

Figuring Out Fluency in Mathematics Teaching and Learning: The Book at a Glance

FIGURE 7.2 • Reference Page of Reasoning Strategies and Automaticities


SEVEN SIGNIFICANT REASONING STRATEGIES	RELEVANT OPERATIONS
1. Count On/Count Back	Addition and subtraction
2. Make Tens	Addition
3. Use Partial	Addition, subtraction, multiplication, and division
4. Break Apart to Multiply	Multiplication
5. Halve and Double	Multiplication
6. Compensation	Addition, subtraction, and multiplication
7. Use an Inverse Relationship	Subtraction and division
AUTOMATICITIES	RELEVANT OPERATIONS
Basic facts	Addition, subtraction, multiplication, and division
Breaking apart all numbers through 10	Addition and subtraction
Base-10 combinations	Addition and subtraction
Using 25s	Multiplication and division
Using 15s and 30s	Multiplication and division
Doubling	Multiplication
Halving	Division
Fraction equivalents within fraction families	Addition, subtraction, multiplication, and division
Conversions between common decimals and fractions	Addition, subtraction, multiplication, and division

 This resource can be downloaded at resources.corwin.com/figuringoutfluency.

The book offers Seven Significant Strategies and other automaticities for building fluency in all number types from whole numbers to fractions, decimals, and integers.

Teaching Takeaways throughout the book help you recall important key ideas and highlight issues of access and equity.

Stop and Reflect boxes throughout help you connect main ideas to your practice.



Stop & Reflect

The first five strategies involved ways to break numbers apart. Compensation instead involves imagining a simpler problem (and then adjusting it to preserve equivalence). How might you help students understand these two different ways of reasoning?

TEACHING TAKEAWAY

Honoring strategies from other countries and cultures builds cultural relevance, strengthens the school-community partnership, and exposes students to more fluent thinking.

TEACHING TAKEAWAY

Students with disabilities benefit as much as other students from an instructional focus on fluency with efficiency, flexibility, and accuracy.

ACTIVITY 2.1 ROUTINE: “THAT ONE”

Materials: A short list of three or four expressions (see examples below)

Directions: Post the list of expressions you create. Have students identify which expression(s) would be solved most efficiently with a standard algorithm and which ones lend to a reasoning strategy. Have students explain their decisions.

GRADE 3 EXAMPLES	GRADE 4 EXAMPLES	GRADE 5 EXAMPLES	GRADE 6 EXAMPLES
• $99 + 14$	• $302 - 199$	• $5 + \frac{1}{4}$	• 0.25×48
• $47 + 47$	• $617 - 438$	• $7 + \frac{1}{3}$	• 9.89×12.3
• $23 + 67$	• $933 - 750$	• $3 + \frac{1}{6}$	• 3.7×4.1

Thirty-six activities throughout the book take three flavors: routines, focus tasks, and games. Game boards and other student work mats are available for download at resources.corwin.com/figuringoutfluency.

ACTIVITY 4.1 FOCUS TASK: WHAT’S THE TEMPERATURE?

Materials: Visual of a thermometer (or a vertical number line), one per student or pair



Resources can be downloaded at resources.corwin.com/figuringoutfluency.

Directions: Explain to the students that you are going to give a clue, and they are going to tell you the temperature you are thinking of. Have students record the related equations. Examples include the following:

1. In the morning, it was 19 degrees, and then, it warmed up 20 degrees. What’s the temperature? ($19 + 20 = 39$)
2. When you got to school, it was 67 degrees, but at recess time, it was 15 degrees cooler. What did the temperature drop to? ($67 - 15 = 52$)
3. It was 10 degrees when the sun set, and overnight the temperature dropped 18 degrees. What was the temperature in the morning? ($10 - 18 = -8$)

ACTIVITY 3.7 GAME: STAY OR GO

Materials: Bottom-Up Hundred Chart (see Figure 3.11), one per pair of students; deck of cards (remove all tens, jacks, and kings; queens = 0, aces = 1), one deck per pair; chip or marker for Hundred Chart

Directions: Place deck facedown between the partners. Both players take two cards and turn them over side by side to form two 2-digit numbers. The goal is for the partners to work together to estimate. Player 1 gives the front-end estimate, placing a marker on the appropriate place on the Hundred Chart. Player 2 looks at numbers in the ones place and says either “stay” or “go up one row” (moving chip, if needed). Students record their estimates on a recording sheet.

FIGURE 3.11 • Bottom-Up Hundred Chart

91	92	93	94	95	96	97	98	99	100
81	82	83	84	85	86	87	88	89	90
71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70
51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50
31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30
11	12	13	14	15	16	17	18	19	20
1	2	3	4	5	6	7	8	9	10

Talk About It

1. How would you describe quality practice to a colleague?
2. What things might you look for in fluency practice?
3. What practice approaches should you keep doing? Which might you rethink?
4. How might you infuse the types of practice shared in this chapter (routines, worked examples, games, centers, and independent practice)?
5. How do you currently hold students accountable for practice? What new ideas might you also use?
6. How do you ensure that students reflect on what they learned through their practice?

Act On It

1. **Review your practice resources.** Identify which of your practice resources meet the characteristics of high-quality practice. Identify which things you should consider modifying or purging. In other words, which aspects of fluency are practiced? How might you adapt or enhance practice in order to have a balanced approach across the components of fluency?
2. **Try an activity.** Identify one of the routines, games, or centers from this chapter (or any other chapter) and begin to work it into your mathematics practice regimen.
3. **Prepare worked examples.** For a topic that is important to your grade and/or is coming up soon, create a pair of worked examples for students to compare and discuss as part of or all of a lesson. Consider how you might use a worked example in a formative or summative assessment.

Talk About It and Act On It sections at the end of each chapter offer further discussion points and practical ideas for immediate implementation.

The book offers a handy metacognitive process chart to help students select a strategy for any given situation.

FIGURE 4.12 • Metacognitive Process for Selecting a Strategy

