

Practice

STAMS[®]
series
Teacher Guide

H

Solve[™] STAMS[®]

Data Analysis and Probability

Geometry and Measurement

Algebra

Table of Contents

CONTENTS IN BRIEF

PROGRAM OVERVIEW	6
PART 1 Lesson Plans for Practices 1–16, Reviews 1–8.	21
PART 2 Reproducible Mini-Practices 17–23	83
INDIVIDUAL TRACKING CHART.	96

PROGRAM OVERVIEW

Classroom Math Intervention Program	6
Solve Overview	8
Pacing Charts	10
Features of a Solve Practice	14
Correlation Charts.	20
NCTM Focal Points and Connections	
Common Core State Standards	

PART 1 LESSON PLANS

Algebra



Expressions and Equations

Practice 1	Exponents	21
Practice 2	Square Roots	24
Practice 3	Solve Two-Step Equations	27
Practice 4	Two-Step Equations with Rational Numbers	30

Reviews 1–2	Practices 1–4	33
--------------------	-------------------------	----

Practice 5	Linear and Nonlinear Equations	36
Practice 6	Slope	39
Practice 7	Graph Linear Equations	42
Practice 8	Solve Systems Graphically	45

Reviews 3–4	Practices 5–8	48
--------------------	-------------------------	----

Practice 9	Solve Systems Algebraically	51
-------------------	---------------------------------------	----

Geometry and Measurement

Plane Geometry

Practice 10 Special Pairs of Angles 54

Practice 11 Angle Sums 57

Practice 12 Triangle Similarity 60

Reviews 5–6 Practices 9–12 63

Linear Measurement and Area

Practice 13 Pythagorean Theorem 66

Practice 14 Distance Formula 69

Data Analysis and Probability

Statistics

Practice 15 Mean, Median, Range 72

Graphs

Practice 16 Scatter Plots 75

Reviews 7–8 Practices 13–16 78



PART 2 REPRODUCIBLE MINI-PRACTICES

Overview for Practices 17–23 83

Teacher Support for Practices 17–23 85

Algebra

Expressions and Equations *(Can be used after Practice 9)*

Practice 17 Use Roots to Solve Equations 89

Geometry and Measurement

Plane Geometry *(Can be used after Practice 12)*

Practice 18 Corresponding Angles and Sides 90

Practice 19 The Effects of Transformations 91

Practice 20 Reflections 92

Practice 21 Dilations 93

Surface Area and Volume *(Can be used after Practice 14)*

Practice 22 Volume of Cylinders and Cones 94

Data Analysis and Probability

Statistics *(Can be used after Practice 15)*

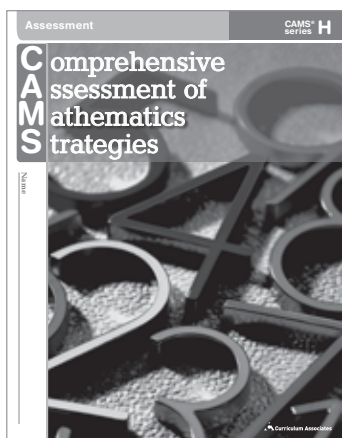
Practice 23 Analyzing Data 95

INDIVIDUAL TRACKING CHART *(Reproducible)* 96

Classroom Math Intervention Program

The classroom math intervention program integrates assessment, data-driven instruction, and meaningful practice. The program focuses on the critical math concepts and skills that students need to advance to the next grade level. The *CAMS*[®], *STAMS*[®], and *STAMS*[®] *Solve*[™] Series work together effectively to ensure that your students gain a solid understanding of key math concepts and skills, helping them become independent problem solvers and succeed on high-stakes state tests.

CAMS[®]



**Books C–H
(Grades 3–8)**

Assessment

Use the *CAMS*[®] *Assessment Series* for data-driven instruction.

- Pretest
- Benchmarks
- Post Test

STAMS[®]



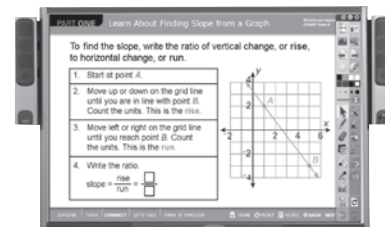
**Books C–H
(Grades 3–8)**

Instruction

Use the *STAMS*[®] *Instruction Series* for in-depth teaching of 16 foundational concepts and skills.

- Highly scaffolded lessons with gradual release of responsibility
- Emphasis on errors as opportunities for learning

STAMS[®] IWB



**Levels C–H
(Grades 3–8)**

Interactive Whiteboard Lessons

Use the *STAMS*[®] *Interactive Whiteboard Lessons* to enhance *STAMS*[®] instruction or for reteaching prior to *Solve* practice.

Solve



Books C–H (Grades 3–8)

Practice

Use the *STAMS® Solve™ Practice Series* for meaningful practice and reinforcement of 16 foundational concepts and skills, plus deeper practice with the Common Core State Standards.

- Two-part practices for each concept or skill offer a variety of engaging problems in different formats.
- Problems encourage students to reason—not rely on rote or repetition—to solve them.
- In each part, problems require increasing levels of higher-order thinking and become progressively more difficult.
- Supportive teacher guides make it easy to assign, correct, and review each practice.

Addresses Transition to Common Core State Standards

- *Solve* addresses all grade-level Common Core State Standards (CCSS)
- Builds conceptual understanding and procedural fluency, as emphasized by CCSS
- Helps students make connections between related concepts and skills

Solve Overview

Each level of the *Solve* Practice Series provides students with meaningful practice of 16 foundational math concepts and skills to reinforce conceptual understanding and procedural fluency and help students achieve mathematical proficiency. Following classroom instruction on each concept or skill, assign the corresponding *Solve* practice for reinforcement.

Student Book

Designed to motivate struggling students, each *Solve* practice clearly presents 20 engaging problems in a variety of formats. These carefully crafted problems develop students' reasoning and problem solving skills.

Practices

Each two-part *Solve* practice focuses on one concept or skill. Part One provides practice with the simpler aspect of the concept or skill, while Part Two provides practice with another more complex aspect of the same concept or skill to increase students' depth of knowledge. Each part begins with an example, typical for the concept or skill, which provides a model for students as they solve the problems independently. As each part progresses, the problems become less scaffolded, more challenging, and require higher levels of reasoning.

