

# Divide and Conquer

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The math Learner's Brain

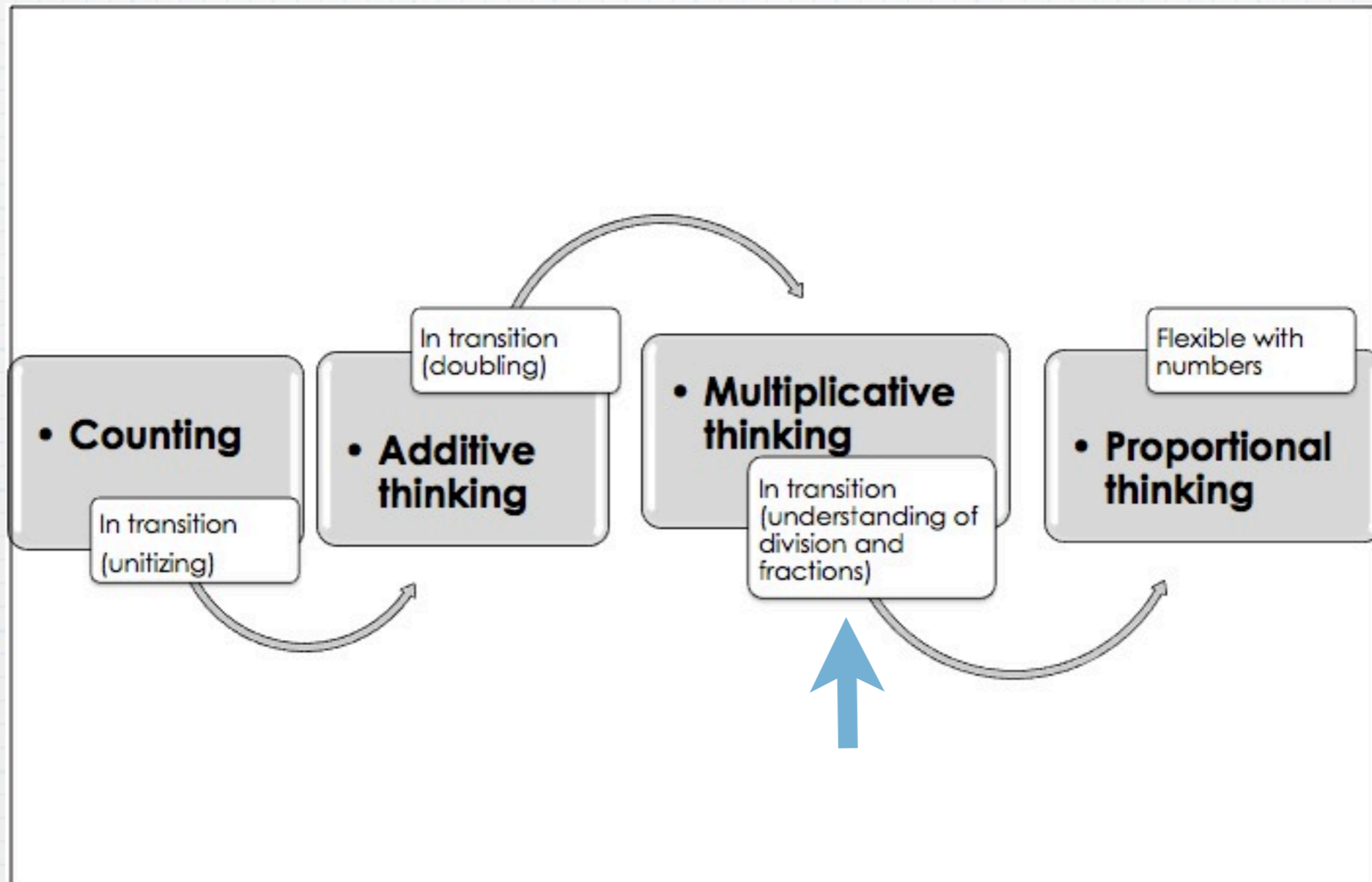
# Key Ideas

- \* Mathematics Understanding progresses through different stages of thinking
- \* Students learn more efficiently when the focus of a lesson is on the thinking
- \* To train the brain to think efficiently there needs to be plenty of practice

# Key Beliefs

- \* Every child can and should be successful with mental mathematics
- \* Students who possess automaticity with Basic Addition, Subtraction, Multiplication and Division Facts maximize their success potential
- \* Mental calculations/Understanding/  
Making connections should be the focus of the elementary classroom

