

Welcome!



This webinar was pre-recorded on Thursday, December 10. There were no FAQs generated during the live presentation.

Please submit any questions or comments to mc2@nmsu.edu.



Developing Number Relationships: Pathways to Fluency

Narrators: Megan Kidwell and Lisa Matthews

Developers: MC² K-3 Team

Learning Targets

Deepen understanding of the mathematics in the CCSSM.

Consider how to create and implement a plan to develop students' fluency in addition & subtraction.

Consider activities designed to develop and monitor student fluency with addition & subtraction.

CCSSM Fluency Standards: Primary Grades

Kinder

Fluently add and subtract within 5

1st Grade

Fluently add and subtract within 10

2nd Grade

Fluently add and subtract within 20
using mental strategies

Kinder:

Fluently add & subtract within 5

For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings....

1st Grade:

Add and subtract within 20, **demonstrating fluency for addition and subtraction within 10.**

Use strategies such as making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).

2nd Grade:

Fluently add & subtract within 20 using mental strategies...

...and by end of Grade 2, know from memory all sums of two one-digit numbers.

Kinder:

Fluently add & subtract within 5

For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings....

1st Grade:

Add and subtract within 20, **demonstrating fluency for addition and subtraction within 10.**

Use strategies such as making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).

2nd Grade:

Fluently add & subtract within 20 using mental strategies...

...and by end of Grade 2, know from memory all sums of two one-digit numbers.



“...the most commonly observed characteristic of low attaining math students is a persistent dependence on counting by ones.”

-Developing Number Knowledge, Wright et. al., p. 52

Fluency: Habits of Unitizing

Fluency is not important because it is important for kids to memorize a checklist of facts.

The big idea behind “fluently adding and subtracting within 20” is to help students develop habits of unitizing when they think about numbers to 20.

Fluency: Strategies for Adding & Subtracting 1-20

Benchmarks in Student Thinking:

- ☑ Knowledge of
Key Number Combinations & Partitions
- ☑ Part-Whole Constructions of Number
- ☑ Relational Thinking

Fluency: Strategies for Adding & Subtracting 1-20

Benchmarks in Student Thinking:

☑ Knowledge of
Key Number Combinations & Partitions

☑ Part-
*doubles, five-plus, ten-plus,
partitions of 5, 10 & 20* of Number

☑ Relational Thinking

Fluency: Strategies for Adding & Subtracting 1-20

Benchmarks in Student Thinking:

*15 could be made of...
...8 and 7
...10 and 5
...12 and 3*

- Knowledge of Key Number Combinations
- Part-Whole Constructions of Number
- Relational Thinking

Fluency: Strategies for Adding & Subtracting 1-20

Benchmarks in Student Thinking:

- ☑ Knowledge of Key Number Combinations & Partitions
- ☑ Part-Whole Constructions of Number
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*7 is 3 less than 10
13 is 6 and 6 and one more*

Fluency: Strategies for Adding & Subtracting 1-20

Benchmarks in Student Thinking:

- ☑ Knowledge of Key Number Combinations & Partitions
- ☑ Part-Whole Constructions of Number
- ☑ Relational Thinking

Planning Supportive Instruction:

Combining & Partitioning Numbers to 20:
Increasing the Complexity of Tasks

Make changes to the...

...Range:

1 to 5



1 to 10



1 to 20

Planning Supportive Instruction:

Combining & Partitioning Numbers to 20:
Increasing the Complexity of Tasks

Make changes to the...

Kinder Fluency ... Range:

1 to 5



1 to 10



1 to 20

Planning Supportive Instruction:

Combining & Partitioning Numbers to 20:
Increasing the Complexity of Tasks

Make changes to the...

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1 to 20

1st Grade Fluency

Planning Supportive Instruction:

Combining & Partitioning Numbers to 20:
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Make changes to the...

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1 to 10



1 to 20

2nd Grade Fluency

Planning Supportive Instruction:

Combining & Partitioning Numbers to 20: Increasing the Complexity of Tasks

Make changes to the...

...Range:

1 to 5



1 to 10



1 to 20

...Focus Structures:

Easier Partitions:

★ Doubles

★ Five-plus / Ten-plus

★ Partitioning 5/10/20



All Partitions

...Use of Materials:

With a visual model...

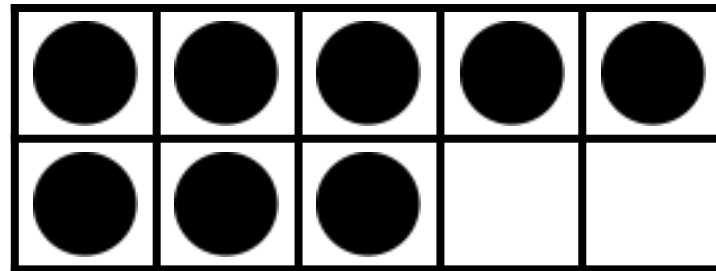
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With numbers...

(& a model → & no model)

Considerations for Planning:



Make changes to the...

...Range:

1 to 5



1 to 10



1 to 20

...Focus Structures:

Easier Partitions:

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★ Partitioning 5/10/20

Ten-plus



All Partitions

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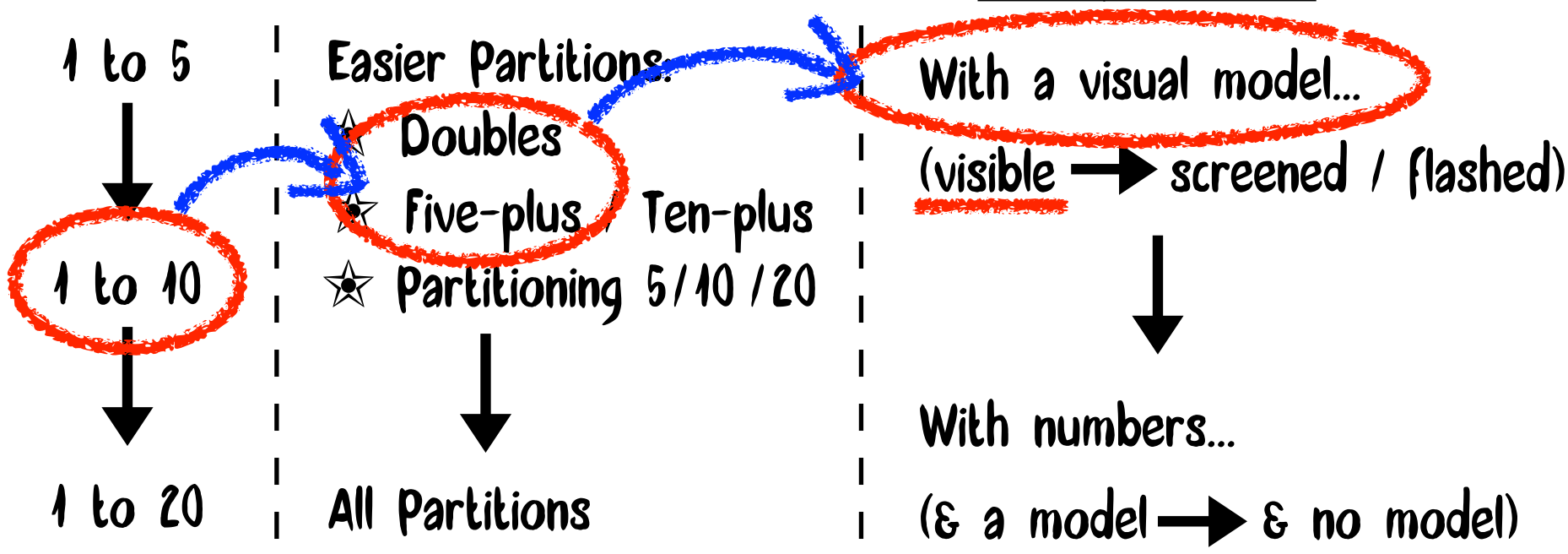
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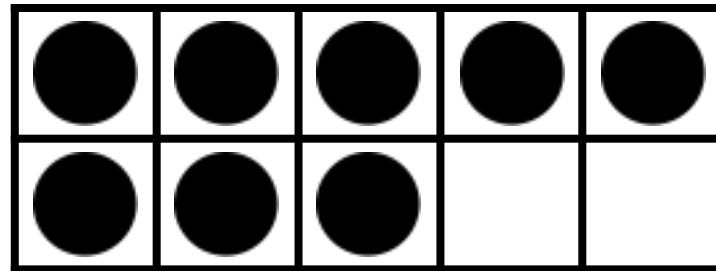