Reviews

Following each group of four practices are two *Solve* reviews. Each 10-problem review provides mixed practice of the preceding four concepts or skills, including problems that require students to make connections between topics and apply multiple concepts and skills.



Level H, Student Book

Additional Practices and Reviews for the Common Core State Standards

The Common Core State Standards (CCSS) present some math concepts and skills at different grade levels than the NCTM Focal Points and state standards have recommended. To address that discrepancy in grade-level content and differences in timelines for implementing the CCSS, *Solve* offers Additional Practices and Reviews at the back of each student book, C–G, plus Reproducible Mini-Practices at the back of each teacher guide, C–H.

- *Solve* Additional Practices and Mini-Practices for CCSS are organized in the same topic groupings as the 16 foundational grade-level practices.
- Refer to the Suggested Pacing Chart on page 13 for when to use each Additional Practice, Review, or Mini-Practice.

Teacher Guide

Comprehensive support for each *Solve* practice or review helps teachers check student progress, anticipate difficulties, and provide effective remediation.

- An overview of each practice or review quickly prepares teachers by identifying objectives, vocabulary, correlations to the Common Core State Standards, and optional STAMS® instruction.
- Facsimiles of the student pages with correct answers noted are a visual answer key for each practice or review.
- For each part of the practice or review, common pitfalls help teachers pinpoint student difficulties and instructional tips guide teachers to redirect students.
- Reproducible Mini-Practices ensure coverage of all grade-level Common Core State Standards.
- Reproducible Individual Tracking Chart helps teachers monitor student performance and make remediation decisions.

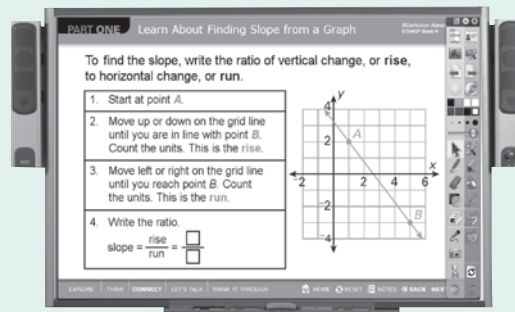


Level H, Teacher Guide

Interactive Whiteboard (IWB) Lessons

Interactive Whiteboard Lessons are available for each *Solve* practice in the student books. The IWB lessons offer students opportunities to question and explore mathematical concepts in greater depth.

- IWB lessons can be used to review the concept or skill prior to assignment of each *Solve* practice.
- Features, such as cloning and dragging objects, and whiteboard tools, such as highlighters, keep students actively engaged in learning.
- Teacher notes help maximize the instructional impact, more fully preparing students to complete the related *Solve* practice independently.



Level H, IWB Lesson



To download your
Interactive Whiteboard Lessons
and a User Guide, go to
CurriculumAssociates.com/STAMS/IWB.

Use the password STAMSIWB
to access your grade-level lessons.
Promethean software is required to present
these lessons. A free download of ActivInspire
Personal Edition is available at
<http://support.prometheanplanet.com>.

Implementing Solve with the Classroom Math Intervention Program

Option 1: Data-Driven Instruction

1 Diagnose with CAMS® Pretest

- Use the CAMS® Pretest to place students in the STAMS® Series. Results identify which STAMS® lessons and corresponding Solve practices students need.

2 Instruct with STAMS® Lessons

- Pinpoint a specific lesson in the STAMS® student book to remediate an area that needs improvement.

3 Reinforce with Solve Practices

- Assign the corresponding practice in the Solve student book to provide reinforcement for the STAMS® lesson you just taught.

4 Monitor Progress with CAMS® Benchmarks

- Assess progress in all 16 foundational topics with the four 16-item CAMS® Benchmarks at four points during the year.

5 Assess Mastery with CAMS® Post Test

- Use the CAMS® Post Test to assess students' mastery of the 16 math concepts and skills following instruction with STAMS® and practice with Solve.

Option 2: Comprehensive Instruction

For implementation of CAMS® and all 16 STAMS® lessons and the corresponding Solve practices, follow this suggested pacing chart. Allocate 21 weeks, with each STAMS® lesson spanning 5 days and the related Solve practice being completed simultaneously. (See the Week at a Glance on page 11 for more details.)

Suggested Pacing Chart

Day(s)	Lesson and Practice	STAMS® Instruction and Solve Practice	CAMS® Assessment	Time (Minutes)
1–5		CAMS® Pretest		30–45/day
6–10	1	Exponents		30–45/day
11–15	2	Square Roots		30–45/day
16–20	3	Solve Two-Step Equations		30–45/day
21–25	4	Two-Step Equations with Rational Numbers		30–45/day
26–27		Solve Reviews 1–2		15/day
28		CAMS® Benchmark 1		30–45/day
29–33	5	Linear and Nonlinear Equations		30–45/day
34–38	6	Slope		30–45/day
39–43	7	Graph Linear Equations		30–45/day
44–48	8	Solve Systems Graphically		30–45/day
49–50		Solve Reviews 3–4		15/day
51		CAMS® Benchmark 2		30–45/day
52–56	9	Solve Systems Algebraically		30–45/day
57–61	10	Special Pairs of Angles		30–45/day
62–66	11	Angle Sums		30–45/day
67–71	12	Triangle Similarity		30–45/day
72–73		Solve Reviews 5–6		15/day
74		CAMS® Benchmark 3		30–45/day
75–79	13	Pythagorean Theorem		30–45/day
80–84	14	Distance Formula		30–45/day
85–89	15	Mean, Median, Range		30–45/day
90–94	16	Scatter Plots		30–45/day
95–96		Solve Reviews 7–8		15/day
97		CAMS® Benchmark 4		30–45/day
98–102		CAMS® Post Test		30–45/day

Note: Allocate 15 minutes more per day if STAMS® additional activities are used in conjunction with each lesson and practice.

Using *STAMS*[®] and *Solve Together*

Week at a Glance

The *STAMS*[®] *Instruction Series* and the *Solve Practice Series* are companion programs—instruct with the *STAMS*[®] lessons and reinforce with the *Solve* practices.

