STAAR® Edition

# Closing the Distance
## Algebra I

2012 Mathematics TEKS


Teacher Edition

region 4®

# Closing the Distance:

# Algebra I

## Teacher Edition

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**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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1. A resource that serves as an intervention for students who are close to success on the State of Texas Assessments of Academic Readiness (STAAR®)

2. A resource that integrates related TEKS to provide a review of mathematics concepts and skills, paired with opportunities for rigorous mathematical discourse

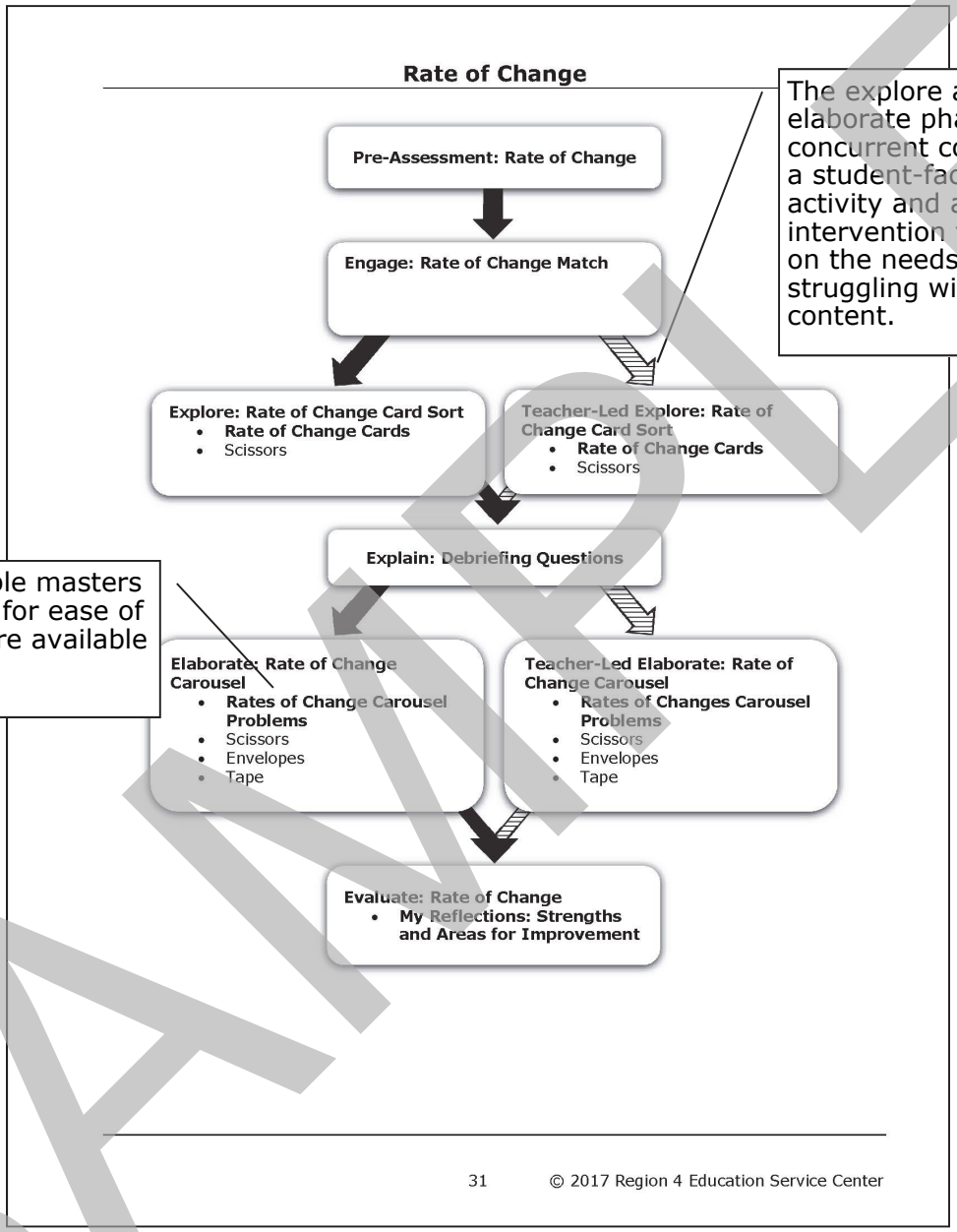
3. A resource of classroom-ready 5E activities that keeps students engaged in a positive, productive manner through strategies, including modeling, card sorts, matching, cooperative learning, and analysis of student work

