

BATTLE SHEETS · THE FULL SET

Algebra 1 Battle Sheets

MathBound Standard Algebra 1 · 12 chapters, each with its answer key

One sheet for each chapter of Algebra 1. On each, students meet the foes of one of MathBound's sky islands and defeat each foe by solving its problems. Every sheet starts with its foes and ends with an answer key that shows the worked steps. Free to copy for your classes.

Contents

1. **Chapter 1** Expressions and Real Numbers
2. **Chapter 2** Solving Linear Equations
3. **Chapter 3** Linear Inequalities
4. **Chapter 4** Functions
5. **Chapter 5** Linear Functions
6. **Chapter 6** Systems of Equations and Inequalities
7. **Chapter 7** Exponents and Exponential Functions
8. **Chapter 8** Polynomials and Factoring
9. **Chapter 9** Quadratic Functions
10. **Chapter 10** Solving Quadratic Equations
11. **Chapter 11** Radicals and More Functions
12. **Chapter 12** Data Analysis

How to use them

- Print a chapter's sheet as review before a test, or one foe's problems as a warm-up or an exit ticket.
- Every card has room to work. Students show their work, then circle the letter of their answer.
- The answer key at the end of each sheet gives each answer's letter and its worked steps, the same steps the game shows after a miss.
- Students who finish early can fight the same foes online: the link under each foe opens practice battles with it, free and with no sign-up.

Some of the foes



> Every problem comes from MathBound's own question engine, and every foe is a battle in the game: free for students, no sign-up, at **play.mathbound.org**. Teachers: classes, progress by skill and assignments with due dates at **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class

BATTLE SHEET · CHAPTER 1

Expressions and Real Numbers

MathBound Standard Algebra 1 · Island 1: Windward Landing

Name _____ Class _____ Date _____

The foes of Windward Landing are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Phrase Parrot

Repeats words as symbols: the language of algebra.

Problems 1–3 · Lessons 1.1–1.4 · Battle it online: **play.mathbound.org/alg1/?practice=r1.use-the-language-of-algebra**



Sign Flipper

Flips a two-faced coin: the signs of products and quotients.

Problems 4–6 · Lesson 1.3 · Battle it online: **play.mathbound.org/alg1/?practice=r1.multiply-and-divide-integers**



Plank Pacer

Paces forward and back along a plank: adding and subtracting integers on the number line.

Problems 7–8 · Lesson 1.3 · Battle it online: **play.mathbound.org/alg1/?practice=r1.add-and-subtract-integers**



Shell-Game Shelly

Shuffles cups, and the answer never changes: the properties of real numbers.

Problems 9–10 · Lesson 1.4 · Battle it online: **play.mathbound.org/alg1/?practice=r1.properties-of-real-numbers**



Neverending Nell

Knits a scarf that never ends: rational and irrational numbers.

Problems 11–12 · Lesson 1.5 · Battle it online: **play.mathbound.org/alg1/?practice=r1.the-real-numbers**



Ladder Leaner

Leans a ladder on the mast to make a right triangle: the Pythagorean theorem.

Problems 13–14 · Lesson 1.5 · Battle it online: **play.mathbound.org/alg1/?practice=geo.right-triangles**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 1 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Phrase Parrot

Repeats words as symbols: the language of algebra. Lessons 1.1–1.4. Battle it:
play.mathbound.org/alg1/?practice=r1.use-the-language-of-algebra

1 Lesson 1.1

Translate: the sum of 2 and y.

A. $\frac{2}{y}$ **B.** $2 - y$

C. $2y$ **D.** $2 + y$

WORK

2 Lesson 1.4

A triangle has sides $3x + 4$, $3x + 4$ and $3x$. Write its perimeter in simplest form.

A. $6x + 8$ **B.** $9x + 8$

C. $17x$ **D.** $9x + 11$

WORK

3 Lesson 1.2

Simplify: $\frac{4^2 + 29}{1 + 4}$

A. 8 **B.** 49 **C.** 9 **D.** 10

WORK



FOE 2 OF 6

Sign Flipper

Flips a two-faced coin: the signs of products and quotients. Lesson 1.3. Battle it:
play.mathbound.org/alg1/?practice=r1.multiply-and-divide-integers

4 Lesson 1.3

What number times -10 gives -110?

A. -100 **B.** 11

C. -11 **D.** -120

WORK

5 Lesson 1.3

Evaluate $\frac{a - b}{c}$ when $a = -5, b = -25, c = 5$.

A. -4 **B.** 4

C. -6 **D.** 0

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 6

Sign Flipper (continued)

Flips a two-faced coin: the signs of products and quotients. Lesson 1.3. Battle it:
play.mathbound.org/alg1/?practice=r1.multiply-and-divide-integers

6 Lesson 1.3

Translate: the quotient of -2 and the product of 4 and x.

A. $\dfrac{-2}{4x}$ **B.** $\dfrac{4x}{-2}$ **C.** $\dfrac{-2}{4}x$ **D.** $\dfrac{-2}{4+x}$

WORK



FOE 3 OF 6

Plank Pacer

Paces forward and back along a plank: adding and subtracting integers on the number line. Lesson 1.3. Battle it:
play.mathbound.org/alg1/?practice=r1.add-and-subtract-integers

7 Lesson 1.3

A diver is at -13 feet. How many feet is the diver from the surface?

A. 0 **B.** 13

C. 26 **D.** -13

WORK

8 Lesson 1.3

Evaluate $-a-b$ when $a=7, b=-10$.

A. -17 **B.** 3

C. -3 **D.** 17

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 6

Shell-Game Shelly

Shuffles cups, and the answer never changes: the properties of real numbers. Lesson 1.4. Battle it:
play.mathbound.org/alg1/?practice=r1.properties-of-real-numbers

9 Lesson 1.4

Which property says that changing the grouping of the factors in a product does not change the product?

A. Commutative Property of Addition

B. Associative Property of Addition

C. Associative Property of Multiplication

D. Commutative Property of Multiplication

WORK

10 Lesson 1.4

For which value of x is $\frac{x-2}{2x-10}$ undefined?

A. -5 **B.** 5

C. 2 **D.** 10

WORK



FOE 5 OF 6

Neverending Nell

Knits a scarf that never ends: rational and irrational numbers. Lesson 1.5. Battle it:
play.mathbound.org/alg1/?practice=r1.the-real-numbers

11 Lesson 1.5

Evaluate $\sqrt{225}$.

A. 15 **B.** 112.5

C. 30 **D.** 225

WORK

12 Lesson 1.5

Which example shows that the sum of two irrational numbers can be rational?

A. $\sqrt{4}+\sqrt{9}$

B. $(5+\sqrt{2})+(2-\sqrt{2})$

C. $\sqrt{2}+\sqrt{3}$

D. $(5+\sqrt{2})+(2+\sqrt{2})$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 6 OF 6

Ladder Leaner

Leans a ladder on the mast to make a right triangle: the Pythagorean theorem. Lesson 1.5. Battle it:
play.mathbound.org/alg1/?practice=geo.right-triangles

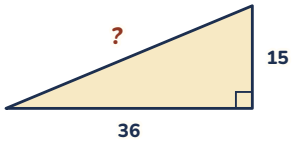
13 Lesson 1.5

A right triangle has legs 36 and 15 units long. How long is its hypotenuse?

A. 39 **B.** 21

C. 51 **D.** 1521

WORK



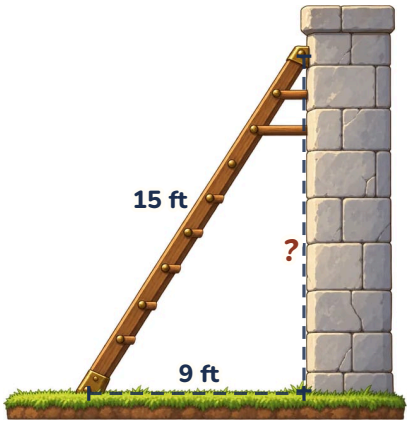
14 Lesson 1.5

A ladder 15 feet long leans against a wall with its foot 9 feet from the wall. How high up the wall does it reach, in feet?

A. 144 **B.** 6

C. 17.5 **D.** 12

WORK



© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 1: Expressions and Real Numbers

Each answer is followed by its worked steps, as the game shows them after a battle.

Phrase Parrot

1. D: $2 + y$

1. "the sum of 2 and y" names one operation on 2 and y.
2. That is $2 + y$.

2. B: $9x + 8$

1. Perimeter is the sum of the sides.
2. x terms: $3x + 3x + 3x = 9x$
3. Constants: $4 + 4 = 8$
4. Perimeter $= 9x + 8$.

3. C: 9

1. The fraction bar groups the top and the bottom.
2. Top: $4^2 + 29 = 16 + 29 = 45$
3. Bottom: $1 + 4 = 5$
4. $\frac{45}{5} = 9$

Sign Flipper

4. B: 11

1. Undo the multiplication by dividing: $\frac{-110}{-10} = 11$.
2. Check: $-10 \cdot 11 = -110$.

5. B: 4

1. Top: $-5 - (-25) = 20$.
2. $\frac{20}{5} = 4$.

6. A: $\frac{-2}{4x}$

1. "the product of 4 and x" is $4x$, and it is the divisor.
2. So the quotient is $\frac{-2}{4x}$.

Plank Pacer

7. B: 13

1. How far from zero is an absolute value: $|-13| = 13$.
2. The answer is 13.

8. B: 3

1. $a = 7$, so $-a = -7$.
2. $-7 - (-10) = 3$.

Shell-Game Shelly

9. C: Associative Property of Multiplication

1. Changing the order is commutative; changing the grouping is associative.
2. That is the Associative Property of Multiplication.

10. B: 5

1. Undefined when the bottom is 0: $2x - 10 = 0$.
2. $2x = 10$, so $x = 5$.

Neverending Nell

11. A: 15

1. Which number times itself gives 225?
2. $15 \cdot 15 = 225$, so $\sqrt{225} = 15$.

12. B: $(5 + \sqrt{2}) + (2 - \sqrt{2})$

1. $5 + \sqrt{2}$ and $2 - \sqrt{2}$ are both irrational.
2. Added, the roots cancel: $5 + 2 = 7$, which is rational.

Ladder Leaner

13. A: 39

1. $c^2 = 36^2 + 15^2 = 1296 + 225 = 1521$.
2. $c = \sqrt{1521} = 39$.

14. D: 12

1. The ladder is the hypotenuse: $h^2 = 225 - 81 = 144$.
2. It reaches 12 feet up.

© 2026 Germ Studios LLC · free to copy for class

BATTLE SHEET · CHAPTER 2

Solving Linear Equations

MathBound Standard Algebra 1 · Island 2: Brasswing Bluffs

Name _____ Class _____ Date _____

The foes of Brasswing Bluffs are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Tip-Scale Tot

A little scale that keeps both sides level: one-step equations.

Problems 1–2 · Lesson 2.1 · Battle it online: **play.mathbound.org/alg1/?practice=r2.addition-and-subtraction-properties**



Fraction Washer

Washes the fractions out of an equation: equations with fractions and decimals.

Problems 3–4 · Lesson 2.2 · Battle it online: **play.mathbound.org/alg1/?practice=r2.fractions-and-decimals**



Side Sweeper

Sweeps everything to one side: variables on both sides.

Problems 5–6 · Lesson 2.3 · Battle it online: **play.mathbound.org/alg1/?practice=r2.variables-on-both-sides**



Mirror Twins

Two halves that mirror each other: absolute value equations have two answers.

Problems 7–8 · Lesson 2.4 · Battle it online: **play.mathbound.org/alg1/?practice=eq.absolute-value**



Recipe Rover

Follows a recipe card of flasks: using formulas and solving for a variable.

Problems 9–10 · Lesson 2.5 · Battle it online: **play.mathbound.org/alg1/?practice=r2.formulas**



Cash-Till Cassie

A rolling cash register with a sale tag: percents, discounts and interest.

Problems 11–12 · Lesson 2.6 · Battle it online: **play.mathbound.org/alg1/?practice=r3.percent-applications**



Clue Ticker

A clockwork detective who reads every clue: turning words into equations.

Problems 13–14 · Lesson 2.7 · Battle it online: **play.mathbound.org/alg1/?practice=r3.problem-solving-strategy**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 2 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 7

Tip-Scale Tot

A little scale that keeps both sides level: one-step equations. Lesson 2.1. Battle it:
play.mathbound.org/alg1/?practice=r2.addition-and-subtraction-properties

1 Lesson 2.1

Which value is the solution to $4x + 1 = 3x + 3$?

A. -2 **B.** 2
C. 1 **D.** 3

WORK

2 Lesson 2.1

Translate and solve: -2 less than y is -10.

A. -12 **B.** -8
C. 8 **D.** 12

WORK



FOE 2 OF 7

Fraction Washer

Washes the fractions out of an equation: equations with fractions and decimals. Lesson 2.2. Battle it:
play.mathbound.org/alg1/?practice=r2.fractions-and-decimals

3 Lesson 2.2

Solve: $9 = \frac{x}{4} + 6$

A. 0.75 **B.** 12
C. 3 **D.** 36

WORK

4 Lesson 2.2

Solve: $-0.5x + 0.5 = 0.5x + 7.5$

A. -1 **B.** -7
C. -8 **D.** 7

WORK



FOE 3 OF 7

Side Sweeper

Sweeps everything to one side: variables on both sides. Lesson 2.3. Battle it:
play.mathbound.org/alg1/?practice=r2.variables-on-both-sides

5 Lesson 2.3

Solve: $3x = x + 20$

A. 10 **B.** 5
C. 20 **D.** 2

WORK

6 Lesson 2.3

Translate and solve: The negative of a number is 20 more than 4 times the number.

A. -5 **B.** -4
C. 6.667 **D.** 4

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 7

Mirror Twins

Two halves that mirror each other: absolute value equations have two answers. Lesson 2.4. Battle it:
play.mathbound.org/alg1/?practice=eq.absolute-value

7 Lesson 2.4

Omar solved $|x + 8| = 3$ and gave $x = -5$ as the only answer. What is the complete solution?

A. $x = -11$ or $x = -5$

B. $x = 5$ or $x = 11$

C. $x = -5$

D. $x = -5$ or $x = 5$

WORK

8 Lesson 2.4

Solve: $|x - 5| = 2x - 7$

A. $x = 4$

B. no solution

C. $x = 2$

D. $x = 2$ or $x = 4$

WORK



FOE 5 OF 7

Recipe Rover

Follows a recipe card of flasks: using formulas and solving for a variable. Lesson 2.5. Battle it:
play.mathbound.org/alg1/?practice=r2.formulas

9 Lesson 2.5

Find V if $l = 12, w = 8$ and $h = 6$, using $V = lwh$.

A. 576

B. 96

C. 26

D. 102

WORK

10 Lesson 2.5

Solve $F = \frac{9}{5}C + 32$ for C.

