

# Multiplication Fact Fluency: A School-Wide Solution that can Actually be Fun!

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Handout:

[http://www.dnamath.com/  
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My students  
don't know their  
basic facts.

If my students just  
knew their basic  
facts, they would  
be so much more  
successful.

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Is there something  
better than the  
mad minute?

There's not  
enough  
practice.

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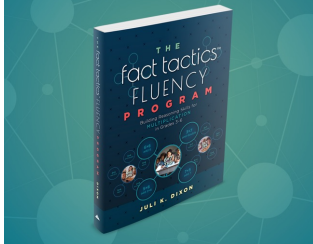
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Support all learners  
with **math fact fluency**



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## Goals

- Examine structures for developing fluency grounded in multiplicative reasoning.
- Make sense of the Six Fluency Tactics.
- Examine the Fact Tactics<sup>®</sup> Fluency Program as a school-wide solution.

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## What is the current focus of fluency instruction?

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graph TD
    A(Push to learn basic facts) --> B(Prioritize drill and kill)
    B --> C(Use timed tests)
    C --> D(Create math anxiety)
    D --> E(Struggle with quick recall)
    E --> A
        
```

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## Why does this current practice miss the point?

Readiness for algebra requires “a grasp of the meaning of the basic operations of addition, subtraction, multiplication, and division. It must also include use of the commutative, associative, and distributive properties; computational facility; and the knowledge of how to apply the operations to problem solving” (NMAP, 2008, p. 17).

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How do we bring sense making to multiplication?



It starts with word problems.

Write a word problem for  $6 \times 7$ .

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Consider  $3 \times 4$ .



I have 3 elephants. Each elephant has 4 legs.

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Consider  $3 \times 4$ .



I have 3 elephants. Each elephant has 4 legs.

What question would you ask?

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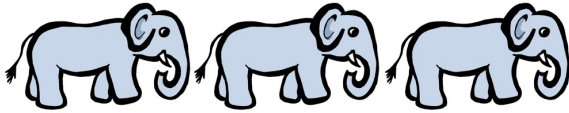
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Consider  $3 \times 4$

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I have 3 elephants. Each elephant has 4 legs. How many legs are there in all?



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Now consider  $4 \times 3$

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Now consider  $4 \times 3$

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I have 4 elephants. Each elephant has 3 legs ...

Same number of legs, really different image ...

When the focus is on sense making, the order of the factors matters.

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How do we bring sense making to multiplication?



Re-examine the word problem you wrote.

Is your word problem modeled by  $6 \times 7$  or  $7 \times 6$ ?

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What strategies might students use to determine the product of  $6 \times 7$  if they did not know it?



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What mathematics is involved in each strategy?



- Drawing
- Counting Strategies
- Multiplicative Reasoning

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- Drawing,
- Counting Strategies, or
- Multiplicative Reasoning

6 x 6  
add 6

Skip Count

Repeated Addition

5 x 7  
add 7

Draw an array

6 x 5  
add 6 x 2

6 x 7

7 x 6

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6 x 7

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7 x 6

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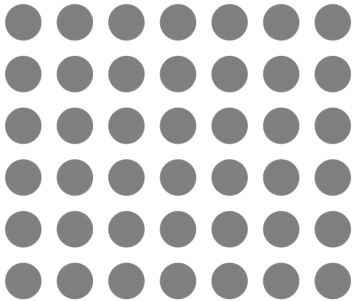
6 x 7 as 3 x 7 and double

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How would we represent the strategy symbolically?

3 x 7 and double

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### Six Fluency Tactics

- The Grounding Tactic
- The Linking Tactic
- The Strategic Repetition Tactic
- The Review Tactic
- The Assessment Tactic
- The Extension Tactic

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### The Grounding Tactic