4. A resource that provides an opportunity for students to track their progress with an analysis of strengths and areas to improve within each lesson

5. A resource that includes a pre-assessment to provide teachers and students quick and timely information on student readiness for the activities in the lesson and identifies students that may benefit from a small-group intervention setting

6. A resource that includes teacher-led interventions for students who may struggle with specific content

# What is in a lesson found in *Closing the Distance*?




The explore and the elaborate phase have two concurrent components: a student-facilitated activity and a teacher-led intervention that focuses on the needs of students struggling with the content.

Titles of reproducible masters are printed in bold for ease of reference. These are available in digital format.

Each lesson supports multiple student expectations with a focus on the STAAR® readiness standards. Student expectations are listed at the beginning of each lesson.

Materials for each phase are summarized on one page for ease in preparation.

## Rate of Change

| Phase | Activity Title | TEKS | Additional Materials | Instructional Grouping |
|---|---|---|---|---|
| Pre-Assessment | **Pre-Assessment: Rate of Change** | A(3)(B) | | Individual |
| Engage | **Rate of Change Match** | A(3)(B) | | Groups of 2 |
| Explore<br>Explain | **Rate of Change Card Sort** | A(3)(B) | • **Rate of Change Cards**<br>• Scissors | Groups of 2<br>Whole Group |
| Elaborate | **Rate of Change Carousel** | A(3)(B) | • ***Rates of Change Carousel Problems***<br>• Scissors<br>• Envelopes<br>• Tape | Groups of 2 |
| Evaluate | **Evaluate: Rate of Change** | A(3)(B) | • **My Reflections: Strengths and Areas for Improvement** | Individual |

Grouping strategies for each phase are summarized to assist in the arrangement of the classroom.

**Bold items are reproducible masters.**
*Italicized items require advanced preparation.*

Students should have continuous access to the graphing technology and STAAR® Reference Materials that will be made available for the assessment.

### Pre-Assessment: Rate of Change

The purpose of this activity is to formatively assess students' understanding of how to calculate the rate of change of a linear function represented tabularly, graphically, or algebraically.

The identified activities are recommended for small-group, teacher-led interventions for students who may struggle with the specific content in **Pre-Assessment: Rate of Change**.

| Content | Teacher-Led Intervention |
|---|---|
| Calculate the rate of change from graphs, tables, equations, and non-contextual mathematical descriptions | **Rate of Change Card Sort** |
| Calculate the rate of change in real-world contexts | **Rate of Change Carousel** |

A focused pre-assessment is provided for each lesson. Tier I intervention activities are identified for use with students who may struggle with the identified content.

