

# **Integrating Fluency Practice**

**Algebra I, Volume 1**

# Integrating Fluency Practice: Algebra I, Volume 1

## Teacher Edition

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## What is fluency?

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*Guiding Principle: Well-structured, intentional fluency practice supports students' ability to carry out procedures flexibly, accurately, efficiently, and appropriately.*

### **What is fluency?**

According to the National Research Council (2001), fluency allows students to carry out procedures flexibly, accurately, efficiently, and appropriately. It is a key component of mathematical proficiency, especially when combined with conceptual understanding, strategic competence, reasoning, and a productive disposition or the inclination to see oneself as able to learn mathematics.

Numerical fluency includes the ability to think flexibly about the value of a number, leading to robust understanding of equivalent representations of a number. Multiple experiences over time with composing and decomposing numbers in a variety of ways support the development of numerical fluency through connections to properties of operations, magnitude, and fact fluency. As numerical fluency increases, students' cognitive load is lightened, allowing for a greater focus on new or developing mathematics content.

A student demonstrates computational fluency, rooted in numerical fluency, through efficient and accurate methods for computing. Students choose computational methods based on the problem, understand and explain these methods, and use the chosen method to produce accurate solutions efficiently. This reflects number sense, skills, and performing operations.

Procedural fluency includes understanding of algorithms and procedures; when to use them; and skill in performing them. Experiences with comparing and contrasting various computation strategies contribute to the development of procedural fluency. Computation strategies may include the use of manipulatives, mental math, written procedures, and calculation devices. Procedural fluency with estimation supports students in determining the reasonableness of solutions. In this way, procedural skills complement the development of computational fluency.

Intentional fluency practice builds students' fluency with needed procedures while building on a foundation of conceptual understanding. Fluency contributes to learning and is neither a set of isolated skills nor compartmentalized ideas.

## What is *Integrating Fluency Practice: Algebra I, Volume 1*?

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This supplemental resource features collections of fluency activities supporting instruction aligned to the Texas Essential Knowledge and Skills.

Each fluency practice activity takes approximately 10 minutes to facilitate as a regular part of daily mathematics instruction, intervention, or tutoring sessions.

Activities are designed to engage students while increasing mathematical proficiency, including computational and procedural fluency.

### Facilitating fluency practice activities

Each activity includes tasks or prompts for the teacher to use when implementing the activity with students. Display pages are provided for most tasks. The teacher may choose to display the tasks using a digital projection device for whole class display, print copies for small group display, or print copies for individual students. The tasks or prompts provide a starting place for these activities. Teachers are encouraged to supplement the tasks or prompts based on the needs of the students and available time.

For some activities, students may benefit from recording their thinking in writing or having possible answers pre-written in student response card format. For these activities, whiteboards are suggested within the teacher notes. If student whiteboards are not available, teachers may choose to have students write on their desks or on blank paper inside a sheet protector with dry erase markers. When using whiteboards, prompt students to show their responses after recording each answer and provide immediate feedback to each student.

Prior to implementation, the teacher may determine that access to additional resources, such as manipulatives or the STAAR® Reference Materials, will benefit students for a specific activity. If so, the teacher can provide these additional resources as needed.

### Providing feedback to students

*"Feedback is about closing the gap between current and desired learning."*

(Hattie & Clarke, 2019)

For each task within a fluency practice activity, the teacher should provide immediate feedback to every student before proceeding to the next task. Feedback for incorrect responses should be concise and specific enough to help each student identify and correct any errors. If consistent error patterns emerge, the teacher should note that re-teaching at a later time may be necessary.