A. $C = \frac{5}{9}(F - 32)$

B. $C = \frac{5}{9}(F + 32)$

C. $C = \frac{9}{5}(F - 32)$

D. $C = \frac{5}{9}F - 32$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 6 OF 7

Cash-Till Cassie

A rolling cash register with a sale tag: percents, discounts and interest. Lesson 2.6. Battle it:
play.mathbound.org/alg1/?practice=r3.percent-applications

11 Lesson 2.6

A school has 300 students, and 10% of them ride the bus. How many students ride the bus?

A. 30 **B.** 270

C. 3000 **D.** 10

WORK

12 Lesson 2.6

90 is what percent of 36?

A. 150% **B.** 250%

C. 40% **D.** 2.5%

WORK



FOE 7 OF 7

Clue Ticker

A clockwork detective who reads every clue: turning words into equations. Lesson 2.7. Battle it:
play.mathbound.org/alg1/?practice=r3.problem-solving-strategy

13 Lesson 2.7

A number decreased by 10 is 33. Find the number.

A. 43 **B.** 33

C. 10 **D.** 23

WORK

14 Lesson 2.7

10 more than the quotient of a number and 3 is 13. Find the number.

A. 1 **B.** 9

C. 69 **D.** 29

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 2: Solving Linear Equations

Each answer is followed by its worked steps, as the game shows them after a battle.

Tip-Scale Tot

1. B: 2

1. Substitute each value in turn.
2. $4(2)+1=9$ and $3(2)+3=9$, so $x=2$.

2. A: -12

1. "-2 less than y" is $y-(-2)=y+2$.
2. $y+2=-10$, so $y=-12$.

Fraction Washer

3. B: 12

1. Subtract 6: $3=\frac{x}{4}$.
2. Multiply by 4: $x=12$.

4. B: -7

1. Subtract $0.5x$ from both sides: $-1x+0.5=7.5$.
2. $-1x=7$, so $x=-7$.

Side Sweeper

5. A: 10

1. Subtract x from both sides: $2x=20$.
2. $x=\frac{20}{2}=10$.

6. B: -4

1. The sentence is $-n=4n+20$.
2. Subtract $4n$: $-5n=20$.
3. $n=\frac{20}{-5}=-4$.

Mirror Twins

7. A: $x=-11$ or $x=-5$

1. Omar solved only $x+8=3$.
2. The bars also equal 3 when $x+8=-3$, so $x=-11$.
3. So $x=-11$ or $x=-5$.

8. A: $x=4$

1. $x-5=2x-7$ gives $x=2$; $x-5=-(2x-7)$ gives $x=4$.
2. Check: at $x=2$ the right side is -3, negative, and an absolute value cannot be. So $x=2$ is extraneous.
3. At $x=4$ both sides are 1: $x=4$.

Recipe Rover

9. A: 576

1. $V=12\cdot 8\cdot 6$.
2. $V=576$.

10. A: $C=\frac{5}{9}(F-32)$

1. Subtract 32: $F-32=\frac{9}{5}C$.
2. Multiply by $\frac{5}{9}$: $C=\frac{5}{9}(F-32)$.

Cash-Till Cassie

11. A: 30

1. "10% of them" means $0.1\cdot 300$.
2. 30 students ride the bus.

12. B: 250%

1. $\frac{90}{36}=2.5$.
2. That is 250%: more than 100%, since 90 is more than 36.

Clue Ticker

13. A: 43

1. Let n be the number: $n-10=33$.
2. Add 10: $n=33+10=43$.

14. B: 9

1. Let n be the number: $\frac{n}{3}+10=13$.
2. $\frac{n}{3}=3$, so $n=3\cdot 3=9$.

© 2026 Germ Studios LLC · free to copy for class





BATTLE SHEET · CHAPTER 3

Linear Inequalities

MathBound Standard Algebra 1 · Island 3: Lantern Isle

Name _____ Class _____ Date _____

The foes of Lantern Isle are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Greater Gator

Its jaws always face the bigger side: solving and graphing inequalities.

Problems 1–4 · Lessons 3.1–3.3 · Battle it online: **play.mathbound.org/alg1/?practice=r2.linear-inequalities**



Phrase Parrot

Repeats words as symbols: the language of algebra.

Problems 5–7 · Lessons 3.1, 3.4 · Battle it online: **play.mathbound.org/alg1/?practice=r1.use-the-language-of-algebra**



Rope-Bridge Bandit

Guards the bridge between two posts: compound inequalities.

Problems 8–11 · Lessons 3.4, 3.5 · Battle it online: **play.mathbound.org/alg1/?practice=eq.inequalities**



Budget Buccaneer

Can spend at most what is in the purse: inequality word problems.

Problems 12–14 · Lesson 3.6 · Battle it online: **play.mathbound.org/alg1/?practice=r3.linear-inequalities-applications**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 3 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 4

Greater Gator

Its jaws always face the bigger side: solving and graphing inequalities. Lessons 3.1–3.3. Battle it:
play.mathbound.org/alg1/?practice=r2.linear-inequalities

1 Lesson 3.1

Which describes the graph of $x < 4$?

A. An open circle at 4, shaded to the left

B. An open circle at 4, shaded to the right

C. A closed circle at 4, shaded to the left

D. A closed circle at 4, shaded to the right

WORK

2 Lesson 3.2

Solve $x - 15 > -5$. Write the solution in set-builder notation.

A. $\{x \mid x > -10\}$ **B.** $\{x \mid x > 10\}$

C. $\{x \mid x < 10\}$ **D.** $\{x \mid x \geq 10\}$

WORK

3 Lesson 3.2

Solve: $-2x > -19$

A. $x < -\frac{19}{2}$ **B.** $x < \frac{19}{2}$

C. $x > \frac{19}{2}$ **D.** $x < \frac{2}{19}$

WORK

4 Lesson 3.3

Translate and solve: The difference of a number and 4 is greater than 5 times the number.

A. $n > 1$ **B.** $n < 1$

C. $n > -1$ **D.** $n < -1$

WORK



FOE 2 OF 4

Phrase Parrot

Repeats words as symbols: the language of algebra. Lessons 3.1, 3.4. Battle it:
play.mathbound.org/alg1/?practice=r1.use-the-language-of-algebra

5 Lesson 3.1

Write with a symbol: y is at least 24.

A. $y \leq 24$ **B.** $y > 24$

C. $y \geq 24$ **D.** $y < 24$

WORK

6 Lesson 3.1

Write with symbols: t is greater than or equal to -3 and less than 0.

A. $-3 < t \leq 0$ **B.** $-3 \leq t < 0$

C. $-3 < t < 0$ **D.** $-3 \leq t \leq 0$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 4

Phrase Parrot (continued)

Repeats words as symbols: the language of algebra. Lessons 3.1, 3.4. Battle it:
play.mathbound.org/alg1/?practice=r1.use-the-language-of-algebra

7 Lesson 3.1

Which value of y makes $-1 \leq y < 5$ true?

A. 3 **B.** -2 **C.** 6 **D.** 5

WORK



FOE 3 OF 4

Rope-Bridge Bandit

Guards the bridge between two posts: compound inequalities. Lessons 3.4, 3.5. Battle it:
play.mathbound.org/alg1/?practice=eq.inequalities

8 Lesson 3.4

Solve: $-8 \leq 4x < 4$

A. $-2 < x \leq 1$ **B.** $-12 \leq x < 0$

C. $-1 \leq x < 2$ **D.** $-2 \leq x < 1$

WORK

9 Lesson 3.4

Solve: $0 \leq \frac{x}{2} + 2 \leq 2$

A. $-4 \leq x \leq 0$ **B.** $4 \leq x \leq 8$

C. $-2 \leq x \leq 2$ **D.** $-2 \leq x \leq 0$

WORK

10 Lesson 3.4

Solve $4x - 5 \leq -21$ or $4x - 2 > -6$. Write the solution in interval notation.

A. $(-\infty, -4] \cup (-1, \infty)$

B. $(-\infty, -4) \cup [-1, \infty)$

C. $(-\infty, -4] \cup [-1, \infty)$

D. $(-4, -1]$

WORK

11 Lesson 3.5

Solve: $|x - 5| + 7 > 4$

A. all real numbers **B.** no solution

C. $x < 2$ or $x > 8$ **D.** $x = 5$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 4

Budget Buccaneer

Can spend at most what is in the purse: inequality word problems. Lesson 3.6. Battle it:
play.mathbound.org/alg1/?practice=r3.linear-inequalities-applications

12 Lesson 3.6

Translate: a number divided by 8 is at least 24.

A. $\frac{n}{8} \leq 24$ **B.** $\frac{8}{n} \geq 24$

C. $\frac{n}{8} \geq 24$ **D.** $\frac{n}{8} > 24$

WORK

13 Lesson 3.6

A rental car costs $40 a week plus $0.25 a mile. How many miles can be driven on a budget of $75?

A. 35 miles **B.** 1.9 miles

C. 300 miles **D.** 140 miles

WORK

14 Lesson 3.6

Translate: the quotient of a number and 6 is at least the number decreased by 7.

A. $\frac{n}{6} \geq n - 7$ **B.** $\frac{n}{6} > n - 7$ **C.** $\frac{n}{6} \geq 7 - n$ **D.** $\frac{n}{6} \geq n + 7$

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 3: Linear Inequalities

Each answer is followed by its worked steps, as the game shows them after a battle.

Greater Gator

1. **A**: An open circle at 4, shaded to the left
1. $<$ is strict, so the endpoint is not included and the circle is open.
2. x is less than 4, so shade to the left.

2. **B**: $\{x \mid x > 10\}$
1. Add 15 to both sides: $x > 10$.
2. As a set: $\{x \mid x > 10\}$, the numbers x with $x > 10$.

3. **B**: $x < \dfrac{19}{2}$
1. Divide both sides by -2, which reverses the inequality.
2. $x < \dfrac{-19}{-2} = \dfrac{19}{2}$.

4. **D**: $n < -1$
1. The sentence is $n - 4 > 5n$.
2. Subtract $5n$ and add 4: $-4n > 4$.
3. Divide by -4 and reverse the symbol: $n < -1$.

Phrase Parrot

5. **C**: $y \geq 24$
1. "is at least 24": y can be the number itself or anything above it.
2. That is $y \geq 24$.

6. **B**: $-3 \leq t < 0$
1. "Greater than -3" puts -3 on the left of t; "less than 0" puts 0 on the right.
2. Together: $-3 \leq t < 0$.

7. **A**: 3
1. y must be at least -1 and less than 5.
2. Only 3 passes both tests.

Rope-Bridge Bandit

8. **D**: $-2 \leq x < 1$
1. Divide all three parts by 4.
2. $-2 \leq x < 1$

9. **A**: $-4 \leq x \leq 0$
1. Subtract 2: $-2 \leq \dfrac{x}{2} \leq 0$.
2. Multiply by 2: $-4 \leq x \leq 0$.

10. **A**: $(-\infty, -4] \cup (-1, \infty)$
1. Solve each part: $x \leq -4$, or $x > -1$.
2. -4 is kept and -1 is not: $(-\infty, -4] \cup (-1, \infty)$.

11. **A**: all real numbers
1. Subtract 7: $|x - 5| > -3$.
2. An absolute value is never negative, so it is always above -3: all real numbers.

Budget Buccaneer

12. **C**: $\dfrac{n}{8} \geq 24$
1. "A number divided by 8" is $\dfrac{n}{8}$.
2. "At least" means no smaller than, $\geq$: $\dfrac{n}{8} \geq 24$.

13. **D**: 140 miles
1. $40 + 0.25m \leq 75$.
2. $0.25m \leq 35$, so $m \leq 140$ miles.

14. **A**: $\dfrac{n}{6} \geq n - 7$
1. "The quotient of a number and 6" is $\dfrac{n}{6}$; "the number decreased by 7" is $n - 7$.
2. "Is at least" is $\geq$: $\dfrac{n}{6} \geq n - 7$.

© 2026 Germ Studios LLC · free to copy for class



BATTLE SHEET · CHAPTER 4

Functions

MathBound Standard Algebra 1 · Island 4: Cogspire Heights

Name _____ Class _____ Date _____

The foes of Cogspire Heights are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Grid Mole

Pops up at a point on the grid: plotting and reading coordinates, and the distances and figures between them.
Problems 1–3 · Lesson 4.1 · Battle it online: **play.mathbound.org/alg1/?practice=r4.rectangular-coordinate-system**



Vending Vic

Press one button, get one snack: is it a function? Domain and range.
Problems 4–6 · Lesson 4.2 · Battle it online: **play.mathbound.org/alg1/?practice=fn.relations**



Number Mill

Grinds an input into its output: function notation, and one relationship as a rule, a table, a graph and a story.
Problems 7–8 · Lessons 4.3, 4.4 · Battle it online: **play.mathbound.org/alg1/?practice=fn.notation**



Peak Peeper

Spots the peaks, valleys and zeros of a graph: reading graphs of functions.
Problems 9–10 · Lessons 4.3, 4.7 · Battle it online: **play.mathbound.org/alg1/?practice=fn.graphs**



Pace Snail

Leaves an even mark at every step: rate of change.
Problems 11–12 · Lesson 4.5 · Battle it online: **play.mathbound.org/alg1/?practice=fn.rate-of-change**



Add-a-Car Train

Adds the same car every stop: arithmetic sequences.
Problems 13–14 · Lesson 4.6 · Battle it online: **play.mathbound.org/alg1/?practice=seq.arithmetic**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 4 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Grid Mole

Pops up at a point on the grid: plotting and reading coordinates, and the distances and figures between them. Lesson 4.1. Battle it: **play.mathbound.org/alg1/?practice=r4.rectangular-coordinate-system**

1 Lesson 4.1

Starting at the origin, which point do you reach by moving 5 units left and 1 unit down?

A. $(-1, -5)$ **B.** $(-5, 1)$

C. $(-5, -1)$ **D.** $(5, -1)$

WORK

2 Lesson 4.1

For $x + y = 11$, what is x when $y = 2$?

A. 11 **B.** 2

C. 9 **D.** 13

WORK

3 Lesson 4.1

The table lists points on a line. What goes in the gap?

x	0	1	3	6
y	6	2	-6	?

A. 6 **B.** -18 **C.** -10 **D.** -14

WORK



FOE 2 OF 6

Vending Vic

Press one button, get one snack: is it a function? Domain and range. Lesson 4.2. Battle it: **play.mathbound.org/alg1/?practice=fn.relations**

4 Lesson 4.2

The graph shows a relation. Is it a function?

