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**.

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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

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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

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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

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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 $x = \frac{8}{3}$.

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