

GRADE

9

$$y = 2x + 3$$

$$x^2 - 5x + 6 = 0$$

$$f(x) = 3x - 1$$

**BUILD
CONFIDENCE.
ONE REP
AT A TIME.**

Muscle Math Mania

ALGEBRA 1

STRONGER SKILLS. EVERY SINGLE REP.



MASTER
ALGEBRA 1
CONCEPTS



THINK
CRITICALLY



BUILD
CONFIDENCE



READY FOR
ALGEBRA 2



SOLVE
STEP BY STEP

SKILLS YOU NEED.
REPS YOU
CONTROL.

How To Use This Book

1. Start with the Algebra 1 Skills Diagnostic. Circle the skills you miss — those are your first workouts.
2. Each unit opens with a mindset page, then runs lessons. Every lesson follows the same pattern: Warm-Up Rep, Coach Notes, Check Your Form, a Worked Example, Try It, a Rep Set, a Challenge, and a Geometry Ready item. In the error-analysis lesson that closes each unit the Challenge becomes Fix the Rep — you hunt down someone else's mistake instead.
3. Do the worksheet after each lesson. Sets A/B/C ramp from basic form to high-school transfer.
4. Verify with the back-matter Answer Keys — every problem in this book is answered there. When an answer alone is not enough, the Worked Solutions section shows the steps for the Challenge, HS Fundamentals, error-analysis, Mixed Review and Final Review problems.
5. Log each lesson on the Progress Tracker so you can see what still needs another rep.
6. Finish with the Geometry Readiness Module, Mixed Review, and the Final Review practice test.

Table of Contents

Every skill in this book is training for Algebra 1 and beyond.

Standards Covered	3
For Parents & Teachers	4
Progress Tracker	5
Diagnostic — Algebra 1 Skills	7
Unit 1: The Bridge	9
Unit 2: Functions	28
Unit 3: Linear Functions in Full	44
Unit 4: Systems	63
Unit 5: Absolute Value	82
Unit 6: Radical Expressions	98
Unit 7: Polynomials	114
Unit 8: Factoring	133
Unit 9: Quadratic Functions	155
Unit 10: Solving Quadratics	174
Unit 11: Exponential Functions	196
Unit 12: Sequences	212
Unit 13: Two-Variable Data	228
Geometry Readiness Module	247
Mixed Review	257
Final Review / Practice Test	260
Reference Sheet	264
Glossary	265
Answer Keys	266
Worked Solutions	287

Functions

Domain, Range, and the Machine

A function is a machine with one rule: one input, one output. Feed it a 3, it gives back exactly one answer, every time.

Functions come first in this book because every unit after it is a family of them. Lines, parabolas, exponentials, sequences — same machine, different rule.

In this unit you will:

- › Decide whether a relation is a function
- › Use function notation and evaluate $f(x)$
- › State domain and range from tables, graphs, and rules
- › Read outputs off a graph and recognize the parent function families



You've trained for this. New level.

2.1 What Makes a Function

WARM-UP REP

1. Function or not a function? (2, 0), (3, 3), (-3, 2), (-1, 0)

2. Function or not a function? (2, 7), (-2, -5), (-3, 7), (4, -3)

3. Function or not a function? (2, -2), (4, 6), (2, 8), (2, 1)

COACH NOTES

A relation is any set of input-output pairs. It is a **FUNCTION** when every input has exactly one output.

Repeating an **OUTPUT** is fine. Repeating an **INPUT** with two different outputs is what breaks it.

CHECK YOUR FORM

Use the vertical line test on a graph: if a vertical line can hit the curve twice, one input has two outputs and it is not a function.

WORKED EXAMPLE

Function or not a function? (4, -3), (1, -4), (1, -4), (1, 2)

Step 1: List the inputs (x-values): 4, 1, 1, 1.

Step 2: The input 1 shows up with more than one output, so the rule breaks.

Step 3: It is not a function.

Answer: not a function

TRY IT

1. Function or not a function? (4, 4), (3, 1), (2, -5), (-3, 1)

2. In which quadrant does the point (-2, -4) lie?

REP SET

1. Function or not a function? (0, 4), (0, 1), (2, 2), (0, -5)

2. Function or not a function? (4, 5), (0, -7), (3, 2), (-1, -2)

3. Function or not a function? (-3, -7), (4, -8), (4, 8), (4, -7)

4. Function or not a function? (4, 0), (-2, 3), (2, 5), (0, -6)

5. Function or not a function? (1, -2), (-2, 1), (0, 8), (-1, -4)

6. In which quadrant does the point (-1, -3) lie?

CHALLENGE REP

A graph follows $y = 3x - 6$. What point is on the graph when $x = 3$?

