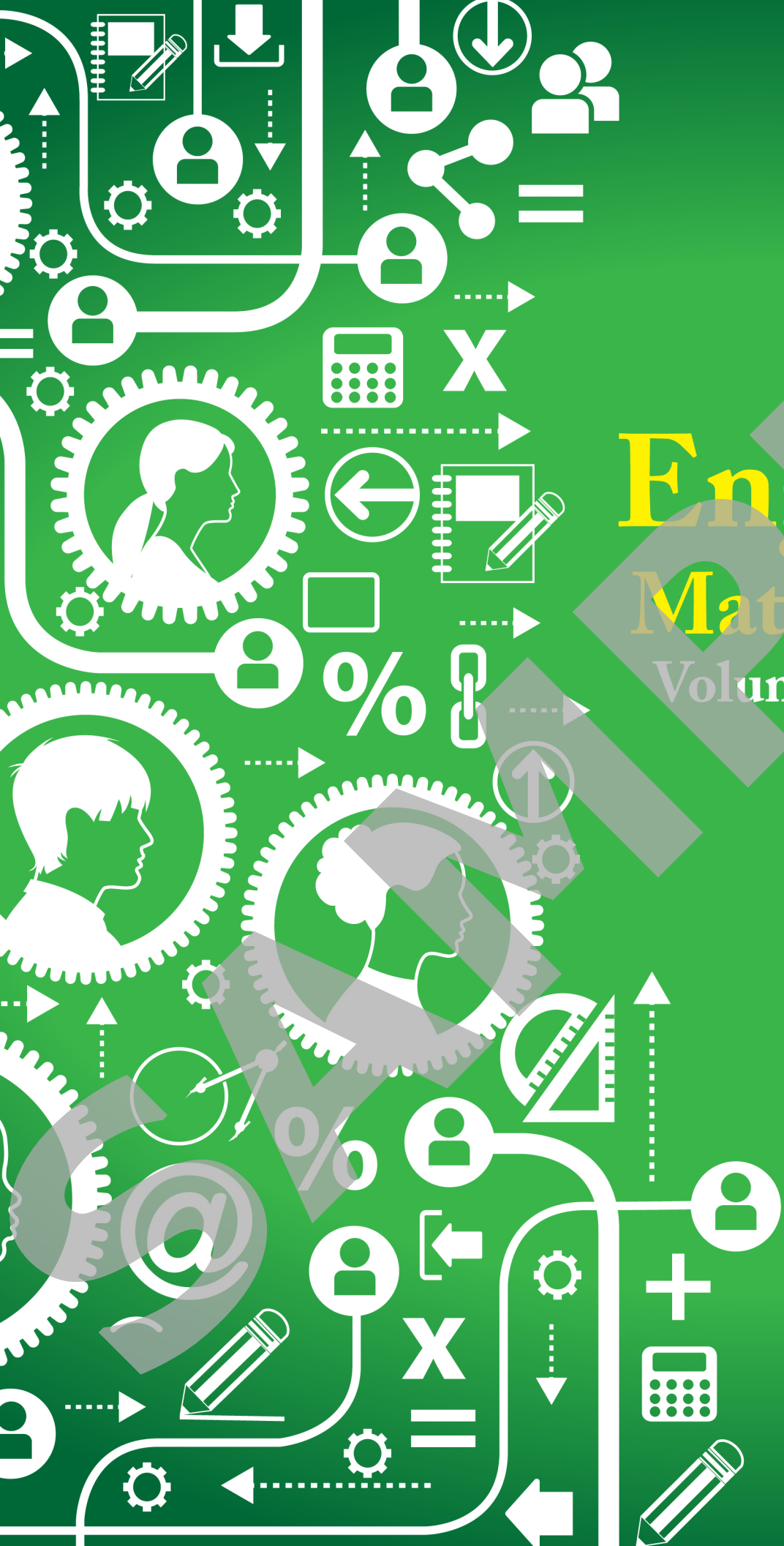

Engaging Mathematics, Volume II: Grade 7

region4®

Engaging Mathematics, Volume II: Grade 7

Teacher Edition

Product ID
407-1815

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Region 4 Education Service Center supports student achievement by providing educational products and services that focus on excellence in service for children.