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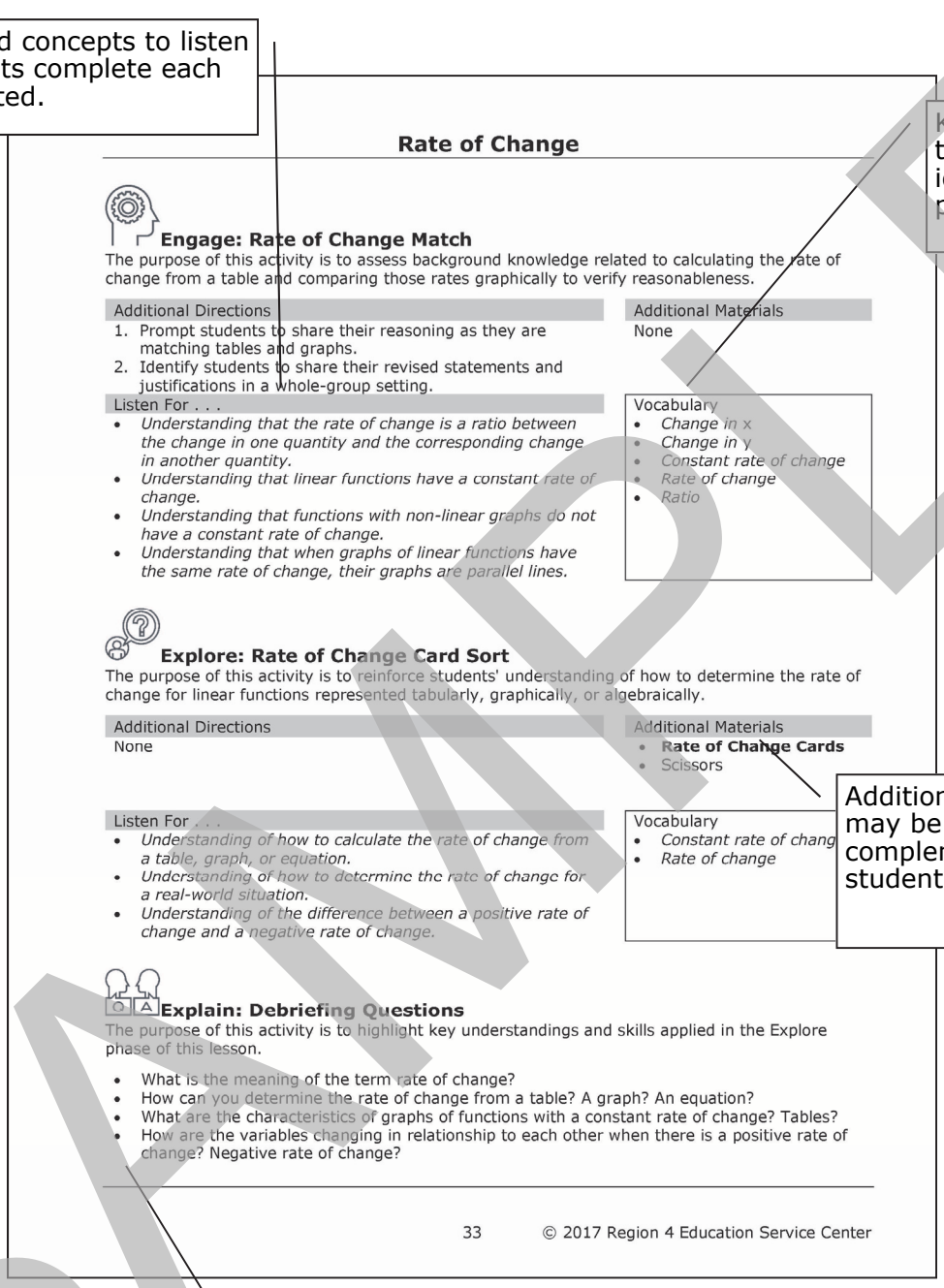
# What is in a lesson found in *Closing the Distance*?

Key ideas and concepts to listen for as students complete each phase are listed.

Key vocabulary terms are identified for each phase.

Additional materials may be needed to complement the student pages.

The explain phase includes debriefing questions to guide class discussion for key understandings and skills found in the activities.



**Rate of Change**

**Engage: Rate of Change Match**

The purpose of this activity is to assess background knowledge related to calculating the rate of change from a table and comparing those rates graphically to verify reasonableness.

| Additional Directions | Additional Materials |
|---|---|
| 1. Prompt students to share their reasoning as they are matching tables and graphs.<br>2. Identify students to share their revised statements and justifications in a whole-group setting. | None |

Listen For . . .

- *Understanding that the rate of change is a ratio between the change in one quantity and the corresponding change in another quantity.*
- *Understanding that linear functions have a constant rate of change.*
- *Understanding that functions with non-linear graphs do not have a constant rate of change.*
- *Understanding that when graphs of linear functions have the same rate of change, their graphs are parallel lines.*

Vocabulary

- *Change in x*
- *Change in y*
- *Constant rate of change*
- *Rate of change*
- *Ratio*

**Explore: Rate of Change Card Sort**

The purpose of this activity is to reinforce students' understanding of how to determine the rate of change for linear functions represented tabularly, graphically, or algebraically.

| Additional Directions | Additional Materials |
|---|---|
| None | • **Rate of Change Cards**<br>• Scissors |

Listen For . . .

- *Understanding of how to calculate the rate of change from a table, graph, or equation.*
- *Understanding of how to determine the rate of change for a real-world situation.*
- *Understanding of the difference between a positive rate of change and a negative rate of change.*

Vocabulary

- *Constant rate of chang*
- *Rate of change*

**Explain: Debriefing Questions**

The purpose of this activity is to highlight key understandings and skills applied in the Explore phase of this lesson.