Suggested *STAMS*[®] and *Solve* Pacing Chart

		Monday	Tuesday	Wednesday	Thursday	Friday
STAMS[®] Instruction Series		modeled and guided instruction		modeled and guided practice		independent practice
	Direct Instruction with <i>STAMS</i>[®] Lesson	Part One Teach new skill. Students solve Your Turn problem. 30 minutes	Part Two Teach new skill. Students solve Your Turn problem. 30 minutes	Part Three Model multiple-choice problem. Students solve multiple-choice problems. 30 minutes	Part Four Model extended-response problem. Students solve extended-response problem. 30 minutes	Part Five Students solve problems in test-prep format. Correct and review answers. 30 minutes
	<i>(Optional Additional Activity)</i>	(15 minutes)	(15 minutes)	(15 minutes)	(15 minutes)	(15 minutes)
Solve Practice Series		independent practice				
	Reinforcement with <i>Solve</i> Practice	Part One Students practice the skill by solving a variety of problems. Correct and review answers. 15 minutes	Part Two Students practice the skill by solving a variety of problems. Correct and review answers. 15 minutes			
	Additional Reinforcement with <i>Solve</i> Reviews			After every 4 weeks, assign first review for cumulative practice of 4 lessons. 15 minutes	Assign second review for cumulative practice of 4 lessons. 15 minutes	

Implementing *Solve* Independently

1 Reinforce Foundational Concepts and Skills with *Solve* Practices

- Have students complete the 16 practices in the *Solve* student book as independent work to reinforce conceptual understanding of all grade-level foundational math concepts and skills. See the Suggested Pacing Chart to the right.

2 Build Connections Among Topics with *Solve* Reviews

- Solidify students' understanding of the 16 foundational topics with the eight cumulative reviews—two reviews for each group of four topics.

Optional

Introduce Additional CCSS Concepts and Skills with *Solve* Additional Practices and Reviews (see page 13)

- To ensure coverage of all grade-level Common Core State Standards (CCSS), have students complete the additional practices, reviews, and mini-practices.

Suggested Pacing Chart for *Solve* Book H

For implementation of all 16 *Solve* practices, follow this suggested pacing chart. Allocate 16 weeks, with one practice being completed per week and one pair of reviews at the end of every fourth week.

Week	Practice	<i>Solve</i> Practice	<i>Solve</i> Review	Time (Minutes)
1	1	Exponents		30/week
2	2	Square Roots		30/week
3	3	Solve Two-Step Equations		30/week
4	4	Two-Step Equations with Rational Numbers		30/week
		Reviews 1–2		30/week
5	5	Linear and Nonlinear Equations		30/week
6	6	Slope		30/week
7	7	Graph Linear Equations		30/week
8	8	Solve Systems Graphically		30/week
		Reviews 3–4		30/week
9	9	Solve Systems Algebraically		30/week
10	10	Special Pairs of Angles		30/week
11	11	Angle Sums		30/week
12	12	Triangle Similarity		30/week
		Reviews 5–6		30/week
13	13	Pythagorean Theorem		30/week
14	14	Distance Formula		30/week
15	15	Mean, Median, Range		30/week
16	16	Scatter Plots		30/week
		Reviews 7–8		30/week

... With All CCSS Standards

Using *Solve* to Support Your Transition to the Common Core State Standards

- The Common Core State Standards (CCSS) present some math concepts and skills at different grade levels than the NCTM Focal Points and state standards have recommended. To address this discrepancy in grade-level content and differences in timelines for implementing the CCSS, *Solve* offers Additional Practices and Reviews at the back of each student book, C–G, plus Reproducible Mini-Practices at the back of each teacher guide, C–H.
- Each additional practice or review has the same length and depth as each of the 16 foundational practices or reviews.
- Each mini-practice provides a short practice, designed to familiarize students with a new grade-level CCSS concept or skill.
- If you are transitioning to the CCSS, use all the extra resources provided with *Solve*. This Suggested Pacing Chart highlights when to use these resources in conjunction with the 16 foundational practices and cumulative reviews.

Suggested Pacing Chart for Solve Book H—All CCSS Standards

Allocate 23 weeks for full implementation of *Solve*.

Week	Practice	<i>Solve</i> Practice	<i>Solve</i> Review	Extra Practice or Review	Time (Minutes)
1	1	Exponents			30/week
2	2	Square Roots			30/week
3	3	Solve Two-Step Equations			30/week
4	4	Two-Step Equations with Rational Numbers			30/week
		Reviews 1–2 (Practices 1–4)			30/week
5	5	Linear and Nonlinear Equations			30/week
6	6	Slope			30/week
7	7	Graph Linear Equations			30/week
8	8	Solve Systems Graphically			30/week
		Reviews 3–4 (Practices 5–8)			30/week
9	9	Solve Systems Algebraically			30/week
10	17*	Use Roots to Solve Equations			15/week
11	10	Special Pairs of Angles			30/week
12	11	Angle Sums			30/week
13	12	Triangle Similarity			30/week
		Reviews 5–6 (Practices 9–12)			30/week
14	18*	Corresponding Angles and Sides			15/week
15	19*	The Effects of Transformations			15/week
16	20*	Reflections			15/week
17	21*	Dilations			15/week
18	13	Pythagorean Theorem			30/week
19	14	Distance Formula			30/week
20	22*	Volume of Cylinders and Cones			15/week
21	15	Mean, Median, Range			30/week
22	23*	Analyzing Data			15/week
23	16	Scatter Plots			30/week
		Reviews 7–8 (Practices 13–16)			30/week

*Reproducible Mini-Practices

Features of a Solve Practice

This 4-page section guides teachers through a sample lesson plan from the *Solve* teacher guide, which shows facsimiles of the student book practice. Numbered boxes call out and describe the key features in both the teacher guide and the student book.

OVERVIEW

PRACTICE 10

SPECIAL PAIRS OF ANGLES

Parts One and Two

1 OBJECTIVES

In Part One, students will:

- Demonstrate the relationships between the corresponding and alternate interior angles formed by parallel lines and transversals.
- Use angle relationships to find missing angle measures.
- Explain the reasoning behind statements about angle relationships.