Published by
Region 4 Education Service Center
7145 West Tidwell Road
Houston, Texas 77092-2096
www.esc4.net

ISBN-13: 978-1-937403-71-3

Printed in the United States of America

Acknowledgments

Region 4 Education Service Center would like to acknowledge the talent and expertise of those who contributed to the development of this book. Their dedication to our core values of excellence in service for children made possible the creation of this resource to assist educators in providing quality, effective instruction for all students.

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Table of Contents

What is *Engaging Mathematics, Volume II: Grade 7*?

1 An instructional resource featuring over 90 Texas Essential Knowledge and Skills (TEKS)-based, classroom-ready mathematics activities that each take approximately 10 to 15 minutes to complete.

2 A TEKS-based resource that addresses all Grade 7 mathematics TEKS and provides—

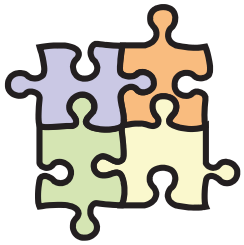
- Rigorous problem-solving tasks
- Manipulative-based tasks
- Vocabulary development tasks
- Sorting and classifying tasks

3 A resource that supports high-quality, research-based instruction by providing activities that can be used for various purposes, including—

- Engaging warm-ups and opening tasks that draw students into relevant and challenging mathematics
- Instructional support for all students, from at-risk to gifted and talented, to help learners articulate, refine, and retain important mathematical concepts, processes, and skills
- Short-cycle, formative assessments that provide immediate and ongoing feedback to guide instruction for the teacher and learning for the student
- Supplemental tasks to support intervention strategies

4 A resource that incorporates the mathematics process standards by promoting—

- Reasoning, generalizing, and problem solving in mathematical and real-world contexts
- Modeling, using tools, and connecting representations
- Analysis
- Communication