- What is the meaning of the term rate of change?
- How can you determine the rate of change from a table? A graph? An equation?
- What are the characteristics of graphs of functions with a constant rate of change? Tables?
- How are the variables changing in relationship to each other when there is a positive rate of change? Negative rate of change?

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Complete directions are included on each student page. Additional directions are provided for teacher-facilitated aspects of an activity.

## Rate of Change

### Elaborate: Rate of Change Carousel

The purpose of this activity is to reinforce students' understanding of how to calculate the rate of change of linear functions represented tabularly, graphically, or algebraically in real-world situations.

**Additional Directions**

1. Make several copies of **Rates of Change Carousel Problems** to display in the room so that only one pair of students will be at a station at any given time. Each problem should have an envelope placed below it.
2. Provide each student pair with **Rate of Change Carousel**. Student pairs should cut apart the cards.
3. Student pairs will visit each problem making sure to show their work, an answer, and an explanation of their reasoning on the problem card. Both students will sign the card and place their card in the corresponding envelope.
4. When students have completed the carousel activity, have each student pair retrieve one problem and its corresponding envelope. Prompt each pair to discuss and analyze the submitted responses.

**Additional Materials**

- **Rates of Change Carousel Problems**
- Scissors
- Envelopes
- Tape

**Listen For . . .**

- *Understanding of how to calculate the rate of change from a table, graph, or equation in a real-world situation.*
- *Understanding of the difference between a positive rate of change and a negative rate of change.*
- *Understanding of the meaning of rate of change for a given context.*

**Vocabulary**

- *Rate of change*
- *Ratio*

### Evaluate: Rate of Change

The purpose of this activity is to assess students' understanding of how to calculate the rate of change of linear functions represented tabularly, graphically, or algebraically in mathematical and real-world situations.

| Question | TEKS | Correct Answer |
|---|---|---|
| 1 | A(3)(B) | D |
| 2 | A(3)(B) | C |
| 3 | A(3)(B) | D |
| 4 | A(3)(B) | C |

Each selected-response item is labeled with the content student expectation.

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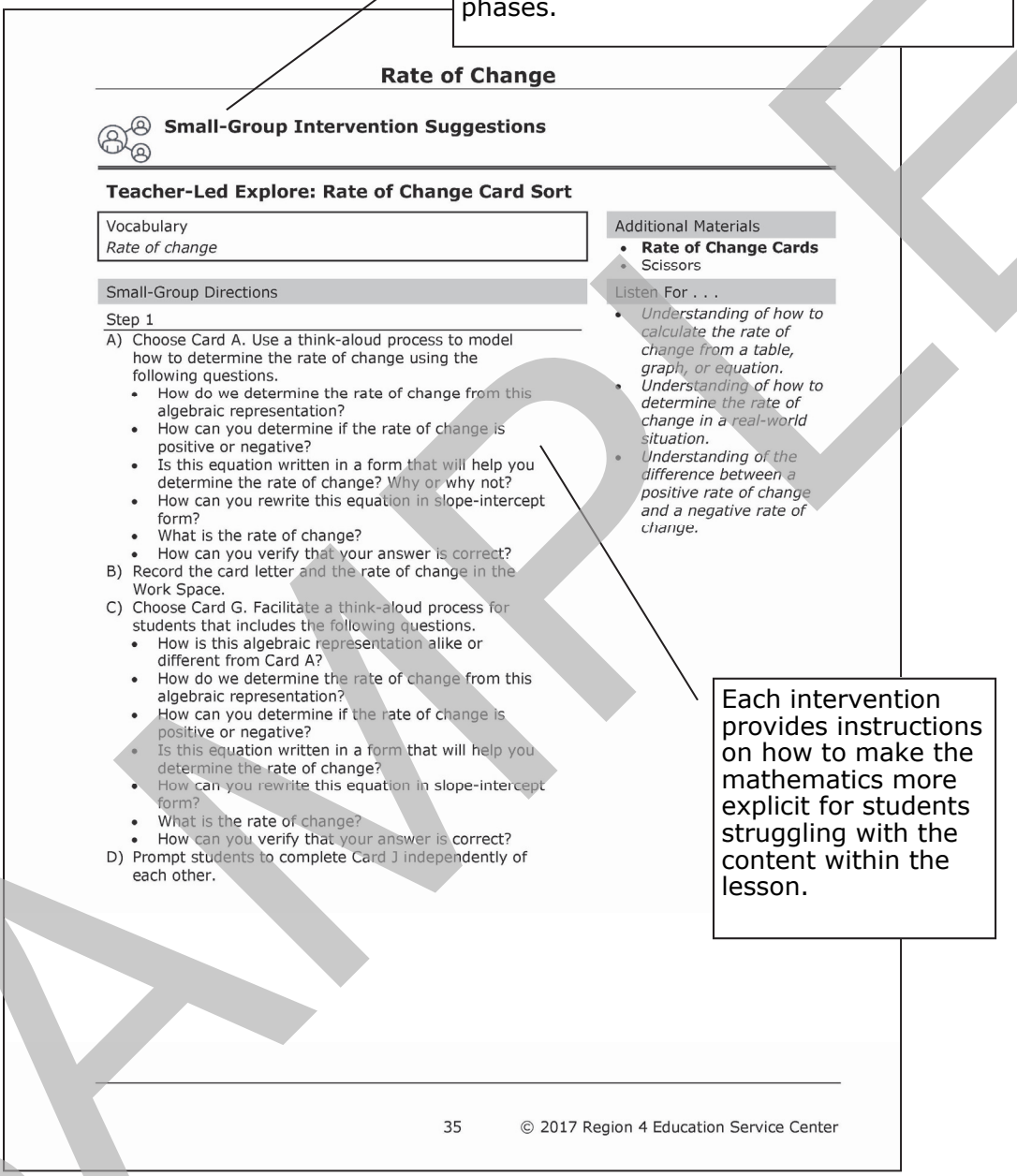
Small-group intervention suggestions are provided for the Explore and the Elaborate phases.