# Suggested Progression of Mathematical Thinking

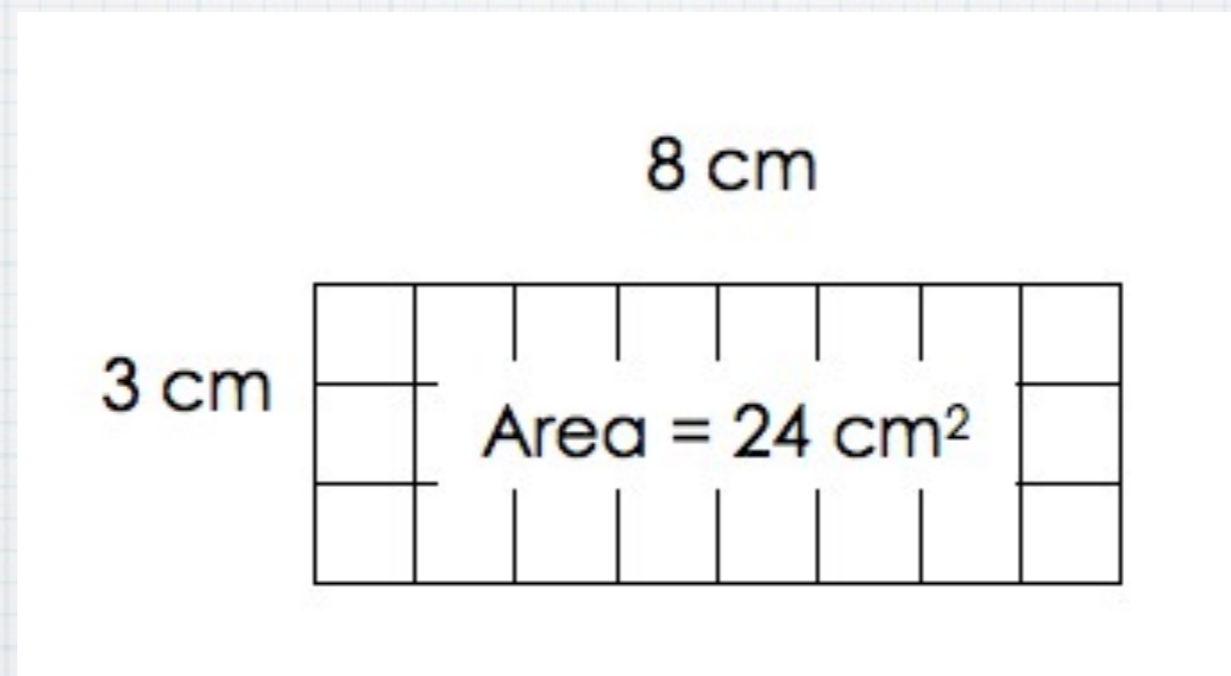


# Prerequisites for Mentally Solving Division Questions

- \* Knowing with fluency Basic Multiplication Facts (0-10)
- \* Understanding that Division is closely related to multiplication

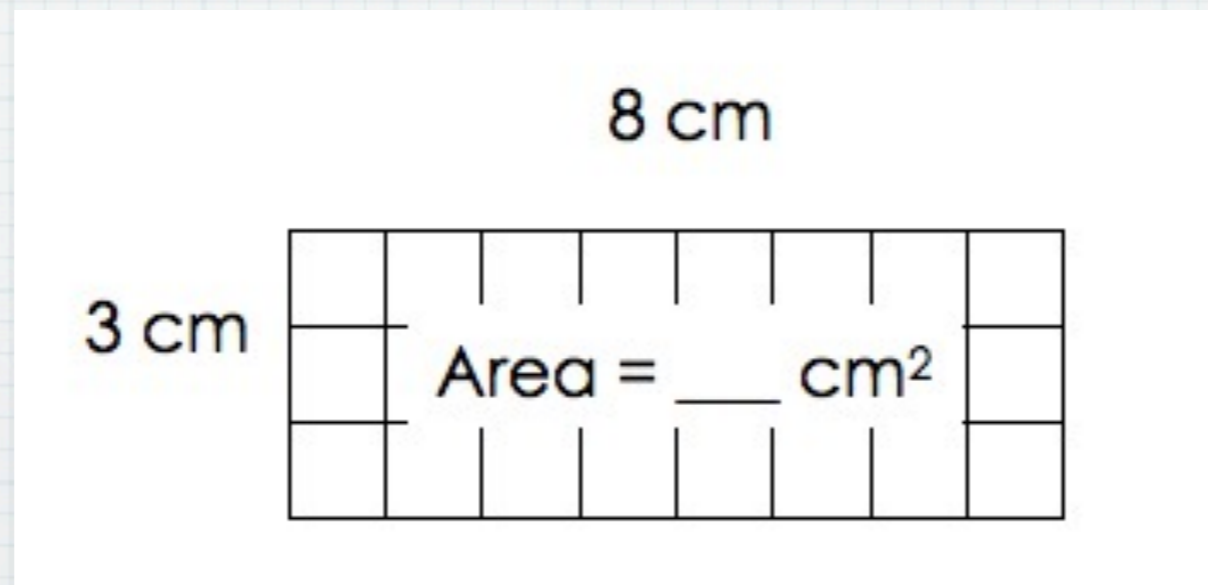
# Let's look at the area model...