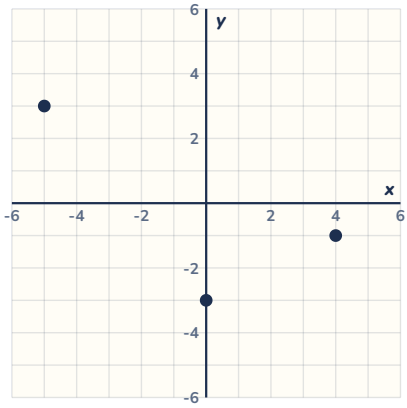
A. No: the input 4 has two outputs

B. Yes: each input has exactly one output

C. No: the input 0 has two outputs

D. No: the input -5 has two outputs

WORK



© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 6

Vending Vic (continued)

Press one button, get one snack: is it a function? Domain and range. Lesson 4.2. Battle it:
play.mathbound.org/alg1/?practice=fn.relations

5 Lesson 4.2

Which relation has range $\{-2, 2, 4\}$?

A. $\{(-5, 3), (1, 9), (6, 6), (-4, 9)\}$

B. $\{(-4, 4), (9, -2), (-6, 2), (2, -2)\}$

C. $\{(-4, 4), (9, -2), (-6, 2), (2, -1)\}$

D. $\{(4, -4), (-2, 9), (2, -6), (-2, 2)\}$

WORK

6 Lesson 4.2

What is the range of the relation graphed?

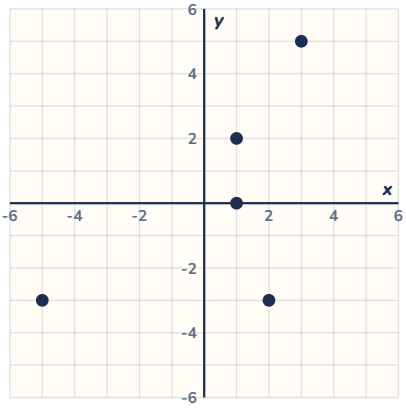
A. $\{-5, -3, 0, 1, 2, 3, 5\}$

B. $\{-3, 0, 2, 5\}$

C. $\{-3, -3, 0, 2, 5\}$

D. $\{-5, 1, 2, 3\}$

WORK





FOE 3 OF 6

Number Mill

Grinds an input into its output: function notation, and one relationship as a rule, a table, a graph and a story. Lessons 4.3, 4.4.
Battle it: play.mathbound.org/alg1/?practice=fn.notation

7 Lesson 4.3

The function f multiplies its input by -5 and then subtracts 2. What is $f(7)$?

A. -33

B. -37

C. 0

D. -25

WORK

8 Lesson 4.4

Is $\frac{y}{2} = -x - 7$ a linear function?

A. No: x is an exponent

B. No: x is in a denominator

C. No: x is squared

D. Yes: it can be written as $y = mx + b$

WORK

© 2026 Germ Studios LLC · free to copy for class



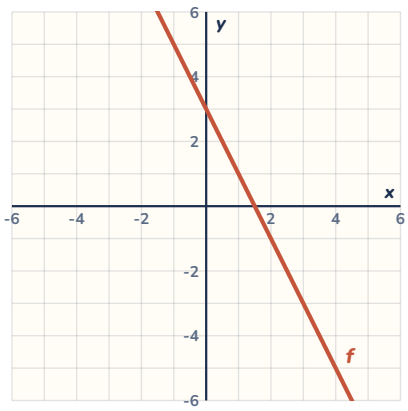
FOE 4 OF 6

Peak Peeper

Spots the peaks, valleys and zeros of a graph: reading graphs of functions. Lessons 4.3, 4.7. Battle it: **play.mathbound.org/alg1/?practice=fn.graphs**

9 Lesson 4.3

The graph of f is shown. What is $f(4)$?



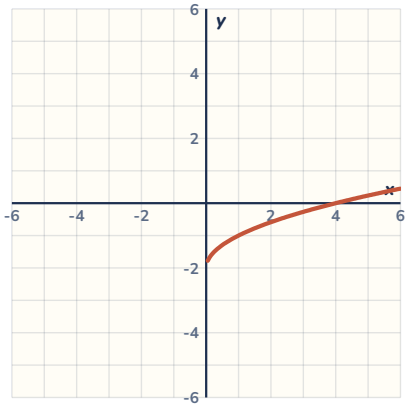
A. -5 **B.** 4

C. 5 **D.** -4

WORK

10 Lesson 4.7

Over which interval is the function increasing?



A. $x > -2$ **B.** $y > -2$

C. $x > 0$ **D.** $x < 0$

WORK



FOE 5 OF 6

Pace Snail

Leaves an even mark at every step: rate of change. Lesson 4.5. Battle it: **play.mathbound.org/alg1/?practice=fn.rate-of-change**

11 Lesson 4.5

What is the rate of change of the function in the table?

x	2	4	6	8
y	4	-2	-8	-14

A. -6 **B.** -3 **C.** 4 **D.** 3

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 5 OF 6

Pace Snail (continued)

Leaves an even mark at every step: rate of change. Lesson 4.5. Battle it: **play.mathbound.org/alg1/?practice=fn.rate-of-change**

12 Lesson 4.5

What is the rate of change of the function in the table?

x	0	3	6	12
y	4	2	0	-4

A. $\frac{-2}{3}$ **B.** -2 **C.** $\frac{2}{3}$ **D.** $\frac{-3}{2}$

WORK



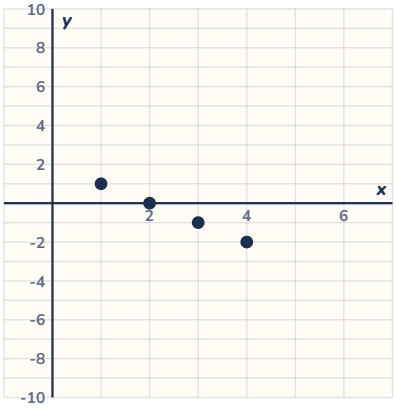
FOE 6 OF 6

Add-a-Car Train

Adds the same car every stop: arithmetic sequences. Lesson 4.6. Battle it: **play.mathbound.org/alg1/?practice=seq.arithmetic**

13 Lesson 4.6

The graph shows the first four terms of an arithmetic sequence. What is the fifth term?



A. -3 **B.** -4

C. 5 **D.** -1

WORK

14 Lesson 4.6

A gym charges 40 dollars to join plus 6 dollars a month. Write a rule for the total cost a_n, in dollars, of the first n months.

A. $a_n = 40n + 6$ **B.** $a_n = 6n + 40$ **C.** $a_n = 6n + 34$ **D.** $a_n = 6n + 46$

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 4: Functions

Each answer is followed by its worked steps, as the game shows them after a battle.

Grid Mole

1. C: $(-5, -1)$

1. The first coordinate is the horizontal move, the second the vertical.
2. That gives $(-5, -1)$.

2. C: 9

1. Substitute $y = 2$: $x + 2 = 11$.
2. $x = 9$.

3. B: -18

1. From $x = 0$ to 1, y changes by -4: the slope is -4.
2. From $x = 3$ to 6 is 3 steps of 1, so y changes by -12: $y = -18$.

Vending Vic

4. B: Yes: each input has exactly one output

1. Look for two points on the same vertical line: one input with two outputs.
2. No vertical line meets two points, so it is a function.

5. B: $\{(-4, 4), (9, -2), (-6, 2), (2, -2)\}$

1. The range lists every y-value once.
2. $\{(-4, 4), (9, -2), (-6, 2), (2, -2)\}$ has range$\{-2, 2, 4\}$.

6. B: $\{-3, 0, 2, 5\}$

1. This relation is not a function: an input repeats. The range still lists each y-value once.
2. The range is the set of outputs, the y-values. An output that appears twice is listed once: $\{-3, 0, 2, 5\}$.

Number Mill

7. B: -37

1. As a rule, $f(x) = -5x - 2$.
2. $f(7) = -5 \cdot 7 - 2 = -37$.

8. D: Yes: it can be written as $y = mx + b$

1. Rearrange it as far as it goes: a linear function becomes $y = mx + b$, with x to the first power only.
2. $\frac{y}{2} = -x - 7$ can be: it is linear.

Peak Peeper

9. A: -5

1. Find $x = 4$ on the x-axis and go up or down to the graph.
2. The graph passes through $(4, -5)$, so the value is -5.

10. C: $x > 0$

1. The graph starts at $x = 0$; nothing is drawn to its left.
2. From there it rises for every larger x: it is increasing for $x > 0$.

Pace Snail

11. B: -3

1. Each time x goes up by 2, y changes by -6.
2. Rate of change $= \frac{-6}{2} = -3$.

12. A: $\frac{-2}{3}$

1. Each time x goes up by 3, y changes by -2.
2. Rate of change $= \frac{-2}{3} = \frac{-2}{3}$.

Add-a-Car Train

13. A: -3

1. The points go down by 1 at each step: $d = -1$.
2. $-2 - 1 = -3$.

14. B: $a_n = 6n + 40$

1. The total starts at 40 and rises 6 for each unit, so after n units it is $40 + 6n$.
2. So $a_n = 6n + 40$. Check $n = 1$: $6 + 40 = 46$.

© 2026 Germ Studios LLC · free to copy for class





BATTLE SHEET · CHAPTER 5

Linear Functions

MathBound Standard Algebra 1 · Island 5: Mistfall Terraces

Name _____ Class _____ Date _____

The foes of Mistfall Terraces are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Slide Sal

Starts at the top of the slide and slides down at a steady slope: slope-intercept form.
Problems 1–2 · Lessons 5.1–5.6 · Battle it online: **play.mathbound.org/alg1/?practice=r4.slope-intercept-form**



Dot-to-Dot Dora

Joins her dots with one straight stroke: graphing linear equations.
Problems 3–4 · Lesson 5.1 · Battle it online: **play.mathbound.org/alg1/?practice=r4.graph-linear-equations**



Staircase Strider

Walks a staircase of rise and run: slope.
Problems 5–6 · Lesson 5.2 · Battle it online: **play.mathbound.org/alg1/?practice=r4.slope**



Rope-Line Rory

Stretches a taut rope between two pegs: writing the equation of a line.
Problems 7–8 · Lessons 5.3–5.6 · Battle it online: **play.mathbound.org/alg1/?practice=r4.equation-of-a-line**



Quick-Change Quinn

The same pirate in three costumes: point-slope and standard form.
Problems 9–10 · Lessons 5.4, 5.5 · Battle it online: **play.mathbound.org/alg1/?practice=eq.linear-forms**



Flip-and-Slide Flo

An acrobat who slides, flips and stretches: transformations of functions and of figures.
Problems 11–12 · Lesson 5.7 · Battle it online: **play.mathbound.org/alg1/?practice=fn.transformations**



Scattershot Sue

Sprays confetti dots and draws a line through them: scatter plots and lines of fit.
Problems 13–14 · Lesson 5.8 · Battle it online: **play.mathbound.org/alg1/?practice=stat.bivariate**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 5 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 7

Slide Sal

Starts at the top of the slide and slides down at a steady slope: slope-intercept form. Lessons 5.1–5.6. Battle it:
play.mathbound.org/alg1/?practice=r4.slope-intercept-form

1 Lesson 5.3

Find the slope and y-intercept of $y = -3x - 4$.

A. slope -3, y-intercept $(0, 4)$

B. slope -3, y-intercept $(0, -4)$

C. slope 3, y-intercept $(0, -4)$

D. slope -4, y-intercept $(0, -3)$

WORK

2 Lesson 5.3

What is the slope of $2(x + 4) + 2y = -x + 15$?

A. $\frac{-3}{2}$

B. $\frac{3}{2}$

C. -1

D. $\frac{-1}{2}$

WORK



FOE 2 OF 7

Dot-to-Dot Dora

Joins her dots with one straight stroke: graphing linear equations. Lesson 5.1. Battle it:
play.mathbound.org/alg1/?practice=r4.graph-linear-equations

3 Lesson 5.1

Which point lies on the graph of $y = 2x + 2$?

A. $(-3, -3)$

B. $(-4, -3)$

C. $(-3, -6)$

D. $(-3, -4)$

WORK

4 Lesson 5.1

What is the equation of the line through $(-0.5, -6)$ and $(-0.5, 7)$?

A. $x = -0.5$

B. $x = -6$

C. $y = -0.5$

D. $y = -6$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 3 OF 7

Staircase Strider

Walks a staircase of rise and run: slope. Lesson 5.2. Battle it: **play.mathbound.org/alg1/?practice=r4.slope**

5 Lesson 5.2

A line rises 4 units for every 5 units it runs to the right. What is its slope?

A. $\frac{5}{4}$ **B.** $\frac{4}{5}$

C. 9 **D.** $\frac{-4}{5}$

WORK

6 Lesson 5.2

The points $(-4, -2), (0, -3)$ and $(k, -4)$ lie on one line. What is k?

A. 4 **B.** -4

C. -6 **D.** $\frac{-7}{2}$

WORK



FOE 4 OF 7

Rope-Line Rory

Stretches a taut rope between two pegs: writing the equation of a line. Lessons 5.3–5.6. Battle it: **play.mathbound.org/alg1/?practice=r4.equation-of-a-line**

7 Lesson 5.3

The table shows points on a line. What is its equation?

x	0	1	2	3
y	1	6	11	16

A. $y = x + 5$ **B.** $y = -5x + 1$ **C.** $y = 5x + 1$ **D.** $y = 5x + 6$

WORK

8 Lesson 5.6

Find the line through $(5, 5)$ that is perpendicular to the line through $(-3, 5)$ and $(3, 3)$.

A. $y = \frac{-1}{3}x - 10$ **B.** $y = 3x + 5$ **C.** $y = -3x - 10$ **D.** $y = 3x - 10$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 5 OF 7

Quick-Change Quinn

The same pirate in three costumes: point-slope and standard form. Lessons 5.4, 5.5. Battle it:
play.mathbound.org/alg1/?practice=eq.linear-forms

9 Lesson 5.4

A line passes through $(4, 3)$ and falls 4 units for every 3 units it runs to the right. Write its equation in point-slope form.

A. $y - 3 = -\frac{3}{4}(x - 4)$

B. $y - 3 = \frac{4}{3}(x - 4)$

C. $y - 3 = -\frac{4}{3}(x - 4)$

D. $y + 3 = -\frac{4}{3}(x + 4)$

WORK

10 Lesson 5.4

Write $y + 7 = -\frac{2}{3}(x + 9)$ in slope-intercept form.

A. $y = -\frac{2}{3}x - 13$

B. $y = -\frac{2}{3}x - 1$

C. $y = -\frac{2}{3}x + 1$

D. $y = -\frac{2}{3}x + 2$

WORK



FOE 6 OF 7

Flip-and-Slide Flo

An acrobat who slides, flips and stretches: transformations of functions and of figures. Lesson 5.7. Battle it:
play.mathbound.org/alg1/?practice=fn.transformations

11 Lesson 5.7

The graph of $f(x) = x$ is made 3 times as steep, then moved up 4 units. Which equation gives the new graph g?

A. $g(x) = 3(x + 4)$

B. $g(x) = -3x + 4$

C. $g(x) = 3x - 4$

D. $g(x) = 3x + 4$

WORK

12 Lesson 5.7

How does the graph of $g(x) = f\left(\frac{1}{4}x\right)$ compare to the graph of $f(x)$?

