

Algebra 1 · Transformations, Absolute Value and Piecewise Functions · Worksheet

Common Core F-BF.B.3, F-IF.C.7b · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

These 24 problems practice transformations of linear, quadratic and absolute value functions (F-BF.B.3) and the graphs of absolute value, piecewise-defined and step functions (F-IF.C.7b). They start with single shifts, move to graphs and equations, and end with word problems about fees, savings, falling objects and parking.

Algebra 1 Common Core: F-BF.B.3 · F-IF.C.7b

Problem 1: Shift down a parabola

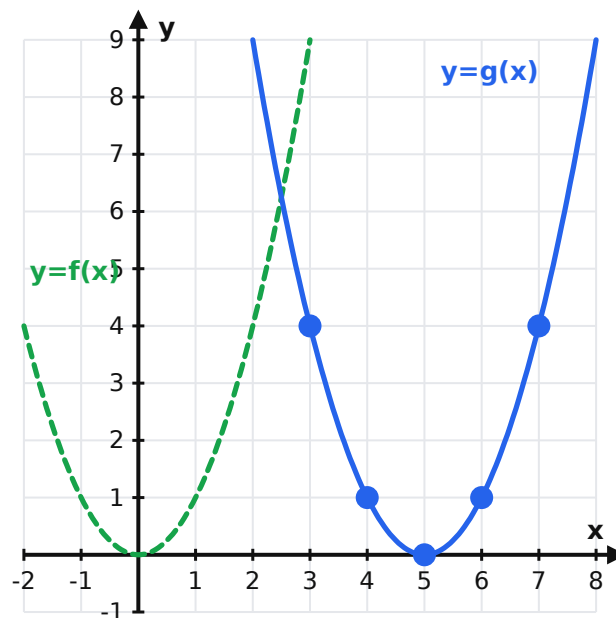
Describe how the graph of $g(x) = x^2 - 6$ compares with the graph of $f(x) = x^2$. Give the vertex of g .

Problem 2: Shift up an absolute value

Describe how the graph of $g(x) = |x| + 7$ compares with the graph of $f(x) = |x|$. Give the vertex of g .

Problem 3: Equation from a shifted parabola

The dashed graph is $f(x) = x^2$. The solid graph g has the same shape. Write $g(x)$ in terms of f and then as an equation in x .



The dashed curve is $f(x) = x^2$. The solid curve is g .

Problem 4: Shift left

Describe how the graph of $g(x) = |x+3|$ compares with $f(x) = |x|$. Give the vertex and the y-intercept of g .

Problem 5: Add outside or inside

Let $f(x) = x^2$. Evaluate $f(3)+2$ and $f(3+2)$. Explain why the results differ.

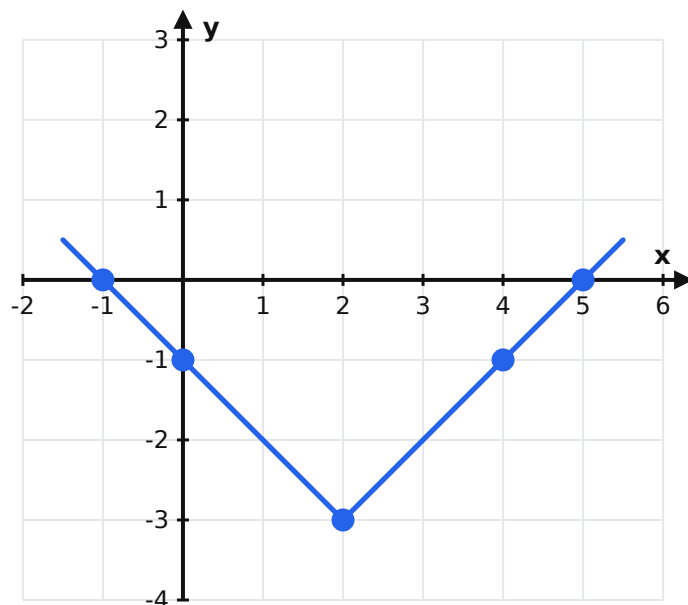
Problem 6: Stretch table

Copy and complete the table for $f(x) = |x|$ and $g(x) = 3|x|$. Then describe how the graph of g compares with the graph of f .