**Rate of Change**

**Small-Group Intervention Suggestions**

**Teacher-Led Explore: Rate of Change Card Sort**

Vocabulary
*Rate of change*

Additional Materials
- **Rate of Change Cards**
- Scissors

Small-Group Directions

Step 1

A) Choose Card A. Use a think-aloud process to model how to determine the rate of change using the following questions.
   - How do we determine the rate of change from this algebraic representation?
   - How can you determine if the rate of change is positive or negative?
   - Is this equation written in a form that will help you determine the rate of change? Why or why not?
   - How can you rewrite this equation in slope-intercept form?
   - What is the rate of change?
   - How can you verify that your answer is correct?

B) Record the card letter and the rate of change in the Work Space.

C) Choose Card G. Facilitate a think-aloud process for students that includes the following questions.
   - How is this algebraic representation alike or different from Card A?
   - How do we determine the rate of change from this algebraic representation?
   - How can you determine if the rate of change is positive or negative?
   - Is this equation written in a form that will help you determine the rate of change?
   - How can you rewrite this equation in slope-intercept form?
   - What is the rate of change?
   - How can you verify that your answer is correct?

D) Prompt students to complete Card J independently of each other.

Listen For . . .
- *Understanding of how to calculate the rate of change from a table, graph, or equation.*
- *Understanding of how to determine the rate of change in a real-world situation.*
- *Understanding of the difference between a positive rate of change and a negative rate of change.*

Each intervention provides instructions on how to make the mathematics more explicit for students struggling with the content within the lesson.

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# What is in a lesson found in *Closing the Distance*?

Each lesson provides an opportunity for student reflection as the student self-assesses strengths for each phase of the lesson. Following this self-assessment, students are prompted to note what they are most proud of and to set a goal to improve understanding.

Name: _____ Date: _____

**My Reflections: Strengths and Areas for Improvement**

Place a plus sign for each statement you feel is a strength after completing each lesson activity.

| Lesson Activity | I can calculate the rate of change of a linear function in a mathematical problem using a table. | I can calculate the rate of change of a linear function in a mathematical problem using a graph. | I can calculate the rate of change of a linear function in a mathematical problem using an algebraic representation. | I can calculate the rate of change of a linear function in a real-world problem using a table. | I can calculate the rate of change of a linear function in a real-world problem using a graph. | I can calculate the rate of change of a linear function in a real-world problem using an algebraic representation. |
|---|---|---|---|---|---|---|
| Rate of Change Matching | | | | | | |
| Rate of Change Card Sort | | | | | | |
| Rate of Change Carousel | | | | | | |
| Evaluate: Rate of Change | | | | | | |

I am most proud . . .

_____

_____

_____

To improve my understanding, I . . .

_____

_____

_____