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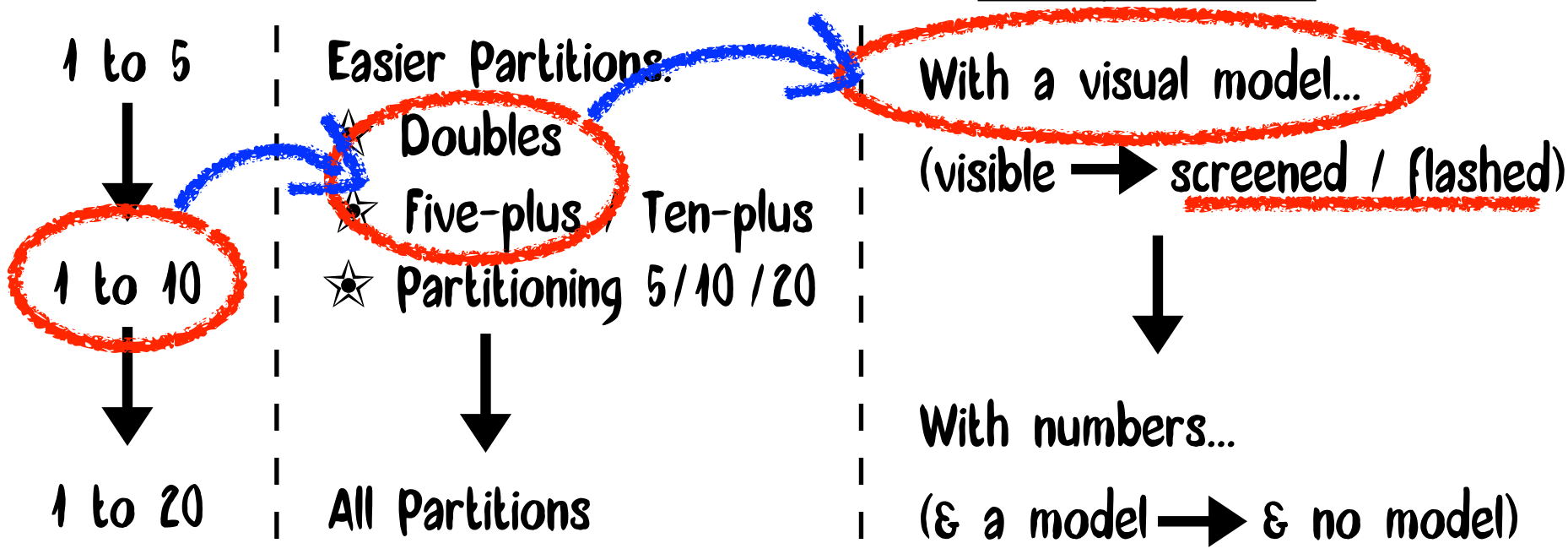
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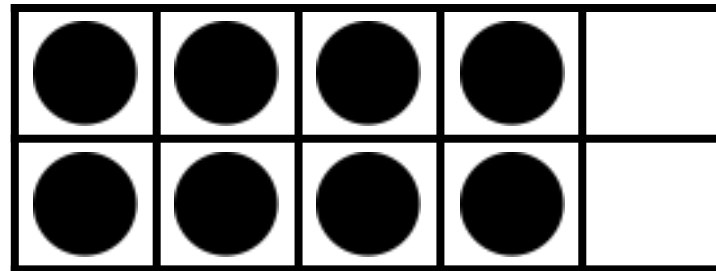


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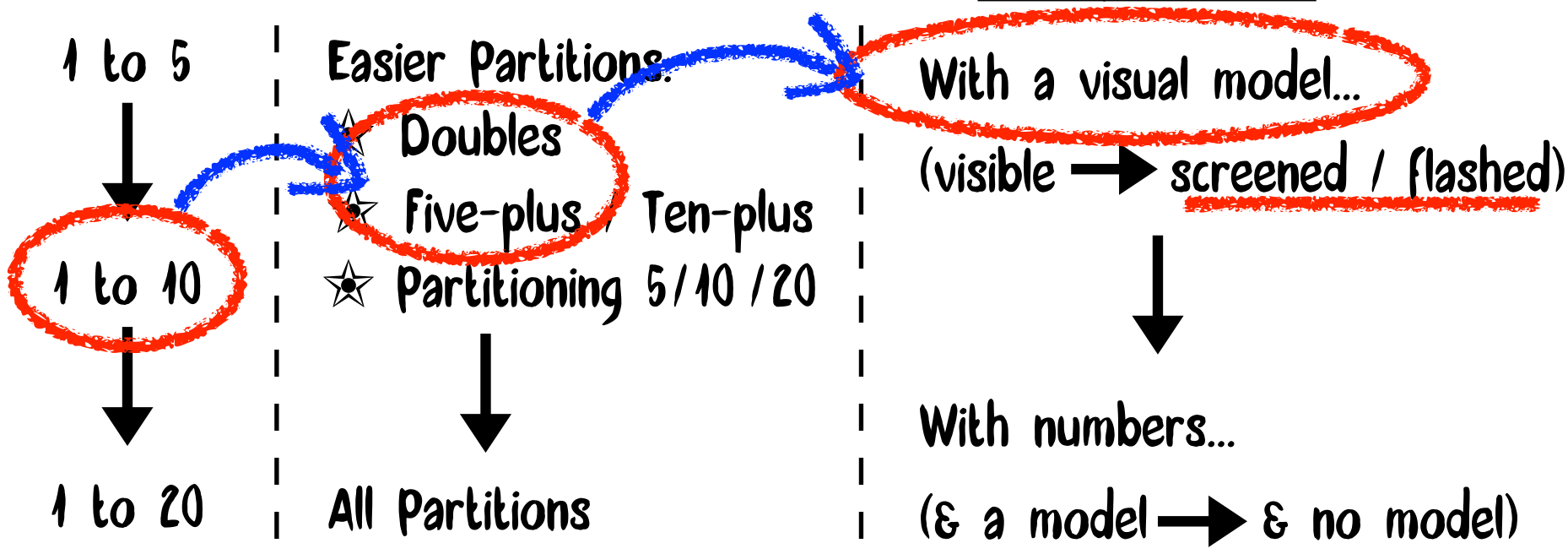
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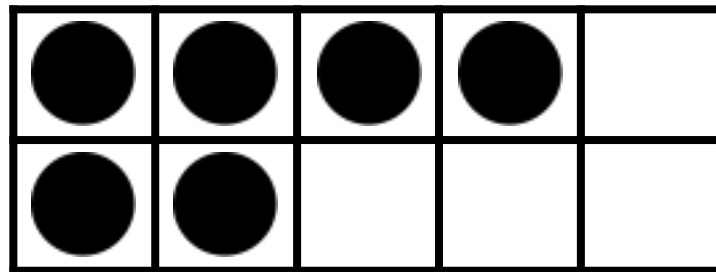


