F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C.8a and F-IF.C.9.

Early problems compute one feature. Later ones combine models for revenue, cost, savings and tides.

Standards: F-IF.B.4, F-IF.B.5, F-IF.B.6, F-IF.C.8a, F-IF.C.9 · **Level:** Grade 11 Algebra 2

Problem 1 Domain in context (easy)

A ball is thrown so that its height in feet is $h(t) = -16t^2 + 64t$, with t in seconds. Find when the ball lands, and state a reasonable domain.

Problem 2 Average rate of change from an equation (easy)

A warehouse robot is $s(t) = t^3 + 2t$ feet from its dock after t seconds. Compute $(s(4) - s(1)) \div (4 - 1)$ and say what it measures.

Problem 3 Interpret a linear model (easy)

A tank holds $V(t) = 640 - 16t$ gallons after t minutes, for $0 \leq t \leq 40$. Interpret 640 and -16 , and find when 200 gallons remain.

Problem 4 Average rate of change from a table (medium)

The table shows the distance a cyclist has traveled. Find the average speed from 2 to 5 minutes and from 5 to 9 minutes, and tell which is greater.

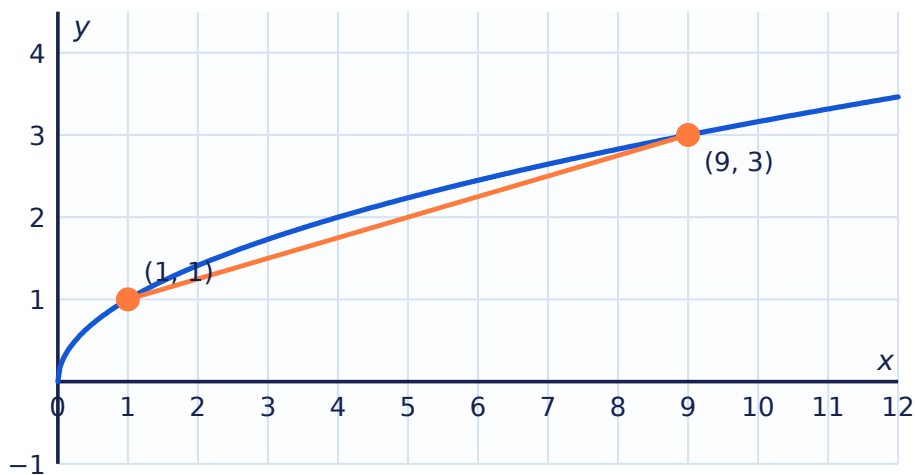
Minutes	0	2	5	9
Distance (mi)	3	11	26	50

Distance traveled over time.

Problem 5 Average rate of change from a graph (medium)

The graph shows $y = \sqrt{x}$ for $x \geq 0$. Use the marked points to find the average rate of change

from $x = 1$ to $x = 9$.



Secant line on $y = \sqrt{x}$.

Problem 6 Complete the square (medium)

Write $x^2 + 6x + 5$ in vertex form and give the vertex.

Problem 7 Zeros, axis and minimum (medium)

For $f(x) = x^2 - 7x + 10$, factor to find the zeros, the axis of symmetry and the minimum value.

Problem 8 Maximum height (medium)

A launched tennis ball has height $h(t) = -16t^2 + 48t + 6$ feet. Rewrite it in vertex form and state the maximum height and when it occurs.

Problem 9 Revenue model (medium)

A shop's weekly revenue is $R(p) = -6p^2 + 168p$ dollars at price p . Find the price that maximizes revenue, the maximum revenue, and the domain in context.

Problem 10 Exponential decay features (medium)

For $f(x) = 250(0.8)^x$, state the y-intercept, the percent decrease per unit, the horizontal asymptote, and the average rate of change from $x = 0$ to $x = 3$.

Problem 11 Logarithmic features (medium)