A. a horizontal stretch by a factor of 4

B. a vertical shrink by a factor of $\frac{1}{4}$

C. a vertical stretch by a factor of 4

D. a horizontal shrink by a factor of $\frac{1}{4}$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 7 OF 7

Scattershot Sue

Sprays confetti dots and draws a line through them: scatter plots and lines of fit. Lesson 5.8. Battle it:
play.mathbound.org/alg1/?practice=stat.bivariate

13 Lesson 5.8

Which pair of quantities most likely shows no correlation?

A. hours spent practising and free throws made

B. birth month and height

C. outside temperature and heating bills

D. hours studied and test score

WORK

14 Lesson 5.8

A line of fit passes through the data points $(4, 51)$ and $(6, 54)$. Another data point is $(9, 60)$. What is its residual?

A. 58.5 **B.** -4.5

C. 1.5 **D.** -1.5

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 5: Linear Functions

Each answer is followed by its worked steps, as the game shows them after a battle.

Slide Sal

1. **B**: slope -3, y-intercept $(0, -4)$

1. In $y = mx + b$ the coefficient of x is the slope.
2. Slope -3, y-intercept $(0, -4)$.

2. **A**: $\dfrac{-3}{2}$

1. Distribute and collect: $3x + 2y = 7$.
2. Solving for y, the coefficient of x is $\dfrac{-3}{2}$.

Dot-to-Dot Dora

3. **D**: $(-3, -4)$

1. A point lies on the graph exactly when it solves the equation.
2. At $x = -3, y = -4$, so $(-3, -4)$ is on the line.

4. **A**: $x = -0.5$

1. Both points have $x = -0.5$, so the line is vertical.
2. Its equation is $x = -0.5$.

Staircase Strider

5. **B**: $\dfrac{4}{5}$

1. Slope is rise over run.
2. $\dfrac{4}{5} = \dfrac{4}{5}$.

6. **A**: 4

1. The slope from $(-4, -2)$ to $(0, -3)$ is $\dfrac{-1}{4}$: 4 across for every -1 up or down.
2. From $(-4, -2)$, y changes by -2, so x changes by 8: $k = 4$.

Rope-Line Rory

7. **C**: $y = 5x + 1$

1. At $x = 0, y = 1$: that is the y-intercept.
2. y changes by 5 for each 1 in x: the slope. So $y = 5x + 1$.

8. **D**: $y = 3x - 10$

1. The given line has slope $\dfrac{-2}{6} = \dfrac{-1}{3}$.
2. A perpendicular line has the negative reciprocal slope, 3.
3. Through $(5, 5)$: $5 = 3(5) + b$, so $b = -10$.

Quick-Change Quinn

9. **C**: $y - 3 = -\dfrac{4}{3}(x - 4)$

1. The slope is rise over run: $m = -\dfrac{4}{3}$.
2. With $(4, 3)$: $y - 3 = -\dfrac{4}{3}(x - 4)$.

10. **A**: $y = -\dfrac{2}{3}x - 13$

1. Distribute: $y + 7 = -\dfrac{2}{3}x - 6$.
2. Subtract 7 on both sides: $y = -\dfrac{2}{3}x - 13$.

Flip-and-Slide Flo

11. **D**: $g(x) = 3x + 4$

1. 3 times as steep gives slope 3.
2. Moving the line up 4 changes its y-intercept from 0 to 4: $g(x) = 3x + 4$.

12. **A**: a horizontal stretch by a factor of 4

1. A factor on x inside the function works sideways and backwards: $f(kx)$ reaches each output of f at x divided by k.
2. Inputs are multiplied by 4, so the graph is pulled away from the y-axis: a horizontal stretch by a factor of 4.

Scattershot Sue

13. **B**: birth month and height

1. No correlation means knowing one quantity tells you nothing about the other.
2. That fits birth month and height.

14. **C**: 1.5

1. Slope: $\dfrac{3}{2} = 1.5$; then $51 = 1.5(4) + b$ gives $b = 45$.
2. Predicted at $x = 9$: 58.5. Residual $= 60 - 58.5 = 1.5$.

© 2026 Germ Studios LLC · free to copy for class





BATTLE SHEET · CHAPTER 6

Systems of Equations and Inequalities

MathBound Standard Algebra 1 · Island 6: Kitecliff Reach

Name _____ Class _____ Date _____

The foes of Kitecliff Reach are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Searchlight Scout

Two searchlight beams that cross at one point: solving systems by graphing.

Problems 1–2 · Lesson 6.1 · Battle it online: **play.mathbound.org/alg1/?practice=r5.solve-by-graphing**



Swap Shuttle

Swaps one part for its twin: solving systems by substitution.

Problems 3–4 · Lesson 6.2 · Battle it online: **play.mathbound.org/alg1/?practice=r5.solve-by-substitution**



Cancel Crab

Two matching claws that clap and cancel: solving systems by elimination.

Problems 5–6 · Lesson 6.3 · Battle it online: **play.mathbound.org/alg1/?practice=r5.solve-by-elimination**



Brew Blender

Pours two flasks into one: mixture, coin and ticket problems.

Problems 7–9 · Lesson 6.4 · Battle it online: **play.mathbound.org/alg1/?practice=r5.mixture-applications-with-systems**



Shade Painter

Paints one side of a line: graphing inequalities in two variables.

Problems 10–12 · Lesson 6.5 · Battle it online: **play.mathbound.org/alg1/?practice=r4.linear-inequalities**



Overlap Roller

Two paint rollers whose stripes overlap: systems of inequalities.

Problems 13–14 · Lesson 6.6 · Battle it online: **play.mathbound.org/alg1/?practice=r5.systems-of-linear-inequalities**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 6 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Searchlight Scout

Two searchlight beams that cross at one point: solving systems by graphing. Lesson 6.1. Battle it:
play.mathbound.org/alg1/?practice=r5.solve-by-graphing

1 Lesson 6.1

Is $(3, 6)$ a solution of the system $-x - 2y = -15$ and $2x + 3y = 25$?

A. No, it satisfies only the second equation

B. No, it satisfies neither equation

C. Yes, it satisfies both equations

D. No, it satisfies only the first equation

WORK

2 Lesson 6.1

How many solutions does the system $-4x - 3y = -3$ and $-12x - 9y = -9$ have?

A. Exactly two solutions

B. No solution

C. Infinitely many solutions

D. Exactly one solution

WORK



FOE 2 OF 6

Swap Shuttle

Swaps one part for its twin: solving systems by substitution. Lesson 6.2. Battle it:
play.mathbound.org/alg1/?practice=r5.solve-by-substitution

3 Lesson 6.2

At what value of x do the lines $y = 3x - 15$ and $y = -x + 9$ cross?

A. -6 **B.** -24

C. 3 **D.** 6

WORK

4 Lesson 6.2

Which system has infinitely many solutions?

A. $y = -3x + 11$ and $0.5y = 6.5 - 1.5x$

B. $y = 2x + 1$ and $2y = 1 + 5x$

C. $y = -2x + 8$ and $0.5y = 4 - x$

D. $y = x + 10$ and $3y = 25 + 2x$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 3 OF 6

Cancel Crab

Two matching claws that clap and cancel: solving systems by elimination. Lesson 6.3. Battle it:
play.mathbound.org/alg1/?practice=r5.solve-by-elimination

5 Lesson 6.3

Subtract the second equation from the first: $-5x - 4y = -1$ and $-2x - 4y = 7$. Which equation results?

A. $-7x = 6$ **B.** $-3x = 6$

C. $-3x - 8y = -8$ **D.** $-3x = -8$

WORK

6 Lesson 6.3

In $3x - 5y = -7$ and $6x - 3y = -12$, which one multiplication lets you add the equations to eliminate x?

A. Multiply the second equation by 2

B. Multiply the first equation by -2

C. Multiply the first equation by 2

D. Multiply the second equation by -2

WORK



FOE 4 OF 6

Brew Blender

Pours two flasks into one: mixture, coin and ticket problems. Lesson 6.4. Battle it:
play.mathbound.org/alg1/?practice=r5.mixture-applications-with-systems

7 Lesson 6.4

A jar holds 34 coins, all dimes and quarters, worth \$6.25. How many quarters are there?

A. 25 **B.** 15

C. 19 **D.** 34

WORK

8 Lesson 6.4

How many gallons of water must evaporate from 20 gallons of 4% salt water to make it 20% salt water?

A. 3.2 gallons **B.** 20 gallons

C. 4 gallons **D.** 16 gallons

WORK

9 Lesson 6.4

An investor puts \$20,000 into two accounts paying 3% and 6% simple interest a year. Over 5 years they earn \$4,650 in interest. How much went into the 3% account?

A. \$9,500 **B.** \$11,000 **C.** \$9,000 **D.** \$10,000

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 5 OF 6

Shade Painter

Paints one side of a line: graphing inequalities in two variables. Lesson 6.5. Battle it:
play.mathbound.org/alg1/?practice=r4.linear-inequalities

10 Lesson 6.5

Which ordered pair is NOT a solution to $y < x + 3$?

A. $(-3, -3)$ **B.** $(3, 8)$

C. $(2, 4)$ **D.** $(1, 2)$

WORK

11 Lesson 6.5

Which point satisfies $4y - 3 > 9$?

A. $(4, 5)$ **B.** $(-3, 1)$

C. $(0, 1)$ **D.** $(-1, 2)$

WORK

12 Lesson 6.5

What boundary line does $3(x + 4) - 2y > -x + 36$ have?

A. A dashed line at $4x - 2y = 24$ **B.** A dashed line at $4x - 2y = 48$

C. A solid line at $4x - 2y = 24$ **D.** A dashed line at $2x - 2y = 24$

WORK



FOE 6 OF 6

Overlap Roller

Two paint rollers whose stripes overlap: systems of inequalities. Lesson 6.6. Battle it:
play.mathbound.org/alg1/?practice=r5.systems-of-linear-inequalities

13 Lesson 6.6

$(-4, -15)$ is a solution of which system?

A. $y < 3x - 4$ and $y > 4x + 5$

B. $y > 3x - 4$ and $y > 4x + 5$

C. $y > 3x - 4$ and $y < 4x + 5$

D. $y < 3x - 4$ and $y < 4x + 5$

WORK

14 Lesson 6.6

A student works at most 20 hours a week across two jobs paying \$10 and \$15 an hour, must earn at least \$200, and must work at least 6 hours at the first job. Let x be the hours at the first job and y at the second. Which system models this?

A. $x + y \leq 20, 10x + 15y \geq 200$ and $x \leq 6$

B. $x + y \leq 20, 10x + 15y \geq 200$ and $y \geq 6$

C. $x + y \geq 20, 10x + 15y \geq 200$ and $x \geq 6$

D. $x + y \leq 20, 10x + 15y \geq 200$ and $x \geq 6$

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 6: Systems of Equations and Inequalities

Each answer is followed by its worked steps, as the game shows them after a battle.

Searchlight Scout

1. **D**: No, it satisfies only the first equation

1. Substitute $(3, 6)$ into each equation.
2. The first holds and the second fails.
3. No, it satisfies only the first equation.

2. **C**: Infinitely many solutions

1. Identical equations are the same line, so every point on it solves both.
2. So it has infinitely many solutions.

Swap Shuttle

3. **D**: 6

1. Both are y, so substitute one into the other: $3x - 15 = -x + 9$.
2. $4x = 24$, so $x = 6$.

4. **C**: $y = -2x + 8$ and $0.5y = 4 - x$

1. Rearrange each second equation and compare it with the first.
2. Rearranged, the second is exactly a multiple of the first: everything cancels and leaves something always true.

Cancel Crab

5. **D**: $-3x = -8$

1. The y terms are equal, so subtracting removes them.
2. x terms: $-5 - (-2) = -3$; constants: $-1 - (7) = -8$. So $-3x = -8$.

6. **B**: Multiply the first equation by -2

1. The $x-$ coefficients are 3 and 6: the second is 2 times the first.
2. Multiplying the first by -2 makes its $x-$ term -6, the opposite of 6, so adding cancels x.

Brew Blender

7. **C**: 19

1. $d + q = 34$ and $10d + 25q = 625$.
2. $15q = 285$, so $q = 19$.

8. **D**: 16 gallons

1. Evaporating removes water, not salt: the salt stays $0.04(20) = 0.8$ gallons.
2. $0.8 = 0.2(20 - w)$, so $w = 16$.

9. **C**: \$9,000

1. Over 5 years the interest is 5 times a year's: $0.03x(5) + 0.06y(5) = 4650$, with $x + y = 20000$.
2. One year's interest is 930; solving gives $x =$ \$9,000.

Shade Painter

10. **B**: $(3, 8)$

1. A solution has y below the line $y = x + 3$.
2. At $x = 3$ the line is at 6, and $(3, 8)$ is above it.

11. **A**: $(4, 5)$

1. Solve: $y > 3$. Only the $y-$ coordinate matters.
2. $(4, 5)$ has $y = 5$, which fits.

12. **A**: A dashed line at $4x - 2y = 24$

1. Distribute 3, then move the x-terms to the left and the numbers to the right: $4x - 2y > 24$.
2. The boundary is $4x - 2y = 24$; $>$ leaves out it, so the line is dashed.

Overlap Roller

13. **C**: $y > 3x - 4$ and $y < 4x + 5$

1. Substitute $(-4, -15)$ into each inequality of each system.
2. Only $y > 3x - 4$ and $y < 4x + 5$ holds twice.

14. **D**: $x + y \leq 20, 10x + 15y \geq 200$ and $x \geq 6$

1. Hours: $x + y \leq 20$. Pay: $10x + 15y \geq 200$.
2. "At least 6 hours at the first job": $x \geq 6$.

© 2026 Germ Studios LLC · free to copy for class



BATTLE SHEET · CHAPTER 7

Exponents and Exponential Functions

MathBound Standard Algebra 1 · Island 7: Gearwhistle Foundry

Name _____ Class _____ Date _____

The foes of Gearwhistle Foundry are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Balloon Bundler

Ties balloons in bundles of bundles: the product and power properties.

Problems 1–3 · Lessons 7.1, 7.7 · Battle it online: **play.mathbound.org/alg1/?practice=r6.multiplication-properties-of-exponents**



Whale-and-Flea Wanda

A whale balloon and a flea on her hat: negative exponents and scientific notation.

Problems 4–6 · Lesson 7.2 · Battle it online: **play.mathbound.org/alg1/?practice=r6.integer-exponents-and-scientific-notation**



Sprout-Root Sid

A plant that sprouts up and roots down at once: rational exponents.

Problems 7–8 · Lesson 7.3 · Battle it online: **play.mathbound.org/alg1/?practice=r9.rational-exponents**



Beanstalk Bonnie

Climbs a beanstalk that doubles: exponential functions.

Problems 9–10 · Lessons 7.4, 7.5 · Battle it online: **play.mathbound.org/alg1/?practice=exp.functions**



Bubble Doubler

Every bubble splits in two: geometric sequences.