In Part Two, students will:

- Understand the supplementary relationships among the angles formed by parallel lines and transversals.
- Use angle relationships to find missing angle measures.
- Explain the process of finding missing angle measures.

VOCABULARY

Part One

- **parallel lines:** lines that never meet
- **transversal:** a line that crosses two or more lines, which may be parallel
- **corresponding angles (of lines):** a pair of angles in the same position relative to the parallel lines and the transversal
- **alternate interior angles:** a pair of angles between the parallel lines on opposite sides of the transversal
- **congruent:** having the same size

Part Two

- **supplementary angles:** a pair of angles whose measures have a sum of 180° (the angles form a straight line)
- **vertical angles:** congruent angles formed when two lines intersect

3 CORRELATION TO COMMON CORE STATE STANDARDS

Geometry


- Understand congruence and similarity using physical models, transparencies, or geometry software—8.G.5

Mathematical Practices

3. Construct viable arguments and critique the reasoning of others.
7. Look for and make use of structure.


4 RELATED STAMS® INSTRUCTION

For instruction that supports this practice, go to:



STAMS®, Book H, Lesson 10, Special Pairs of Angles, pp. 94–103

STAMS® Interactive Whiteboard Lessons, Level H, Visualize Special Pairs of Angles
<http://www.curriculumassociates.com/STAMS/IWB/>



Use features such as drag and drop to deepen students' understanding of special pairs of angles.

54 Special Pairs of Angles

Geometry and Measurement

Level H, Teacher Guide

1**Objectives:** Identifies skill- and process-related goals for students.**2****Vocabulary:** Lists key math terms from the practice, with definitions.**3****Correlation to Common Core State Standards:** Correlates the CCSS content standards and mathematical practices to the practice.**4****Related STAMS® Instruction:** Identifies optional instruction that supports the practice, including corresponding lessons from the *STAMS® Instruction Series* and the *STAMS® Interactive Whiteboard Lessons*.

Some lesson plans also include a **Related Additional Practice and Review** or **Related Mini-Practice** feature, which identifies optional practice on a new grade-level CCSS concept or skill.

Tips for using the Interactive Whiteboard Lessons:

- Review the skill practiced in Part One and Part Two of *Solve* with the Interactive Whiteboard Lessons before students begin solving the practice problems.
- Alternatively, reteach the skill using the Interactive Whiteboard Lessons if students are struggling to complete the problems.
- You may also wish to access Interactive Whiteboard Lessons from previous levels to quickly address gaps in students' background knowledge.
- Click on and preview the teacher notes before teaching the lesson. Print out these notes for easy reference.
- Encourage student participation. Allow plenty of time for students to use the interactive whiteboard features to work out problems and present solutions.
- Rename, save, and print out the work done on the interactive whiteboard to share with students.

To download the Interactive Whiteboard Lessons and a User Guide, go to CurriculumAssociates.com/STAMS/IWB. Use the password STAMSIWB.

Best Practices**Math Vocabulary**

Knowledge of math terminology is critical to students' understanding of concepts and skills and their ability to apply them to problem solving. To master math vocabulary and effectively communicate mathematical ideas, students must see and use the words in context frequently.

- Review vocabulary used in a practice before students begin solving the problems.
- Have students underline or highlight vocabulary as they encounter it in the practice.
- Encourage students to reference the Glossary at the back of their books when they do not understand a term.
- Suggest that students add their own terms and definitions to the Glossary, along with examples and illustrations.
- Remind students to use math terms whenever a practice problem asks for an explanation.

Student Book Features

Part One and Part Two have identical formats and features.

PART ONE

PART TWO

Part One

Name _____

PRACTICE 10
Part One **3**

SPECIAL PAIRS OF ANGLES

1 Use what you know about angle pairs to solve the problem.

The capital letters F and Z contain sets of parallel lines and transversals.

1. Use the diagrams of the letters to identify corresponding angles and alternate interior angles.

These are corresponding angles because they are on the same side of the parallel lines and the same side of the transversal.

These are alternate interior angles because they are between the parallel lines and the opposite sides of the transversal.

What other letters can you think of that show parallel lines, perpendicular lines, transversals, or sets of special angles?

The letter E shows parallel and perpendicular lines as well as corresponding angles. The letter N shows alternate interior angles.

2 **Connections**

Glue or tape 3 thin strips of paper onto a piece of paper to form parallel lines and a transversal. Then follow these directions.

2. Carefully cut out a pair of corresponding angles from one side of the transversal. Cut right along the edges of the parallel lines and transversal. Align the cut outs and compare angle measures. This investigation shows that corresponding angles are congruent.

3. Cut out the angle from the other side of the transversal that is an alternate interior angle to one of the angles you cut in number 2. Compare angle measures. This investigation shows that alternate interior angles are congruent.

4. If one corresponding angle measures 75° , the other measures 75° .

5. If one alternate interior angle measures 60° , the other measures 60° .

Use this diagram for numbers 6–9. Solve each problem. Choose the best answer.

6. What is the measure of $\angle 5$?

A 22° C 90°
 B 68° D 112°

7. Which angle's measure is equivalent to the measure of $\angle 4$?

A $\angle 2$ C $\angle 5$
 B $\angle 3$ D $\angle 7$

8. Which is a pair of corresponding angles?

A $\angle 2$ and $\angle 4$ C $\angle 3$ and $\angle 6$
 B $\angle 2$ and $\angle 6$ D $\angle 7$ and $\angle 8$

9. Which is a pair of alternate interior angles?

A $\angle 1$ and $\angle 2$ C $\angle 3$ and $\angle 5$
 B $\angle 2$ and $\angle 8$ D $\angle 3$ and $\angle 6$

4 **Reasoning**

Solve the problem. Explain your thinking.

10. Find the two angle measures. Show your work.

Since the two angles are alternate interior angles, they are congruent.

Set the measures equal to each other and solve the equation.

$$\begin{array}{r} 2x + 36 = 5x \\ 36 = 3x \\ x = 12 \\ \text{So } 5x = 5(12) = 60 \\ \text{and } 2x + 36 = 2(12) + 36 = 60 \end{array}$$

The angles measure 60° .

At a Glance

Students explore the relationships among special pairs of angles. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Connections, Problems 2–5

If If students have trouble completing the hands-on activity, they may need more guidance on how to begin.