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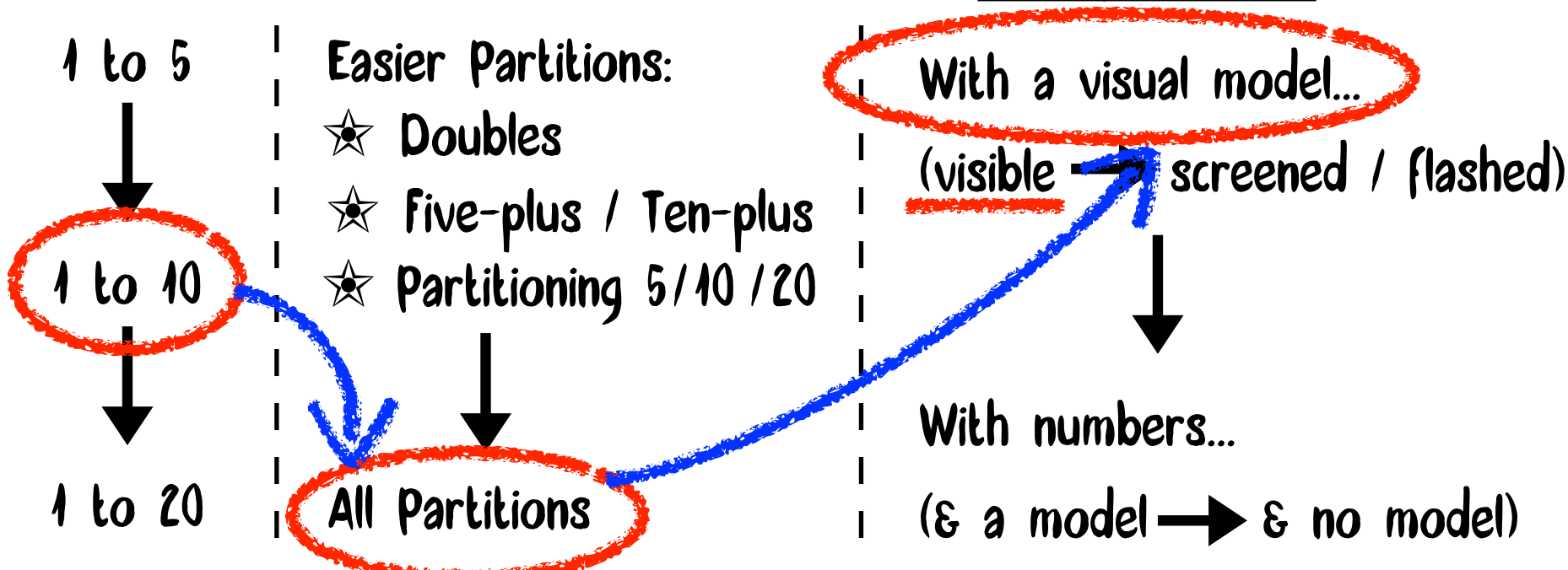
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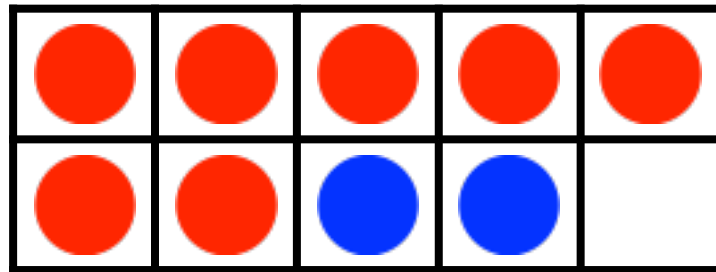


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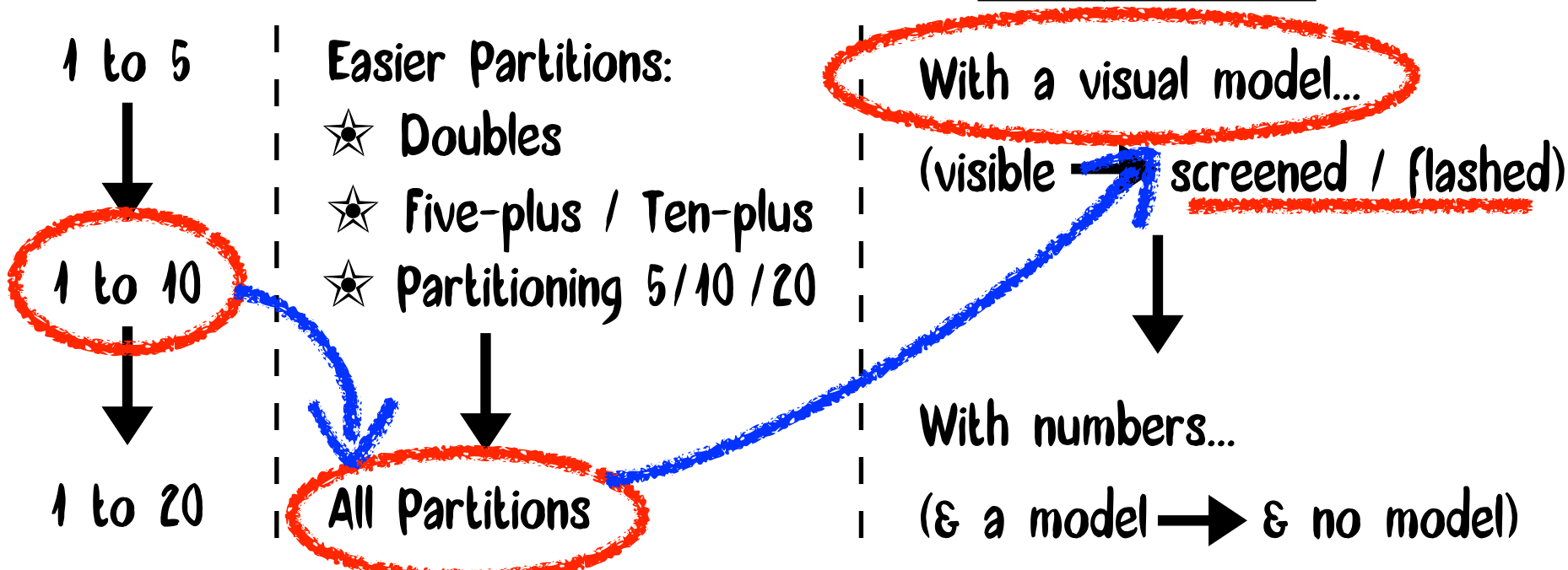
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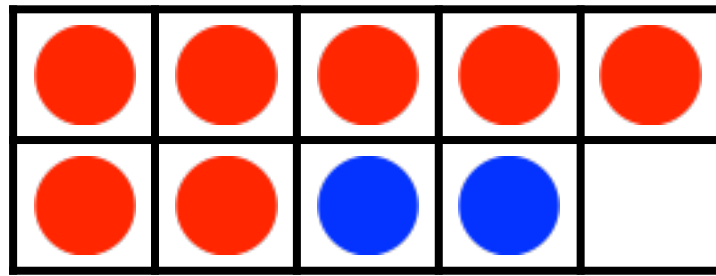


With numbers...

