Helping Students Build Relational Thinking, Not Just Computational Thinking

with CHRISTINA TONDEVOLD
@BuildMathMinds

Shout out what you are learning and tag @BuildMathMinds

How would you figure out what number goes in the empty spot?

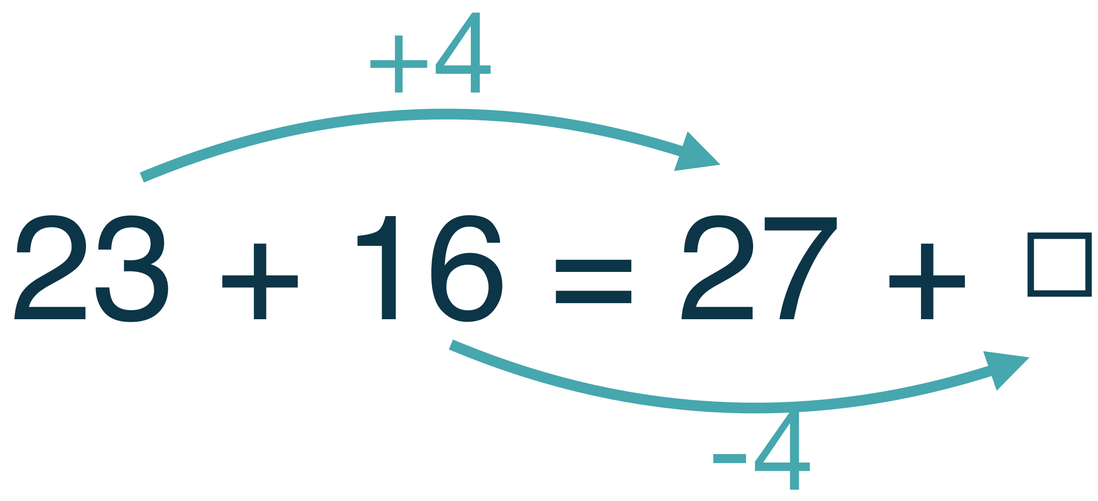
$$23 + 16 = 27 + \square$$

Computational Thinking

$23 + 16 = 27 + \square$

23 + 16 = 39, so
39 - 27 is 12

Relational Thinking



Relational Thinking is 'the recognition and use of relations between elements in arithmetic or algebraic expression and the properties of number and operations.'

—Kristin Klingensmith & Joe Dostilio

Relational Thinking is using the structure of math & connections between numbers to solve problems.

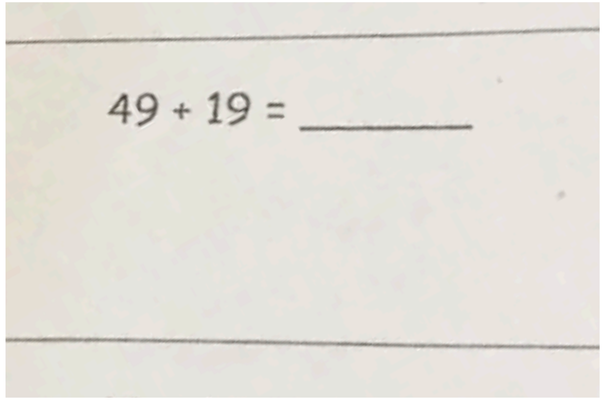
When we regularly and intentionally look for opportunities to surface and discuss relational thinking, we provide learning experiences that move beyond calculating to produce an answer.

