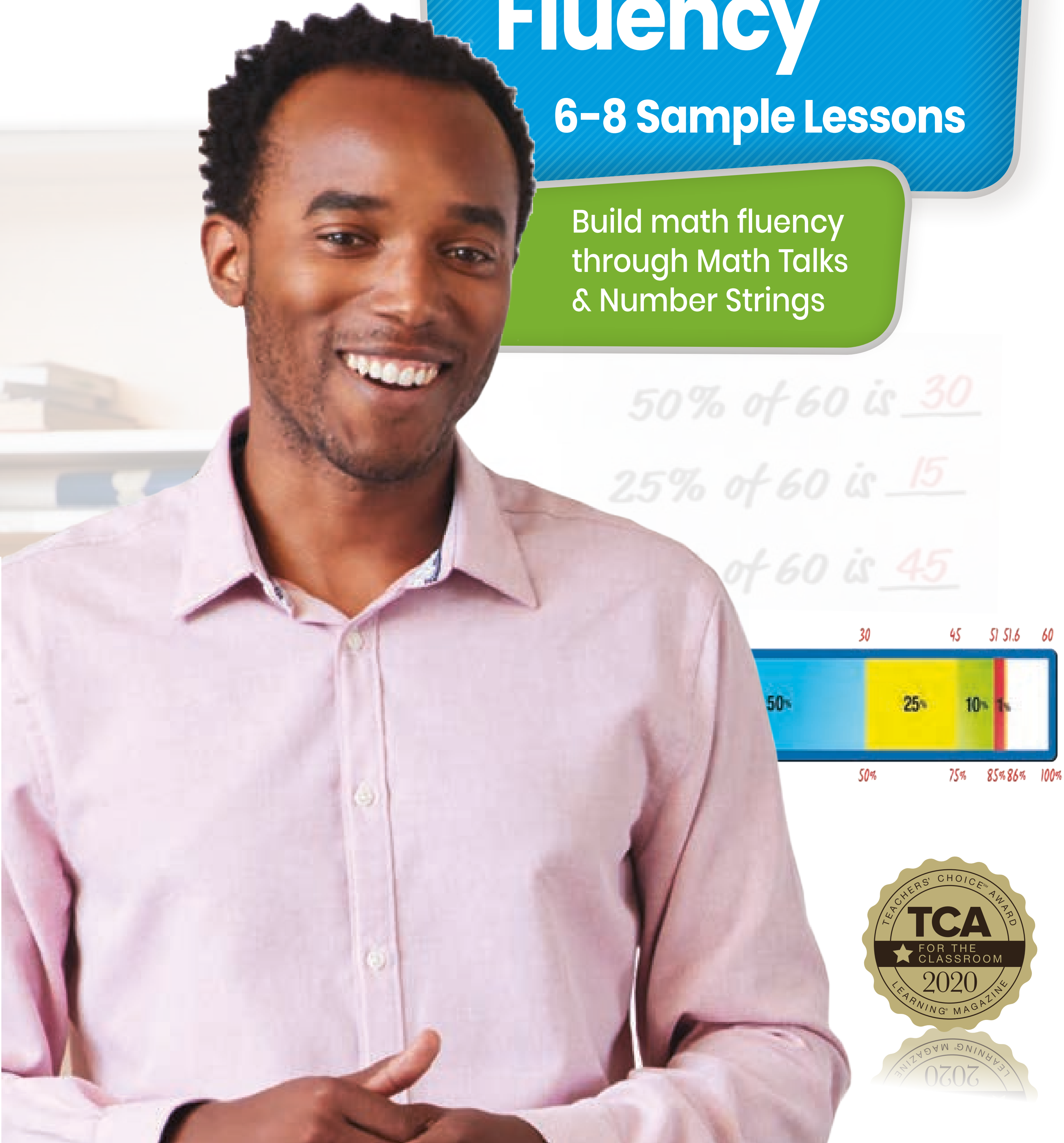
hand2mind

Daily Math Fluency

6-8 Sample Lessons

Build math fluency through Math Talks & Number Strings



TEACHERS' CHOICE AWARD
TCA
FOR THE CLASSROOM
2020
LEARNING MAGAZINE

Grade 6

Number Strings

Scale Up to Scale Down

10 shirts

Draw a table with 5 shirts at a cost of $135

Teacher: *A local store sells 5 shirts for $135. How much would 10 shirts cost?* **Student:** $270. That's twice the number of shirts, so I doubled $135 to get $270. **Teacher:** *We can track our proportional reasoning in a ratio table.*