x	-2	-1	0	1	2
$f(x)$					
$g(x)$					

Problem 7: Equation from an absolute value graph

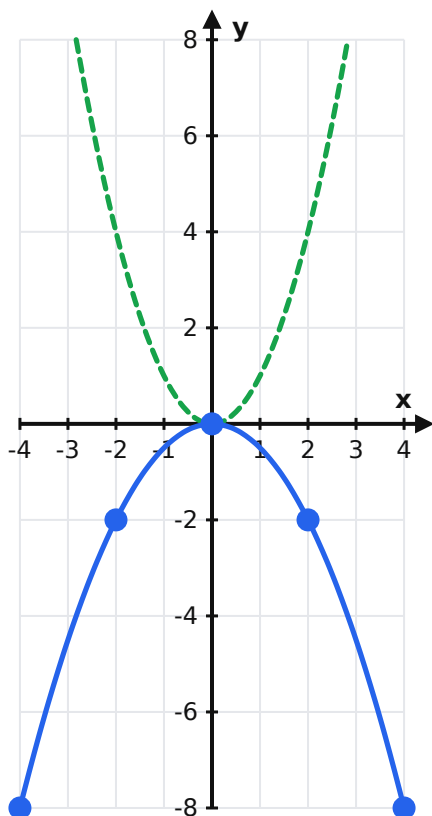
The graph of g is a shifted copy of $f(x) = |x|$. Write the equation of g in the form $g(x) = |x-h|+k$.



The graph of g , a shifted copy of $f(x) = |x|$.

Problem 8: Reflect and shrink

Write $g(x)$ in terms of $f(x) = x^2$, then as an equation in x , and describe the transformation.



The dashed curve is $f(x) = x^2$. The solid curve is g .

Problem 9: Transform a linear function

Let $f(x) = 2x + 1$. Write each function in simplified form: (a) $g(x) = f(x) + 3$; (b) $h(x) = f(x + 3)$; (c) $k(x) = -f(x)$.

Problem 10: Vertex and range

For $g(x) = |x - 4| + 2$, find the vertex, the equation of the axis of symmetry, the minimum value, the domain and the range.

Problem 11: Graph an absolute value function

Make a table of values for $x = -2, -1, 0, 1, 2, 3, 4$ and graph $y = |x - 1| - 2$. Label the vertex.

Problem 12: Intercepts of an absolute value graph

Find the y-intercept and the x-intercepts of $g(x) = 2|x + 1| - 4$.

Problem 13: An absolute value that opens down

For $h(x) = -|x - 3| + 5$, find the vertex, the maximum value, the y-intercept and the x-intercepts.

Problem 14: Evaluate a piecewise function

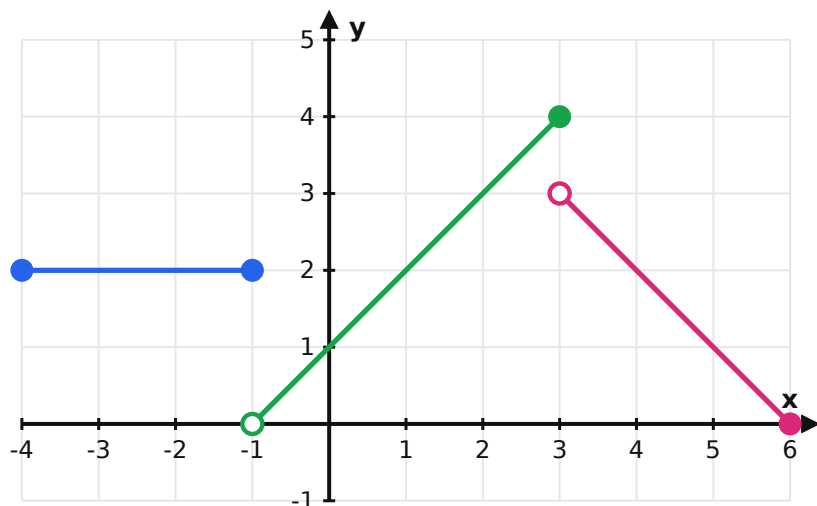
Let $f(x) = x + 4$ when $x < 0$, and $f(x) = x^2$ when $x \geq 0$. Find $f(-3)$, $f(-1)$, $f(0)$ and $f(2)$.