Finding the area of a  
rectangle with  
dimensions 3 cm x 8 cm



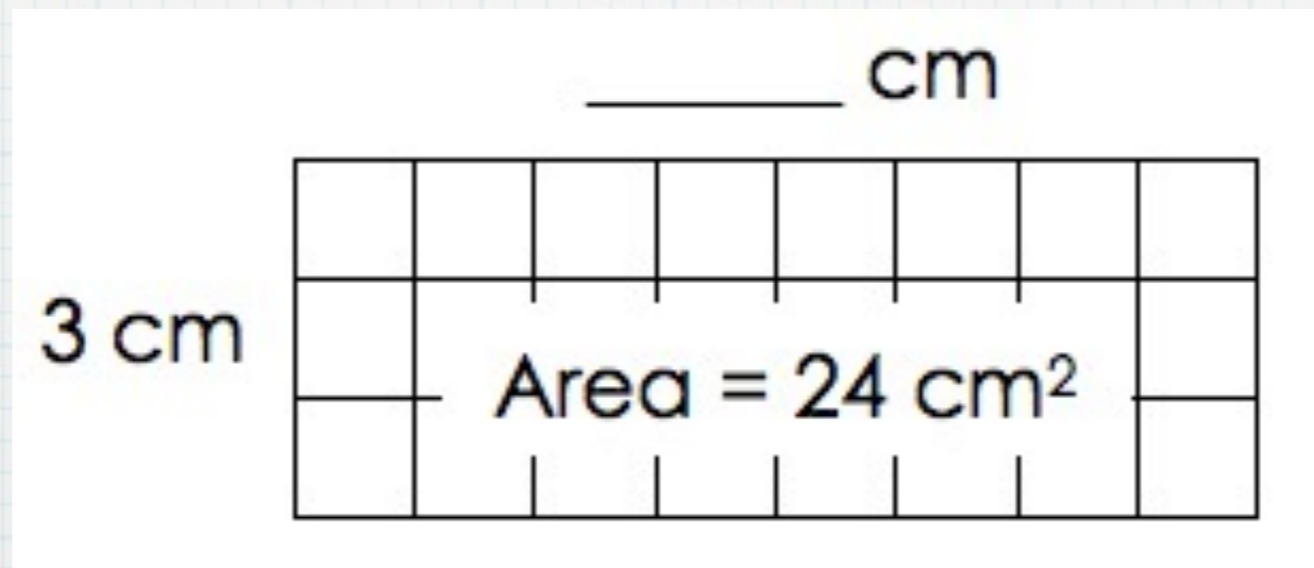
# Let's look at the area model...

The typical question asked when using the area model for multiplication would be: What is the area of the rectangle that has dimension of 3 and 8?



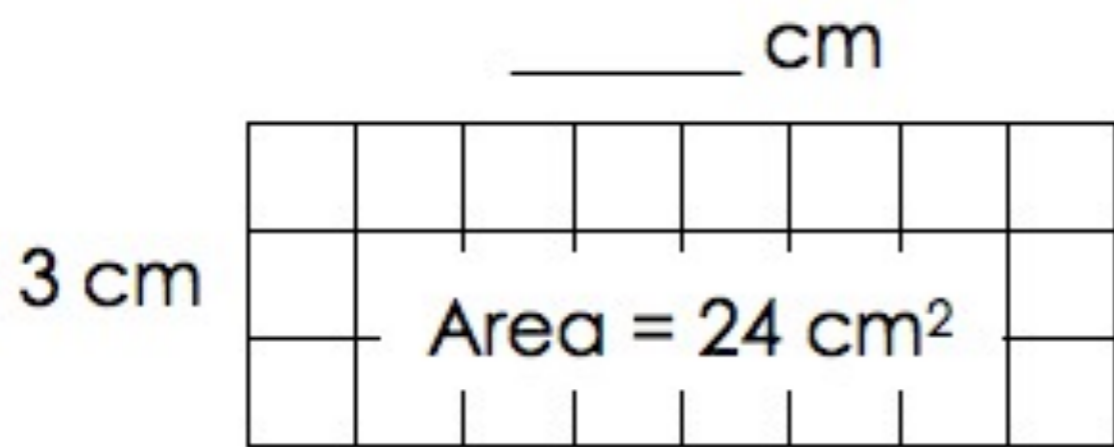
# Let's look at the area model...

The Division question using the same model becomes: I have a rectangle that has an area of  $24\text{cm}^2$ , one of its sides measures  $3\text{ cm}$ . What is the length of the other side?