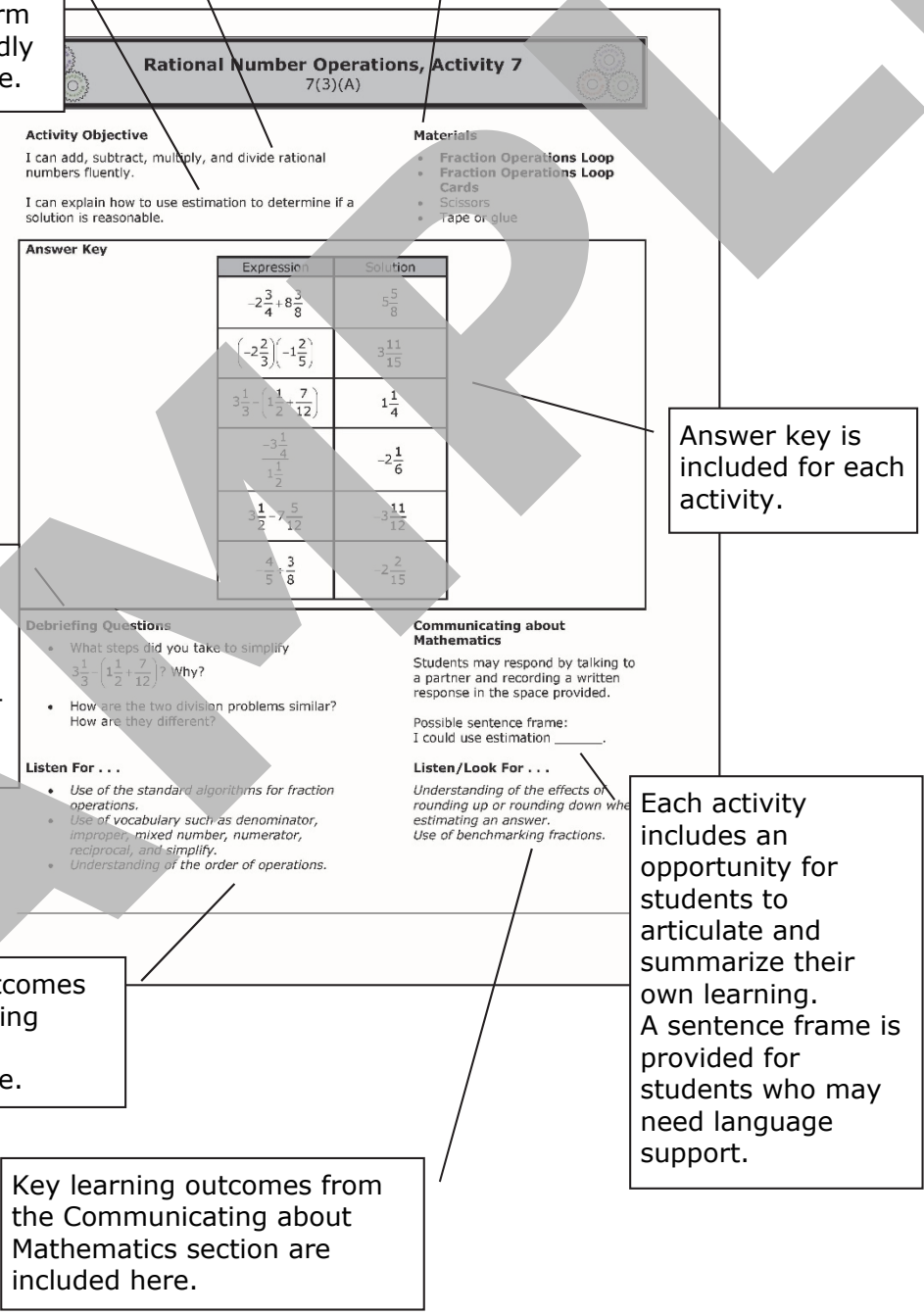


What is found in an Engaging Mathematics TEKS-based activity?

TEKS have been phrased in student-friendly language so that students may gauge their learning.

Common classroom materials are used for ease of preparation. Materials are listed 1-per-student unless otherwise noted. Page titles for student handouts are bolded.

ELPS have been included in the form of a student-friendly language objective.



Rational Number Operations, Activity 7
7(3)(A)

Activity Objective

I can add, subtract, multiply, and divide rational numbers fluently.

I can explain how to use estimation to determine if a solution is reasonable.

Materials

- **Fraction Operations Loop**
- **Fraction Operations Loop Cards**
- Scissors
- Tape or glue

Answer Key

Expression	Solution
$-2\frac{3}{4}+8\frac{3}{8}$	$5\frac{5}{8}$
$\left(-2\frac{2}{3}\right)\left(-1\frac{2}{5}\right)$	$3\frac{11}{15}$
$3\frac{1}{3}-\left(1\frac{1}{2}+\frac{7}{12}\right)$	$1\frac{1}{4}$
$\frac{-3\frac{1}{4}}{1\frac{1}{2}}$	$-2\frac{1}{6}$
$3\frac{1}{2}+\frac{5}{12}$	$3\frac{11}{12}$
$-\frac{4}{5}\div\frac{3}{8}$	$-2\frac{2}{15}$

Answer key is included for each activity.

Debriefing questions are included to assist the teacher with facilitating a post-activity student discussion.

Debriefing Questions

- What steps did you take to simplify $3\frac{1}{3}-\left(1\frac{1}{2}+\frac{7}{12}\right)$? Why?
- How are the two division problems similar? How are they different?

Listen For . . .