GEOMETRY READY › Function or not a function? (3, -3), (-2, -4), (2, -3), (0, 5)

Worksheet 2.1: What Makes a Function

Part 1 of 2

1. Function or not a function? $(-3, 0)$, $(3, -1)$, $(0, 7)$, $(0, -5)$

SET A

2. Function or not a function? $(-3, -1)$, $(-1, 3)$, $(2, -4)$, $(0, -7)$

SET A

3. Function or not a function? $(-3, -2)$, $(-3, -4)$, $(-3, -1)$, $(0, 6)$

SET A

4. Function or not a function? $(2, 2)$, $(1, -4)$, $(-2, -3)$, $(4, 2)$

SET A

5. Function or not a function? $(1, 8)$, $(2, 5)$, $(-3, 8)$, $(4, 7)$

SET A

6. Function or not a function? $(0, -4)$, $(-2, 0)$, $(2, 3)$, $(3, -5)$

SET B

7. Function or not a function? $(-1, -3)$, $(-3, 5)$, $(-4, -4)$, $(0, -5)$

SET B

8. Function or not a function? $(1, -4)$, $(-4, 2)$, $(1, 1)$, $(1, 6)$

SET B

Worksheet 2.1: What Makes a Function

Part 2 of 2

9. Function or not a function? $(-4, 1)$, $(-1, 6)$, $(2, 7)$, $(-4, -8)$

SET B

10. Function or not a function? $(-3, -2)$, $(-2, 3)$, $(-4, 4)$, $(0, -3)$

SET B

11. In which quadrant does the point $(7, 2)$ lie?

SET C

12. In which quadrant does the point $(2, -1)$ lie?

SET C

13. In which quadrant does the point $(-8, 7)$ lie?

SET C

14. In which quadrant does the point $(7, -7)$ lie?

SET C

15. In which quadrant does the point $(-7, -7)$ lie?

SET C

2.2 Function Notation

WARM-UP REP

1. If $f(x) = 2x + 3$, find $f(-3)$.

2. If $f(x) = -4x - 4$, find $f(-8)$.

3. If $f(x) = 11x + 6$, find $f(-2)$.

COACH NOTES

$f(x)$ is a name, not a multiplication. It reads 'f of x' and means the output of machine f for input x.

$f(3)$ means substitute 3 for every x in the rule, then simplify.

CHECK YOUR FORM

$f(x)$ is not f times x. Writing $f(3) = f \times 3$ is the single most common misread of this notation, and it makes every later unit unreadable.

WORKED EXAMPLE

If $f(x) = 6x + 8$, find $f(2)$.

Step 1: Substitute 2 for x: $f(2) = 6(2) + 8$.

Step 2: Multiply: 6 times 2 = 12.

Step 3: Add the constant: $12 + 8 = 20$.

Answer: 20

TRY IT

1. If $f(x) = -9x - 15$, find $f(7)$.

2. A rule is $y = 4x + 3$. Complete the table for $x = 0$.

REP SET

1. If $f(x) = -7x - 13$, find $f(-6)$.

2. If $f(x) = -4x - 10$, find $f(-4)$.

3. If $f(x) = 2x - 2$, find $f(7)$.

4. If $f(x) = -2x - 6$, find $f(-9)$.

5. If $f(x) = 3x + 16$, find $f(0)$.

6. A rule is $y = -2x + 3$. Complete the table for $x = -1$.

CHALLENGE REP

A rule is $y = 4x - 3$. Complete the table for $x = 3$.

GEOMETRY READY › If $f(x) = -9x + 8$, find $f(3)$.