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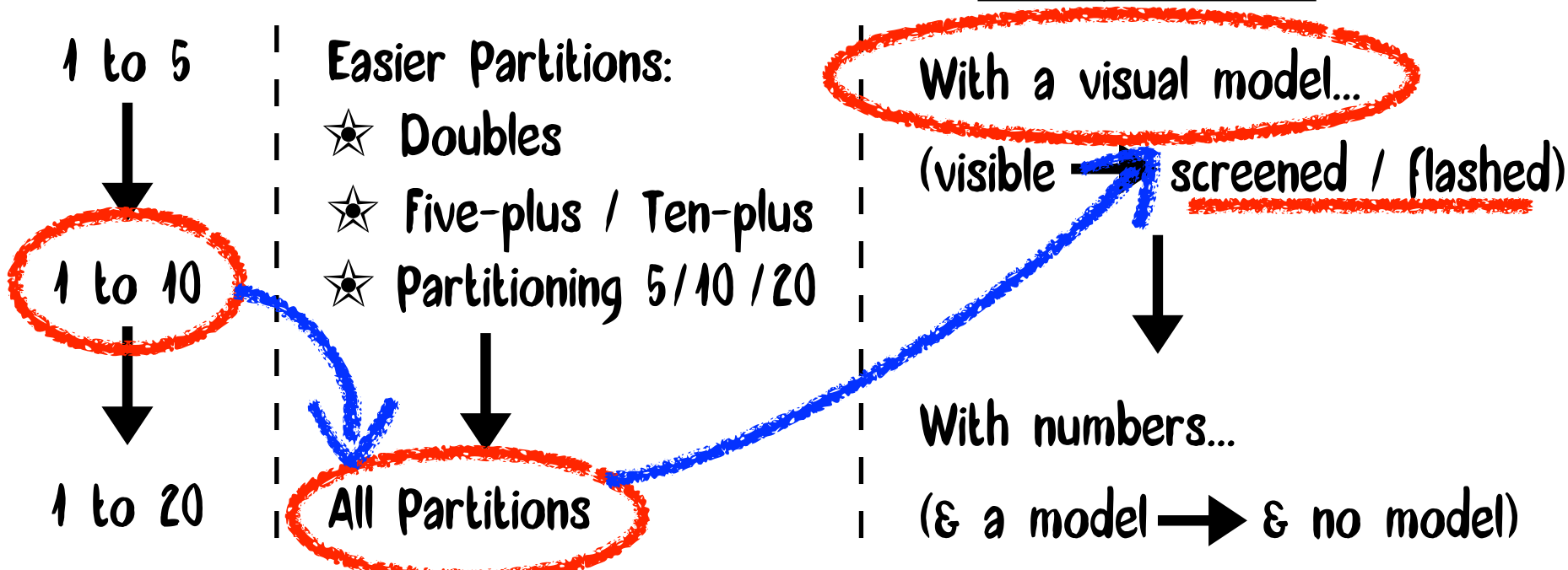
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With numbers...

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All Partitions

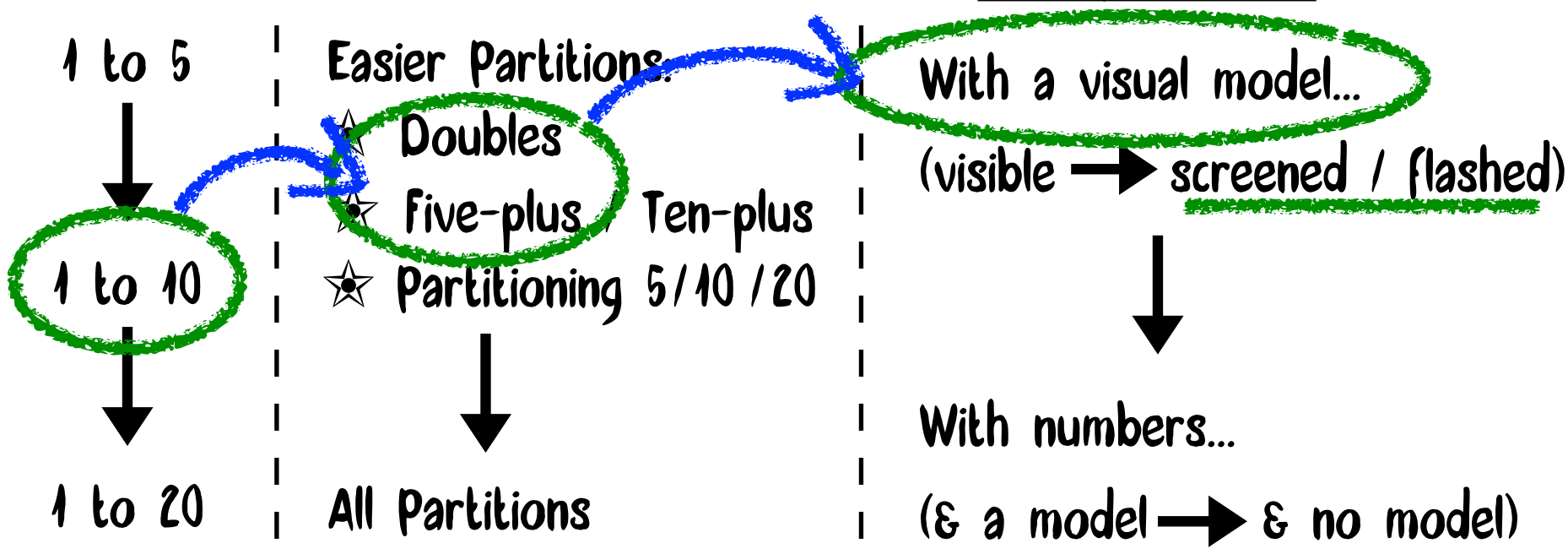
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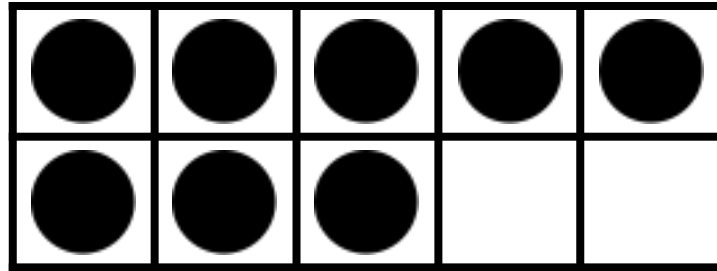
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With numbers...

(& a model → & no model)



Considerations for Planning:



$$8 - 5$$

Make changes to the...

...Range:

1 to 5



1 to 10



1 to 20

...Focus Structures:

Easier Partitions:

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- ★ Ten-plus
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All Partitions

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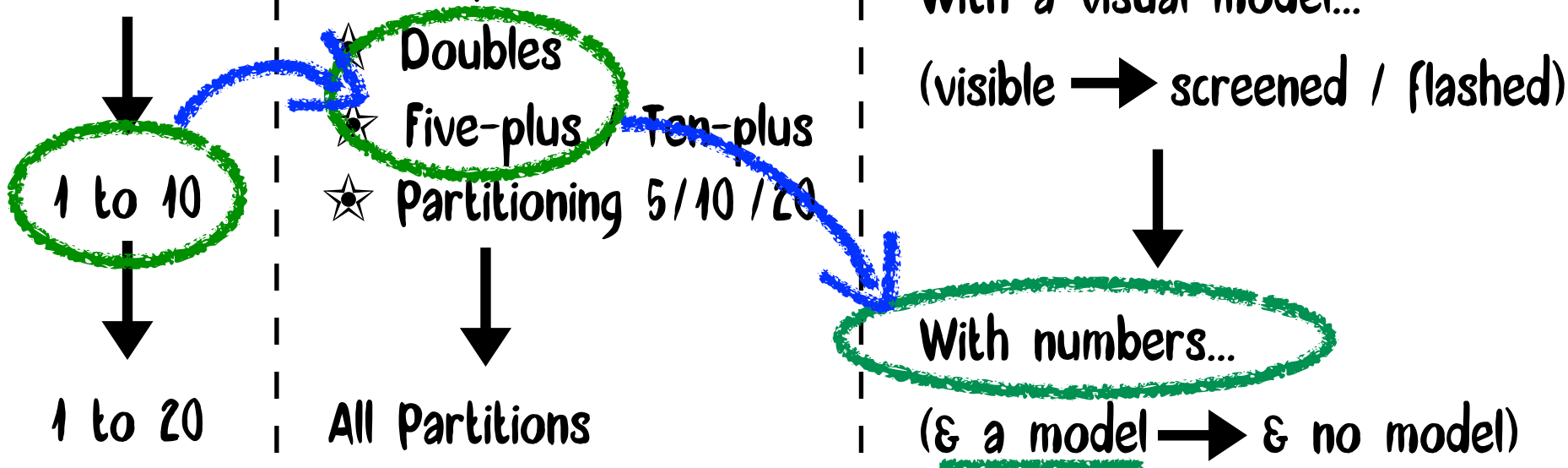
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All Partitions