×2

shirts	5	10
cost ($)	135	270

×2

1 shirt

Add entry to table for 1 shirt

Teacher: *How much would 1 shirt cost? How do you know?* **Student:** $27. I used the 10 shirts for $270 and divided that by 10 to get the cost for 1 shirt. **Teacher:** *Did anyone use the cost of 5 shirts?* **Student:** No, it was easier to think about the cost of 1 shirt from 10 shirts. **Teacher:** *Interesting. So, we scaled up to 10 shirts, then scaled down to the cost of 1 shirt.*

÷10

shirts	5	10	1
cost ($)	135	270	27

÷10

60 shirts

Draw table with 30 shirts at a cost of $225

Teacher: *A different store sells 30 shirts for $225. How much would 60 shirts cost at this store?* **Student:** $450. You double 30 to get to 60, so we double $225 to get to $450. **Teacher:** *Nice use of scaling in tandem!*

×2

shirts	30	60
cost ($)	225	450

×2

20 shirts

Add entry to table for 20 shirts

Teacher: *How much would 20 shirts cost at this store?* **Student:** $150. I divided the 60 shirts for $450 by three to find that 20 shirts cost $150. **Teacher:** *Nice scaling in tandem! So, how would you explain how we reasoned from 30 shirts cost $225 to 20 shirts cost $150?* **Student:** We scaled up to 60 shirts (by doubling), then scaled down to 20 shirts (by taking thirds). **Teacher:** *That's an important strategy. Sometimes it is helpful to scale up in order to scale down.*

÷3

shirts	30	60	20
cost ($)	225	450	150

÷3

2 shirts

Draw table with 5 shirts at a cost of $43

Teacher: *At another store, 5 shirts sell for $43. How much would 2 shirts cost at this store?* **Student:** If 5 shirts cost $43, then 10 shirts cost $86 and 1 shirt costs $8.60. I doubled that to find 2 shirts cost $17.20. **Teacher:** *Did anyone think of this another way?* **Student:** I multiplied 5 shirts for $43 times four to get 20 shirts for $172. Then, I divided by 10 to get 2 shirts for $17.20. **Teacher:** *You both strategically scaled up to scale down! Great proportional reasoning!*

×2 ÷10 ×2

shirts	5	2	10	1	2
cost ($)	43	?	86	8.6	17.20

×2 ÷10 ×2

×4 ÷10

shirts	5	2	20	2
cost ($)	43	?	172	17.2

×4 ÷10

Strategies Taught

- Use a Friendly Number
- Over and Adjust
- Get to a Friendly Number
- Give and Take
- Removal vs. Distance
- Find the Distance
- Keep the Same Distance
- Use Partial Products
- Over and Under
- Use Commutative Property
- Double and Halve
- Factor and Group Flexibility
- Multiply Up
- Use Quotative Division
- Use Common Denominators
- Partial Quotients
- Use Proportional Reasoning
- Scale in Tandem
- Scale Up to Scale Down
- Within and Between Ratios
- Use a Friendly Percent
- Use Unit Rate
- Cover-Up
- Solution-Preserving Moves

Manipulatives included

- Magnetic Two-color Counters
- Magnetic Cuisenaire® Rods
- Magnetic Rainbow Fraction Circles with rings
- Demonstration Percent Bar
- Number Line Poster
- Ratio Poster
- Picture Cards

Grade 6

Math Talks

$$\frac{15}{48} = \frac{10}{x}$$

Scaling in Tandem

32; I thought about the scale factor from 15 to 10. Since 15 x $\frac{2}{3}$ is 10, I multiplied 48 x $\frac{2}{3}$ to get 32. Also, 48 x $\frac{1}{3}$ is 16, so 48 x $\frac{2}{3}$ is 32.

$\times\frac{2}{3}$

lbs. sugar	15	10
cost ($)	48	32

$\times\frac{2}{3}$

$48 \times \frac{1}{3} = 16$
$48 \times \frac{2}{3} = 32$

Scale Down to Scale Up

32; I divided 15 lbs for $48 by 3 to find that 5 lbs cost $16. Then, I doubled that to find that 10 lbs must cost $32.