Suggest that students sketch a picture of

Reasoning, Problem 10

If If students cannot solve the problem, they may not realize how to find the angles when an unknown quantity (variable) is involved.

Then Ask students to tell you what they know

- 1** **Example problem 1:** Provides students with a model for solving practice problems 2–10.
- 2** **Connections:** Applies or extends learning or makes connections between concepts and skills.
- 3** **Solve problems:** Build flexibility, asking students to solve problems in different formats.
- 4** **Reasoning:** Develops high-order thinking, requiring students to analyze, evaluate, justify, or explain.

Using Solve Practice Features for Differentiation

Solve practices include several features that support differentiating practice to meet the needs of students with varying levels of proficiency.

1

Highly scaffolded example

In the example, most problem-solving steps are provided to the student. With support from the text, the student completes the remaining steps and writes the solution. This example serves as a model for the remaining 9 problems.

Tips for struggling students and ELL students

- Preview math vocabulary (see page 15) used in the example.
- Read aloud the example to ensure students understand the problem.
- Demonstrate how to complete the example by guiding students through each step.
- Review the concept or skill visually with the *STAMS*® Interactive Whiteboard Lesson.

2–4

Progressively more difficult problems

Problems 2 through 10 become gradually less scaffolded, progressively more difficult, and require increasing levels of higher-order thinking.

Tips for struggling students and ELL students

- Provide manipulatives and other tools, when appropriate, to give students another more concrete approach to problem solving.
- Model how to solve the Reasoning problems by thinking aloud step by step through a few examples.

1–4

Multiple problem types

Practice problems include fill-in-the-blank, matching, multiple-choice, short-response, and extended-response formats.

Tips for struggling students and ELL Students

Use the following tips to support students when they write answers to short-response and extended-response problems:

- Pair students to share their thinking before they write to help them reason and communicate mathematically.
- Encourage students to think aloud quietly as they write their explanations.

Best Practices

Reasoning and Communicating About Math

The Reasoning problems are ideal opportunities for students to develop problem-solving skills.

- Pair or group students with varying levels of proficiency to read a problem, identify what the problem is asking, and brainstorm strategies for solving it.
- Have students choose a few strategies and use them to solve the problem collaboratively. Encourage students to record and discuss their work.
- After students have solved the problem, have a representative from each pair or group share their strategies and solutions with the class.
- Discuss the various strategies. Ask students to consider which strategies worked best and how they could apply the strategies to other problems.

Teacher Guide Features

Part One and Part Two have identical formats and features.

PART ONE

PART TWO

The image shows two pages from a student book. The left page, labeled 'PART ONE', contains a hands-on activity. It starts with a prompt: 'You think of parallel lines, perpendicular lines, transversals, or sets of special angles? The letter E shows parallel and perpendicular lines as well as corresponding angles. The letter N shows alternate interior angles.' Below this is a 'Connections' section with instructions: 'Glue or tape 3 thin strips of paper onto a piece of paper to form parallel lines and a transversal. Then follow these directions.' It lists three steps: 1. Cut out a pair of corresponding angles. 2. Cut out an alternate interior angle. 3. Compare the angles. Below the steps are four numbered problems (2-5) involving angle measures and variables. The right page, labeled 'PART TWO', contains a 'Reasoning' problem. It asks to 'Solve the problem. Explain your thinking.' Problem 10 asks to find two angle measures. A diagram shows two parallel lines intersected by a transversal. One angle is labeled $2x + 36$ and the other is $5x$. Below the diagram is a solution: 'Since the two angles are alternate interior angles, they are congruent. Set the measures equal to each other and solve the equation.' The solution shows a system of equations: $2x + 36 = 5x$, $36 = 3x$, $x = 12$. Then it calculates $5(12) = 60$ and $2(12) + 36 = 60$. The final answer is 'The angles measure 60° .'

2 At a Glance

Students explore the relationships among special pairs of angles. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Connections, Problems 2–5

If If students have trouble completing the hands-on activity, they may need more guidance on how to begin.

Then Suggest that students sketch a picture of a pair of parallel lines and their transversal, and then place the strips of paper over those lines.

Solve Problems 6–9

If If students choose A for problem 6, they may be forgetting the relationship between corresponding angles.

Then Ask students to imagine sliding the lower parallel line up the transversal until it coincides with the upper parallel line. How are angles 1 and 5 related?

Reasoning, Problem 10

If If students cannot solve the problem, they may not realize how to find the angles when an unknown quantity (variable) is involved.

Then Ask students to tell you what they know about the two angles without accounting for the expressions for their values. How can they show that the two values are equal, and then how can they solve for x ? You may wish to relate this concept to the substitution method of solving systems of linear equations, introduced in Practice 9.

- 1 Annotated student book pages:** Provide a visual answer key for correcting student work.
- 2 At a Glance:** Sums up the concept or skill students are practicing in each part of the practice.
- 3 If:** Identifies a common pitfall—an error, misconception, or other difficulty—that may be leading students to an incorrect answer.
- 4 Then:** Recommends a quick instructional tip for addressing the error or misconception and redirecting students.

Using Solve Features to Monitor Student Work

3–4

Helpful teacher support

Each part of a practice has three or four sets of similar problems. Each set has a common pitfall (**If**) and a related instructional tip (**Then**) designed to help teachers monitor students' work.

- Have students solve the practice problems independently, but correct and review their work to make sure they are on track.
- Use the common pitfalls and related instructional tips to recognize and correct errors and misconceptions as they arise.
- If you notice that students are making the same mistake with problems in a set, intervene promptly to prevent them from repeating the error with other problems.

Using the Results of Solve to Remediate

Use the reproducible Individual Tracking Chart on page 96 of this teacher guide to record each student's performance in *Solve*. After correcting each student's practice or review, record the number of correct responses and the percent correct. Then use this data to make decisions about remediation.

If students are unsuccessful in solving the problems in a particular *Solve* Practice, use the Related *STAMS*[®] Instruction recommendations in this *Solve* teacher guide.