Problems 11–12 · Lesson 7.6 · Battle it online: **play.mathbound.org/alg1/?practice=seq.geometric**



Same-Base Sam

Stacks towers on matching bases: exponential equations with a common base.

Problems 13–14 · Lesson 7.7 · Battle it online: **play.mathbound.org/alg1/?practice=exp.equations**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 7 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Balloon Bundler

Ties balloons in bundles of bundles: the product and power properties. Lessons 7.1, 7.7. Battle it:
play.mathbound.org/alg1/?practice=r6.multiplication-properties-of-exponents

1 Lesson 7.1

Simplify: $7^2 \cdot 7^5$.Write the answer as a power of 7.

A. 14^7 **B.** 49^7

C. 7^7 **D.** 7^{10}

WORK

2 Lesson 7.1

What goes in the box? $(\square x^3)^2 = 4x^6$

A. 2 **B.** 3

C. 1 **D.** 4

WORK

3 Lesson 7.1

Multiply: $(\frac{3}{2}a^2b)(2ab^3)$

A. $6a^3b^4$ **B.** $3a^3b^4$ **C.** $3a^2b^3$ **D.** $-3a^3b^4$

WORK



FOE 2 OF 6

Whale-and-Flea Wanda

A whale balloon and a flea on her hat: negative exponents and scientific notation. Lesson 7.2. Battle it:
play.mathbound.org/alg1/?practice=r6.integer-exponents-and-scientific-notation

4 Lesson 7.2

Simplify: y^{-3}

A. $\frac{1}{-3y}$ **B.** $\frac{1}{y^3}$

C. $-y^3$ **D.** y^3

WORK

5 Lesson 7.2

A bacterium is about 0.00000476 meters long. Write this number in scientific notation.

A. $4.76 \cdot 10^{-5}$ **B.** $4.76 \cdot 10^{-6}$

C. $4.76 \cdot 10^{6}$ **D.** $4.76 \cdot 10^{-7}$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 6

Whale-and-Flea Wanda (continued)

A whale balloon and a flea on her hat: negative exponents and scientific notation. Lesson 7.2. Battle it:
play.mathbound.org/alg1/?practice=r6.integer-exponents-and-scientific-notation

6 Lesson 7.2

Simplify: $(5.6 \cdot 10^{-5}) - (9 \cdot 10^{-6})$

A. $4.7 \cdot 10^{-5}$ **B.** $4.7 \cdot 10^{-6}$ **C.** $5.51 \cdot 10^{-5}$ **D.** $6.5 \cdot 10^{-5}$

WORK



FOE 3 OF 6

Sprout-Root Sid

A plant that sprouts up and roots down at once: rational exponents. Lesson 7.3. Battle it:
play.mathbound.org/alg1/?practice=r9.rational-exponents

7 Lesson 7.3

Simplify: $8^{\frac{1}{3}}$

A. 8 **B.** 3

C. 2 **D.** 512

WORK

8 Lesson 7.3

Simplify: $\dfrac{y^{\frac{2}{5}}}{y^{\frac{1}{5}}}$

A. $y^{\frac{-1}{5}}$ **B.** $y^{\frac{1}{25}}$

C. $y^{\frac{1}{5}}$ **D.** $y^{\frac{3}{5}}$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 6

Beanstalk Bonnie

Climbs a beanstalk that doubles: exponential functions. Lessons 7.4, 7.5. Battle it: play.mathbound.org/alg1/?practice=exp.functions

9 Lesson 7.4

Kim says $y = 3\,(2)^x$ at $x = 2$ is $6^2 = 36$. What is the correct value?

A. 36 **B.** 18

C. 12 **D.** 6

WORK

10 Lesson 7.5

The number of fish in a lake is $P = 1200(0.9)^t$, where t counts years. To the nearest hundredth of a percent, what is its monthly rate of decay?

A. decay of 71.76% a month

B. decay of 0.87% a month

C. decay of 10% a month

D. decay of 0.83% a month

WORK



FOE 5 OF 6

Bubble Doubler

Every bubble splits in two: geometric sequences. Lesson 7.6. Battle it: play.mathbound.org/alg1/?practice=seq.geometric

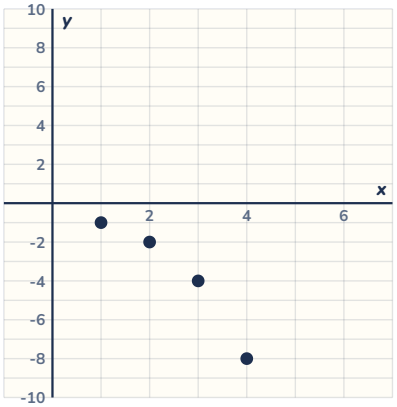
11 Lesson 7.6

The graph shows the first four terms of a geometric sequence. What is the fifth term?

A. -12 **B.** -16

C. 16 **D.** -32

WORK



12 Lesson 7.6

A geometric sequence with a positive common ratio has $a_1 = 4$ and $a_3 = 64$. Write an explicit rule for a_n.

A. $a_n = 64\,(4)^{n-1}$ **B.** $a_n = 4\,(4)^n$ **C.** $a_n = 4\,(16)^{n-1}$ **D.** $a_n = 4\,(4)^{n-1}$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 6 OF 6

Same-Base Sam

Stacks towers on matching bases: exponential equations with a common base. Lesson 7.7. Battle it:
play.mathbound.org/alg1/?practice=exp.equations

13 Lesson 7.7

The table shows $y = 3\,(2)^x$. For what value of x is $y = 384$?

x	0	1	2	3
y	3	6	12	24

A. $x = 7$ **B.** $x = 64$ **C.** $x = 192$ **D.** $x = 6$

WORK

14 Lesson 7.7

Solve: $8^x = \frac{1}{4}$

A. $x = \frac{-2}{3}$ **B.** $x = -2$ **C.** $x = \frac{-3}{2}$ **D.** $x = \frac{2}{3}$

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 7: Exponents and Exponential Functions

Each answer is followed by its worked steps, as the game shows them after a battle.

Balloon Bundler

1. C: 7^7

1. Multiplying powers of the same base adds the exponents.
2. The base stays 7: $7^2 \cdot 7^5 = 7^7$.

2. A: 2

1. The coefficient raised to the 2 must give 4.
2. $2^2 = 4$, so the box holds 2.

3. B: $3a^3b^4$

1. Coefficients multiply; each variable's exponents add separately.
2. $\frac{3}{2} \cdot 2 = 3$; a: $2 + 1$; b: $1 + 3$.

Whale-and-Flea Wanda

4. B: $\frac{1}{y^3}$

1. A negative exponent means a reciprocal, not a negative number.
2. $y^{-3} = \frac{1}{y^3}$.

5. B: $4.76 \cdot 10^{-6}$

1. A number smaller than one has a negative power of ten.
2. The decimal point moves 6 places, so $4.76 \cdot 10^{-6}$.

6. A: $4.7 \cdot 10^{-5}$

1. To add or subtract, first rewrite one number so both have the same power of ten.
2. $9 \cdot 10^{-6} = 0.9 \cdot 10^{-5}$.
3. $5.6 - 0.9 = 4.7$, so $4.7 \cdot 10^{-5}$.

Sprout-Root Sid

7. C: 2

1. An exponent of one over 3 is the $3th$ root: $8^{\frac{1}{3}} = \sqrt[3]{8}$.
2. That is 2.

8. C: $y^{\frac{1}{5}}$

1. Dividing subtracts the exponents: $\frac{2}{5} - \frac{1}{5}$.
2. That is $\frac{1}{5}$.

Beanstalk Bonnie

9. C: 12

1. The power belongs to the base 2 only: $2^2 = 4$.
2. $3 \cdot 4 = 12$.

10. B: decay of 0.87% a month

1. A month is $\frac{1}{12}$ of a year, so the monthly factor is $(0.9)^{\frac{1}{12}} \approx 0.9913$.
2. That is decay of about 0.87% a month −− not 0.83%, since the months compound.

Bubble Doubler

11. B: -16

1. Each point is 2 times the one before.
2. $-8 \cdot 2 = -16$.

12. D: $a_n = 4\,(4)^{n-1}$

1. Two steps lead from a_1 to a_3: $r^2 = \frac{64}{4} = 16$, so $r = 4$.
2. $a_n = a_1 r^{n-1}$: $a_n = 4\,(4)^{n-1}$.

Same-Base Sam

13. A: $x = 7$

1. Keep multiplying by 2: 3, 6, 12, 24, 48, 96, 192, 384.
2. $y = 384$ when $x = 7$.

14. A: $x = \frac{-2}{3}$

1. $\frac{1}{4} = 2^{-2}$ and $8 = 2^3$.
2. $3x = -2$, so $x = \frac{-2}{3}$.

© 2026 Germ Studios LLC · free to copy for class

BATTLE SHEET · CHAPTER 8

Polynomials and Factoring

MathBound Standard Algebra 1 · Island 8: Sunsail Archipelago

Name _____ Class _____ Date _____

The foes of Sunsail Archipelago are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Tile Sorter

Sorts tiles by shape: adding and subtracting polynomials.

Problems 1–2 · Lesson 8.1 · Battle it online: **play.mathbound.org/alg1/?practice=r6.add-and-subtract-polynomials**



Box Loom

Weaves rows by columns into a box: multiplying polynomials.

Problems 3–4 · Lesson 8.2 · Battle it online: **play.mathbound.org/alg1/?practice=r6.multiply-polynomials**



Magnet Max

Pulls the shared piece out of everything: the greatest common factor and grouping.

Problems 5–6 · Lesson 8.4 · Battle it online: **play.mathbound.org/alg1/?practice=r7.greatest-common-factor-and-grouping**



Nutcracker Nick

Cracks a trinomial into two binomials: factoring x squared plus bx plus c.

Problems 7–8 · Lesson 8.5 · Battle it online: **play.mathbound.org/alg1/?practice=r7.factor-trinomials-x2-bx-c**



Clamshell Clem

A clam that opens into two halves: factoring ax squared plus bx plus c.

Problems 9–10 · Lesson 8.6 · Battle it online: **play.mathbound.org/alg1/?practice=r7.factor-trinomials-ax2-bx-c**



Toolbox Tinker

Picks the right tool every time: the general factoring strategy.

Problems 11–12 · Lesson 8.7 · Battle it online: **play.mathbound.org/alg1/?practice=r7.general-factoring-strategy**



Zero-Door Doorman

Two doors, and one of them must be open: the zero product property.

Problems 13–14 · Lesson 8.8 · Battle it online: **play.mathbound.org/alg1/?practice=r7.quadratic-equations**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 8 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 7

Tile Sorter

Sorts tiles by shape: adding and subtracting polynomials. Lesson 8.1. Battle it:
play.mathbound.org/alg1/?practice=r6.add-and-subtract-polynomials

1 Lesson 8.1

Which of these is a monomial?

A. $-8a^5 - 4a^4$

B. $9a^3 - 3a$

C. $-6a^5$

D. $-9a^4 + a^2 + a$

WORK

2 Lesson 8.1

Subtract $(-6a^2b - 5ab^2)$ from $(3a^2b - ab^2)$.

A. $13a^2b$

B. $-3a^2b - 6ab^2$

C. $9a^2b + 4ab^2$

D. $9a^2b - 6ab^2$

WORK



FOE 2 OF 7

Box Loom

Weaves rows by columns into a box: multiplying polynomials. Lesson 8.2. Battle it:
play.mathbound.org/alg1/?practice=r6.multiply-polynomials

3 Lesson 8.2

Multiply: $6x(6x^2 - 5x - 4)$

A. $36x^3 - 30x^2 - 24x$

B. $36x^3 - 5x^2 - 4x$

C. $36x^2 - 30x - 24$

D. $36x^3 - 30x^2 - 4x$

WORK

4 Lesson 8.2

What is the coefficient of x^2 when $(x^2 + x - 2)(x^2 - 4x - 6)$ is multiplied out?

A. -12

B. -4

C. -8

D. -3

WORK



FOE 3 OF 7

Magnet Max

Pulls the shared piece out of everything: the greatest common factor and grouping. Lesson 8.4. Battle it:
play.mathbound.org/alg1/?practice=r7.greatest-common-factor-and-grouping

5 Lesson 8.4

Find the GCF of 51 and 34.

A. 85

B. 34

C. 102

D. 17

WORK

6 Lesson 8.4

Factor: $2x^2 - 7x + 6x - 21$

A. $(x + 3)(2x - 7)$

B. $(x - 7)(2x + 3)$

C. $(x - 3)(2x + 7)$

D. $(x + 4)(2x - 8)$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 7

Nutcracker Nick

Cracks a trinomial into two binomials: factoring x squared plus bx plus c. Lesson 8.5. Battle it:
play.mathbound.org/alg1/?practice=r7.factor-trinomials-x2-bx-c

7 Lesson 8.5

For $x^2 + 15x + 56$, the numbers 7 and 8 multiply to 56 and add to 15. Which factoring do they give?

A. $(x + 15)(x + 56)$ **B.** $(x - 8)(x - 7)$

C. $(x + 8)(x + 7)$ **D.** $(x + 8)(x - 7)$

WORK

8 Lesson 8.5

Factor: $-x^2 + 7 - 6x$

A. $(x + 7)(x - 1)$ **B.** $-(x - 7)(x - 1)$

C. $-(x - 7)(x + 1)$ **D.** $-(x + 7)(x - 1)$

WORK



FOE 5 OF 7

Clamshell Clem

A clam that opens into two halves: factoring ax squared plus bx plus c. Lesson 8.6. Battle it:
play.mathbound.org/alg1/?practice=r7.factor-trinomials-ax2-bx-c

9 Lesson 8.6

Factor: $3x^2 + 10x - 8$

A. $(3x - 2)(x + 4)$ **B.** $(3x - 1)(x + 3)$

C. $(3x + 4)(x - 2)$ **D.** $(3x + 2)(x - 4)$

WORK

10 Lesson 8.6

To factor $-4x^2 - 13x + 35$ by grouping, which two numbers multiply to -140 and add to -13?

A. -20 and -7 **B.** -7 and 20

C. -20 and 7 **D.** 7 and 20

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 6 OF 7

Toolbox Tinker

Picks the right tool every time: the general factoring strategy. Lesson 8.7. Battle it:
play.mathbound.org/alg1/?practice=r7.general-factoring-strategy

11 Lesson 8.7

After taking out the GCF of $2xy + 10x + 8y + 40$, which method finishes the factoring?

A. Perfect square trinomial

B. Factoring by grouping

C. Trinomial factoring

D. Difference of squares

WORK

12 Lesson 8.7

Which of these cannot be factored with integer coefficients?