- *Use of the standard algorithms for fraction operations.*
- *Use of vocabulary such as denominator, improper, mixed number, numerator, reciprocal, and simplify.*
- *Understanding of the order of operations.*

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
I could use estimation _____.

Listen/Look For . . .

Understanding of the effects of rounding up or rounding down when estimating an answer.
Use of benchmarking fractions.

Each activity includes an opportunity for students to articulate and summarize their own learning.
A sentence frame is provided for students who may need language support.

Key learning outcomes from the debriefing discussion are summarized here.

Key learning outcomes from the Communicating about Mathematics section are included here.

Texas Essential Knowledge and Skills (TEKS) Alignment Chart

Number and operations

Focus TEKS	Activity	Page
7(2)(A)	Classifying Rational Numbers	2
7(3)(A)	Rational Number Operations, Activity 2	6
7(3)(A)	Rational Number Operations, Activity 4	12
7(3)(A)	Rational Number Operations, Activity 7	18
7(3)(B)	Rational Number Operations, Activity 1	4
7(3)(B)	Rational Number Operations, Activity 3	10
7(3)(B)	Rational Number Operations, Activity 5	14
7(3)(B)	Rational Number Operations, Activity 6	16

Proportionality

Focus TEKS	Activity	Page
7(4)(A)	Representing Constant Rates of Change, Activity 1	48
7(4)(A)	Representing Constant Rates of Change, Activity 2	50
7(4)(A)	Representing Constant Rates of Change, Activity 3	52
7(4)(B)	Unit Rates, Activity 1	42
7(4)(B)	Unit Rates, Activity 2	44
7(4)(B)	Unit Rates, Activity 3	46
7(4)(C)	Constant of Proportionality, Activity 1	54
7(4)(C)	Constant of Proportionality, Activity 2	56
7(4)(C)	Constant of Proportionality, Activity 3	58
7(4)(D)	Solving Problems Involving Percents, Activity 1	22
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7(4)(D)	Solving Problems Involving Percent Decrease, Activity 1	36
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7(4)(E)	Convert Between Measurement Systems, Activity 1	136
7(4)(E)	Convert Between Measurement Systems, Activity 2	138
7(5)(A)	Similar Figures, Activity 1	110

Proportionality

Expressions, equations, and relationships

Expressions, equations, and relationships

Measurement and data

Personal financial literacy

Solving Inequalities, Activity 2

7(11)(A)

Activity Objective

I can solve a two-step inequality.

I can explain in writing about the error in the problem solving process.

Materials

- **Inequalities: Who Is Correct?**

Answer Key

Lee is correct.
Possible answer.
When Lee uses any value greater than or equal to 15, the inequality is true.

Lisa is incorrect.
Possible answer.
Lisa made more than one error in her work. It appears that she didn't recognize that the constant, 6, is being added to $-\frac{2}{3}$x*. She should have subtracted six from both sides of the inequality.*

Her second mistake was to think she can "undo" the product of $\frac{2}{3}$ *and* x *by multiplying by the opposite of* $\frac{2}{3}$ *rather than the reciprocal. Even though she multiplied by the incorrect amount on both sides, she did recognize that she needed to reverse the inequality sign when multiplying both sides of an inequality by a negative number.*

Debriefing Questions

- How could you rewrite the given inequality so that the variable term is first and the constant is second?
- How do you eliminate a fractional coefficient when solving an inequality?
- When solving an inequality, when is it necessary to reverse the inequality sign?
- How do you know if your solution satisfies the inequality?

Listen For . . .

- *Appropriate use of inverse operations to isolate the variable.*
- *Connections between multiplication by a negative value and reversing the inequality symbol.*

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
The opposite of a fraction is _____. The reciprocal of a fraction is _____.

Listen/Look For . . .

Understanding that the opposite of any number involves changing its sign and position related to zero on the number line while preserving its distance from zero.
Understanding that the reciprocal of a rational number reverses the position of the numerator and denominator so that the product of the original value and its reciprocal is one. The sign is unchanged.