Students will be more likely to make sense of their basic facts if they have already developed an understanding of the meaning of multiplication and can apply that meaning to strategies for multiplying basic facts.

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### The Grounding Tactic

Where do we start?

What might be more informing is to consider where we don't start!

We do not start with one and zero facts...

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### The Grounding Tactic

Where do we start?

Beyond making sense of multiplication, there are facts students need to know to make the most of Fact Tactics<sup>®</sup>.

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### The Grounding Tactic

Foundations for Fact Fluency:

- ✓ Twos
- ✓ Fives
- ✓ 3 x 3

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## Six Fluency Tactics

- The Grounding Tactic
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## The Linking Tactic

The order of facts we use to build fact fluency has the power to support reasoning and sense making. It is about being Fact Tactical 😊.

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## The Linking Tactic

How many facts are we talking about anyway?

Twenty facts.

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### The Linking Tactic

X	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

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### The Linking Tactic

This progression addresses all facts in 20 weeks and provides a tactical development of fact fluency.

✓ 3 x 4	✓ 3 x 7	✓ 4 x 8	✓ 8 x 8
✓ 3 x 6	✓ 4 x 7	✓ 6 x 8	✓ 4 x 9
✓ 4 x 4	✓ 6 x 7	✓ 7 x 8	✓ 7 x 9
✓ 4 x 6	✓ 7 x 7	✓ 3 x 9	✓ 8 x 9
✓ 6 x 6	✓ 3 x 8	✓ 6 x 9	✓ 9 x 9

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### The Linking Tactic

4 x 6

How might students derive this fact as they develop fact fluency? Create a sample web to support your thinking.

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# The Linking Tactic

6 x 6

How is this focus fact connected to the one you just explored?

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# The Linking Tactic

Notice how previous facts are used to derive the new focus fact. This is linking.

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## The Strategic Repetition Tactic



Students should be provided many opportunities to verbalize *both* their strategies and the product. As students verbalize their strategies, they will approach automaticity with the focus and partner facts.

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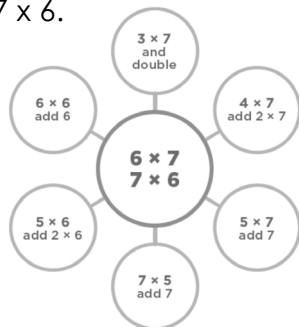
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Examine the Fact Tactics® Web for  $6 \times 7$  and the partner fact  $7 \times 6$ .



Choose one of these strategies.

Write your strategy in your notes.



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## The Strategic Repetition Tactic



With the program, the fact would be on one side of a card and the student's chosen strategy on the other.

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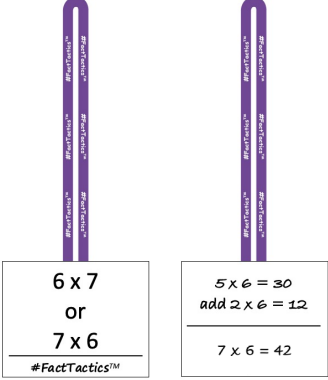
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Some ideas for strategic repetition:

1. Find someone with the same strategy as you and discuss why you chose that strategy.
2. Find someone with a different strategy and discuss how the strategies are the same and how they are different.

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# The Review Tactic



Practice in the form of review is crucial for developing long term fact fluency. Review is strategic when it is connected to fact strategies.

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6 x 7  
or  
7 x 6  
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4 x 7  
or  
7 x 4  
#FactTactics™

6 x 6  
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4 x 4  
#FactTactics™

3 x 7  
or  
7 x 3  
#FactTactics™

4 x 6  
or  
6 x 4  
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3 x 6  
or  
6 x 3  
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3 x 4  
or  
4 x 3  
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5 x 6 = 30  
Add 2 x 6 = 12  
Product: 42

2 x 3 = 6  
Add double  
Product: 28

4 x 6 = 24  
Add 2 x 6 = 12  
Product: 36

3 x 4 = 12  
Add 4  
Product: 16

5 x 4 = 20  
Add 4 to 20 = 24  
Product: 24

2 x 6 = 12  
