Piecewise Functions and Transformations

Piecewise-defined functions, library functions, and graph transformations.

Name _____ Date _____

32 main 2-up grid 2 pages

Completion Reward

Shown here as a small pack artifact, not a preview destination.

1. What does a piecewise function do?

input region	rule
x < 0	2x
x >= 0	x + 1

A piecewise function uses different formulas on different input intervals, so the condition decides which rule applies.

A. It always has two x-intercepts.
B. It must be nonlinear.
C. It uses different rules on different parts of the domain.
D. It can never be graphed.

2. What does x <= 2 mean in a piecewise condition?

A. The value x = 2 is excluded from that branch.
B. The graph must cross the x-axis at 2.
C. The value x = 2 is included in that branch.
D. The function must be even.

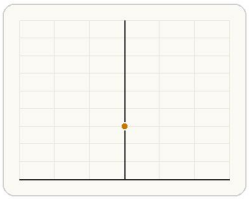
3. Which is the parent absolute-value function?

A. y = x^2
B. y = sqrt(x)
C. y = |x|
D. y = 1 / x

4. Which is the parent square-root function?

A. y = x^2
B. y = |x|
C. y = x^3
D. y = sqrt(x)

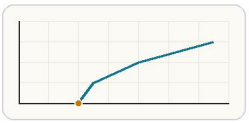
5. Compared to y = x^2, what does y = x^2 + 3 do?



Adding 3 outside the quadratic raises every output by 3 without changing the basic shape.

A. Shifts the graph right 3 units
B. Reflects the graph across the x-axis
C. Shrinks the graph horizontally
D. Shifts the graph up 3 units

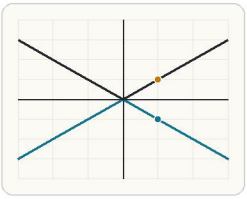
6. Compared to y = sqrt(x), what does y = sqrt(x - 4) do?



Replacing x with x - 4 moves the starting point and the whole square-root graph 4 units to the right.

A. Shifts the graph left 4 units
B. Shifts the graph up 4 units
C. Reflects the graph across the y-axis
D. Shifts the graph right 4 units

7. Compared to y = |x|, what does y = -|x| do?



A negative sign outside the absolute-value function flips every output value across the x-axis.

A. Reflects the graph across the y-axis
B. Shifts the graph down 1
C. Shifts the graph right 1
D. Reflects the graph across the x-axis

8. Compared to y = |x|, what does y = 2|x| do?

A. It shifts the graph right 2.
B. It reflects the graph across the y-axis.
C. It doubles every output value.
D. It halves every output value.

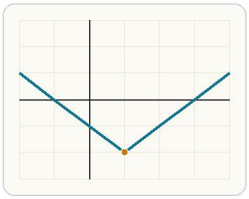
9. Which expression shifts y = x^2 right 3 units?

A. y = (x - 3)^2
B. y = (x + 3)^2
C. y = x^2 + 3
D. y = -x^2

10. **Which expression shifts y = x^2 down 2 units?**

A. y = x^2 - 2
B. y = (x - 2)^2
C. y = x^2 + 2
D. y = -x^2 - 2

11. **Which expression shifts y = |x| right 1 and down 2?**



A right 1 and down 2 shift moves the absolute-value vertex from (0, 0) to (1, -2).

A. y = |x + 1| - 2
B. y = |x - 2| + 1
C. y = -|x - 1| + 2
D. y = |x - 1| - 2

12. **Which expression reflects y = sqrt(x) across the x-axis?**

A. y = sqrt(-x)
B. y = -sqrt(x)
C. y = sqrt(x) - 1
D. y = sqrt(x + 1)

13. **Which expression is a vertical stretch of y = x^3 by factor 4?**

A. y = (4x)^3
B. y = x^3 + 4
C. y = 4x^3
D. y = x^3 - 4

14. **What is the best first step when evaluating a piecewise function?**

A. Add the formulas together first.
B. Decide which interval contains the input.
C. Assume the first branch is always used.
D. Differentiate each branch.

15. **A student says y = (x - 4)^2 shifts y = x^2 up 4 units. What is the mistake?**

A. Subtracting inside shifts right, not up.
B. The graph actually shifts down 4 units.
C. The minus sign reflects the graph.
D. Squaring removes the shift entirely.

16. **For f(x) = 2x when x < 0 and x + 1 when x >= 0, find f(-3). Answer with a number.**

17. **For f(x) = 2x when x < 0 and x + 1 when x >= 0, find f(4). Answer with a number.**

18. **For g(x) = (x - 2)^2, find g(5). Answer with a number.**

19. **For h(x) = -|x| + 4, find h(-3). Answer with a number.**

20. **For p(x) = sqrt(x - 1), find p(10). Answer with a number.**

21. **For q(x) = 2|x| + 1, find q(-2). Answer with a number.**

22. **For r(x) = x - 2 when x <= 1 and 3x when x > 1, find r(1). Answer with a number.**

23. **For s(x) = x^2 when x < 2 and x + 5 when x >= 2, find s(2). Answer with a number.**

24. **Which student correctly explains y = -sqrt(x) + 2?**

A. Student A: reflect y = sqrt(x) across the x-axis, then shift up 2.
B. Student B: shift right 2, then reflect across the y-axis.
C. Student C: reflect across the y-axis, then shift down 2.
D. Student D: square the graph, then move left 2.

25. **Write the function that shifts y = x^2 right 4 units. Answer as an equation.**

26. **Write the function that shifts y = x^2 up 5 units. Answer as an equation.**

27. **Write the function that reflects y = |x| across the x-axis. Answer as an equation.**

28. **Write the function that shifts y = sqrt(x) left 2 units. Answer as an equation.**

29. **Write the function that stretches y = |x| vertically by factor 3. Answer as an equation.**

30. **Write the function that shifts y = 1 / x right 3 units. Answer as an equation.**

31. **Write the function that shifts y = |x| right 1 and down 2. Answer as an equation.**

32. **Write a piecewise function with rule x for x < 0 and x + 2 for x >= 0. Answer as a piecewise definition.**