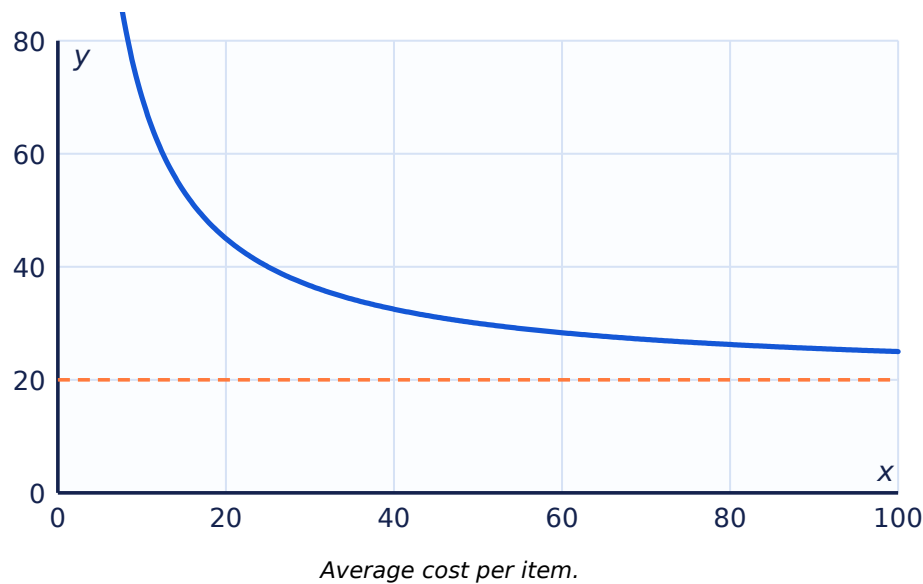
For $f(x) = \log_2(x + 3)$, find the domain, the vertical asymptote and the x-intercept.

Problem 12 Tide features (medium)

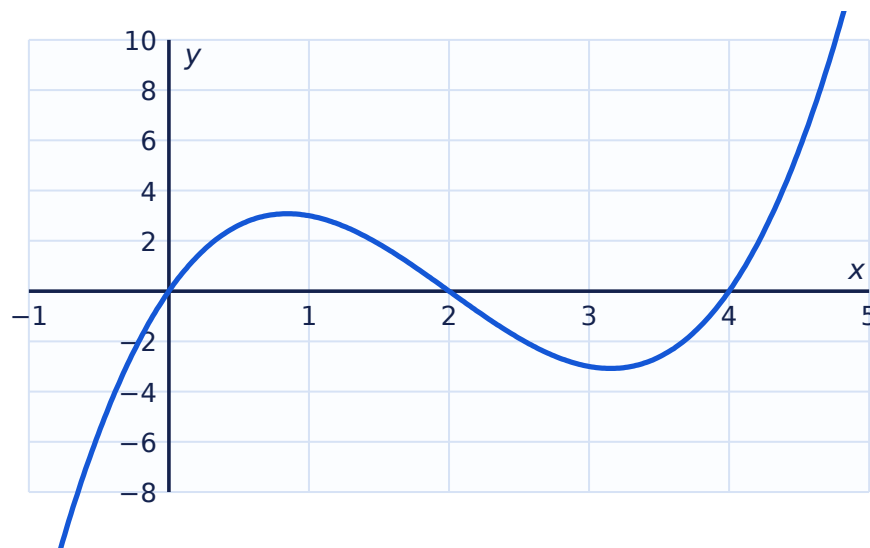
The water depth in feet at a pier is $d(t) = 4 \sin(\pi t/6) + 10$, where t is hours after midnight. Find the period, the maximum and minimum depths, and the average rate of change from $t = 0$ to $t = 3$.

Problem 13 Average cost with an asymptote (hard)

The average cost per item of making x items is $C(x) = (500 + 20x)/x$ dollars. State the domain in context, the horizontal asymptote and its meaning, and $C(25)$.

**Problem 14 Features of a cubic** (hard)

The graph shows $p(x) = x(x - 2)(x - 4)$. List the zeros, the intervals where $p(x) > 0$, and the end behavior.



A cubic with three zeros.

Problem 15 Compare a line and a table (hard)

Function f is given by $f(x) = 3x + 8$. Function g is given by the table below. Compare their starting values and rates of change, and say which is larger at $x = 10$.

x	0	1	2	3
$g(x)$	5	9	13	17

Table for g .

Problem 16 Compare two quadratics (hard)

Quadratic $f(x) = -(x - 2)^2 + 7$. Quadratic g has the values $(0, -2)$, $(1, 2)$, $(2, 4)$, $(3, 4)$, $(4, 2)$. Which has the greater maximum value, and which has the axis of symmetry farther right?

Problem 17 Population change from a table (hard)

A town's population was 12,400 in 2010, 13,750 in 2015 and 15,900 in 2020. Find the average rate of change for each five-year period and describe the trend.

Problem 18 Completing the square with a leading coefficient (hard)

Rewrite $f(x) = 3x^2 - 18x + 10$ in vertex form, give the minimum, and find the zeros to the nearest hundredth.

Problem 19 Exponential versus linear savings (hard)

Account A is worth $1,000(1.05)^t$ dollars after t years. Account B is worth $1,200 + 80t$ dollars. Compare their values at $t = 10$, 20 and 30, and estimate when A overtakes B.

Problem 20 Average rate of change of sine (hard)

For $f(x) = \sin x$, find the average rate of change from 0 to $\pi/2$ and from $\pi/2$ to π , to the nearest hundredth, and explain the sign.