add 6  
Product: 18

4 x 3 = 12  
Add 3 x 3 = 9  
Product: 12

5 x 3 = 15  
Add 3 x 3 = 9  
Product: 24

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## Six Fluency Tactics

- The Grounding Tactic
- The Linking Tactic
- The Strategic Repetition Tactic
- The Review Tactic
- The Assessment Tactic
- The Extension Tactic

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## The Assessment Tactic

Timed tests are not encouraged. Instead, students are given five facts per week as mini assessments. On the assessment, students indicate the product of each fact and state if they “just knew it” or provide the Fact Tactics strategy they used.

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## The Assessment Tactic

Examine the mini assessments for weeks 3 and 4 when the focus facts are  $4 \times 4$  and  $4 \times 6$ . What do you notice?

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# The Assessment Tactic

✓ 3 × 4

✓ 3 × 7

✓ 4 × 8

✓ 8 × 8

✓ 3 × 6

✓ 4 × 7

✓ 6 × 8

✓ 4 × 9

✓ 4 × 4

✓ 6 × 7

✓ 7 × 8

✓ 7 × 9

✓ 4 × 6

✓ 7 × 7

✓ 3 × 9

✓ 8 × 9

✓ 6 × 6

✓ 3 × 8

✓ 6 × 9

✓ 9 × 9

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✓ 4 × 4

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# The Assessment Tactic

Week Three Assessment: Record the product of each fact. Indicate if you just knew it by checking the box, or describe the Fact Tactics<sup>™</sup> strategy you used to determine it.

	I just knew it!	I used the Fact Tactics strategy of ...
1. 4 × 4 =	<input type="checkbox"/>	
2. 6 × 3 =	<input type="checkbox"/>	
3. 2 × 4 =	<input type="checkbox"/>	
4. 3 × 6 =	<input type="checkbox"/>	
5. 3 × 4 =	<input type="checkbox"/>	

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✓ 4 × 6

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# The Assessment Tactic

Week Four Assessment: Record the product of each fact. Indicate if you just knew it by checking the box, or describe the Fact Tactics<sup>™</sup> strategy you used to determine it.

	I just knew it!	I used the Fact Tactics strategy of ...
1. 6 × 4 =	<input type="checkbox"/>	
2. 3 × 6 =	<input type="checkbox"/>	
3. 2 × 4 =	<input type="checkbox"/>	
4. 2 × 6 =	<input type="checkbox"/>	
5. 3 × 4 =	<input type="checkbox"/>	

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### Six Fluency Tactics

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### The Extension Tactic

Students who already “know” their basic facts, reason and connect concepts to procedures through extension tasks. These more complicated problems are solved by applying the same properties that are emphasized with the Fact Tactics Webs.

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### The Extension Tactic: Supporting Students who Need More

4 x 6

Consider students who already know the product of this fact without using a strategy.

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### The Extension Tactic: Supporting Students who Need More

4 x 36

How might you determine this product  
using mental computation?

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### In what ways is this practice supporting algebra readiness?

Readiness for algebra requires “a grasp of the meaning of the basic operations of addition, subtraction, multiplication, and division. It must also include use of the commutative, associative, and distributive properties; computational facility; and the knowledge of how to apply the operations to problem solving” (NMAP, 2008, p. 17).

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### A School-Wide Solution

- Set a schedule for the twenty-week program and make sure all school personnel are informed.
- Introduce a new focus fact each Monday.
- Begin each Tuesday-Friday with a Fact Tactics strategy.
- Review past facts.
- Implement a process for data monitoring.

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## Goals

- Examine structures for developing fluency grounded in multiplicative reasoning.
- Make sense of the Six Fluency Tactics.
- Examine the Fact Tactics® Fluency Program as a school-wide solution.

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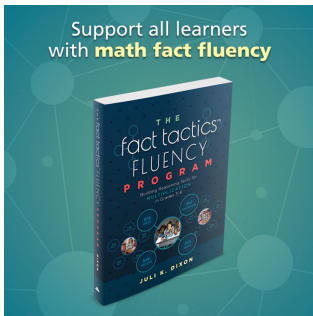
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Support all learners  
with **math fact fluency**



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