Effective feedback focuses on refining students' understanding of the content. Some examples of effective feedback are:

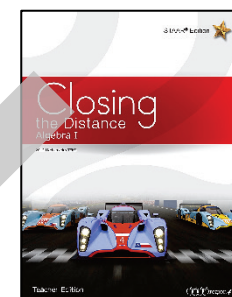
- If you answered 16, you likely halved the number. The task was to double the number. Please refine your answer.
- The answer is 16. Try again, this time representing your thinking on the whiteboard to get to an answer of 16.
- The answer is 16. Some recorded 61. If you recorded 61, you determined the correct digits. However, you did not record the digits with the correct place values. Try using a place value mat to support your thinking.
- The answer is (6, 1). If you recorded (1, 6) you reversed the x- and y-coordinates of the point. Why is order important when recording the coordinates of a point?

## What is *Integrating Fluency Practice: Algebra I, Volume 1*?

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### Connections to *Closing the Distance, Algebra I*

The fluency practice activities within *Integrating Fluency Practice: Algebra I, Volume 1* align to the content of *Closing the Distance, Algebra I*. Additionally, the fluency practice activities may be used to support implementation of the *Sample Tutoring Plans for Closing the Distance*. These tutoring plans are available at no additional cost for those who have purchased *Closing the Distance*. For more information about *Closing the Distance* or the *Sample Tutoring Plans for Closing the Distance* please contact [math@esc4.net](mailto:math@esc4.net).



A strong tutoring program has in place:

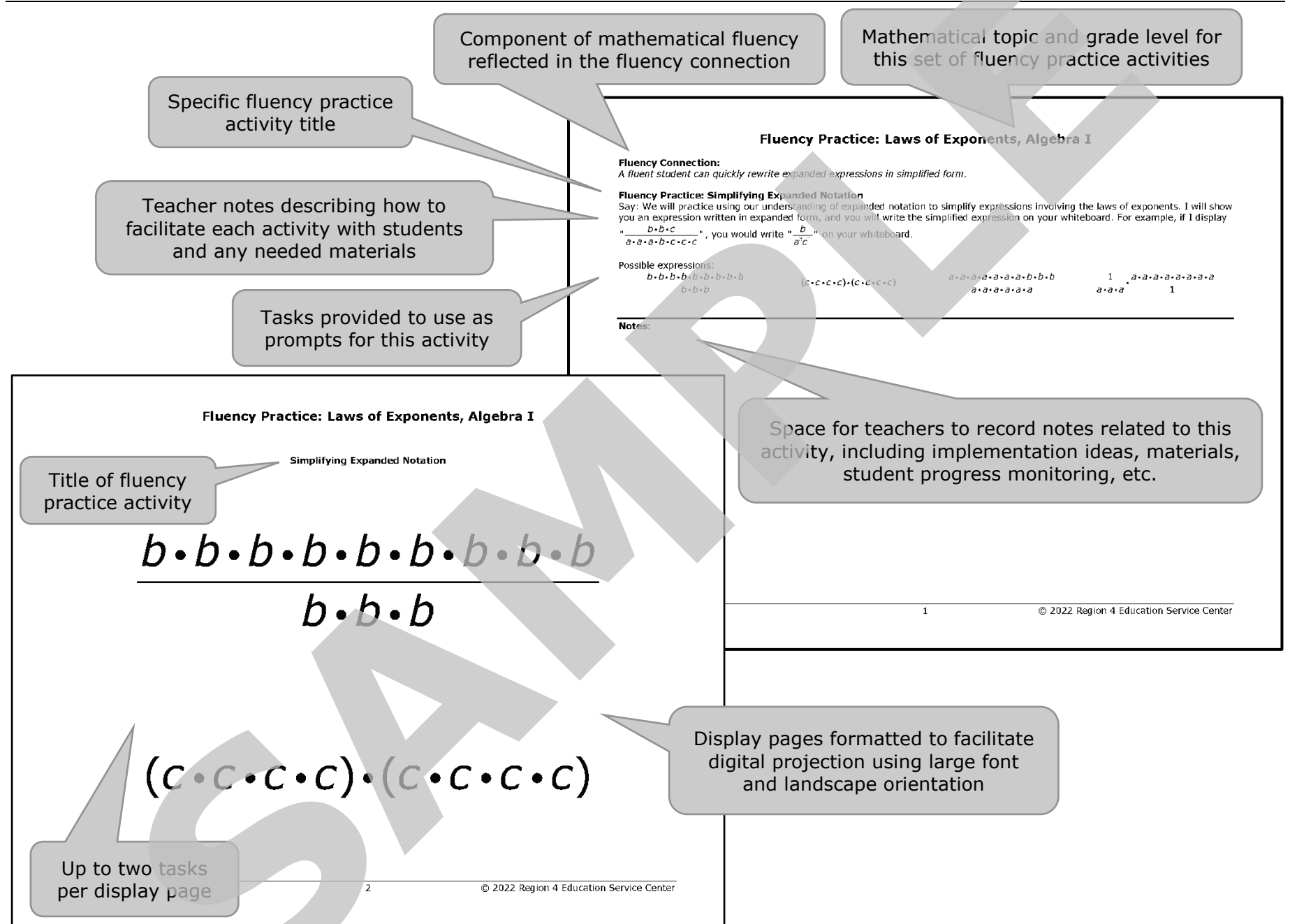
- Well-trained, consistent tutors who build strong relationships with students
- High-quality instructional materials aligned to standards and classwork
- One-to-one or small groups (3 or less) for individualized support
- Tutoring sessions embedded in the school day or immediately before or after to maximize student access
- At least 3 sessions per week for a minimum of 30 minutes per session
- Data-driven planning, utilizing aligned formative assessments, with tutors building sessions around student strengths and needs (Texas Education Agency, 2021)