A. $x^2 + 2xy - 3y^2$ **B.** $x^2 - 9xy + 20y^2$

C. $x^2 - 7xy - 6y^2$ **D.** $x^2 - 4xy + 3y^2$

WORK



FOE 7 OF 7

Zero-Door Doorman

Two doors, and one of them must be open: the zero product property. Lesson 8.8. Battle it:
play.mathbound.org/alg1/?practice=r7.quadratic-equations

13 Lesson 8.8

Solve: $(x + 2)(x - 4) = 0$

A. $x = -2$ or $x = 4$

B. $x = -4$ or $x = -2$

C. $x = -4$ or $x = 2$

D. $x = 2$ or $x = 4$

WORK

14 Lesson 8.8

Solve: $(3x + 4)^2 = 60x - 16$

A. $x = \frac{-8}{3}$ or $x = \frac{-4}{3}$

B. $x = \frac{-4}{3}$ or $x = \frac{8}{3}$

C. $x = \frac{4}{3}$ or $x = \frac{8}{3}$

D. $x = \frac{-4}{3}$

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 8: Polynomials and Factoring

Each answer is followed by its worked steps, as the game shows them after a battle.

Tile Sorter

1. C: $-6a^5$

1. A monomial has one term, a binomial two and a trinomial three; terms are separated by $+$ and $-$ signs.
2. $-6a^5$ has 1 term.

2. C: $9a^2b + 4ab^2$

1. "From" names the polynomial that comes first: $\left(3a^2b - ab^2\right) - \left(-6a^2b - 5ab^2\right)$.
2. a^2b and ab^2 are different variable parts, so they stay apart.
3. That gives $9a^2b + 4ab^2$.

Box Loom

3. A: $36x^3 - 30x^2 - 24x$

1. Multiply $6x$ by each term inside.
2. Every exponent goes up by one: $36x^3 - 30x^2 - 24x$.

4. A: -12

1. x^2 comes three ways: $x^2 \cdot -6$, $x \cdot -4x$ and $-2 \cdot x^2$.
2. $-6 + -4 + -2 = -12$.

Magnet Max

5. D: 17

1. $51 = 17 \cdot 3$ and $34 = 17 \cdot 2$.
2. 3 and 2 share no factor, so the GCF is 17.

6. A: $(x + 3)(2x - 7)$

1. Group: $(2x^2 - 7x) + (6x - 21)$.
2. That is $x(2x - 7) + 3(2x - 7) = (x + 3)(2x - 7)$.

Nutcracker Nick

7. C: $(x + 8)(x + 7)$

1. $7 \cdot 8 = 56$ and $7 + 8 = 15$.
2. They are the constants of the brackets: $(x + 8)(x + 7)$.

8. D: $-(x + 7)(x - 1)$

1. Write it in standard form first: $-x^2 - 6x + 7$.
2. The x^2 term is negative, so take out -1 first: $-(x^2 + 6x - 7)$.
3. Then factor what is left: $-(x + 7)(x - 1)$.

Clamshell Clem

9. A: $(3x - 2)(x + 4)$

1. $a \cdot c = -24$, and two numbers multiplying to that and adding to 10 split the middle term.
2. Grouping then gives $(3x - 2)(x + 4)$.

10. C: -20 and 7

1. $a \cdot c = -140$, and the middle coefficient is -13.
2. $7 \cdot -20 = -140$ and $7 + (-20) = -13$, so the numbers are -20 and 7.

Toolbox Tinker

11. B: Factoring by grouping

1. Take out 2: $2(xy + 5x + 4y + 20)$.
2. What is left has 4 terms, so use Factoring by grouping.

12. C: $x^2 - 7xy - 6y^2$

1. For $x^2 - 7xy - 6y^2$, no two whole numbers multiply to -6 and add to -7.
2. Each of the others has such a pair, so $x^2 - 7xy - 6y^2$ is prime.

Zero-Door Doorman

13. A: $x = -2$ or $x = 4$

1. If a product is zero, one of its factors is zero.
2. $x + 2 = 0$ gives $x = -2$, and the other gives $x = 4$.

14. C: $x = \frac{4}{3}$ or $x = \frac{8}{3}$

1. Expand the square: $9x^2 + 24x + 16 = 60x - 16$.
2. Collect on the left: $9x^2 - 36x + 32 = 0$, which gives $x = \frac{4}{3}$ or $x = \frac{8}{3}$.

© 2026 Germ Studios LLC · free to copy for class



BATTLE SHEET · CHAPTER 9

Quadratic Functions

MathBound Standard Algebra 1 · Island 9: Thunderhead Rookery

Name _____ Class _____ Date _____

The foes of Thunderhead Rookery are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Arc Kite

A kite on a parabola-shaped frame: graphing parabolas, the vertex and the axis.

Problems 1–3 · Lessons 9.1–9.6 · Battle it online: **play.mathbound.org/alg1/?practice=r10.graph-quadratic-equations**



Fountain Fiona

Her fountain arcs in every form: vertex, intercept and standard form.

Problems 4–6 · Lessons 9.1–9.4 · Battle it online: **play.mathbound.org/alg1/?practice=quad.forms**



Pace Snail

Leaves an even mark at every step: rate of change.

Problems 7–8 · Lesson 9.5 · Battle it online: **play.mathbound.org/alg1/?practice=fn.rate-of-change**



Peak Peeper

Spots the peaks, valleys and zeros of a graph: reading graphs of functions.

Problems 9–11 · Lesson 9.6 · Battle it online: **play.mathbound.org/alg1/?practice=fn.graphs**



Growth Racer

Races a steady car, a curving one and a rocket: linear, quadratic and exponential models.

Problems 12–14 · Lesson 9.7 · Battle it online: **play.mathbound.org/alg1/?practice=fn.models**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 9 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 5

Arc Kite

A kite on a parabola-shaped frame: graphing parabolas, the vertex and the axis. Lessons 9.1–9.6. Battle it:
play.mathbound.org/alg1/?practice=r10.graph-quadratic-equations

1 Lesson 9.1

Does the graph of $y = 4x^2 + 2x - 8$ open upward or downward?

A. Opens downward

B. It is a straight line

C. It opens to the right

D. Opens upward

WORK

2 Lesson 9.2

Which is $y = x^2 + 7x + 6$ written in vertex form?

A. $y = \left(x + \frac{7}{2}\right)^2 + 6$

B. $y = \left(x - \frac{7}{2}\right)^2 - \frac{25}{4}$

C. $y = (x + 7)^2 - 43$

D. $y = \left(x + \frac{7}{2}\right)^2 - \frac{25}{4}$

WORK

3 Lesson 9.5

A cinema charges 11 dollars a ticket and sells 90 tickets a night. For each $1-$dollar cut in price, it sells 10 more tickets. What is the greatest possible nightly revenue, in dollars?

A. 10 **B.** 960 **C.** 990 **D.** 1000

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 5

Fountain Fiona

Her fountain arcs in every form: vertex, intercept and standard form. Lessons 9.1–9.4. Battle it: **play.mathbound.org/alg1/?practice=quad.forms**

4 Lesson 9.1

$f(x) = x^2$ and $g(x) = f(x) - 4$. How does the graph of g compare to the graph of f?

A. a shift up 4 units

B. a shift right 4 units

C. a shift down 4 units

D. a shift left 4 units

WORK

5 Lesson 9.3

How does the graph of $y = (x - 4)^2$ compare to the graph of $y = x^2$?

A. a shift left 4 units

B. a shift up 4 units

C. a shift right 4 units

D. a shift down 4 units

WORK

6 Lesson 9.4

What is the vertex of $y = -(x + 9)(x - 1)$?

A. $(4, 25)$ **B.** $(-4, 25)$ **C.** $(-9, 1)$ **D.** $(-4, -25)$

WORK



FOE 3 OF 5

Pace Snail

Leaves an even mark at every step: rate of change. Lesson 9.5. Battle it: **play.mathbound.org/alg1/?practice=fn.rate-of-change**

7 Lesson 9.5

The table shows a quadratic function f. What is the average rate of change of f from $x = 1$ to $x = 3$?

x	1	2	3	4	5
y	2	6	12	20	30

A. 10 **B.** 5 **C.** 4 **D.** -5

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 3 OF 5

Pace Snail (continued)

Leaves an even mark at every step: rate of change. Lesson 9.5. Battle it: **play.mathbound.org/alg1/?practice=fn.rate-of-change**

8

Lesson 9.5

Over which interval is the average rate of change of $f(x) = x^2 - 4x + 6$ equal to 0?

A. from $x = -5$ to $x = 1$

B. from $x = -1$ to $x = 6$

C. from $x = 2$ to $x = 8$

D. from $x = -1$ to $x = 5$

WORK



FOE 4 OF 5

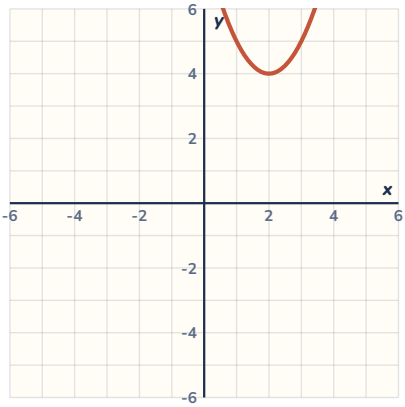
Peak Peeper

Spots the peaks, valleys and zeros of a graph: reading graphs of functions. Lesson 9.6. Battle it: **play.mathbound.org/alg1/?practice=fn.graphs**

9

Lesson 9.6

What is the minimum value of the function graphed?



A. 4

B. -4

C. 5

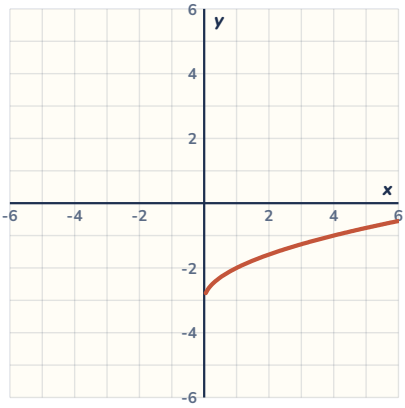
D. 2

WORK

10

Lesson 9.6

What is the range of the function graphed?



A. $y \geq 0$

B. $y \leq -3$

C. $x \geq 0$

D. $y \geq -3$

WORK

© 2026 Germ Studios LLC · free to copy for class



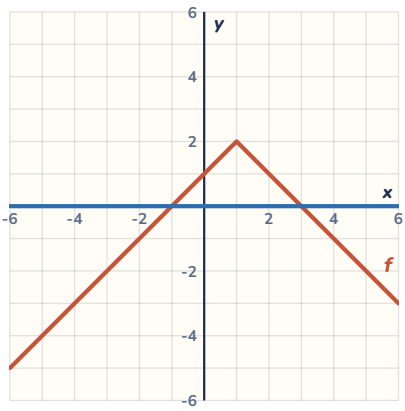
FOE 4 OF 5

Peak Peeper (continued)

Spots the peaks, valleys and zeros of a graph: reading graphs of functions. Lesson 9.6. Battle it:
play.mathbound.org/alg1/?practice=fn.graphs

11 Lesson 9.6

The graphs of f and $y = 0$ are shown. What are the solutions of $f(x) = 0$?



A. $x = 1$

B. $x = -2$ and $x = 4$

C. $x = -3$ and $x = 1$

D. $x = -1$ and $x = 3$

WORK



FOE 5 OF 5

Growth Racer

Races a steady car, a curving one and a rocket: linear, quadratic and exponential models. Lesson 9.7. Battle it:
play.mathbound.org/alg1/?practice=fn.models

12 Lesson 9.7

A sensor takes a reading every minute. The readings are $4, 12, 36, 108, 324$. What kind of function fits the readings?

A. exponential

B. linear

C. quadratic

D. absolute value

WORK

13 Lesson 9.7

The table is quadratic. What is y when $x = 5$?

x	0	1	2	3	4
y	2	0	-4	-10	-18

A. -20

B. -30

C. -28

D. -26

WORK

© 2026 Germ Studios LLC · free to copy for class



GROWTH RACER (continued)

Races a steady car, a curving one and a rocket: linear, quadratic and exponential models. Lesson 9.7. Battle it:
play.mathbound.org/alg1/?practice=fn.models

14 Lesson 9.7

Ana puts $2,100 in an account that earns 6% interest a year, compounded. Ben puts $3,600 in a box and adds $125 each year. After how many whole years does Ana first have more than Ben?

A. 19 **B.** 18 **C.** 17 **D.** 16

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 9: Quadratic Functions

Each answer is followed by its worked steps, as the game shows them after a battle.

Arc Kite

1. **D**: Opens upward

1. The direction depends only on the sign of the x^2 coefficient.
2. Here $a = 4$, which is positive, so it opens upward.

2. **D**: $y = \left(x + \frac{7}{2}\right)^2 - \frac{25}{4}$

1. Half of 7 is $\frac{7}{2}$; its square is $\frac{49}{4}$.
2. Add and subtract it: $y = \left(x + \frac{7}{2}\right)^2 - \frac{25}{4}$.

3. **D**: 1000

1. With x cuts of 1 dollar, $R = (11 - x)(90 + 10x) = -10x^2 + 20x + 990$.
2. The vertex is at $x = \frac{-20}{-20} = 1$, a price of 10 dollars.
3. $R = 10 \cdot 100 = 1000$ dollars.

Fountain Fiona

4. **C**: a shift down 4 units

1. Adding to $f(x)$ changes every output, so the graph moves vertically.
2. So it is a shift down 4 units.

5. **C**: a shift right 4 units

1. A number inside the square moves the graph horizontally, the opposite way to its sign.
2. So it is a shift right 4 units.

6. **B**: $(-4, 25)$

1. The vertex is on the axis $x = -4$, halfway between -9 and 1.
2. $y = - \cdot 5 \cdot (-5) = 25$, so the vertex is $(-4, 25)$.

Pace Snail

7. **B**: 5

1. $f(3) = 12$ and $f(1) = 2$.
2. Average rate $= \frac{12 - 2}{3 - 1} = 5$.

8. **D**: from $x = -1$ to $x = 5$

1. The average rate is 0 when f has the same value at both ends.
2. The vertex is at $x = 2$, and $f(-1) = f(5) = 11$, so the interval is from $x = -1$ to $x = 5$.

Peak Peeper

9. **A**: 4

1. The minimum is the y-value of the vertex, the lowest point.
2. The vertex is $(2, 4)$, so the minimum value is 4.

10. **D**: $y \geq -3$

1. The graph starts at $(0, -3)$ and rises without end.
2. So the range is $y \geq -3$.

11. **D**: $x = -1$ and $x = 3$

1. The solutions are the x-values where the graph of f meets the line $y = 0$.
2. They meet at $(-1, 0)$ and $(3, 0)$, so $x = -1$ and $x = 3$.

Growth Racer

12. **A**: exponential

1. The differences $(8, 24, 72, 216)$ change, but each y is 3 times the one before.
2. A constant ratio means the table is exponential.

