Function Notation and Evaluating Functions

Name: _____	Date: _____	Score: _____ / 26

Quick Review

Function notation replaces y with $f(x)$ (read "f of x"). The letter names the function; the input goes in parentheses. To **evaluate** $f(a)$, substitute a for every x in the rule and simplify. To **solve** $f(x) = k$, set the rule equal to k and solve. Other letters like g, h, or p can name functions too. The notation looks scarier than it is: $f(3)$ just means "use 3 as the input." The parentheses are not multiplication — they're holding the input.

PRACTICE

Evaluate each function or solve for the unknown.

1. $f(x) = 4x - 9;\ f(5)$ _____
2. $g(x) = x^2 + 2;\ g(-3)$ _____
3. $h(x) = -2x + 7;\ h(0)$ _____
4. $f(x) = 3x^2 - x;\ f(2)$ _____
5. $p(x) = \dfrac{x+6}{2};\ p(8)$ _____
6. $g(x) = 7 - 3x;\ g(-4)$ _____
7. $f(x) = 2x + 5;\ f(x) = 17,\ x = ?$ _____
8. $g(x) = x^2 - 1;\ g(x) = 24,\ x = ?$ _____
9. $h(x) = -x + 10;\ h(x) = 3,\ x = ?$ _____
10. $f(x) = 6x;\ f(x) = 42,\ x = ?$ _____
11. $f(x) = ax + b;\ f(0)$ _____
12. $f(x) = 2x^2 + x - 3;\ f(1)$ _____
13. $f(x) = 5x + 2;\ f(-1)$ _____
14. $f(x) = |x - 3|;\ f(-2)$ _____
15. $g(x) = \sqrt{x+9};\ g(7)$ _____
16. $f(x) = x^3;\ f(-2)$ _____
17. $f(x) = 4x;$ solve $f(x) = 0$ _____
18. $g(x) = 2x + 7;$ solve $g(x) = g(3)$ _____
19. $f(x) = x^2;\ f(a+1)$ _____
20. $f(x) = 3x - 1;\ f(f(2))$ _____

VISUAL PRACTICE

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

21. Use the table to find $f(2)$.

x	-1	0	2	4
$f(x)$	5	3	7	11

Answer: _____

22. Use the table to find $f(-2)$.

x	-2	0	1	3
$f(x)$	9	5	2	-4

Answer: _____

Word Problems

23. A phone plan's monthly cost is $C(m) = 0.10m + 25$, where m is minutes used. Find the cost for 120 minutes. How many minutes for a $40 budget? _____

24. The height of a ball is modeled by $h(t) = -16t^2 + 48t + 4$ feet, where t is the time in seconds after it is thrown. Find $h(1)$ and $h(2)$ and state what the outputs mean. _____

25. A delivery driver charges $f(d) = 2.50 + 1.75d$ for d miles. Find the cost of a 6-mile delivery. If the customer paid $15, how many miles? _____

26. A lab starts with 100 bacteria, and the count doubles every hour according to $B(t) = 100 \cdot 2^t$. How many bacteria are $t = 3$ hours, and what does $B(0)$ represent? _____

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Answer Keys

1. $\boxed{11}$
2. $\boxed{11}$
3. $\boxed{7}$
4. $\boxed{10}$
5. $\boxed{7}$
6. $\boxed{19}$
7. $\boxed{x = 6}$
8. $\boxed{x = \pm 5}$
9. $\boxed{x = 7}$
10. $\boxed{x = 7}$
11. $\boxed{b}$
12. $\boxed{0}$
13. $\boxed{-3}$
14. $\boxed{5}$
15. $\boxed{4}$
16. $\boxed{-8}$
17. $\boxed{x = 0}$
18. $\boxed{x = 3}$
19. $\boxed{a^2 + 2a + 1}$
20. $\boxed{14}$
21. $\boxed{7}$
22. $\boxed{9}$
23. $\boxed{\$37;\ 150 \text{ min}}$
24. $\boxed{h(1) = 36,\ h(2) = 36}$
25. $\boxed{\$13;\ 7.14 \text{ miles}}$
26. $\boxed{B(3) = 800,\ B(0) = 100}$

