

Piecewise Functions

Name: _____

Date: _____

Score: _____ / 27

Q Quick Review

A **piecewise function** uses different rules on different parts of the domain. First decide which interval contains the input, then use only that rule. On graphs, a closed circle means the endpoint is included; an open circle means it is not. Piecewise functions are useful for real situations with changing rules, such as shipping costs, tax brackets, parking fees, and step rates.

PRACTICE

Evaluate each piecewise function or interpret the boundary correctly.

- $f(x) = \begin{cases} 2x + 1, & x < 0 \\ x^2, & x \geq 0 \end{cases}; f(-3)$ _____
- $f(x) = \begin{cases} 2x + 1, & x < 0 \\ x^2, & x \geq 0 \end{cases}; f(0)$ _____
- $f(x) = \begin{cases} 2x + 1, & x < 0 \\ x^2, & x \geq 0 \end{cases}; f(4)$ _____
- $g(x) = \begin{cases} x + 5, & x < 2 \\ 3x, & x \geq 2 \end{cases}; g(1)$ _____
- $g(x) = \begin{cases} x + 5, & x < 2 \\ 3x, & x \geq 2 \end{cases}; g(2)$ _____
- $g(x) = \begin{cases} x + 5, & x < 2 \\ 3x, & x \geq 2 \end{cases}; g(5)$ _____
- $h(x) = \begin{cases} -4, & x < -1 \\ 2x + 1, & -1 \leq x < 3 \\ 9, & x \geq 3 \end{cases}; h(-2)$ _____
- $h(x) = \begin{cases} -4, & x < -1 \\ 2x + 1, & -1 \leq x < 3 \\ 9, & x \geq 3 \end{cases}; h(-1)$ _____
- $h(x) = \begin{cases} -4, & x < -1 \\ 2x + 1, & -1 \leq x < 3 \\ 9, & x \geq 3 \end{cases}; h(3)$ _____
- Open point $(4, 7)$, closed point $(4, 2)$; $f(4)$ _____
- Open point $(-2, 1)$, closed point $(-2, 5)$; $f(-2)$ _____
- Graph has $f(x) = x + 1$ for $x < 3$, $f(x) = 6$ for $x \geq 3$; $f(3)$ _____
- $S(w) = \begin{cases} 6, & 0 < w \leq 2 \\ 6 + 1.5(w - 2), & w > 2 \end{cases}; S(2)$ _____
- $S(w) = \begin{cases} 6, & 0 < w \leq 2 \\ 6 + 1.5(w - 2), & w > 2 \end{cases}; S(5)$ _____
- $A(a) = \begin{cases} 9, & a < 13 \\ 15, & 13 \leq a < 60 \\ 11, & a \geq 60 \end{cases}; A(13)$ _____
- $A(a) = \begin{cases} 9, & a < 13 \\ 15, & 13 \leq a < 60 \\ 11, & a \geq 60 \end{cases}; A(62)$ _____
- $P(n) = \begin{cases} 12n, & n < 10 \\ 10n, & n \geq 10 \end{cases}; P(9)$ _____
- $P(n) = \begin{cases} 12n, & n < 10 \\ 10n, & n \geq 10 \end{cases}; P(10)$ _____
- $C(t) = \begin{cases} 25, & 0 \leq t \leq 500 \\ 25 + 0.05(t - 500), & t > 500 \end{cases}; C(500)$ _____
- $C(t) = \begin{cases} 25, & 0 \leq t \leq 500 \\ 25 + 0.05(t - 500), & t > 500 \end{cases}; C(620)$ _____



Scan Me

◆ VISUAL PRACTICE

Use the graph, table, chart, or diagram to answer the question.