### References

- Hattie, John, and Shirley. *Visible Learning: Feedback*. New York, NY: Routledge, 2019.
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- Swafford, Jane, Bradford Findell, and Jeremy Kilpatrick. *Adding It All up: How Children Learn Mathematics*. Washington, DC: National Academy Press, 2001.
- Texas Education Agency. "Texas Tutoring Supports." Texas Education Agency. Texas Education Agency, August 2, 2022. <https://tea.texas.gov/texas-schools/health-safety-discipline/covid/texas-tutoring-supports>.



# What is in a fluency practice activity set?



# Fluency Practice: Laws of Exponents, Algebra 1

## Fluency Connection:

A fluent student can quickly rewrite expanded expressions in simplified form.

## Fluency Practice: Simplifying Expanded Notation

Say: We will practice using our understanding of expanded notation to simplify expressions involving the laws of exponents. I will show you an expression written in expanded form, and you will write the simplified expression on your whiteboard. For example, if I display

" $\frac{b \cdot b \cdot c}{a \cdot a \cdot a \cdot b \cdot c \cdot c \cdot c}$ ", you would write " $\frac{b}{a^3 c^2}$ " on your whiteboard.

Possible expressions:

$$\frac{b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b}{b \cdot b \cdot b}$$

$$(c \cdot c \cdot c \cdot c) \cdot (c \cdot c \cdot c \cdot c)$$

$$\frac{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b}{a \cdot a \cdot a \cdot a \cdot a \cdot a}$$

$$\frac{1}{a \cdot a \cdot a} \cdot \frac{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a}{1}$$

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Notes:

## Fluency Practice: Laws of Exponents, Algebra I

### Simplifying Expanded Notation

$$\frac{b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b \cdot b}{b \cdot b \cdot b}$$

$$(c \cdot c \cdot c \cdot c) \cdot (c \cdot c \cdot c \cdot c)$$

## Fluency Practice: Laws of Exponents, Algebra I

### Simplifying Expanded Notation

$$\frac{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot b \cdot b \cdot b}{a \cdot a \cdot a \cdot a \cdot a \cdot a}$$

$$\frac{1}{a \cdot a \cdot a} \cdot \frac{a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a \cdot a}{1}$$