



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**.

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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

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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

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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

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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

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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 $= 60 - 58.5 = 1.5$.

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