÷3 ×2

lbs. sugar	15	5	10
cost ($)	48	16	32

÷3 ×2

Scale Up to Scale Down

32; I doubled 15 lbs for $48 to get 30 lbs for $96. Then, I divided that by 3 to find 10 lbs must cost $32.

×2 ÷3

lbs. sugar	15	30	10
cost ($)	48	96	32

×2 ÷3

Teacher Notes

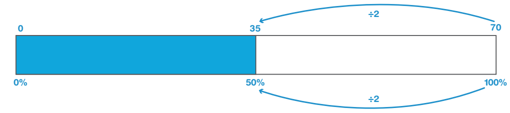
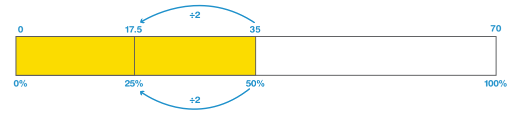
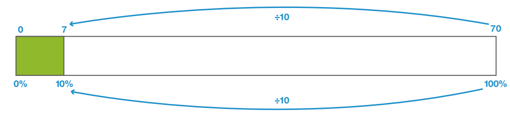
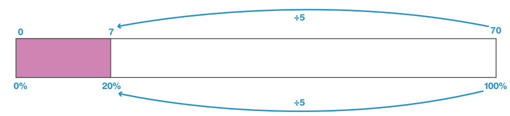
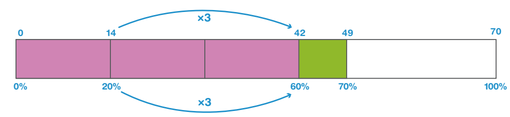
Start the Math Talk by writing 15 pounds of sugar and $48 in a ratio table. Ask students how much 10 pounds of sugar would cost. Give students time to mentally solve the problem. Write all answers on the board and then have students explain their thinking. Model student thinking using a representation that will help make the strategy clear for all students to access.

Facilitating Questions: **1.** Can you find two strategies that are similiar? How are they the same? **2.** Are there any strategies that are more efficient than the others? Why? **3.** After observing other strategies, did you revise your thinking? How?

Grade 7

Number Strings

Use a Friendly Percent

35 is ___ % of 70 Display percent bar manipulative	**Teacher:** *35 is what percent of 70? How do you know?* **Student:** 50%. 35 is half of 70, so it is 50% of 70. **Teacher:** *We can represent that thinking on a percent bar model.*	 35 is 50% of 70
17.5 is ___% of 70 Display percent bar manipulative	**Teacher:** *17.5 is what percent of 70? How do you know?* **Student:** 25%. If 35 is 50% and 17.5 is half of 35, then 17.5 must be 25%, half of 50%. **Teacher:** *Great use of proportional reasoning to make sense of that!*	 17.5 is 25% of 70
7 is ___ % of 70 Display percent bar manipulative	**Teacher:** *7 is what percent of 70? How might we think about this?* **Student:** 10%; I know that 70 divided by 10 is 7, so I just divide 100% by 10 to get 10%. **Teacher:** *Nice job scaling in tandem.*	 7 is 10% of 70
14 is ___ % of 70 Display percent bar manipulative	**Teacher:** *14 is what percent of 70?* **Student:** 20%. Since 7 is 10% of 70, I thought about 70 divided by 5 to get 14 and 100% divided by 5 to get 20%. **Teacher:** *Nice reasoning!*	 14 is 20% of 70
49 is ___ % of 70 Display percent bar manipulative	**Teacher:** *49 is what percent of 70? How do you know?* **Student:** 70%; I know that 14 is 20% of 70, so I thought about 14 x 3 to get 42, which is 60%. I still needed 7 more to get to 49. I know 7 is 10% of 70, so 60% + 10% = 70%. Then, 49 is 70% of 70. **Teacher:** *Nice job thinking relationships to help you reason about the missing percent.*	 49 is 70% of 70

Strategies Taught

- Use a Friendly Number
- Over and Adjust
- Get to a Friendly Number
- Give and Take
- Removal vs. Distance
- Find the Distance
- Keep the Same Distance
- Use Partial Products
- Over and Under
- Use Commutative Property
- Double and Halve
- Factor and Group Flexibility
- Multiply Up
- Use Quotative Division
- Use Common Denominators
- Partial Quotients
- Use Proportional Reasoning
- Scale in Tandem
- Scale Up to Scale Down
- Within and Between Ratios
- Use a Friendly Percent
- Use Unit Rate
- Cover-Up
- Solution-Preserving Moves