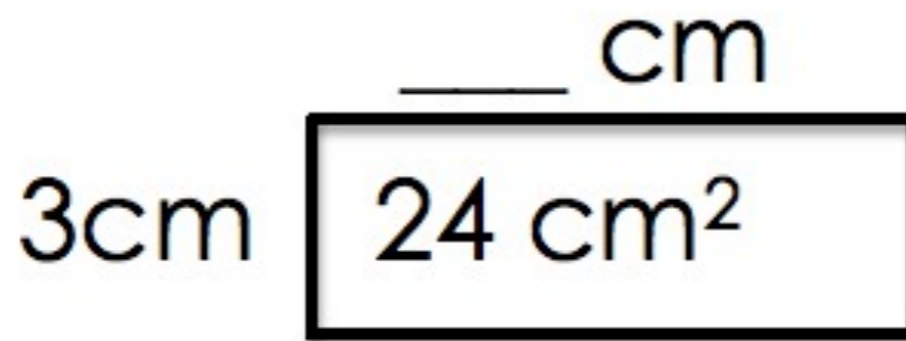




# Just for fun...



$$3 \overline{) 24} \quad ?$$



# The Thinking for Division Facts

- \* For example, to solve  $25 \div 5$  you can think  $5 \times \underline{\quad} = 25$
- \* What do I know, how can this help me find what I do not know...
- \* Multiplication facts you always know are 10 times a number and 5 times a number

# Division Facts Progression

- \* [AAA] Halving numbers
- \* [AA] Division questions with answers of 5 or 10
- \* [A] Division questions with answers of 9
- \* [B] Division questions with answers of 8
- \* [C] Division questions with answers of 6
- \* [D] Division questions with answers of 4
- \* [E] Division questions with answers of 4, 5 or 6
- \* [F] Division questions with answers of 2 or 1
- \* [G] Division questions with answers of 3
- \* [H] Division questions with answers of 7

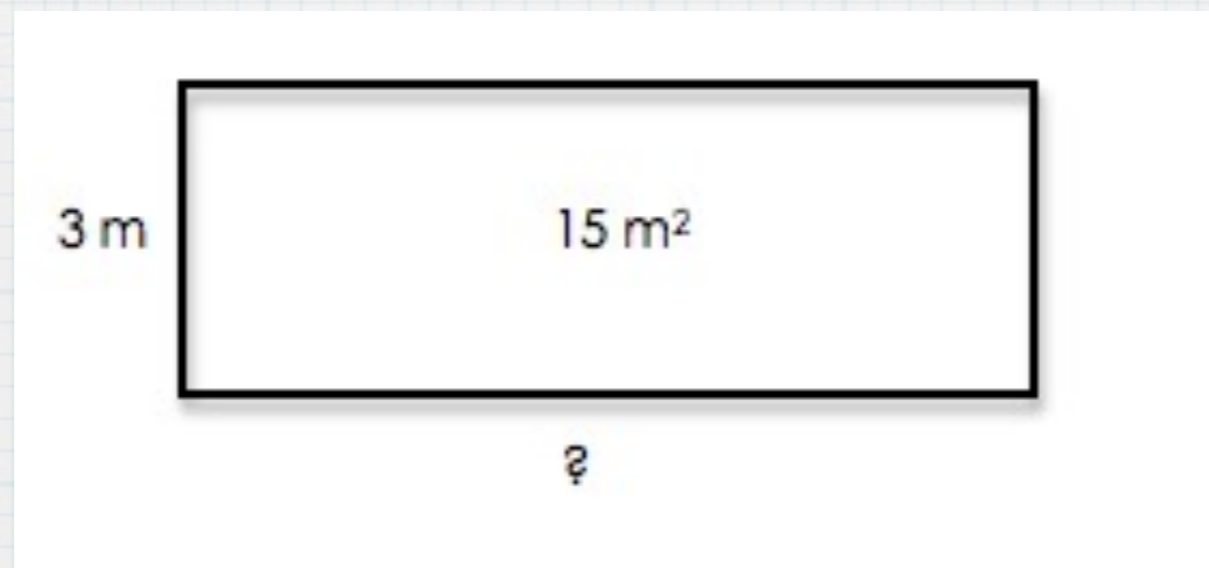
# Division Facts Progression

## [AA] Divisions with answers of 5 and 10

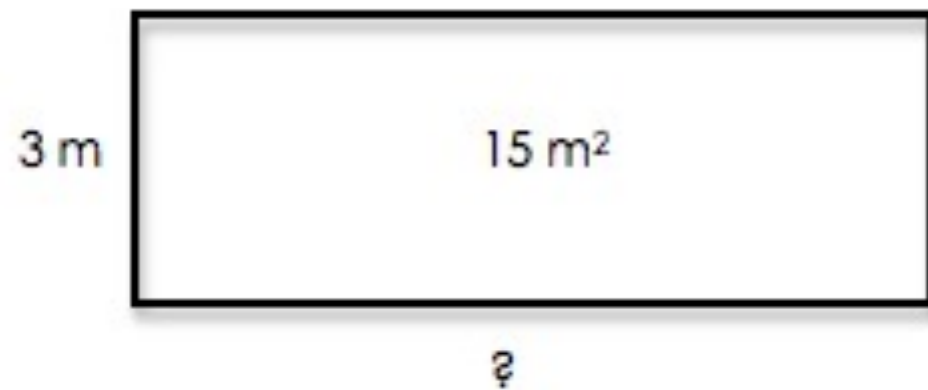
A starting problem can be:

If I have a rectangular patio that has an area of  $15 \text{ m}^2$  and one of its sides measures 3 meters in length. What is the length of the other side?