Individual Tracking Chart		Practices 1–16 Reviews 1–8
Student's Name: _____		Date: _____
Directions: Use the student's corrected practices or reviews to fill in the chart below. Record the number of correct responses and the percent of correct responses for each practice or pair of reviews.		
Practice or Review	Practice or Review Score	
1. Exponents	____ / 20 = ____%	
2. Square Roots	____ / 20 = ____%	
3. Solve Two-Step Equations	____ / 20 = ____%	
4. Two-Step Equations with Rational Numbers	____ / 20 = ____%	
Reviews 1–2 (Practices 1–4)	____ / 20 = ____%	
5. Linear and Nonlinear Equations	____ / 20 = ____%	
6. Slope	____ / 20 = ____%	
7. Graph Linear Equations	____ / 20 = ____%	
8. Solve Systems Graphically	____ / 20 = ____%	
Reviews 3–4 (Practices 5–8)	____ / 20 = ____%	
9. Solve Systems Algebraically	____ / 20 = ____%	
10. Special Pairs of Angles	____ / 20 = ____%	
11. Angle Sums	____ / 20 = ____%	
12. Triangle Similarity	____ / 20 = ____%	
Reviews 5–6 (Practices 9–12)	____ / 20 = ____%	
13. Pythagorean Theorem	____ / 20 = ____%	
14. Distance Formula	____ / 20 = ____%	
15. Mean, Median, Range	____ / 20 = ____%	
16. Scatter Plots	____ / 20 = ____%	
Reviews 7–8 (Practices 13–16)	____ / 20 = ____%	
Total	____ / 400 = ____%	

96 STAMS[®] Solve™ Series, Book H Individual Tracking Chart

Level H, Teacher Guide

Correlation Charts

NCTM Focal Points and Connections The chart below indicates the practices in *Solve Book H* that provide instruction for the NCTM Focal Points and related Connections for grade 8.

NCTM Focal Points and Connections for Grade 8	<i>Solve Book H</i>
FOCAL POINTS	
Algebra: Students analyze and represent linear functions and solve linear equations and systems of linear equations.	Practices 3, 4, 5, 6, 7, 8, 9
Geometry and Measurement: Students analyze two- and three-dimensional space and figures using distance and angles.	Practices 10, 11, 12, 13, 14
Data Analysis and Number and Operations and Algebra: Students analyze and summarize data sets.	Practices 15, 16
CONNECTIONS	
Algebra: Students identify linear and nonlinear equations.	Practice 5
Geometry: Students develop an understanding that all slope triangles created on a given line in a coordinate plane are similar.	Practice 12
Data Analysis: Students use scatter plots to display bivariate data and estimate lines of best fit to make and test conjectures.	Practice 16
Number and Operations: Students use exponents and square roots to express quantities.	Practices 1, 2

Common Core State Standards The chart below correlates the practices in *Solve Book H* with the Common Core State Standards for grade 8 mathematics. For correlations to the Mathematical Practices, see the overview page of each *Solve* practice in this teacher guide.

Common Core State Standards for Grade 8 Mathematics	<i>Solve Book H</i>
The Number System	
8.NS.1	Practice 4
8.NS.2	Practice 2
Expressions and Equations	
8.EE.1	Practice 1
8.EE.2	Practice 2
8.EE.6	Practice 12
8.EE.7	Practices 3, 4, 5
8.EE.8	Practices 8, 9
Functions	
8.F.3	Practices 5, 7
8.F.4	Practices 5, 6, 7
8.F.5	Practice 5

Common Core State Standards for Grade 8 Mathematics	<i>Solve Book H</i>
Geometry	
8.G.5	Practices 10, 11, 12
8.G.6	Practice 13
8.G.7	Practice 13
8.G.8	Practice 14
Statistics and Probability	
8.SP.1	Practice 16
8.SP.2	Practice 16

OBJECTIVES

In Part One, students will:

- Apply knowledge of slope and intercepts to write equations from graphs.
- Answer questions about lines and solutions for systems of equations.
- Explain mathematical problems involving graphs of systems of equations.

In Part Two, students will:

- Determine the number of solutions to a system of linear equations.
- Apply systems of equations to word problems.
- Explain the possible solutions to systems of equations.

VOCABULARY**Part One**

- **system of linear equations:** a set of two or more linear equations
- **intersecting lines:** lines that meet
- **solution of an equation:** a value of the variable or variables that makes an equation true

Part Two

- **parallel lines:** lines that never meet
- **coinciding lines:** lines that lie on top of each other

CORRELATION TO COMMON CORE STATE STANDARDS**Expressions and Equations**

- Analyze and solve linear equations and pairs of simultaneous linear equations—8.EE.8

Mathematical Practices

2. Reason abstractly and quantitatively.
5. Use appropriate tools strategically.
8. Look for and express regularity in repeated reasoning.

RELATED STAMS® INSTRUCTION

For instruction that supports this practice, go to:



STAMS®, Book H, Lesson 8,
Solve Systems Graphically,
pp. 74–83

STAMS® Interactive Whiteboard Lessons,
Level H, Visualize Solving Systems of
Equations by Graphing

[http://www.curriculumassociates.com/
STAMS/IWB/](http://www.curriculumassociates.com/STAMS/IWB/)

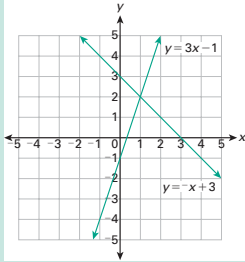


Use features such as sliding screens with additional practice to deepen students' understanding of solving systems of equations graphically.

SOLVE SYSTEMS GRAPHICALLY

Use the graph to solve the problem.

1. The graph shows a system of linear equations, $y = -x + 3$ and $y = 3x - 1$. Find the solution to the system from the graphs.

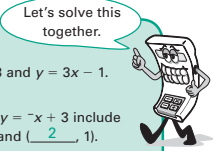


Solutions to $y = -x + 3$ include $(-1, \underline{4})$ and $(\underline{2}, 1)$.

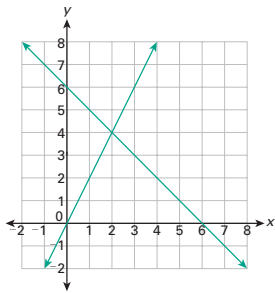
Solutions to $y = 3x - 1$ include $(-1, \underline{-4})$ and $(\underline{2}, 5)$.