21. Use the piecewise graph. What is $f(1)$?



Answer: _____

22. Use the rule $f(x) = \begin{cases} x + 2, & x < 3 \\ 10, & x \geq 3 \end{cases}$. Find $f(3)$.

| | | |
|-----------|---------|------------|
| x value | $x < 3$ | $x \geq 3$ |
| rule | $x + 2$ | 10 |

Answer: _____

23. Use the parking fee rule. What is $C(6)$?

| | | |
|-----------|----------------|----------------|
| h hours | $0 < h \leq 2$ | $h > 2$ |
| $C(h)$ | 8 | $8 + 3(h - 2)$ |

Answer: _____

◆ Word Problems

24. A parking garage charges \$4 for the first hour and \$2 for each additional hour. Write a piecewise cost function for h hours.

25. A delivery service charges \$6 for packages up to 5 lb and \$10 for packages over 5 lb. Find the cost for 5 lb and 8 lb. _____

26. A concert ticket costs \$12 before the event day and \$18 on the event day. Write a simple piecewise model for the ticket price.

27. A water bill is \$20 for up to 1000 gallons and then \$0.03 for each gallon over 1000. Write the cost for g gallons. _____



Answer Keys

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

11.

12.

13.

14.

15.

16.

17.

18.

19.

20.

21.

22.

23.

24.
$$C(h) = \begin{cases} 4, & 0 < h \leq 1 \\ 4 + 2(h - 1), & h > 1 \end{cases}$$

25.

26.
$$P = \begin{cases} 12, & \text{before event day} \\ 18, & \text{event day} \end{cases}$$

27.
$$C(g) = \begin{cases} 20, & 0 \leq g \leq 1000 \\ 20 + 0.03(g - 1000), & g > 1000 \end{cases}$$

Step-by-Step Tutor Notes

1. Start with the definition the problem is testing, then apply it directly. Since $-3 < 0$, use $2x + 1$. Then $2(-3) + 1 = -5$. So the answer is -5 .
2. Use the clue in the question first, then let the arithmetic finish the job. The boundary 0 is included in $x \geq 0$, so use x^2 and get 0 . So the answer is 0 .
3. This is a good place to slow down, check the notation, and simplify cleanly. Because $4 \geq 0$, use x^2 . Then $4^2 = 16$. So the answer is 16 .
4. Use the clue in the question first, then let the arithmetic finish the job. Since $1 < 2$, use $x + 5$. That gives $1 + 5 = 6$. So the answer is 6 .
5. Start with the definition the problem is testing, then apply it directly. The value 2 belongs to $x \geq 2$, so use $3x$: $3(2) = 6$. So the answer is 6 .
6. Take it one clear step at a time and keep the original question in mind. Since $5 \geq 2$, use the second rule. Then $3(5) = 15$. So the answer is 15 .
7. Start with the definition the problem is testing, then apply it directly. The input -2 is less than -1 , so use the first rule. So the answer is -4 .
8. Use the clue in the question first, then let the arithmetic finish the job. The input -1 is included in the middle interval, so $2(-1) + 1 = -1$. So the answer is -1 .
9. Start with the definition the problem is testing, then apply it directly. The middle interval stops before 3 , so $x = 3$ uses the last rule. So the answer is 9 .
10. At one x -value, the closed point gives the function value. The open point is not included.
11. Focus on the main idea of the problem, then simplify carefully. The closed point at $x = -2$ is the one the graph actually includes. So the answer is 5 .
12. Focus on the main idea of the problem, then simplify carefully. Because the second rule includes $x = 3$, use the constant value 6 . So the answer is 6 .
13. Use the clue in the question first, then let the arithmetic finish the job. The first shipping bracket includes 2 lb, so the cost is 6 . So the answer is 6 .
14. Use the clue in the question first, then let the arithmetic finish the job. Five pounds is over 2 , so use $6 + 1.5(5 - 2) = 10.5$. So the answer is 10.5 .
15. Take it one clear step at a time and keep the original question in mind. Age 13 is included in the middle bracket, so the price is 15 . So the answer is 15 .
16. This is a good place to slow down, check the notation, and simplify cleanly. Since $62 \geq 60$, use the senior-price bracket. So the answer is 11 .
17. Take it one clear step at a time and keep the original question in mind. Nine shirts is below the discount threshold, so $12(9) = 108$. So the answer is 108 .
18. Start with the definition the problem is testing, then apply it directly. Ten shirts qualifies for the lower unit price, so $10(10) = 100$. So the answer is 100 .
19. Focus on the main idea of the problem, then simplify carefully. The base plan includes 500 texts, so the cost is still 25 . So the answer is 25 .
20. There are 120 extra texts, and $0.05(120) = 6$. Add that to 25 to get 31 .
21. At $x = 1$, the closed point is at $y = 1$. The open point is not included.
22. This is a good place to slow down, check the notation, and simplify cleanly. Because 3 is included in $x \geq 3$, use the second rule. So the answer is 10 .
23. Take it one clear step at a time and keep the original question in mind. Since $6 > 2$, use $8 + 3(h - 2)$. Then $8 + 3(6 - 2) = 20$. So the answer is 20 .
24. The first rule handles the first hour. After 1 hour, add $\$2$ for each extra hour.
25. The 5 -lb package is included in the first rule, while 8 lb is over 5 lb and uses the second rule.
26. The price depends on which time category applies, so a two-rule piecewise model fits the situation.
27. The flat fee covers the first 1000 gallons. After that, only the extra gallons are charged at $\$0.03$ each.