To answer a question like this one, a model can certainly help



# [AA] Divisions with Answers of 5 and 10

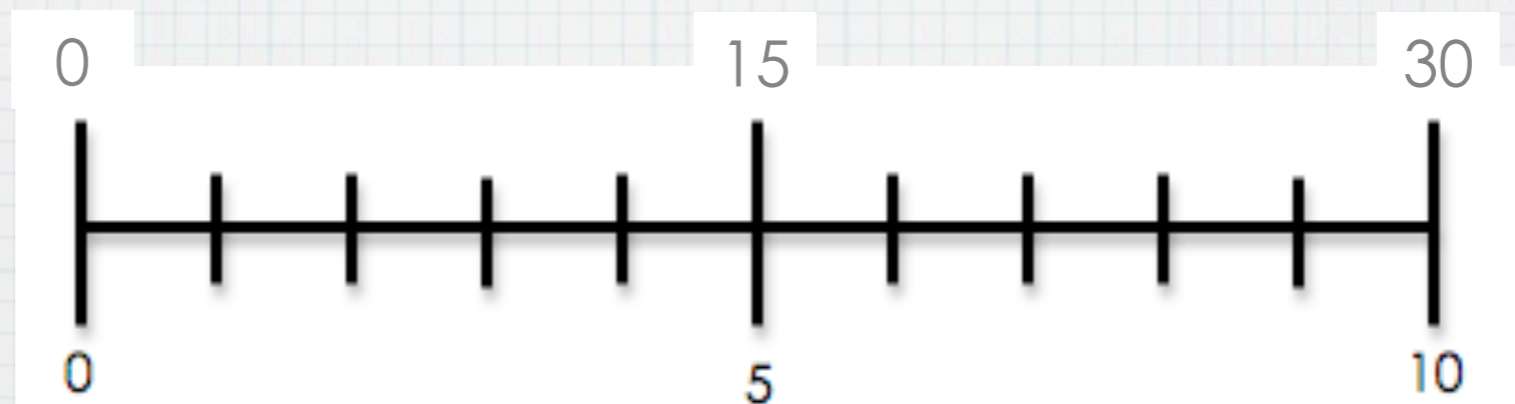


This question is also the same as saying

$$\underline{\hspace{2cm}} \times 3 \text{ m} = 15 \text{ m}^2$$

## Let's look at what we know...

We know that  $3 \times 10 = 30$ , we also know that  $3 \times 5$  must be half of 30 which is 15



# [AA] Divisions : Making a Logical Decision

Is the answer going to be  $<$  ,  $>$  or  $=$  to 5?