Both equations have the solution $(\underline{1}, \underline{2})$.

The solution of the system is $(\underline{1}, \underline{2})$.



Use this graph for numbers 2–5. Solve each problem.



2. Find each equation from the y-intercepts and the slopes.

Solution: $y = -x + 6$ and $y = 2x$

3. Using the graph, find the solution to the system.

Solution: $(2, 4)$

4. The x and y values in the system represent the lengths of two boards cut from a 6-foot board. What does $y = 2x$ mean?

Solution: One piece is twice as long as the other.

5. Explain why there is only one solution to a system of intersecting lines.

Solution: Lines can only intersect once.

Solve each problem. Choose the best answer.

6. What can you say about the statement two lines with the same y -intercept are parallel?
 never true
 true when the intercept is $(0, 0)$
 sometimes true
 always true
7. Which ordered pair is the solution to the system of equations $y = -2x + 5$ and $y = x - 4$?
 $(-3, 9)$
 $(-1, 1)$
 $(3, -1)$
 $(3, 9)$

Solve each problem.

8. Write an equation for a line with a slope of $\frac{1}{2}$ and a y -intercept of 3. Write a second equation for a line with a slope of $\frac{2}{3}$ and a y -intercept of 3. If these two equations were graphed on the same coordinate grid, what would be the solution to the system? Explain your answer.

First equation: $y = \frac{1}{2}x + 3$

Second equation: $y = \frac{2}{3}x + 3$

Solution to the system $(0, 3)$; Both equations have the same y -intercept, so the lines intersect on the y -axis at $(0, 3)$.

9. Write a system of equations that has a solution of $(2, 0)$.

Possible answer: $y = -\frac{3}{2}x + 3$ and $y = -\frac{1}{2}x + 1$

10. A system of equations is graphed. The solution to the system is $(3, 4)$. One equation is $y = x + 1$. With this information is there only one equation that could be in the system? Explain your answer.

No; Without knowing the slope or another point, there are an infinite number of lines going through $(3, 4)$.

At a Glance

Students find solutions to systems of equations from graphs. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 2–5

If If students' answer to problem 3 is *no solution*, they may not be connecting the point of intersection to the solution.

Then Ask students what they think is special about the ordered pair $(2, 4)$. Then have them substitute these values into both equations to decide whether they make the equations true.

Solve Problems 6–7

If If students answer B or C for problem 6, they may not be able to visualize a graph of parallel lines.

Then Ask students to draw two parallel lines on the same graph. Then ask them to identify the ordered

pair that is the solution to the system. Have them read the problem aloud and rethink their answer choice.

Solve Problems 8–10

If If students' answer for problem 10 is *yes*, they are probably using the slope of the given line with the given point and not considering lines with other slopes.

Then Have students substitute the values of the ordered pair into the given equation to find the y -intercept and sketch the graph. Then ask them to sketch another line that goes through $(3, 4)$. After they do, have them revisit their answer.

Name _____

PRACTICE

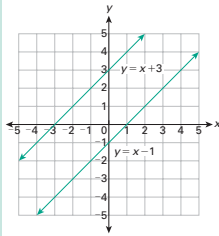
8

Part Two

SOLVE SYSTEMS GRAPHICALLY

Use the graph to solve the problem.

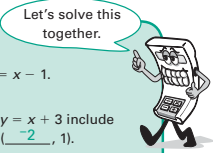
1. The graph shows a system of equations, $y = x + 3$ and $y = x - 1$. Find the solution to the system.



Solutions to $y = x + 3$ include $(-1, \underline{2})$, $(\underline{-2}, 1)$.

Solutions to $y = x - 1$ include $(-1, \underline{-2})$, $(\underline{4}, 3)$.

The lines are parallel and have no points in common, so there is no solution.



Use the graph for numbers 2 and 3. Solve each problem.

2. Use the y -intercepts and slopes to write an equation for each line.

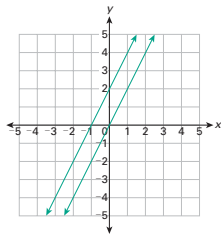
Solution: $y = 2x + 2$ and $y = 2x$

3. Using the graph, find the solution to the system.

Solution: no solution

4. Consider the system $y = 4(x + 1)$ and $y = 4x + 4$. Find the solution.

Solution: There is an infinite number of solutions; the lines coincide.



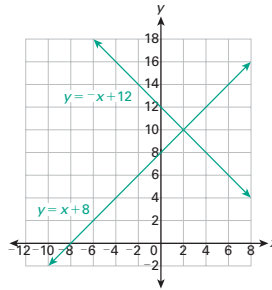
5. Use mental math to find the solution to the system $y = -2$ and $x = 5$.

Solution: $(5, -2)$

Solve each problem. Choose the best answer or write the solution.

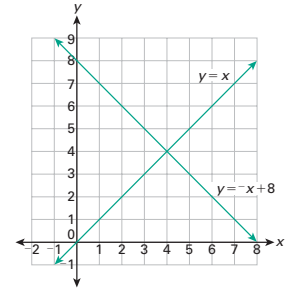
6. If a system of equations has a solution, the slopes of the two equations are
 Ⓐ the same. Ⓒ different.
 Ⓑ both negative. Ⓓ both positive.

7. Graph the equations $y = -x + 12$ and $y = x + 8$ to find two numbers whose sum is 12 and whose difference is 8.



Solution: The numbers are 10 and 2.

8. A triangle is defined by the y -axis and the equations as shown in the graph below. Write the coordinate pair for each vertex of the triangle. How do the vertices relate to the solution of a system of equations?



Vertex 1: $(0, \underline{0})$ Vertex 3: $(\underline{0}, 8)$

Vertex 2: $(\underline{4}, 4)$

The vertex $(4, 4)$ is the solution to the system of equations on the graph.

Reasoning

Solve each problem. Explain your thinking.

9. Write a system of equations that has no solution. Explain why.
Any two equations with the same slope are parallel and have no points in common. Possible answer: $y = 3x + 2$ and $y = 3x - 1$
10. There are three possible types of graphs for a system of equations. Name the three types and the solution(s) that result in each.
A system may have intersecting lines with one solution, parallel lines with no solutions, or coinciding lines with infinite solutions.