Manipulatives included

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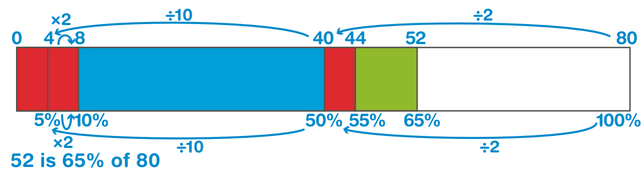
Grade 7

Math Talks

52 is ____% of 80

Use a Friendly Percent

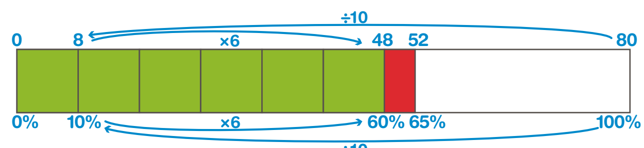
65%; I thought about 40 being 50% of 80 first. From 40, I divided by 10 to see that 4 is 5% of 80, then multiplied that by 2 to see that 8 is 10% of 80. Then 40 + 4 + 8 is 52, and 50% + 5% + 10% is 65%.



52 is 65% of 80

Use a Friendly Percent

65%; I first found 10% by dividing by 10, so that's 8. I multiplied by 6 to see that 48 is 60% of 52. I needed 4 more to make 52. Since 4 is half of 8, it must be 5%, or half of 10%. Then 60% + 5% is 65%.



52 is 65% of 80

Use a Friendly Percent

65%; I thought about 40 being 50% of 80. I divided that by 10 to see that 4 is 5% of 80. I knew that 52 is a multiple of 4, so I tried to figure out what I could scale 4 by to get 52. I knew 4 x 12 is 48, and 52 is just one more group of 4. So 4 x 13 is 52, and 5% x 13 is 65%.

40 is 50% of 80
÷10 ÷10
4 is 5% of 80
×13 ×13
52 is 65% of 80

Teacher Notes

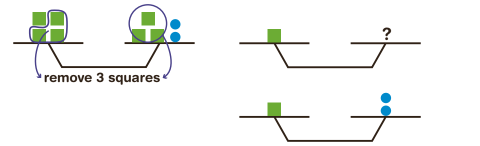
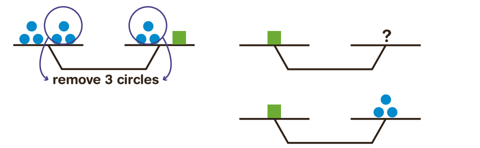
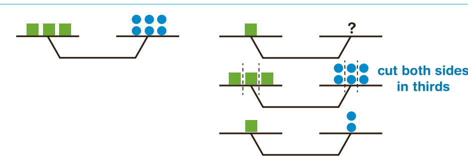
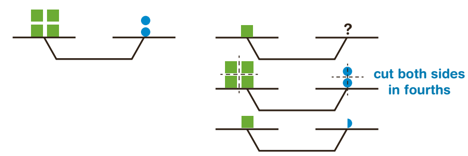
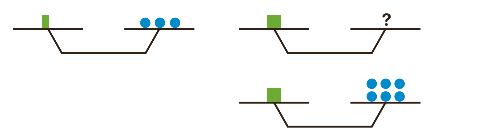
Start the Math Talk by writing 52 is ____% of 80. Give students time to mentally solve the problem. Write all answers on the board and then have students explain their thinking. Model student thinking using a representation that will help make the strategy clear for all students to access. Write any equations that represent the strategy.

Facilitating Questions: **1.** Can you find two strategies that are similiar? How are they the same? **2.** Are there any strategies that are more efficient than the others? Why? **3.** After observing other strategies, did you revise your thinking? How?