$36 \div 4 \square 5$ 

Division: sequence AA Created by Julie Roy

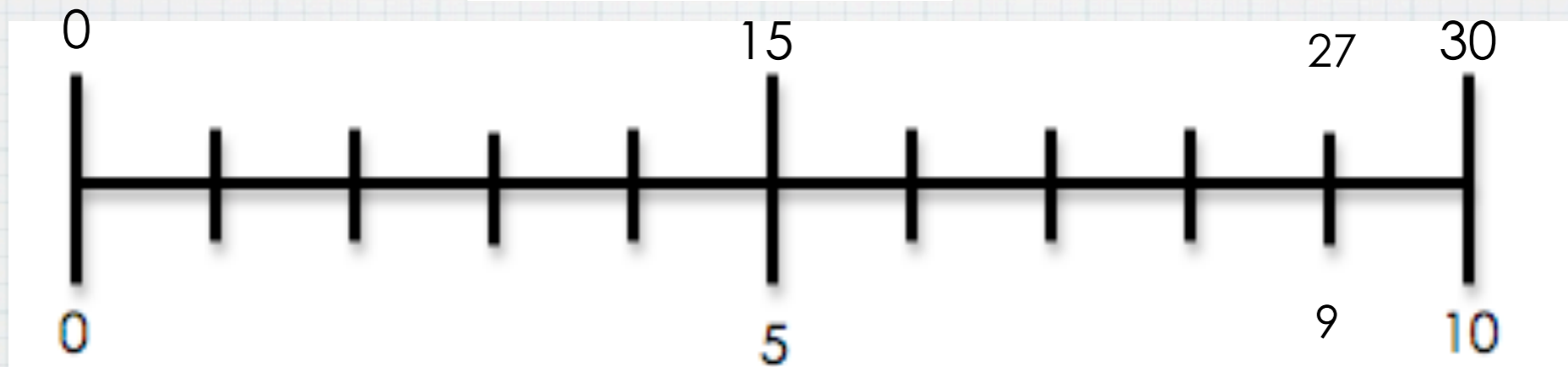
# [A] Divisions with Answers of 9

Question is:  $27 \div 3 =$

Let's restate question:  $3 \times \underline{\quad} = 27$

What we know:  $3 \times 10 = 30$  and  $3 \times 5 = 15$

Therefore:  $3 \times 9 = 27$



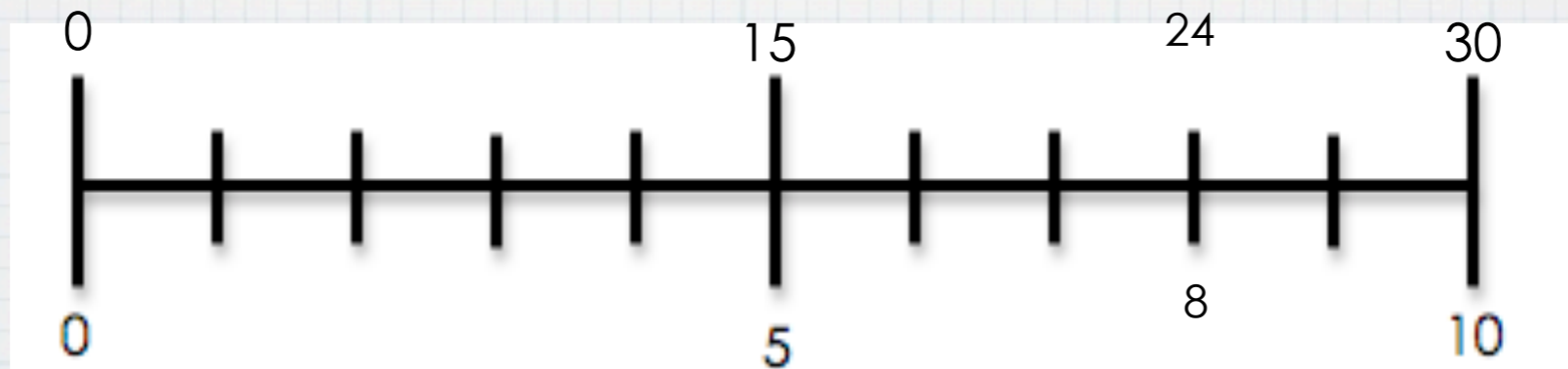
# [B] Divisions with Answers of 8

Question is:  $24 \div 3 =$

Let's restate question:  $3 \times \underline{\quad} = 24$

What we know:  $3 \times 10 = 30$  and  $3 \times 5 = 15$

Therefore:  $3 \times 8 = 24$





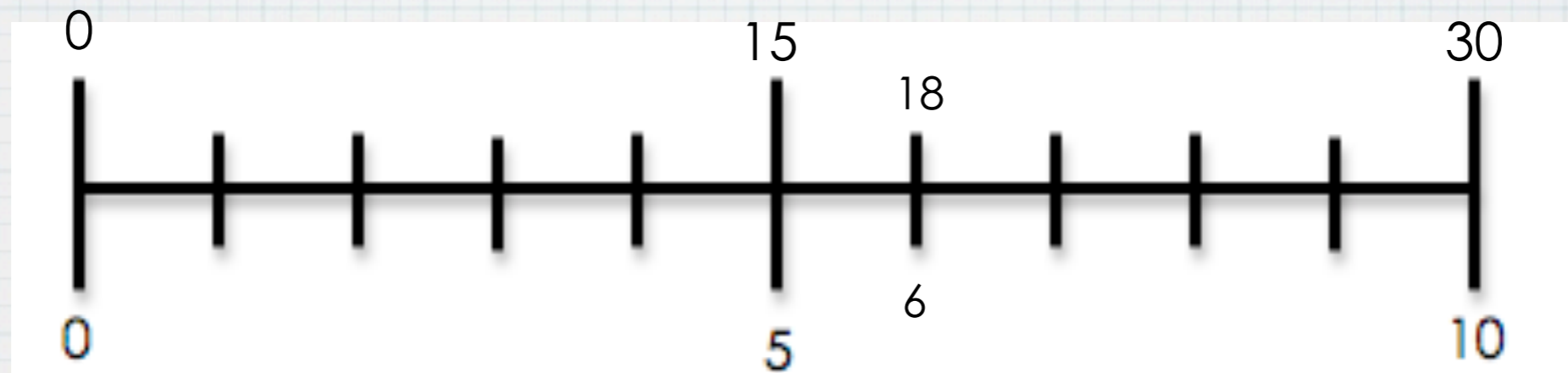
# [C] Divisions with Answers of 6

Question is:  $18 \div 3 =$

Let's restate question:  $3 \times \underline{\quad} = 18$

What we know:  $3 \times 10 = 30$  and  $3 \times 5 = 15$

Therefore:  $3 \times 6 = 18$



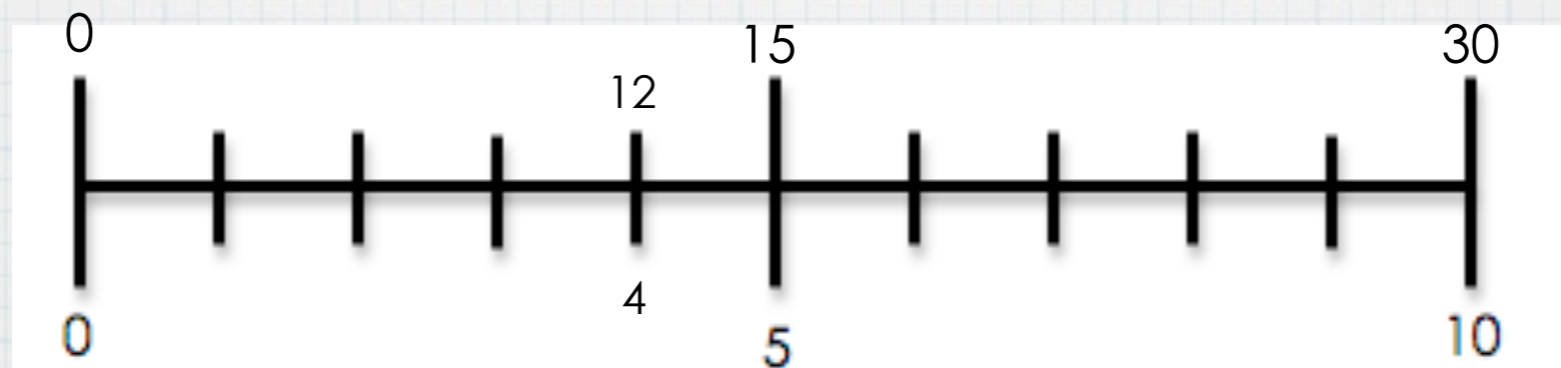
# [D] Divisions with Answers of 4

Question is:  $12 \div 3 =$

Let's restate question:  $3 \times \underline{\quad} = 12$

What we know:  $3 \times 10 = 30$  and  $3 \times 5 = 15$

Therefore:  $3 \times 4 = 12$



# [E] Divisions with Answers of 4, 5 or 6

# [F] Divisions with Answers of 2 or 1

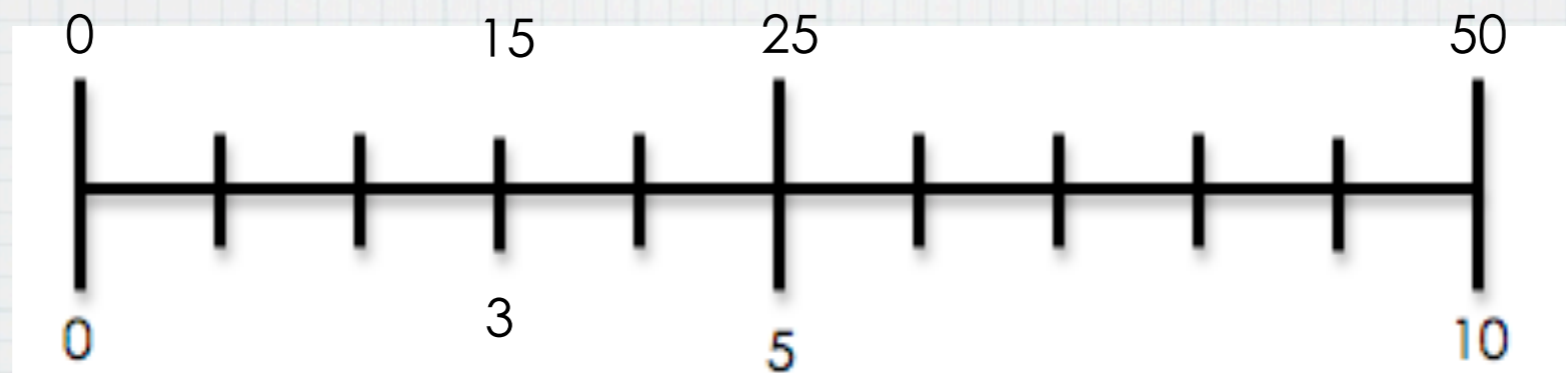
# [G] Divisions with Answers of 3

Question is:  $15 \div 5 =$

Let's restate question:  $5 \times \underline{\quad} = 15$

What we know:  $5 \times 10 = 50$  and  $5 \times 5 = 25$

Therefore:  $5 \times 3 = 15$



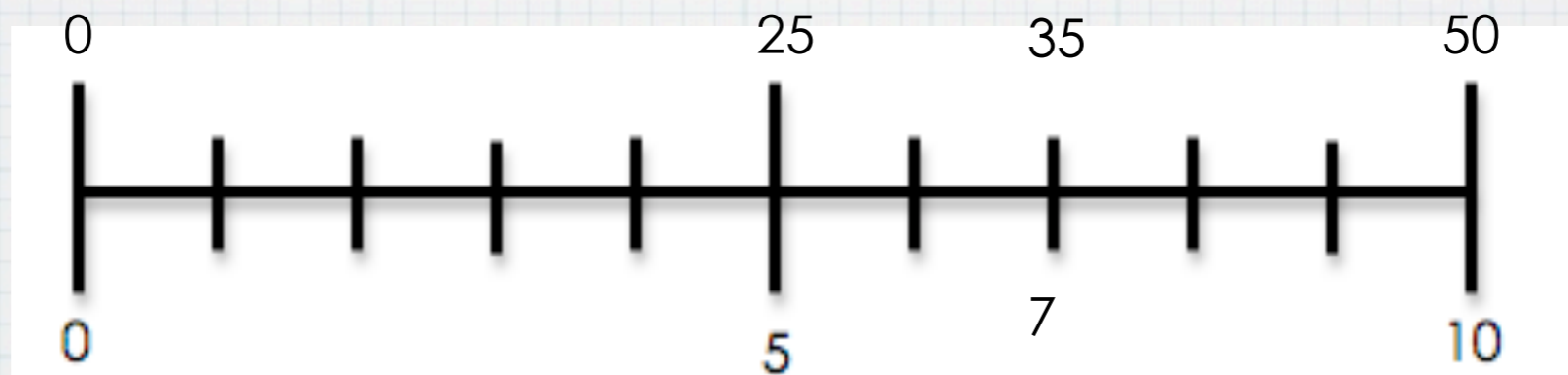
# [H] Divisions with Answers of 7

Question is:  $35 \div 5 =$

Let's restate question:  $5 \times \underline{\quad} = 35$