Curriculum Associates, LLC STAMAS Solve™ Book H

Curriculum Associates, LLC STAMAS Solve™ Book H

At a Glance

Students identify the solutions to systems of equations from graphs, including those with no solution. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 2–5

If If students believe that there is no solution for problem 4, they may need help with the Distributive Property.

Then Write a few simple problems, such as $3(x + 4)$ or $-4(x - 2)$, and have students draw arrows from the first factor to both parts of the second factor before applying the Distributive Property. Then ask them to use the property on problem 4's equation.

Solve Problems 6–8

If If students write 1 and 5 for problem 7, they are most likely ignoring the scale on the axes.

Then Direct students' attention to the x - and y -axes. Have them follow the point down and then right to obtain the correct x -value and y -value.

Reasoning, Problems 9–10

If If students' equations do not have the same slope in problem 9, then they might not understand that systems with no solutions have no points in common.

Then Have students graph their answer to problem 9 and examine the slope of each equation. Ask them how they can be certain that the system has no solution. When they see that their lines intersect, have them change one of the equations and try again.

OBJECTIVES

In Review 3, students will:

- Determine whether an equation is linear or nonlinear.
- Explain choices of x -values for making a table of values.
- Find slope.
- Relate an equation, a table of values, and the graph of the equation.

In Review 4, students will:

- Analyze a graph in the context of a word problem.
- Write and solve linear equations.
- Apply systems of equations to real-world and mathematical problems.

VOCABULARY

Review 3

- **linear equation:** an equation whose graph is a straight line
- **nonlinear equation:** an equation whose graph is not a straight line
- **ordered pair:** a pair of numbers used to represent the location of a point in the coordinate plane
- **slope:** the slope of a line is the ratio of the vertical change (rise) to the horizontal change (run)

Review 4

- **y -intercept:** the y -coordinate of a point at which a graph crosses the y -axis
- **system of linear equations:** a set of two or more linear equations

CORRELATION TO COMMON CORE STATE STANDARDS

Expressions and Equations

- Analyze and solve linear equations and pairs of simultaneous linear equations—8.EE.7, 8.EE.8

Functions

- Define, evaluate, and compare functions—8.F.3
- Use functions to model relationships between quantities—8.F.4, 8.F.5

Mathematical Practices

2. Reason abstractly and quantitatively.
5. Use appropriate tools strategically.
7. Look for and make use of structure.

Review 4

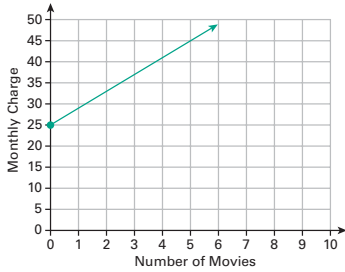
Name _____

REVIEW 4

REVIEW 4: PRACTICES 7 AND 8

Use this information for numbers 1–5. Solve each problem.

The graph shows how the monthly cost of cable television (y) changes. The plan has a \$4 charge per movie and a monthly charge of \$25.



- What is the y -intercept, and what does it mean to the problem?
Solution: 25; \$25 is the monthly fee.
- From the graph, find the cost for a month when five movies are ordered.
Solution: \$45
- Find the slope of the equation. How does the charge per movie relate to the slope of the equation?
Solution: 4; \$4 is the charge per movie.
- What is the equation represented by the graph?
Solution: $y = 4x + 25$
- If the monthly charge increases from \$25 to \$28, how will the graph change?
Solution: The new line will be parallel, with its y -intercept at 28 instead of 25.

©Curriculum Associates, LLC STAMS Solve™ Book H

Algebra

Review 4: Practices 7 and 8 43

Solve each problem. Choose the best answer.

- Which ordered pair is a solution to the system of equations $y = 2x + 1$ and $y = -x + 7$?
 Ⓐ (-5, 1) Ⓒ (1, 6)
 Ⓑ (0, 5) Ⓓ (2, 5)
- At $t = 0$, Ted is 50 feet away from school. He arrives at school 10 seconds later. Which equation relates distance from school to time?
 Ⓐ $50 = 10t$ Ⓒ $50 = 10r$
 Ⓑ $r = 50t$ Ⓓ $d = 50t$

Reasoning

Solve each problem. Explain your thinking.

- Many systems of equations compare the cost for using one company to the cost for using a different company. Why is the solution to this system referred to as the break-even point? How can you use this solution to decide between the two companies?
The solution to the system is the point where the two costs are equal. One company is usually more expensive before the break-even point, but less expensive after. Your decision on which company to use is based on whether you want less or more than the value of the x -coordinate of the solution.
- What is the solution to a system of two proportions?
(0, 0); The graph for every proportion goes through the origin, so every proportion has (0, 0) as an ordered pair.
- Slope is found differently within a table, a graph, and an equation. Explain each method.
Find the slope in a table by choosing two ordered pairs, then finding the ratio between the differences of the y -values and of the x -values. Find the slope in a graph by choosing two points and setting up a ratio between the direction and the distance up or down over the distance and direction left or right.
The slope in an equation is m , when the equation is written as $y = mx + b$.

©Curriculum Associates, LLC STAMS Solve™ Book H

44 Review 4: Practices 7 and 8

Algebra

At a Glance

Students analyze and solve problems about equations and systems of equations. If students have difficulty, check for these common pitfalls and use the related tips to provide help.

Solve Problems 1–5

If If students' answer to problem 5 is that the slope increases from 4 to 7, they may need help distinguishing between the slope and the y -intercept.

Then Have students identify the new costs for zero, one, and two movies and plot those points on the graph. Ask them to describe what is happening to the graph, based on these three ordered pairs.

Solve Problems 6–7

If If students choose C for problem 6, they probably determined that (1, 6) was a solution to the second equation.

Then Have students substitute the values of the ordered pair into the first equation. Remind

them that a solution to a system must make both equations true.

Reasoning, Problems 8–10

If If students believe that there is not enough information to solve problem 9, they may not understand that the graph of every proportion passes through the origin.

Then Write two proportions. Ask students for y -values when $x = 0$ for each equation. They should find that one solution to the first proportion is (0, 0) and one solution to the second proportion is (0, 0). That makes (0, 0) the solution to the system.