13. **C**: -28

1. First differences: $-2, -4, -6, -8$. The second difference is -2.
2. The next first difference is $-8 - 2 = -10$.
3. So $y = -18 - 10 = -28$.

14. **B**: 18

1. After y years Ana has $2{,}100(1.06)^y$ dollars and Ben has $3{,}600 + 125y$.
2. After 17 years: Ana \$5654.82, Ben \$5,725. After 18: Ana \$5994.11, Ben \$5,850.

© 2026 Germ Studios LLC · free to copy for class





BATTLE SHEET · CHAPTER 10

Solving Quadratic Equations

MathBound Standard Algebra 1 · Island 10: Copperroot Hollow

Name _____ Class _____ Date _____

The foes of Copperroot Hollow are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Wishbone Bot

A wishbone that splits into plus and minus: the square root property.

Problems 1–3 · Lesson 10.1 · Battle it online: **play.mathbound.org/alg1/?practice=r10.square-root-property**



Corner Patcher

Patches the missing corner of a square: completing the square.

Problems 4–6 · Lesson 10.2 · Battle it online: **play.mathbound.org/alg1/?practice=r10.complete-the-square**



Plus-Minus Pendulum

Swings to both sides: the quadratic formula and the discriminant.

Problems 7–9 · Lesson 10.3 · Battle it online: **play.mathbound.org/alg1/?practice=r10.quadratic-formula**



Catapult Kit

Lobs a ball in a perfect arc: projectile and area problems.

Problems 10–12 · Lesson 10.4 · Battle it online: **play.mathbound.org/alg1/?practice=r10.quadratic-applications**



Swingline Spider

One straight thread, one swinging arc: a line and a parabola.

Problems 13–14 · Lesson 10.5 · Battle it online: **play.mathbound.org/alg1/?practice=quad.systems**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 10 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 5

Wishbone Bot

A wishbone that splits into plus and minus: the square root property. Lesson 10.1. Battle it:
play.mathbound.org/alg1/?practice=r10.square-root-property

1 Lesson 10.1

Solve: $x^2 = \frac{49}{16}$

A. $x = \pm\frac{49}{4}$ **B.** $x = \pm\frac{7}{16}$

C. $x = \frac{7}{4}$ **D.** $x = \pm\frac{7}{4}$

WORK

2 Lesson 10.1

Solve: $(x+8)^2 = 80$

A. $x = 8 \pm 4\sqrt{5}$ **B.** $x = -8 \pm 16\sqrt{5}$

C. $x = -8 \pm 4\sqrt{5}$ **D.** $x = -8 + 4\sqrt{5}$

WORK

3 Lesson 10.1

Two squares have a total area of 45 square centimeters. The side of the larger is 2 times the side of the smaller. How long, in centimeters, is a side of the smaller square?

A. 6 **B.** 9 **C.** ± 3 **D.** 3

WORK



FOE 2 OF 5

Corner Patcher

Patches the missing corner of a square: completing the square. Lesson 10.2. Battle it:
play.mathbound.org/alg1/?practice=r10.complete-the-square

4 Lesson 10.2

What constant completes the square for $x^2 + \frac{2}{7}x$?

A. $\frac{1}{49}$ **B.** $\frac{2}{7}$

C. $\frac{4}{49}$ **D.** $\frac{1}{7}$

WORK

5 Lesson 10.2

Solve by completing the square:
$3x^2 - 27x + 60 = 0$

A. $x = 5$

B. $x = -5$ or $x = -4$

C. $x = 15$ or $x = 12$

D. $x = 5$ or $x = 4$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 5

Corner Patcher (continued)

Patches the missing corner of a square: completing the square. Lesson 10.2. Battle it:
play.mathbound.org/alg1/?practice=r10.complete-the-square

6 Lesson 10.2

Solve by completing the square: $x\,(x-4) = -2x + 9$

A. $x = 2 \pm \sqrt{13}$ **B.** $x = 1 \pm 2\sqrt{2}$ **C.** $x = -1 \pm \sqrt{10}$ **D.** $x = 1 \pm \sqrt{10}$

WORK



FOE 3 OF 5

Plus-Minus Pendulum

Swings to both sides: the quadratic formula and the discriminant. Lesson 10.3. Battle it:
play.mathbound.org/alg1/?practice=r10.quadratic-formula

7 Lesson 10.3

For $6x^2 - 2x - 6 = 0$, name a, b and c.

A. $a = 6, b = -6, c = -2$

B. $a = 6, b = 2, c = -6$

C. $a = -2, b = 6, c = -6$

D. $a = 6, b = -2, c = -6$

WORK

8 Lesson 10.3

Solve: $\frac{x^2}{4} - \frac{5}{4}x = -1$

A. $x = 16$ or $x = 4$

B. $x = 4$

C. $x = 4$ or $x = 1$

D. $x = -1$ or $x = -4$

WORK

9 Lesson 10.3

For what value of k does $kx^2 - 72x + 9 = 0$ have exactly one real solution?

A. 576 **B.** -144 **C.** 36 **D.** 144

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 5

Catapult Kit

Lobs a ball in a perfect arc: projectile and area problems. Lesson 10.4. Battle it:
play.mathbound.org/alg1/?practice=r10.quadratic-applications

10 Lesson 10.4

The product of two consecutive positive integers is 89 more than their sum. Find them.

A. 10 and 11 **B.** 11 and 12

C. 9 and 10 **D.** 44 and 45

WORK

11 Lesson 10.4

One leg of a right triangle is 3 units long. The hypotenuse is 1 unit longer than the other leg. How long is the hypotenuse?

A. 4 units **B.** 5 units

C. 6 units **D.** 7 units

WORK

12 Lesson 10.4

An arrow is shot upward. Its height in feet after t seconds is $h = -16t^2 + 96t + 29$. To the nearest tenth of a second, when does it first reach a height of 121 feet?

A. 3 seconds **B.** 0.8 seconds **C.** 4.8 seconds **D.** 1.2 seconds

WORK



FOE 5 OF 5

Swingline Spider

One straight thread, one swinging arc: a line and a parabola. Lesson 10.5. Battle it:
play.mathbound.org/alg1/?practice=quad.systems

13 Lesson 10.5

A quadratic f and a linear g take these values. For which values of x is $f(x) = g(x)$?

x	1	2	3	4	5	6
$f(x)$	1	3	3	1	-3	-9
$g(x)$	1	2	3	4	5	6

A. $x = 1$ **B.** $x = 1$ and $x = 3$ **C.** $x = 3$ **D.** $x = 2$ and $x = 4$

WORK

© 2026 Germ Studios LLC · free to copy for class



Swingline Spider (continued)

One straight thread, one swinging arc: a line and a parabola. Lesson 10.5. Battle it:
play.mathbound.org/alg1/?practice=quad.systems

14 Lesson 10.5

Setting $y = 3x^2 + 8x + 4$ equal to $y = 4x$ gives a quadratic equation. What is its discriminant?

A. -8 **B.** 64 **C.** 16 **D.** -32

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 10: Solving Quadratic Equations

Each answer is followed by its worked steps, as the game shows them after a battle.

Wishbone Bot

1. D: $x = \pm\frac{7}{4}$

1. Take the square root of both sides, top and bottom separately.
2. $\sqrt{49} = 7$ and $\sqrt{16} = 4$, so $x = \pm\frac{7}{4}$.

2. C: $x = -8 \pm 4\sqrt{5}$

1. Take the root of both sides: $x + 8 = \pm\sqrt{80}$.
2. $\sqrt{80}$ simplifies to $4\sqrt{5}$.
3. So $x = -8 \pm 4\sqrt{5}$.

3. D: 3

1. With the smaller side x, the larger is $2x$, so $x^2 + (2x)^2 = 45$.
2. $5x^2 = 45$, so $x^2 = 9$ and $x = \pm 3$.
3. A length is positive, so the side is 3 centimeters.

Corner Patcher

4. A: $\frac{1}{49}$

1. Half of $\frac{2}{7}$ is $\frac{1}{7}$.
2. Then square it: $\left(\frac{1}{7}\right)^2 = \frac{1}{49}$.

5. D: $x = 5$ or $x = 4$

1. Divide every term by 3: $x^2 - 9x + 20 = 0$.
2. Move 20 across and add $\frac{81}{4}$: $\left(x - \frac{9}{2}\right)^2 = \frac{1}{4}$.
3. That gives $x = 5$ or $x = 4$.

6. D: $x = 1 \pm \sqrt{10}$

1. Expand and gather: $x^2 - 2x = 9$.
2. Add 1 to both sides: $(x - 1)^2 = 10$.
3. Take the root and simplify: $x = 1 \pm \sqrt{10}$.

Plus-Minus Pendulum

7. D: $a = 6, b = -2, c = -6$

1. a is the coefficient of x^2, b the coefficient of x, c the constant.
2. The sign belongs to the coefficient, so $b = -2$ and $c = -6$.

8. C: $x = 4$ or $x = 1$

1. Multiply every term by 4: $x^2 - 5x = -4$.
2. Bring it across: $x^2 - 5x + 4 = 0$.
3. That factors, so $x = 4$ or $x = 1$.

9. D: 144

1. One solution means the discriminant is zero: $(-72)^2 - 4 \cdot k \cdot 9 = 0$.
2. $5184 = 36k$, so $k = \frac{5184}{36} = 144$.

Catapult Kit

10. A: 10 and 11

1. $n(n + 1) = n + (n + 1) + 89$.
2. That is $n^2 - n - 90 = 0$, giving $n = 10$.
3. The integers are 10 and 11.

11. B: 5 units

1. Let the other leg be x: $3^2 + x^2 = (x + 1)^2$.
2. The x^2 terms cancel: $9 = 2x + 1$, so $x = 4$.
3. The hypotenuse is $4 + 1 = 5$ units.

12. D: 1.2 seconds

1. Set $h = 121$ and bring it across: $-16t^2 + 96t - 92 = 0$.
2. $t = \frac{-96 \pm \sqrt{3328}}{-32}$, so $t \approx 1.2$ or $t \approx 4.8$.
3. It first reaches that height on the way up, at about 1.2 seconds.

Swingline Spider

13. B: $x = 1$ and $x = 3$

1. Look along the table for columns where $f(x)$ and $g(x)$ are equal.
2. $f(1) = g(1) = 1$ and $f(3) = g(3) = 3$.
3. So $x = 1$ and $x = 3$.

14. D: -32

1. Set them equal and collect: $3x^2 + 4x + 4 = 0$.
2. $b^2 - 4ac = 16 - 48 = -32$.

© 2026 Germ Studios LLC · free to copy for class



BATTLE SHEET · CHAPTER 11

Radicals and More Functions

MathBound Standard Algebra 1 · Island 11: Skyglass Observatory

Name _____ Class _____ Date _____

The foes of Skyglass Observatory are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Carrot Bundler

Only bundles carrots of the same kind: adding and subtracting like radicals.

Problems 1–2 · Lesson 11.1 · Battle it online: **play.mathbound.org/alg1/?practice=r9.add-and-subtract-square-roots**



Root Grafter

Grafts roots together: multiplying square roots.

Problems 3–5 · Lesson 11.2 · Battle it online: **play.mathbound.org/alg1/?practice=r9.multiply-square-roots**



Stump Puller

Hauls a stump out roots and all: solving radical equations.

Problems 6–8 · Lesson 11.3 · Battle it online: **play.mathbound.org/alg1/?practice=r9.solve-radical-equations**



Family-Tree Fern

Keeps a locket of family portraits: parent functions.

Problems 9–10 · Lesson 11.4 · Battle it online: **play.mathbound.org/alg1/?practice=fn.families**



Hopscotch Hattie

Flat squares, then a jump: step functions.

Problems 11–12 · Lesson 11.5 · Battle it online: **play.mathbound.org/alg1/?practice=fn.step**



Mash-Up Marlo

Cranks two hoppers into one grinder: operations with functions.

Problems 13–14 · Lesson 11.6 · Battle it online: **play.mathbound.org/alg1/?practice=fn.operations**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 11 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Carrot Bundler

Only bundles carrots of the same kind: adding and subtracting like radicals. Lesson 11.1. Battle it:
play.mathbound.org/alg1/?practice=r9.add-and-subtract-square-roots

1 Lesson 11.1

Simplify: $3\sqrt{14} + 5\sqrt{14} - \sqrt{14}$

A. $9\sqrt{14}$ **B.** $7\sqrt{14}$

C. $-3\sqrt{14}$ **D.** $7\sqrt{42}$

WORK

2 Lesson 11.1

Simplify: $\sqrt{3x^3} - 2x\sqrt{27x}$

A. $7x\sqrt{3x}$ **B.** $-5x\sqrt{3x}$

C. $5x\sqrt{3x}$ **D.** $-x\sqrt{3x}$

WORK



FOE 2 OF 6

Root Grafter

Grafts roots together: multiplying square roots. Lesson 11.2. Battle it:
play.mathbound.org/alg1/?practice=r9.multiply-square-roots

3 Lesson 11.2

Multiply: $\sqrt{3} \cdot \sqrt{7}$

A. $\sqrt{21}$ **B.** 21

C. $3\sqrt{7}$ **D.** $\sqrt{10}$

WORK

4 Lesson 11.2

Multiply: $-4\sqrt{21} \cdot 2\sqrt{33}$

A. $-24\sqrt{77}$ **B.** $-8\sqrt{693}$

C. $24\sqrt{77}$ **D.** $-72\sqrt{77}$

WORK

5 Lesson 11.2

Multiply: $(\sqrt{y} - 2)^2$

A. $y + 4\sqrt{y} + 4$ **B.** $y - 4$ **C.** $y - 2\sqrt{y} + 4$ **D.** $y - 4\sqrt{y} + 4$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 3 OF 6

Stump Puller

Hauls a stump out roots and all: solving radical equations. Lesson 11.3. Battle it: play.mathbound.org/alg1/?practice=r9.solve-radical-equations

6 Lesson 11.3

Solve: $\sqrt{x} = \frac{3}{5}$

A. $x = \frac{9}{25}$ **B.** $x = \frac{3}{25}$

C. $x = \frac{9}{5}$ **D.** $x = \frac{3}{5}$

WORK

7 Lesson 11.3

Solve: $\sqrt{5x - 11} + 1 = x$

A. $x = 3$ or $x = 4$ **B.** $x = 2$ or $x = 3$

C. $x = 4$ **D.** $x = 3$

WORK

8 Lesson 11.3

Solve: $\sqrt{2x - 17} = \sqrt{x} + 2$

A. $x = 49$ **B.** $x = 49$ or $x = 9$ **C.** $x = 7$ **D.** $x = 9$

WORK



FOE 4 OF 6

Family-Tree Fern

Keeps a locket of family portraits: parent functions. Lesson 11.4. Battle it: play.mathbound.org/alg1/?practice=fn.families

9 Lesson 11.4

Its graph is a V-shape with a sharp corner at its vertex. Which parent function is it?