Step-by-Step Tutor Notes

1. Put the given value into the expression first, then simplify from the inside out. Substitute: $f(5) = 4(5) - 9 = 20 - 9 = 11$. That confirms the final answer is 11.
2. Put the given value into the expression first, then simplify from the inside out. Substitute (in parentheses!): $g(-3) = (-3)^2 + 2 = 9 + 2 = 11$. That confirms the final answer is 11.
3. $h(0) = -2(0) + 7 = 0 + 7 = 7$. (Using 0 as the input usually gives the y-intercept.).
4. Focus on the main idea of the problem, then simplify carefully. $f(2) = 3(2)^2 - 2 = 3(4) - 2 = 12 - 2 = 10$. So the answer is 10.
5. Start with the definition the problem is testing, then apply it directly. $p(8) = \frac{8+6}{2} = \frac{14}{2} = 7$. So the answer is 7.
6. $g(-4) = 7 - 3(-4) = 7 + 12 = 19$. Watch the sign — -3 times -4 is positive.
7. Move carefully through the arithmetic; one clean operation usually unlocks the next one. Set equal: $2x + 5 = 17$. Subtract 5: $2x = 12$. Divide: $x = 6$. After simplifying, the answer is $x = 6$.
8. $x^2 - 1 = 24$, so $x^2 = 25$. Two solutions: $x = 5$ or $x = -5$ (squaring loses sign info).
9. For a table question, slow down and locate the exact row, column, or cell before calculating. $-x + 10 = 3 \Rightarrow -x = -7 \Rightarrow x = 7$. This gives $x = 7$.
10. Work one inverse operation at a time and keep both sides balanced. Divide both sides by 6: $x = 7$. After simplifying, the answer is $x = 7$.
11. Focus on the main idea of the problem, then simplify carefully. $f(0) = a(0) + b = b$. The y-intercept is always $f(0)$. So the answer is b.
12. Use the structure of the expression to find the important point, then check that it fits the context. $f(1) = 2(1) + 1 - 3 = 2 + 1 - 3 = 0$. (A zero at $x = 1$.). That leads to 0.
13. Use the clue in the question first, then let the arithmetic finish the job. $f(-1) = 5(-1) + 2 = -5 + 2 = -3$. So the answer is -3.
14. Start with the definition the problem is testing, then apply it directly. $f(-2) = |-2 - 3| = |-5| = 5$. Absolute value strips the sign. So the answer is 5.
15. This is a good place to slow down, check the notation, and simplify cleanly. $g(7) = \sqrt{7 + 9} = \sqrt{16} = 4$. So the answer is 4.
16. Use the clue in the question first, then let the arithmetic finish the job. $f(-2) = (-2)^3 = -8$. Negative cubed stays negative. So the answer is -8.
17. $4x = 0$, so $x = 0$. (The only zero of a non-horizontal line through the origin is at $x = 0$.).
18. $g(3) = 2(3) + 7 = 13$. So solve $2x + 7 = 13$: $x = 3$. (A one-to-one function maps each output back to one input.).
19. Substitute $a + 1$ for x: $f(a + 1) = (a + 1)^2 = a^2 + 2a + 1$. (Expanding by FOIL.).
20. Inside first: $f(2) = 3(2) - 1 = 5$. Now $f(5) = 3(5) - 1 = 14$. (Composing means feeding the output back as the input.).
21. Read the table by matching the correct row and column first, then use the count or total that fits the question. Look in the row for $x = 2$. The matching function value is 7. This gives 7.
22. This is a good place to slow down, check the notation, and simplify cleanly. When $x = -2$, the table gives $f(x) = 9$. So the answer is 9.
23. Evaluate $C(120) = 0.10(120) + 25 = 12 + 25 = 37$. For $40: set $0.10m + 25 = 40$, so $0.10m = 15$, giving $m = 150$ minutes.
24. $h(1) = -16(1)^2 + 48(1) + 4 = -16 + 48 + 4 = 36$ ft. $h(2) = -16(4) + 48(2) + 4 = -64 + 96 + 4 = 36$ ft. (Same height because the ball passes that level on the way up and again on the way down.).
25. $f(6) = 2.50 + 1.75(6) = 2.50 + 10.50 = 13.00$. For $15: $2.50 + 1.75d = 15$, so $1.75d = 12.50$, giving $d \approx 7.14$ miles.
26. $B(3) = 100 \cdot 2^3 = 100 \cdot 8 = 800$. $B(0) = 100 \cdot 2^0 = 100 \cdot 1 = 100$. (Any nonzero number to the 0 power is 1.).

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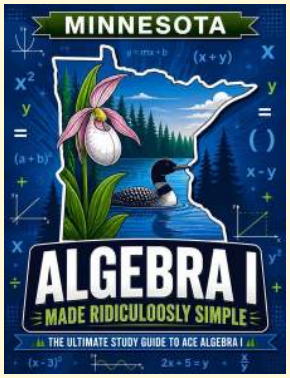

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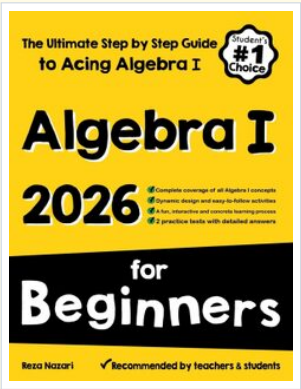

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