Problem 15: Graph a piecewise function

Graph $f(x) = \frac{1}{2}x + 1$ when $x < 2$, and $f(x) = -x + 5$ when $x \geq 2$, for $-4 \leq x \leq 6$. Use an open or closed circle at $x = 2$ for each piece.

Problem 16: Write a piecewise function

Write a piecewise function for the graph. Then find $f(-4)$, $f(3)$ and $f(5)$.



A piecewise graph with three pieces.

Problem 17: Greatest integer step function

Let $s(x)$ be the greatest integer less than or equal to x . Find $s(3.7)$, $s(-1.2)$, $s(5)$, $s(-4)$ and $s(0.99)$.

Problem 18: Check a point

Is the point $(4,0)$ on the graph of $g(x) = -2|x-1|+6$? Is the point $(-2,2)$?

Problem 19: Ride-share booking fee

Maya's ride costs $f(m) = 2m$ dollars for m miles. The company adds a \$4 booking fee, so the new cost is $g(m) = f(m) + 4$. Describe the transformation of the graph, write $g(m)$, and find the cost of a 7-mile ride.

Problem 20: Starting to save later

Jamal saves \$15 each week, so after w weeks he has $f(w) = 15w$ dollars. This year he starts saving 3 weeks later. Write the new function g in terms of f , describe the shift, and find how much he has saved after week 8.

Problem 21: Dropped ball

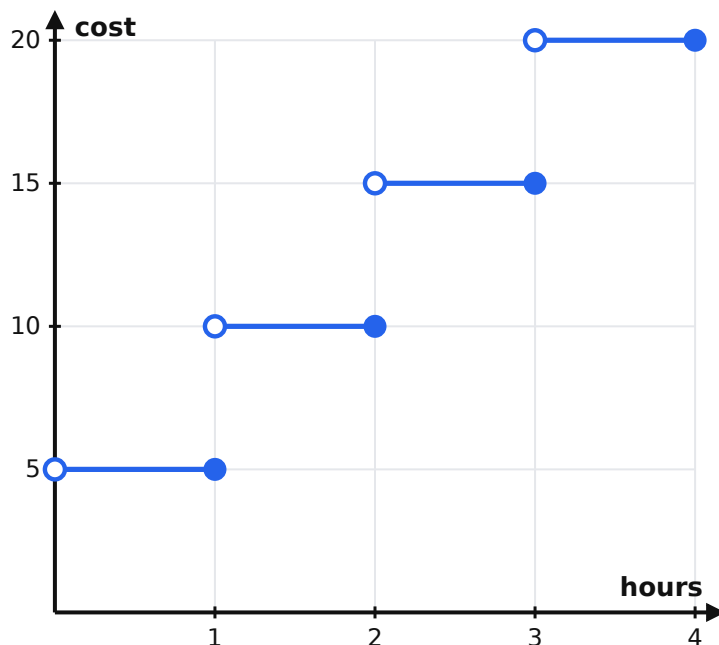
A ball is dropped from a platform. Its height in feet after t seconds is $h(t) = -16t^2 + 64$. Describe how the graph of h is obtained from $f(t) = t^2$, give the starting height, and find when the ball lands.

Problem 22: Data plan

A phone plan costs \$20 per month for up to 5 GB of data, plus \$4 for each additional GB. Let $C(g)$ be the monthly cost for g GB. Write $C(g)$ as a piecewise function, then find the cost for 3 GB, 8 GB and 12 GB, and graph the function.

Problem 23: Parking garage

A garage charges \$5 for each hour or part of an hour. The graph shows the cost. Find the cost of parking for (a) 2.3 hours, (b) exactly 3 hours, (c) 3.01 hours.



Parking cost for up to 4 hours.

Problem 24: Bottle tolerance

A machine fills bottles to x ounces. The error is $E(x) = |x - 16|$, and a bottle is acceptable when $E(x) \leq 0.2$. Is a bottle with 15.9 ounces acceptable? Is one with 16.3 ounces? Write the acceptable amounts as an inequality.