A. absolute value **B.** cube root

C. square root **D.** cubic

WORK

10 Lesson 11.4

$f(x) = x^3$ and $g(x) = f(x + 2) - 3$. What is the center of the graph of g?

A. $(-3, -2)$ **B.** $(-2, -3)$

C. $(-2, 3)$ **D.** $(2, -3)$

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 5 OF 6

Hopscotch Hattie

Flat squares, then a jump: step functions. Lesson 11.5. Battle it: **play.mathbound.org/alg1/?practice=fn.step**

11 Lesson 11.5

The number of full teams of 9 that n players can make is $T(n) = \lfloor \frac{n}{9} \rfloor$. Find $T(83)$.

A. 9 **B.** 8

C. 9.22 **D.** 10

WORK

12 Lesson 11.5

A garage charges \$4 for each hour or part of an hour. Jonah works out the charge for 2 hours 45 minutes as \$11.00. What should it be?

A. \$8 **B.** \$11.00

C. \$12 **D.** \$16

WORK



FOE 6 OF 6

Mash-Up Marlo

Cranks two hoppers into one grinder: operations with functions. Lesson 11.6. Battle it: **play.mathbound.org/alg1/?practice=fn.operations**

13 Lesson 11.6

$f(x) = -2x + 7$ and $g(x) = -6x + 2$. Find $(g - f)(x)$.

A. $-8x + 9$ **B.** $-4x + 9$

C. $4x + 5$ **D.** $-4x - 5$

WORK

14 Lesson 11.6

$f(x) = -2x + 8$ and $g(x) = 6x - 9$. For what value of x is $(f + g)(x) = -9$?

A. -2 **B.** -2.5

C. -8 **D.** 2

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 11: Radicals and More Functions

Each answer is followed by its worked steps, as the game shows them after a battle.

Carrot Bundler

1. B: $7\sqrt{14}$

1. The radicands match, so combine the coefficients only.
2. $3 + 5 - 1 = 7$.

2. B: $-5x\sqrt{3x}$

1. $\sqrt{3x^3} = x\sqrt{3x}$ and $2x\sqrt{27x} = 6x\sqrt{3x}$.
2. $1 - 6 = -5$, so the result is $-5x\sqrt{3x}$.

Root Grafter

3. A: $\sqrt{21}$

1. Roots multiply straight across: $3 \cdot 7 = 21$.
2. 21 has no square factor, so $\sqrt{21}$ is fully simplified.

4. A: $-24\sqrt{77}$

1. Coefficients: $-4 \cdot 2 = -8$. Roots: $\sqrt{693} = 3\sqrt{77}$.
2. $-8 \cdot 3\sqrt{77} = -24\sqrt{77}$.

5. D: $y - 4\sqrt{y} + 4$

1. The middle term is twice the product, and it is negative: $-4\sqrt{y}$.
2. The last term is positive, since a negative squared is positive: 4.

Stump Puller

6. A: $x = \dfrac{9}{25}$

1. Square both sides: $x = (\frac{3}{5})^2$.
2. Square the top and the bottom: $\dfrac{9}{25}$.

7. A: $x = 3$ or $x = 4$

1. Isolate: $\sqrt{5x - 11} = x - 1$.
2. Square: $5x - 11 = (x - 1)^2$, so $x^2 - 7x + 12 = 0$.
3. That factors as $(x - 3)(x - 4) = 0$, and both roots check.

8. A: $x = 49$

1. Square: $2x + -17 = x + 4\sqrt{x} + 4$, so $x - 21 = 4\sqrt{x}$.
2. In terms of $\sqrt{x}$: $(\sqrt{x})^2 - 4\sqrt{x} - 21 = 0$, so $\sqrt{x} = 7$ or -3.
3. A square root is never negative, so $\sqrt{x} = 7$ and $x = 49$.

Family-Tree Fern

9. A: absolute value

1. Match the description to the shape of each parent.
2. It describes the absolute value parent.

10. B: $(-2, -3)$

1. $g(x) = (x + 2)^3 - 3$: the graph of f moved left 2 and down 3.
2. $(0, 0)$ moves to $(-2, -3)$.

Hopscotch Hattie

11. A: 9

1. $\dfrac{83}{9}$ is about 9.22.
2. The greatest integer rounds it down: $T(83) = 9$. The players left over do not make a team.

12. C: \$12

1. Jonah charged for the exact time. A part of an hour counts as a whole hour.
2. 2 hours 45 minutes counts as 3 hours: $3 \cdot 4 = 12$.

Mash-Up Marlo

13. D: $-4x - 5$

1. $(g - f)(x)$ is $g(x) - f(x)$, in that order: $(-6x + 2) - (-2x + 7)$.
2. Combine like terms: $-4x - 5$.

14. A: -2

1. $(f + g)(x) = 4x - 1$.
2. Solve $4x - 1 = -9$: $x = -2$.

© 2026 Germ Studios LLC · free to copy for class



BATTLE SHEET · CHAPTER 12

Data Analysis

MathBound Standard Algebra 1 · Island 12: Galeheart Citadel

Name _____ Class _____ Date _____

The foes of Galeheart Citadel are out, and each one fights with its own kind of Algebra 1 problem. **Defeat each foe by solving its problems.** Show your work in the space on each card, then circle the letter of your answer.

The foes on this sheet



Fair-Share Otto

Levels every pile to a fair share: mean and median.

Problems 1–2 · Lesson 12.1 · Battle it online: **play.mathbound.org/alg1/?practice=stat.center**



Box-Whisker Cat

A box of a body with long whiskers: range, quartiles and the five-number summary.

Problems 3–5 · Lessons 12.2, 12.4 · Battle it online: **play.mathbound.org/alg1/?practice=stat.spread**



Sheepdog Sprocket

Measures how far each sheep strays from the middle: mean absolute deviation and standard deviation.

Problems 6–7 · Lesson 12.2 · Battle it online: **play.mathbound.org/alg1/?practice=stat.deviation**



Stem-and-Leaf Sprig

A clockwork plant of stems and leaves: kinds of data and stem-and-leaf plots.

Problems 8–10 · Lesson 12.3 · Battle it online: **play.mathbound.org/alg1/?practice=stat.data**



Table-Top Ted

A clockwork table with a grid on top: two-way tables.

Problems 11–12 · Lesson 12.5 · Battle it online: **play.mathbound.org/alg1/?practice=stat.two-way**



Ticker-Tape Tilly

Reads a long ticker tape: regression output.

Problems 13–14 · Lesson 12.6 · Battle it online: **play.mathbound.org/alg1/?practice=stat.regression**

> **For teachers.** 14 problems from MathBound's own question engine, on chapter 12 of MathBound Standard Algebra 1. The answer key, with worked steps, is at the end. Free to copy for your classes.
>
> Every foe here is also a battle in MathBound, the Algebra 1 adventure game: free for students, no sign-up, at **play.mathbound.org**. The link under each foe opens practice battles with it. Classes, progress by skill and assignments: **mathbound.org/teachers**.

© 2026 Germ Studios LLC · free to copy for class



FOE 1 OF 6

Fair-Share Otto

Levels every pile to a fair share: mean and median. Lesson 12.1. Battle it: **play.mathbound.org/alg1/?practice=stat.center**

1 Lesson 12.1

Students were asked how many pets they have. What is the mean number of pets?

Pets	0	1	2	3	4
Students	3	0	2	2	2

A. 18 **B.** 2 **C.** 3.6 **D.** 1.8

WORK

2 Lesson 12.1

A student's test scores are $73, 63, 71, 94$. What score on the next test makes the mean of all 5 scores exactly 80?

A. 76.2 **B.** 99 **C.** 19 **D.** 80

WORK



FOE 2 OF 6

Box-Whisker Cat

A box of a body with long whiskers: range, quartiles and the five-number summary. Lessons 12.2, 12.4. Battle it: **play.mathbound.org/alg1/?practice=stat.spread**

3 Lesson 12.2

The table shows how many goals a team scored in its games. What is the range of the goals scored?

Goals	0	1	2	3	4	5	6
Games	0	3	4	0	2	1	1

A. 5 **B.** 4 **C.** 6 **D.** 11

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 2 OF 6

Box-Whisker Cat (continued)

A box of a body with long whiskers: range, quartiles and the five-number summary. Lessons 12.2, 12.4. Battle it: play.mathbound.org/alg1/?practice=stat.spread

4 Lesson 12.4

The 10 test scores in a class are $54, 61, 64, 67, 78, 84, 91, 92, 94, 95$. What percent of the scores are less than 67?

A. 40%
B. 30%
C. 60%
D. 70%

WORK

5 Lesson 12.4

What is the third quartile of $9, -10, -18, -20, 2, 1, -20, 9, 27, -4, 14$?

A. 14
B. 1
C. 9
D. 27

WORK



FOE 3 OF 6

Sheepdog Sprocket

Measures how far each sheep strays from the middle: mean absolute deviation and standard deviation. Lesson 12.2. Battle it: play.mathbound.org/alg1/?practice=stat.deviation

6 Lesson 12.2

What is the mean absolute deviation (MAD) of $22, 24, 27, 19$?

A. 10
B. 3.33
C. 0
D. 2.5

WORK

7 Lesson 12.2

What is the standard deviation of $11, 5, 3, 11, 9, 9$? Divide by the number of values.

A. 54
B. 3
C. 3.29
D. 9

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 4 OF 6

Stem-and-Leaf Sprig

A clockwork plant of stems and leaves: kinds of data and stem-and-leaf plots. Lesson 12.3. Battle it:
play.mathbound.org/alg1/?practice=stat.data

8 Lesson 12.3

Why is this a statistical question? How tall are the trees in the park?

A. It has one correct answer

B. The answers vary, so the data will show variability

C. It starts with the word how

D. It asks for a number

WORK

9 Lesson 12.3

The stem-and-leaf plot shows the points a team scored in its games.

Stem	Leaf
4	0 3 8 9
5	
6	5
7	1 1 3 5 6 6

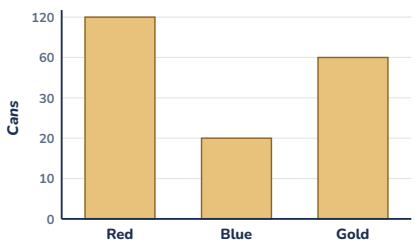
Key: 4|4 means 44. What is the interquartile range?

A. 75 **B.** 27 **C.** 36 **D.** 48

WORK

10 Lesson 12.3

The bar graph shows the cans each team collected for a food drive. How many times as many cans as the Gold team did the Red team collect?



A. 60 **B.** 1

C. 1.25 **D.** 2

WORK

© 2026 Germ Studios LLC · free to copy for class



FOE 5 OF 6

Table-Top Ted

A clockwork table with a grid on top: two-way tables. Lesson 12.5. Battle it: **play.mathbound.org/alg1/?practice=stat.two-way**

11 Lesson 12.5

What percent of all the viewers are children?

	Liked the film	Did not	Total
Adults	14	17	31
Children	15	4	19
Total	29	21	50

A. 62% **B.** 38% **C.** 58% **D.** 30%

WORK

12 Lesson 12.5

There are 50 adults, and 20% of them liked the film. In all, 20 viewers liked the film. What percent of the viewers who liked the film are adults?

A. 20% **B.** 14.3% **C.** 50% **D.** 28.6%

WORK



FOE 6 OF 6

Ticker-Tape Tilly

Reads a long ticker tape: regression output. Lesson 12.6. Battle it: **play.mathbound.org/alg1/?practice=stat.regression**

13 Lesson 12.6

A calculator fit a line to data on years since 2015(x) and tickets sold, in thousands (y).

LinReg
$y = ax + b$
$a = 3.1$
$b = 24.5$
$r^2 = 0.9409$
$r = 0.97$

What does the line predict for y when $x = 4$?

A. 36.9 **B.** 12.4 **C.** 101.1 **D.** -12.1

WORK

© 2026 Germ Studios LLC · free to copy for class

14

Lesson 12.6

A calculator fit a quadratic to the height of a ball in meters (y) against the time in seconds (x).

QuadReg
$y = ax^2 + bx + c$
$a = -4.9$
$b = 29.4$
$c = 1$
$r^2 = 0.98$

What does the value of c tell you?

A. The ball was about 1 meters high when it was thrown

B. The ball rose about 1 meters each second

C. The ball reached a greatest height of about 1 meters

D. The ball was highest after about 1 seconds

WORK

© 2026 Germ Studios LLC · free to copy for class

Answer key · Chapter 12: Data Analysis

Each answer is followed by its worked steps, as the game shows them after a battle.

Fair-Share Otto

1. B: 2

1. There are 9 students, with 18 pets between them.
2. $\frac{18}{9} = 2$.

2. B: 99

1. 5 scores with mean 80 add to 400.
2. $400 - 301 = 99$.

Box-Whisker Cat

3. A: 5

1. Only values that happened count: from 1 to 6 goals.
2. Range $= 6 - 1 = 5$.

4. B: 30%

1. 3 of the 10 scores are less than 67: count the values before it in the ordered list.
2. $\frac{3}{10} = 30\%$, so 67 sits at the $30th$ percentile of the class.

5. C: 9

1. In order: $-20, -20, -18, -10, -4, 1, 2, 9, 9, 14, 27$. The median is the $6th$ value, 1, and is left out of both halves.
2. The upper half is $2, 9, 9, 14, 27$, whose median is 9.

Sheepdog Sprocket

6. D: 2.5

1. The mean is $\frac{92}{4} = 23$.
2. The distances from the mean are $1, 1, 4, 4$.
3. MAD $= \frac{10}{4} = 2.5$.

7. B: 3

1. The mean is 8; the squared deviations add up to 54.
2. Variance: $\frac{54}{6} = 9$.
3. Standard deviation: $\sqrt{9} = 3$.

Stem-and-Leaf Sprig

8. B: The answers vary, so the data will show variability

1. What makes a question statistical is variability in its answers.
2. The answers vary, so the data will show variability

9. B: 27

1. Split the ordered values at the median: $Q1 = 48, Q3 = 75$.
2. IQR $= 75 - 48 = 27$.

10. D: 2

1. The marks on the scale are evenly spaced, but their numbers are not: $0, 10, 20, 30, 60, 120$. So read each bar's number, not its height.
2. The bars reach 60 and 120, so $\frac{120}{60} = 2$.

Table-Top Ted

11. B: 38%

1. The children row totals 19, out of 50 in all.
2. $\frac{19}{50} = 38\%$.

12. C: 50%

1. 20% of 50: 10 adults liked the film.
2. Out of the 20: $\frac{10}{20} = 50\%$.

Ticker-Tape Tilly

13. A: 36.9

1. The line is $y = 3.1x + 24.5$.
2. At $x = 4$: $3.1 \cdot 4 + 24.5 = 36.9$.

14. A: The ball was about 1 meters high when it was thrown

1. At $x = 0$ the model gives $y = c$: the height at the moment of the throw.
2. The ball was about 1 meters high when it was thrown

© 2026 Germ Studios LLC · free to copy for class