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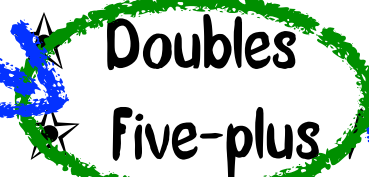
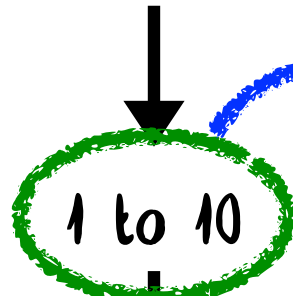
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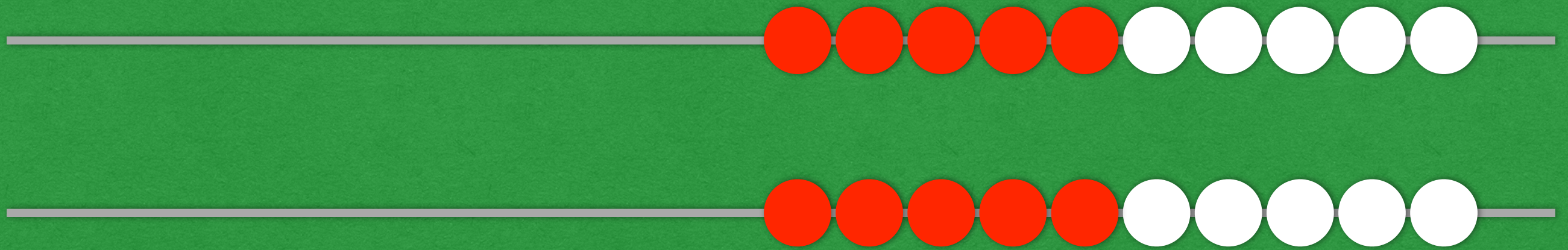


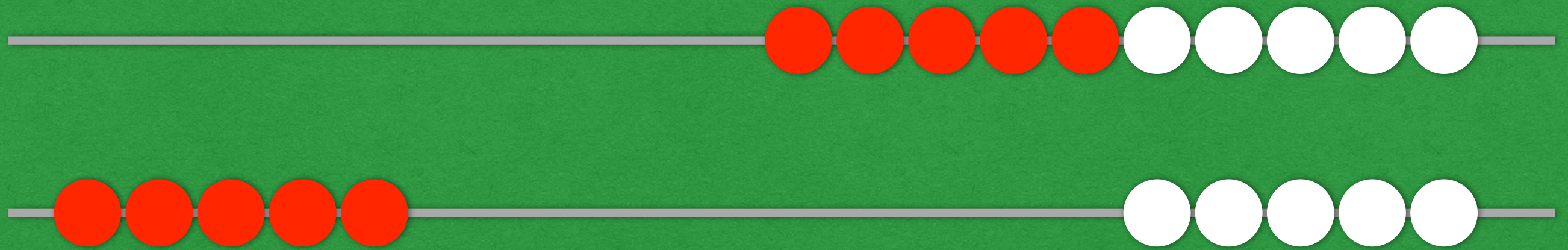
With numbers...

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Rekenrek / Arithmetic Rack / Math Rack





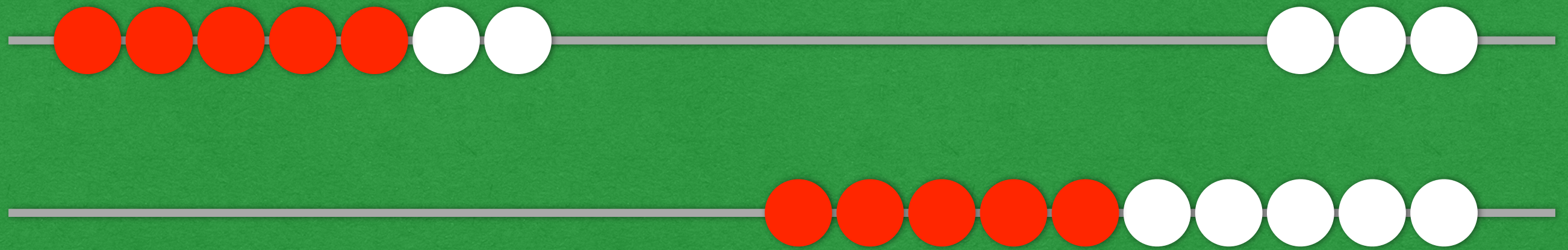
reading the rekenrek: partitioning five



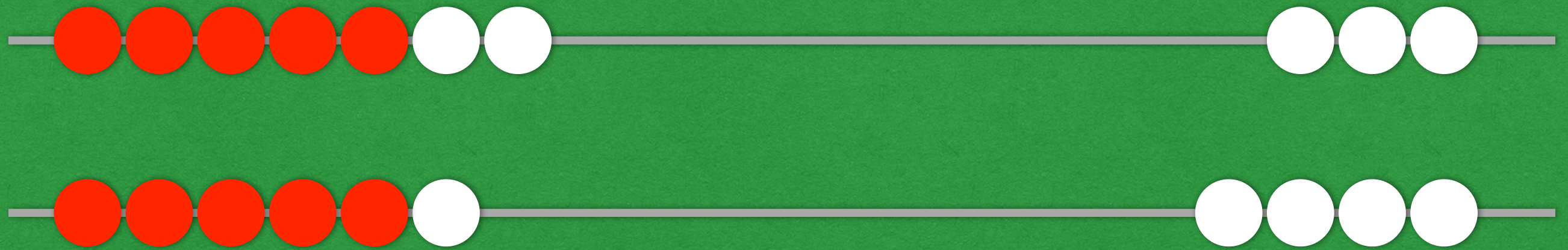
Let's be
Pleasant
to give us
Happy!



1234
5678
9012



reading the rekenrek: 6 to 10



reading the rekenrek: 11 to 20

Arithmetic Rack Bingo

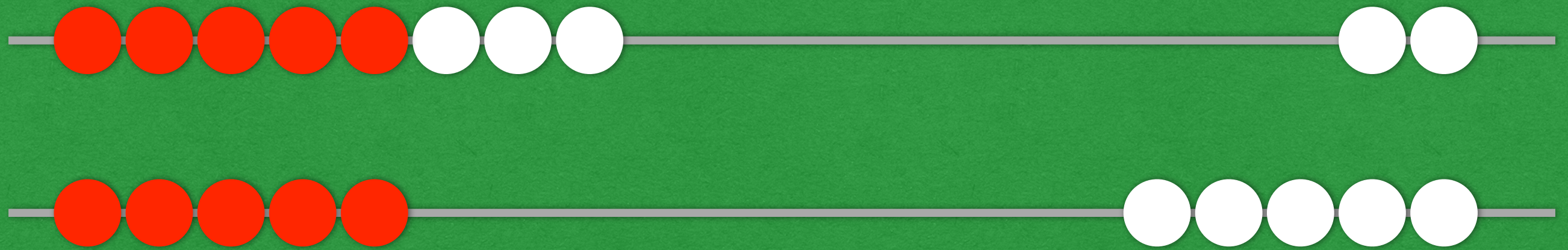
Arithmetic Rack Bingo: 1 to 10				
1 1 & 0	2 1 & 1	3 2 & 1	4 3 & 1	5 4 & 1
6 5 & 1	7 5 & 2	8 5 & 3	9 5 & 4	10 5 & 5
Caller's Card Doubles and Five-plus				
1 0 & 1	2 2 & 0	3 3 & 0	4 2 & 2	5 2 & 3
6 3 & 3	7 3 & 4	8 4 & 4	9 4 & 5	10 _____