What we know:  $5 \times 10 = 50$  and  $5 \times 5 = 25$

Therefore:  $5 \times 7 = 35$



# [1] All Basic Division Facts

# [A] Extension: Basic Division Facts Multiples of 10

For these questions, Students need to connect to the Basic Facts they already know.

$$210 \div 7$$

Division: Multiples of 10 EXT [A]

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# [A] Division Transition

$$164 \div 4$$

Division: Transition [A]

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# [B] Division Transition

$$312 \div 6$$

Division: Transition [B]

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# [B] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 10 and 20

$$68 \div 4$$

Division: Larger numbers EXT [B]

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# [C] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 20 and 30

$$116 \div 4$$

Division: Larger numbers EXT [C]

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# [D] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 30 and 40

$$304 \div 8$$

Division: Larger numbers EXT [D]

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# [E] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 40 and 50

$$294 \div 7$$

Division: Larger numbers EXT [E]

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# [F] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 50 and 60

$$159 \div 3$$

Division: Larger numbers EXT [F]

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# [G] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 60 and 70

$$414 \div 9$$

Division: Larger numbers EXT [G]

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# [H] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 70 and 80

$$438 \div 6$$

Division: Larger numbers EXT [H]

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# [1] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 80 and 90

$$440 \div 5$$

Division: Larger numbers EXT [1] Created by Julie Roy

# [J] Extension: Division

Division of 2-digit and 3-digit numbers by one-digit numbers- Answers between 90 and 100

$$388 \div 4$$

Division: Larger numbers EXT [J]

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# [A] Division with Remainders

Division of numbers by 10,  
the remainder will be  $1/10$  or  $0.1...$

$$24 \div 10$$

Division: Remainder [A]

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# [B] Division with Remainders

Division of numbers by 2,  
the remainder will be  $\frac{1}{2}$  or 0.5.

$$7 \div 2$$

Division: Remainder [B]

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# [C] Division with Remainders

Division of numbers by 4,  
the remainder will be  $\frac{1}{4}$  or 0.25;  $\frac{2}{4}$  or 0.5;  $\frac{3}{4}$  or 0.75

$$13 \div 4$$

Division: Remainder [C]

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# [D] Division with Remainders

Division of numbers by 5, the remainder will be  
 $1/5$  or 0.2;  $2/5$  or 0.4;  $3/5$  or 0.6;  $4/5$  or 0.8

$$11 \div 5$$

Division: Remainder [D]

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# Thank You!

- \* You can find all the materials you have seen today at:  
[JulieRoyMath.weebly.com](http://JulieRoyMath.weebly.com)