Grade 8

Number Strings

Solution-Preserving Moves

1 square = ? Show card P–38	**Teacher:** *4 squares balance with 3 squares and 2 circles. How many circles would balance with just 1 square? How do you know?* **Student:** 1 square would balance with 2 circles. If you remove three squares from both sides, that's what you would have left. **Teacher:** *Why does that work?* **Student:** It would stay balanced because you took away the exact same thing from both sides. **Teacher:** *That's an example of a solution-preserving move; removing the same thing from both sides.*	
1 square = ? Show card P–39	**Teacher:** *6 circles balance with 1 square and 3 circles. How many circles would balance with just 1 square?* **Student:** 3 circles. I took 3 circles off both sides, which left 3 circles balancing with 1 square. **Teacher:** *That's interesting, you removed circles instead of squares this time. Why?* **Student:** There were extra circles on both sides, so I removed those. There were squares on only one side, so I couldn't remove them. **Teacher:** *Nice thinking!*	
1 square = ? Show card P–16	**Teacher:** *3 squares balance with 6 circles. How many circles would balance with just 1 square?* **Student:** 2 circles. I cut each side in thirds to show that 1 square balances with 2 circles. **Teacher:** *That's an example of a solution-preserving move. We can partition a situation equally and still maintain balance.*	
1 square = ? Show card P–40	**Teacher:** *4 squares balance with 2 circles. How many circles would balance with just 1 square?* **Student:** I cut everything in fourths to get that 1 square balances with 1/2 of a circle. **Teacher:** *Good thinking! So, we can use this idea of partitioning even when we end up with fractional pieces.*	
1 square = ? Show card P–19	**Teacher:** *What if 1/2 a square balances with 3 circles. How many circles would balance with 1 square?* **Student:** 6 circles! I added half a square to the left and 3 circles to the right to keep things balanced. **Teacher:** *Did anyone think of that another way?* **Student:** I doubled what we had to get 1 square balances with 6 circles. **Teacher:** *Both are helpful ways of thinking about this! Another solution-preserving move is doubling or scaling up by a multiple.*	

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Grade 8

Math Talks

$0.25x + 5.2 = 7.2$

Cover Up

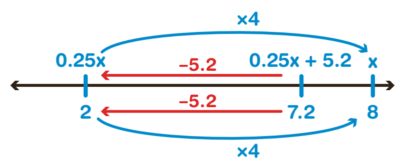
x = 8. I covered up the 0.25x and thought about what plus 5.2 is 7.2. That's 2, so I knew 0.25x is 2. Then I covered up the x to think about 0.25 times what is 2, and that's 8, because 8 quarters makes $2.

$$0.25x + 5.2 = 7.2$$
$$\blacksquare + 5.2 = 7.2$$
$$0.25x = 2$$
$$0.25 \cdot \blacksquare = 2$$
$$x = 8$$

Solution-Preserving Moves

x = 8. I started by moving the numbers back 5.2 to see that 0.25x is at 2. Then I multiplied it by 4 to get x is at 8.

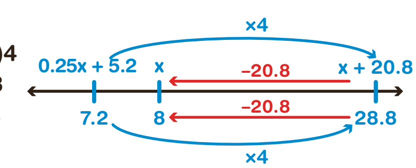
$$0.25x + 5.2 = 7.2$$
$$-5.2 \quad -5.2$$
$$4(0.25x) = (2)(4)$$
$$x = 8$$



Solution-Preserving Moves

x = 8. I quadrupled the equation to get x + 20.8 = 28.8. Then I thought about going back 20.8 to get x is 8.

$$4(0.25x + 5.2) = (7.2)4$$
$$x + 20.8 = 28.8$$
$$-20.8 \quad -20.8$$
$$x = 8$$



Teacher Notes

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Recommended by Teachers

"I believe Daily Math Fluency is an engaging routine that all math teachers should be implementing. I already did Number Talks, following the book by Sherry Parrish, which is very similar to Daily Math Fluency routines. **One of these programs should be followed everyday in a math classroom!** I enjoyed the materials that came with the Daily Math Fluency kit, especially the flexible grid arrays. My students love these routines and is a wonderful way for students to share their math thinking in a safe environment."

—3rd grade teacher, Alabama

"There are many reasons I love hand2mind's Daily Math Fluency Kits, but one of my top reasons is the combination of Concrete-Representation-Abstract. The kits have my favorite manipulatives, but the guides included in the kits help teachers build the connections. **It's the perfect mix to help students build their fluency."**

—Christina Tondevold, teacher educator & former middle school math teacher

"Daily Math Fluency from hand2mind **helps educators easily and effectively guide math talks with students.** This allowed our teachers the framework they were looking for to be intentional about math talks in their classrooms."

—Catherine Castillo, coordinator of 21st century numeracy, Springfield (MO) Public Schools

800.445.5985
hand2mind.com

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To Learn More
hand2mind.com/mathfluency