*Caller's Choice: choose 6 & 4 / 7 & 3 / 8 & 2 / 9 & 1

Arithmetic Rack Bingo: 1 to 10				
X	8	10	4	X
6	1	3	10	7
5	9	FREE	2	8
2	3	7	5	6
X	9	4	1	X

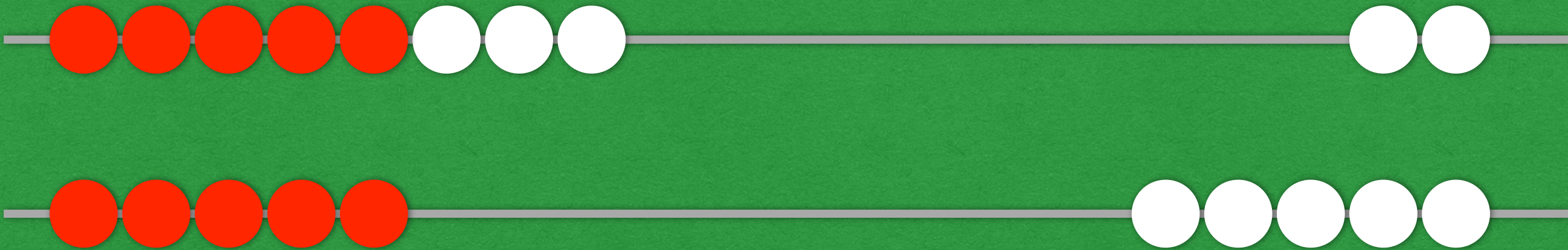
Write the numbers from 1-10, in random order
(use each number 2 times)





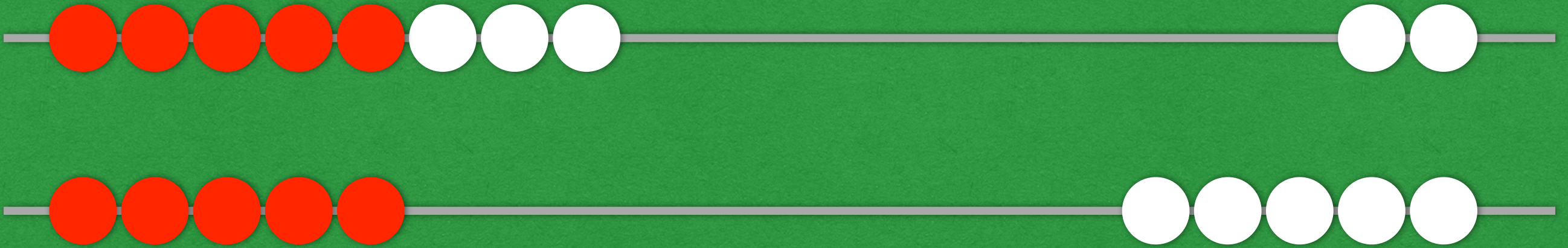
computing with the rekenrek

$$8 + 5$$



computing with the rekenrek

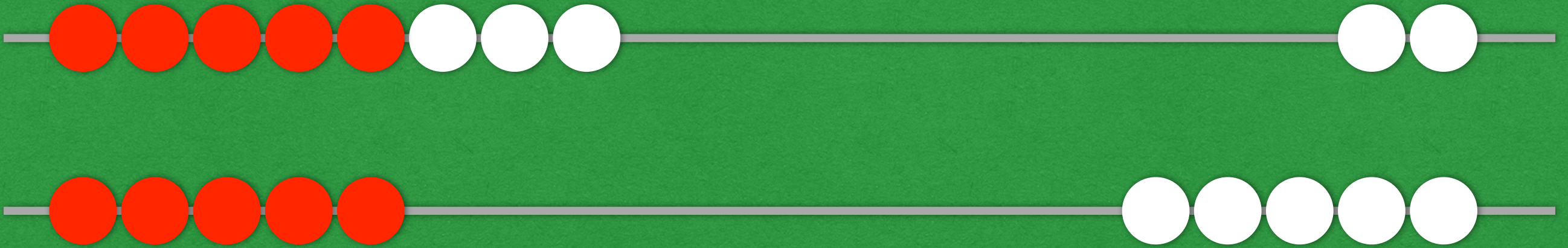
$$8 + 5$$



$$\begin{array}{c} 8 + 5 \\ \swarrow \quad \searrow \\ 5 \quad 3 \\ 5 + 5 \rightarrow 10 + 3 \rightarrow 13 \end{array}$$

computing with the rekenrek

$$8 + 5$$



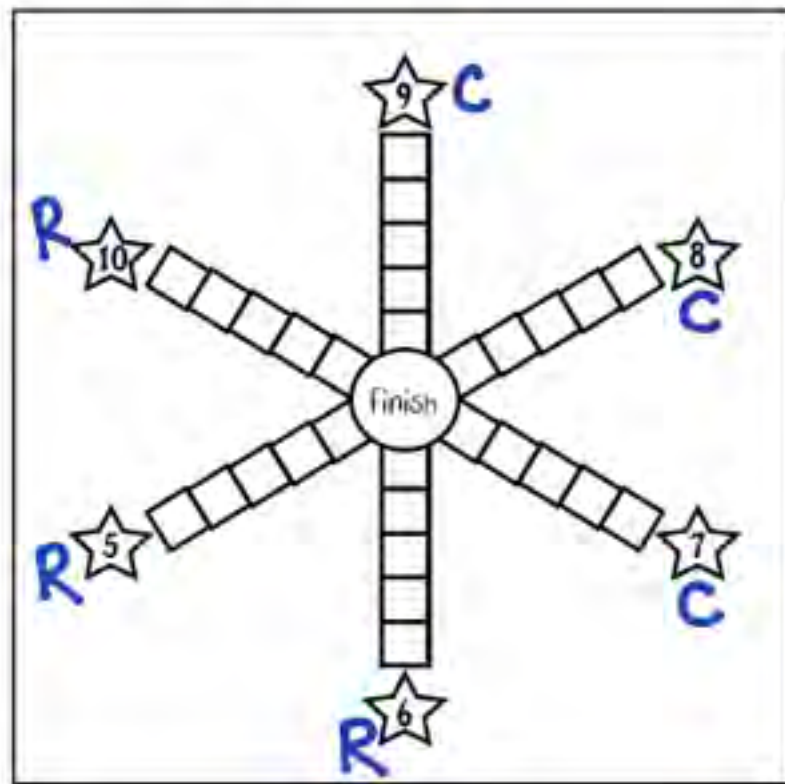
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$$\begin{array}{c} 8 + 5 \\ \quad \swarrow \quad \searrow \\ \quad 2 \quad 3 \\ 8 + 2 \rightarrow 10 + 3 \rightarrow 13 \end{array}$$