Student Name: _____ Date: _____

Inequalities: Who Is Correct?

Lee and Lisa were asked to solve the following inequality: $6 - \frac{2}{3}x \le -4$

Lee and Lisa each solved the inequality but determined different solutions.

Lee's Work	Lisa's Work
$6 - \frac{2}{3}x \le -4$ $6 + \left(-\frac{2}{3}\right)x \le -4$ $-6 \qquad\qquad -6$ $-\frac{2}{3}x \le -10$ $\left(-\frac{3}{2}\right)\left(-\frac{2}{3}\right)x \ge \left(-\frac{3}{2}\right)(-10)$ $x \ge 15$	$6 - \frac{2}{3}x \le -4$ $+6 \qquad\qquad +6$ $\frac{2}{3}x \le 2$ $\left(-\frac{2}{3}\right)\frac{2}{3}x \le \left(-\frac{2}{3}\right)(2)$ $x \ge -\frac{4}{3}$
Is Lee correct? Justify your answer.	Is Lisa correct? Justify your answer.

Communicating about Mathematics

What is the difference between the opposite of a fraction and its reciprocal?

Representing Solutions of Inequalities on Number Lines 7(10)(B), 7(10)(A)

Activity Objective

I can represent the solutions to inequalities using a number line.

I can compare and contrast number lines and situations to choose the most appropriate representation for each solution.

Materials

- **Representing Inequality Solutions**
- **Number Line Cards**
- Scissors
- Tape or glue

Answer Key

	Inequality	Solution	Number Line
1.	$3x + 250 > 400$	$x > 50$	*C*
2.	$3x + 250 \geq 400$	$x \geq 50$	*A*
3.	$400 - 3x \geq 250$	$x \leq 50$	*B*

Debriefing Questions

- How does the inequality for situation 3 compare to situation 1 and 2? How does it differ? Why?
- What do you notice about the solutions to the inequalities?
- How are the number line representations different?
- How does number line A compare to number lines B and C? How does it differ?
- What type of situations would require representations such as number line A? Number lines B and C?

Communicating about Mathematics

Students may respond by talking to a partner and recording a written response in the space provided.

Possible sentence frame:
Number line C does/does not represent all possible solutions for situation 3, because _____.

Listen For . . .

- *Connections between the constraints and conditions given in a situation and how to represent these constraints and conditions with an inequality.*
- *Understanding of the process for solving a two-step inequality.*
- *Understanding of the representations of discrete and continuous solutions and how to distinguish between them as they relate to a situation.*

Listen/Look For . . .

Understanding of the relationship between the solution to an inequality, a context, and the representation of the solution(s) on a number line.

Student Name: _____ Date: _____

Representing Inequality Solutions

- Write an inequality to model each situation.
- Solve the inequality.
- Choose the number line that best represents reasonable solutions for each situation.

1.	The Kingsville High School booster club is sponsoring a car wash to earn money for new soccer uniforms. They have already raised $250. Each car wash is $3. How many cars will they have to wash to collect more than $400?	Inequality and Solution Number Line
2.	Julie's family has a Christmas tree farm. After the winter break, they planted numerous small trees that were each about 250 mm tall. After three months, each grew to a height of at least 400 mm. What was the rate of growth per month?	Inequality and Solution Number Line
3.	Chris saved $400 by working during the school year. He plans to pay $3 per visit to work out at a gym. He would like to keep at least $250, so he can buy a new weight bench. How many workout sessions at the gym will he be able to attend and still have money for the weight bench?	Inequality and Solution Number Line

Communicating about Mathematics

Does the number line representation show all possible solutions for situation 3? Explain your thinking.

_____

_____

_____

_____

_____

_____

Number Line Cards

Cut along the bold dotted lines. Four sets of cards are provided.