Piecewise Functions and Features

Branch conditions, boundary values, domain gaps, and output reasoning.

Name ____________________ Date ________________

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Completion Reward

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

1. A function is defined by u(x) = x + 2 when x < 1 and u(x) = 3x when x >= 1. What is the domain?

A. All real numbers
B. x < 1 only
C. x >= 1 only
D. All integers

2. If f(x) = { x + 2 when x < 0; 3x when x >= 0 }, which rule is used for x = -4?

A. 3x
B. x + 2
C. Both rules
D. No rule

3. Why does a piecewise function have more than one formula?

A. Different input regions follow different rules.
B. Every function must have at least two formulas.
C. The graph would be invalid otherwise.
D. It lets one input use whichever rule gives the nicer output.

4. A function is defined by h(x) = x + 1 when x <= 2 and h(x) = 5 - x when x > 2. Which expression should be used to find h(2)?

A. 5 - x
B. Both expressions
C. x + 1
D. Neither expression

5. What is the first thing you should do before evaluating a piecewise function at a specific input?

A. Add the formulas together.
B. Find the inverse function.
C. Set the formulas equal to each other.
D. Check which condition the input satisfies.

6. A student evaluates f(-2) using the branch f(x) = x^2 when x >= 0. What is the mistake?

A. They used the branch for nonnegative inputs even though -2 is negative.
B. They should square every input no matter what.
C. They should add the branch outputs together.
D. They should ignore the condition and use both branches.

7. A function is defined by f(x) = 2x + 1 when x < 0 and f(x) = x^2 when x >= 0. Find f(-3). Answer with a number.

8. A function is defined by g(x) = 3x - 2 when x < 0 and g(x) = x + 4 when x >= 0. Find g(0). Answer with a number.

9. A function is defined by q(x) = x + 2 when x < 0 and q(x) = 3 - x when x >= 0. What is the y-intercept?

A. (0, 2)
B. (3, 0)
C. (0, 3)
D. (0, -3)

10. A function is defined by w(x) = x + 5 when x < 0 and w(x) = x - 1 when x >= 0. Which is larger: w(-2) or w(3)?

A. w(3)
B. They are equal
C. Not enough information
D. w(-2)

11. A function is defined by v(x) = x - 1 when x < 1 and v(x) = 2x when x > 1. Which input is not included in the domain?

A. 0
B. 1
C. -4
D. 3

12. If x = 0, which condition is true?

A. x < 0
B. x > 2
C. x < -3
D. x >= 0

13. Which piecewise rule fails to define a function because one input could get two outputs?

A. f(x) = x when x >= 0 and f(x) = x + 1 when x <= 0
B. f(x) = x when x < 0 and f(x) = x + 1 when x >= 0
C. f(x) = 2x when x < 3 and f(x) = 5 when x >= 3
D. f(x) = 1 when x < -2 and f(x) = 4 when x >= -2

14. If g(x) = { 2x - 1 when x <= 3; x + 4 when x > 3 }, which expression gives g(3)?

A. 3 + 4
B. Both branches
C. 2(3) - 1
D. No branch

15. A parking lot costs $8 for up to 2 hours and $8 plus $3 for each hour after 2. Which idea explains why a piecewise rule is needed?

A. The pricing rule changes after 2 hours.
B. The cost is always linear with one slope.
C. Parking costs cannot use functions.
D. The rule only depends on the hour, not time region.

16. Which piecewise rule matches: multiply negatives by 2, but add 1 to nonnegative numbers?

A. f(x) = 2x when x <= 0 and f(x) = x - 1 when x > 0
B. f(x) = 2x when x < 0 and f(x) = x + 1 when x >= 0
C. f(x) = x + 1 when x < 0 and f(x) = 2x when x >= 0
D. f(x) = 2x + 1 for every x

17. A function is defined by r(x) = x + 4 when x < 0 and r(x) = x + 10 when x >= 0. Which number cannot be an output?

A. 7
B. 3
C. 10
D. -2

18. A ride costs $5 for trips up to 2 miles and $5 plus $2 for each mile beyond 2 miles for longer trips. Which piecewise rule matches this?

A. C(x) = 5 when x <= 2 and C(x) = 5 + 2(x - 2) when x > 2
B. C(x) = 5x when x <= 2 and C(x) = 2x when x > 2
C. C(x) = 5 + 2x for all x
D. C(x) = 2(x - 2) when x <= 2 and C(x) = 5 when x > 2

19. What is the first step when finding p(-1) for a piecewise function?

A. Check which condition -1 satisfies
B. Use every branch and average the answers
C. Always use the first branch
D. Simplify both formulas before looking at the input

20. A student uses the rule y = 2x + 1 for x = 2, but the piecewise definition says y = 2x + 1 when x < 2 and y = x - 3 when x >= 2. What is the mistake?

A. They used the branch that excludes x = 2.
B. They should use both branches and average the answers.
C. They should always use the first branch at boundary values.
D. They should change x = 2 into x = 1.99 first.

21. A student says f(-2) = -6 for f(x) = { x + 2 when x < 0; 3x when x >= 0 }. What is the mistake?

A. They used the wrong branch for a negative input.
B. They should always use the larger formula.
C. They should plug in 2 instead of -2.
D. They forgot to square the input.

22. A function is defined by p(x) = 4 - x when x < 1 and p(x) = 2x when x >= 1. Find p(3). Answer with a number.

23. Let f(x) = { x + 2 when x < 0; 3x when x >= 0 }. Find f(-4). Answer with a number.

24. Let f(x) = { x + 2 when x < 0; 3x when x >= 0 }. Find f(5). Answer with a number.

25. Let g(x) = { 2x - 1 when x <= 3; x + 4 when x > 3 }. Find g(3). Answer with a number.

26. Let h(x) = { 4 when x < 2; x + 1 when x >= 2 }. Find h(6). Answer with a number.

27. Let h(x) = { 4 when x < 2; x + 1 when x >= 2 }. Find h(1). Answer with a number.

28. Let p(x) = { -x when x < 0; x when x >= 0 }. Find p(-7). Answer with a number.

29. Let p(x) = { -x when x < 0; x when x >= 0 }. Find p(9). Answer with a number.

30. A fee is f(x) = { 8 when x <= 2; 8 + 3(x - 2) when x > 2 }. Find f(5). Answer with a number.

31. A function is defined by t(x) = x + 3 when x < 0 and t(x) = 2x - 1 when x >= 0. Find t(4) - t(-1). Answer with a number.

32. Which student correctly finds q(0) for q(x) = { x - 1 when x < 0; 2x + 5 when x >= 0 }?

A. Student A: 0 satisfies x >= 0, so q(0) = 2(0) + 5 = 5.
B. Student B: 0 is close to negative, so q(0) = -1.
C. Student C: Use both branches and add them.
D. Student D: q(0) is undefined because 0 is on the boundary.