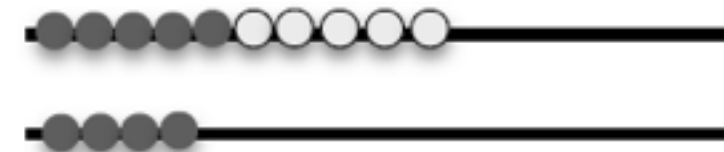
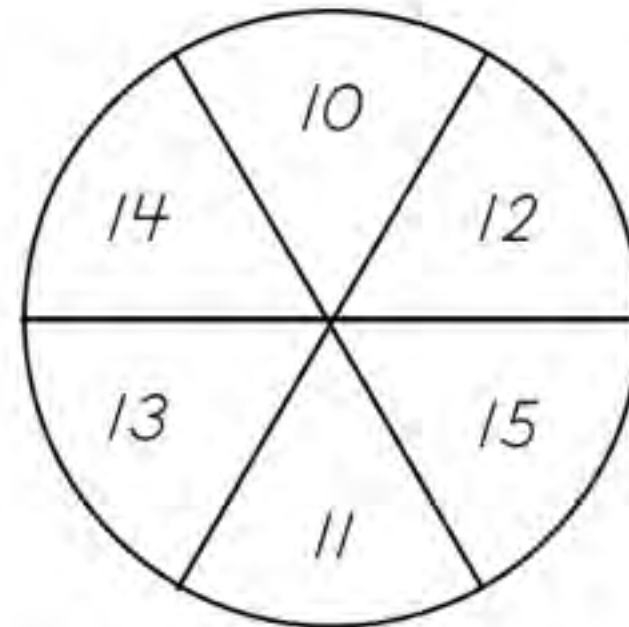
computing with the rekenrek

Great Race Games

The Great Race for Minus 5 The Great Race for Minus 5

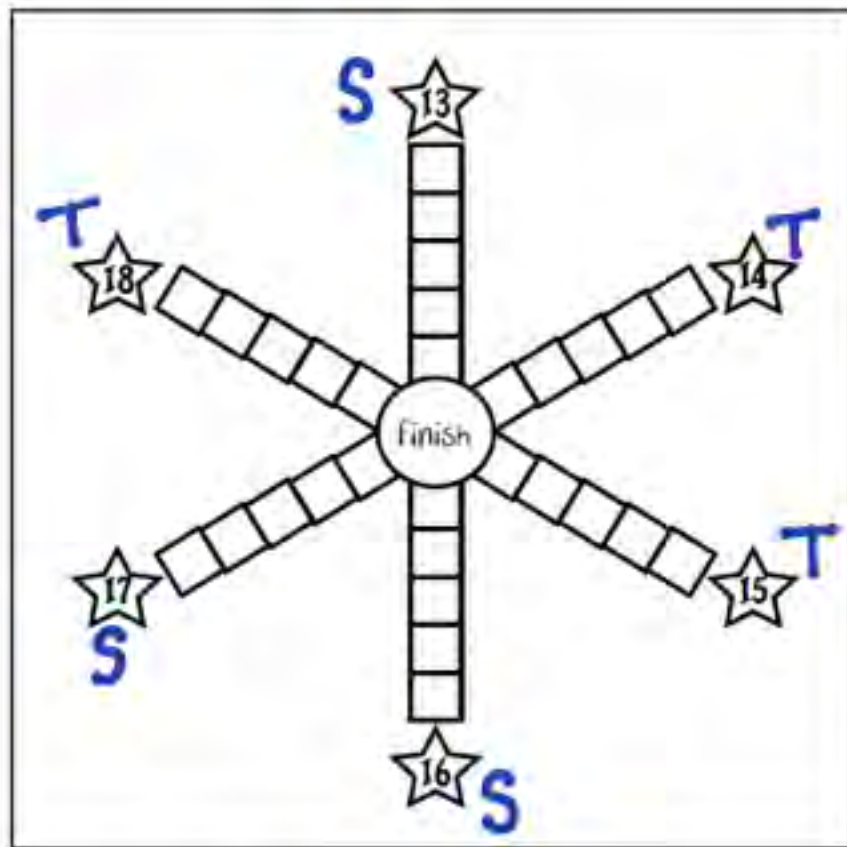


$$\underline{\quad} - 5 = \underline{\quad}$$



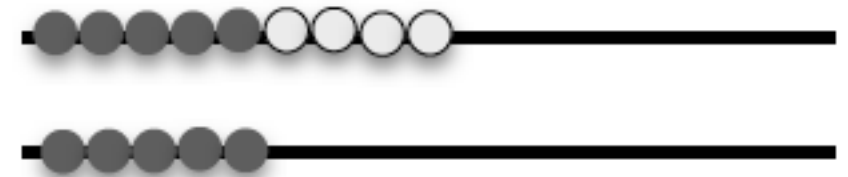
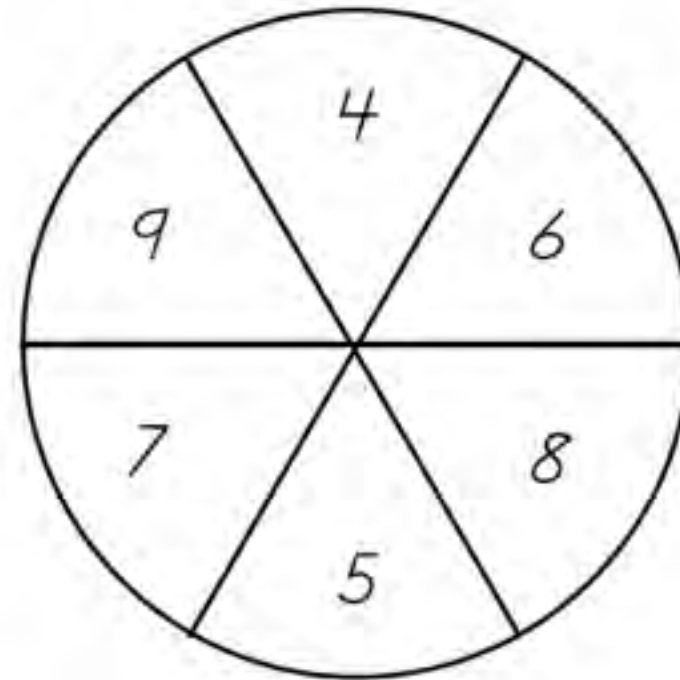
Great Race Games

The Great Race for 9 Plus



$$9 + \underline{\quad} = \underline{\quad}$$

The Great Race for 9 Plus





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Using Visual Models to Develop Fluency:

Domino Dot patterns



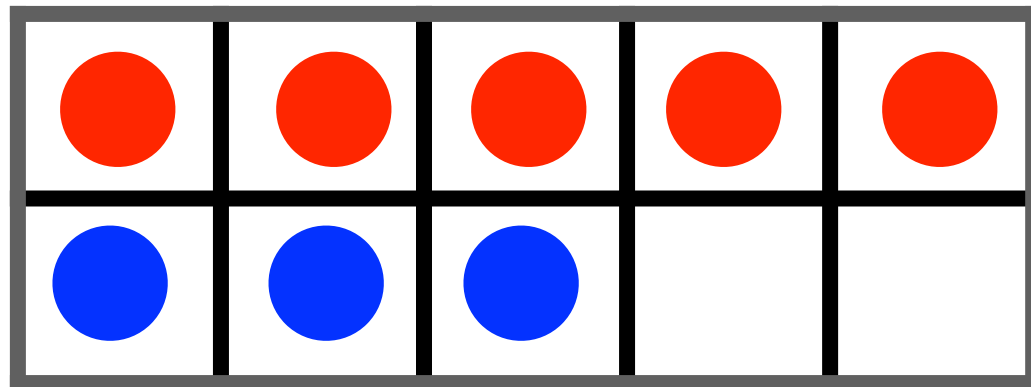
Using Visual Models to Develop Fluency:

Finger patterns

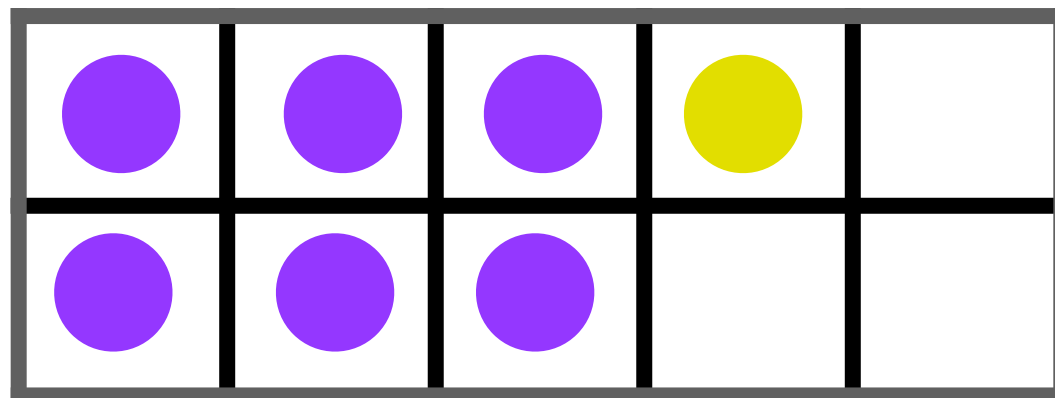


Using Visual Models to Develop Fluency:

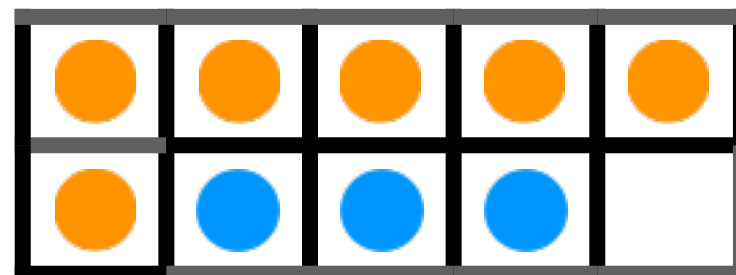
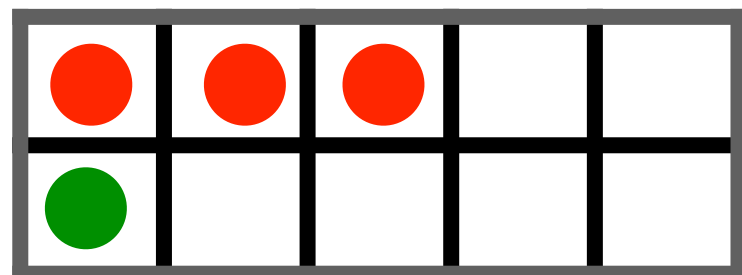
Ten Frames



Five-plus



Doubles



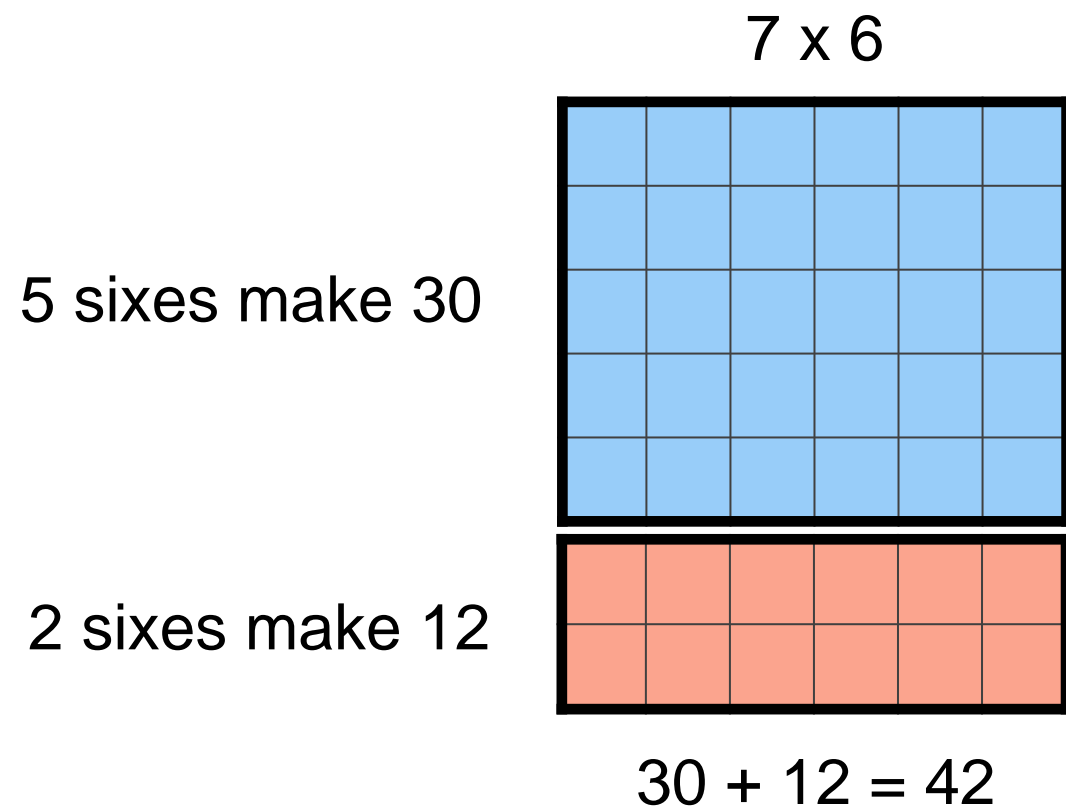
Other combinations



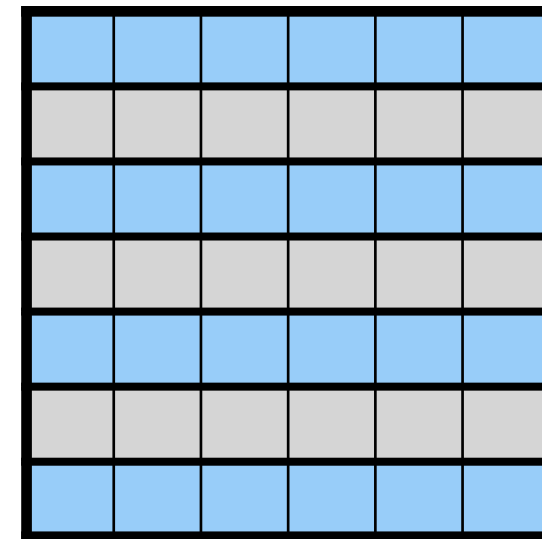
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-Developing Number Knowledge, Wright et. al., p. 52

Fluency: Connections to the Future



vs.
 $6+6+6+6+6+6+6=42$



$3/5$ and $2/5$

vs.
 $(1/5 + 1/5 + 1/5) \& (1/5 + 1/5)$



CCSSM Fluency Standards: Unitizing in the Primary Grades

Kinder

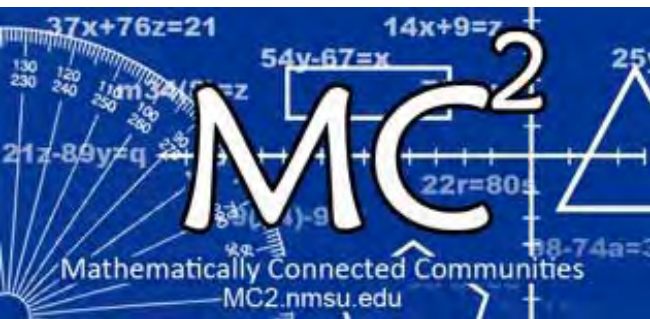
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Fluently add and subtract within 10

2nd Grade

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using mental strategies



Thank you!



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