Worksheet 2.2: Function Notation

Part 1 of 2

1. If $f(x) = 3x + 16$, find $f(-6)$.

SET A

2. If $f(x) = -7x - 11$, find $f(-11)$.

SET A

3. If $f(x) = -11x - 7$, find $f(-3)$.

SET A

4. If $f(x) = 7x + 4$, find $f(1)$.

SET A

5. If $f(x) = x - 18$, find $f(6)$.

SET A

6. If $f(x) = 2x - 9$, find $f(-7)$.

SET A

7. If $f(x) = 10x + 8$, find $f(6)$.

SET B

8. If $f(x) = -9x + 8$, find $f(7)$.

SET B

Worksheet 2.2: Function Notation

Part 2 of 2

9. If $f(x) = 7x + 17$, find $f(0)$.

SET B

10. If $f(x) = 8x + 13$, find $f(7)$.

SET B

11. If $f(x) = -4x + 12$, find $f(5)$.

SET B

12. A rule is $y = -2x + 6$. Complete the table for $x = 0$.

SET C

13. A rule is $y = -2x + 5$. Complete the table for $x = 0$.

SET C

14. A rule is $y = 4x + 1$. Complete the table for $x = 0$.

SET C

15. A rule is $y = -3x - 5$. Complete the table for $x = -2$.

SET C

Try 2) $x \leq -12$

Rep 1) $x > 3$

Rep 2) $x < -1$

Rep 3) $x > -6$

Rep 4) $x > -1$

Rep 5) $x \geq -11$

Rep 6) $-8 < x \leq -6$

Challenge) $w \leq 7$

Geometry Ready) $w \leq 9$

WS 1) $x \leq 11$

WS 2) $x \geq -2$

WS 3) $x > 10$

WS 4) $x \leq 10$

WS 5) $x > 5$

WS 6) $x \leq -6$

WS 7) $x \geq -6$

WS 8) $x \geq -7$

WS 9) $x < 6$

WS 10) $x \leq 13$

WS 11) $-2 \leq x \leq 5$

WS 12) $-9 < x < -3$

WS 13) $0 < x \leq 3$

WS 14) $-6 \leq x < -3$

WS 15) $-1 \leq x \leq 2$

Lesson 1.5 — Slope and Intercept at a Glance

Warm 1) $\frac{4}{7}$

Warm 2) $-\frac{5}{7}$

Warm 3) $-\frac{21}{2}$

Try 1) $\frac{4}{9}$

Try 2) slope 3, y-intercept 7

Rep 1) $-\frac{5}{9}$

Rep 2) 0

Rep 3) -23

Rep 4) $\frac{14}{9}$

Rep 5) slope -5, y-intercept -7

Rep 6) negative

Challenge) $y = x + 6$

Geometry Ready) $y = 3x + 11$

WS 1) $\frac{3}{8}$

WS 2) $-\frac{1}{3}$

WS 3) $\frac{4}{3}$

WS 4) $\frac{17}{6}$

WS 5) $-\frac{3}{7}$

WS 6) slope 4, y-intercept -2

WS 7) slope 3, y-intercept -7

WS 8) slope 5, y-intercept -4

WS 9) slope -4, y-intercept -3

WS 10) slope -4, y-intercept 4

WS 11) positive

WS 12) negative

WS 13) negative

WS 14) undefined

WS 15) zero

Lesson 1.6 — Bridge Error Analysis

Warm 1) $x = -9$

Warm 2) $x = 0$

Warm 3) $x = -5$

Try 1) $x = 12$

Try 2) $x \geq 11$

Rep 1) $x = -4$

Rep 2) $x = 4$

Rep 3) $x = 6$

Rep 4) $x = -9$

Rep 5) $x \leq 14$

Rep 6) x^2

Fix the Rep) $x = -12$ (fix: used the wrong sign when dividing to isolate x)

Geometry Ready) $x = 4$

WS 1) $x = 3$ (fix: used the wrong sign when dividing to isolate x)

WS 2) $x = 3$ (fix: used the wrong sign when dividing to isolate x)

WS 3) $x = -2$ (fix: used the wrong sign when dividing to isolate x)

WS 4) $x = 0$ (fix: used the wrong sign when dividing to isolate x)

WS 5) $x = -12$ (fix: used the wrong sign when dividing to isolate x)

WS 6) $x < 11$ (fix: forgot to flip the sign after dividing by a negative)

WS 7) $x \geq 12$ (fix: flipped the sign without a negative multiplier)

WS 8) $x > 2$ (fix: flipped the sign without a negative multiplier)

WS 9) $x > 13$ (fix: forgot to flip the sign after dividing by a negative)

WS 10) $x \leq 2$ (fix: forgot to flip the sign after dividing by a negative)

WS 11) a^3 (fix: added the exponents instead of subtracting)

WS 12) m^1 (fix: added the exponents instead of subtracting)

WS 13) y^4 (fix: added the exponents instead of subtracting)

WS 14) x^4 (fix: added the exponents instead of subtracting)

WS 15) y^3 (fix: added the exponents instead of subtracting)

Unit 2 — Functions**Lesson 2.1 — What Makes a Function**

Warm 1) function

Warm 2) function

Warm 3) not a function

Try 1) function

Try 2) Quadrant III

Rep 1) not a function

Rep 2) function

Rep 3) not a function

Rep 4) function

Rep 5) function

Rep 6) Quadrant III

Challenge) (3, 3)

Geometry Ready) function

WS 1) not a function

WS 2) function

WS 3) not a function

WS 4) function

WS 5) function

WS 6) function

WS 7) function

WS 8) not a function

WS 9) not a function

WS 10) function

WS 11) Quadrant I

WS 12) Quadrant IV

WS 13) Quadrant II

WS 14) Quadrant IV

WS 15) Quadrant III

Lesson 2.2 — Function Notation

Warm 1) -3

Warm 2) 28

Warm 3) -16

Try 1) -78



THAT WAS THE WARM-UP.

Ready for the full workout?

The Algebra 1 Workbook · Grade 9

WHAT'S IN THE FULL BOOK

- 75 lessons across 13 units
- A Unit 0 diagnostic that shows what to work on first
- Linear equations, systems, factoring, quadratics, exponentials
- Full worked solutions, not just answers

Paperback on Amazon · Instant-download PDF

musclemathmania.com/workbooks

These pages are taken unchanged from the full workbook, so page numbers and answer-key references point to the complete book. This sample is free to print for your own household. Muscle Math Mania workbooks are practice material; no grades, scores or placement are promised.