Scan Me

Want a Full Algebra 1 Textbook? Try Our Vermont VTCAP Made Simple Book!



Vermont VTCAP Algebra I Made Ridiculously Simple

The friendly, step-by-step Algebra 1 textbook
Plain-English explanations, guided practice, and
review support.



Full Lessons Inside

Concepts
Practice
Mastery

Important: All our test books contain **unique, completely different tests** from each other! Each book offers fresh practice questions—no repeats!

5 Practice Tests

- ✓ 5 complete practice tests with detailed explanations
- ✓ Perfect foundation for VT CAP test preparation
- ✓ Builds confidence and test-taking skills
- ✓ High-quality questions aligned with state standards

Start your practice journey!

6 Practice Tests

- ✓ 6 complete practice tests with detailed explanations
- ✓ **Unique tests**—different from the 5 tests book
- ✓ Perfect for more practice after mastering 5 tests
- ✓ Builds even more confidence and test-taking skills
- ✓ Same high-quality questions aligned with standards

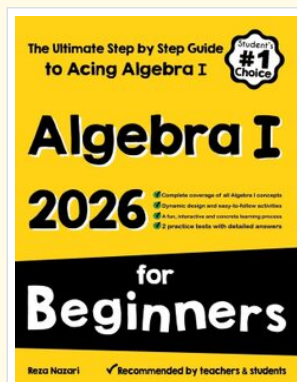
Take your practice to the next level!

7 Practice Tests

- ✓ 7 complete practice tests for maximum preparation
- ✓ **Unique tests**—different from 5 and 6 tests books
- ✓ The most comprehensive practice for Algebra 1
- ✓ Ideal for students aiming for top scores
- ✓ Extensive practice builds mastery and confidence

Go all the way with comprehensive practice!

STUDENT FAVORITE • Master Algebra I From the Ground Up



Algebra I for Beginners

Written by a top math teacher & aligned with national and state Algebra I courses. From linear equations to graphing quadratics — explained the easy way.

- ✓ **Complete coverage** of every Algebra I concept — perfect companion to these worksheets
- ✓ **Step-by-step explanations** with worked examples on every topic
- ✓ **QR codes in every chapter** for free video lessons & bonus practice
- ✓ **2 full-length practice tests** with detailed answer keys

- ✓ 100% Guaranteed
- ✓ Lifetime Support
- ✓ Trusted by Teachers

Start Your Algebra Journey Today! →

★ STUDENT'S #1 CHOICE ★

Teacher-recommended • 12,000+ Happy Students

PDF EDITION



Instant download • any device

PAPERBACK



Paperback on Amazon

Hold it in your hands

Pair these free worksheets with *Algebra I for Beginners* and you have a complete self-paced course — concept lessons, daily practice, and full exam-style reviews, all in one path. →

EffortlessMath.com/product/algebra-i-for-beginners