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**.

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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

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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

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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

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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

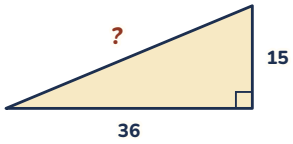
13

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

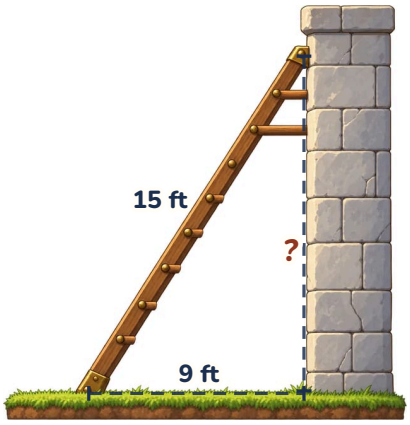
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Lesson 1.5

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

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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.

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