—Kristin Klingensmith & Joe Dostilio

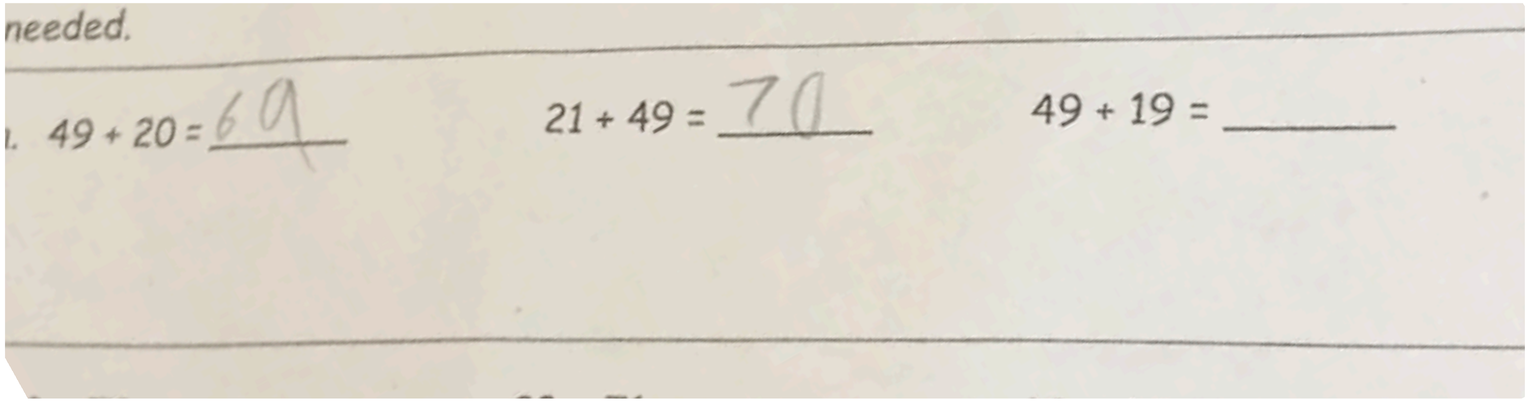
$$6 + 7 = \_\_ + 8$$

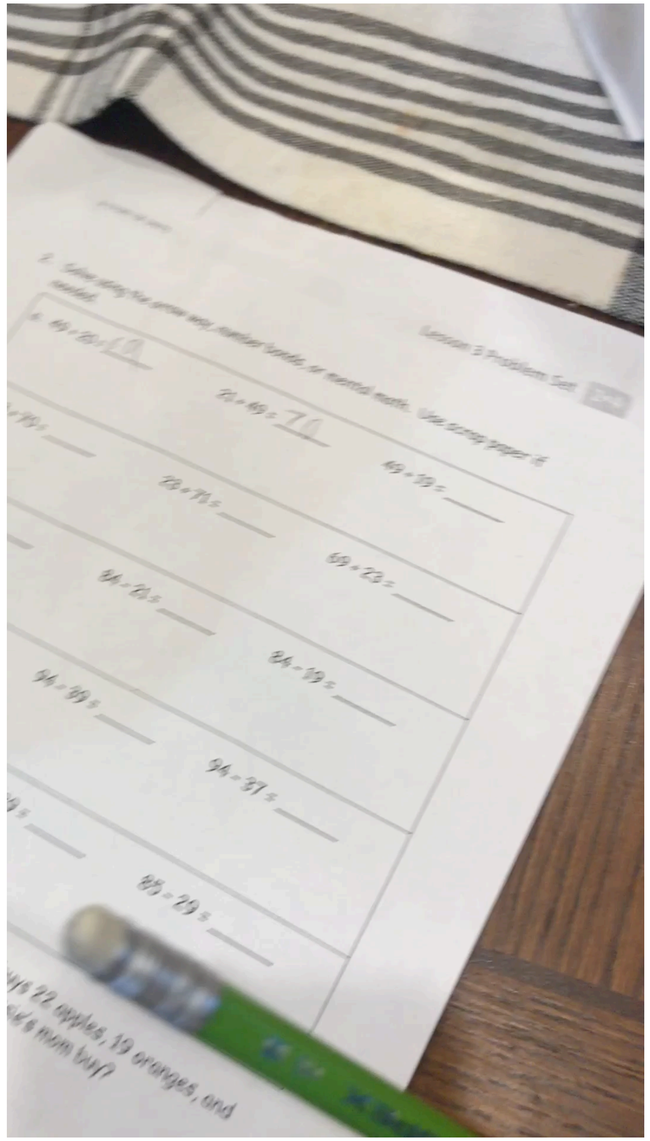
How would

~~Could~~ a 5 year old solve this??



What it looks like when kids DO have relational thinking





Key Idea

Equal Sign is a balance sign, not a sign to calculate.

Common Mistake #1

How would you say this to your students?

3 + 6 =

~~*“Three plus six equals…”*~~

How would you say this to your students?

3 + 6 =

“Three plus six IS THE SAME AS…”

How would you notate this with just symbols (no visual)?

36 + 58

“I added 4 to the 36 and that made 40, then had 54 left to add so that makes 94.”

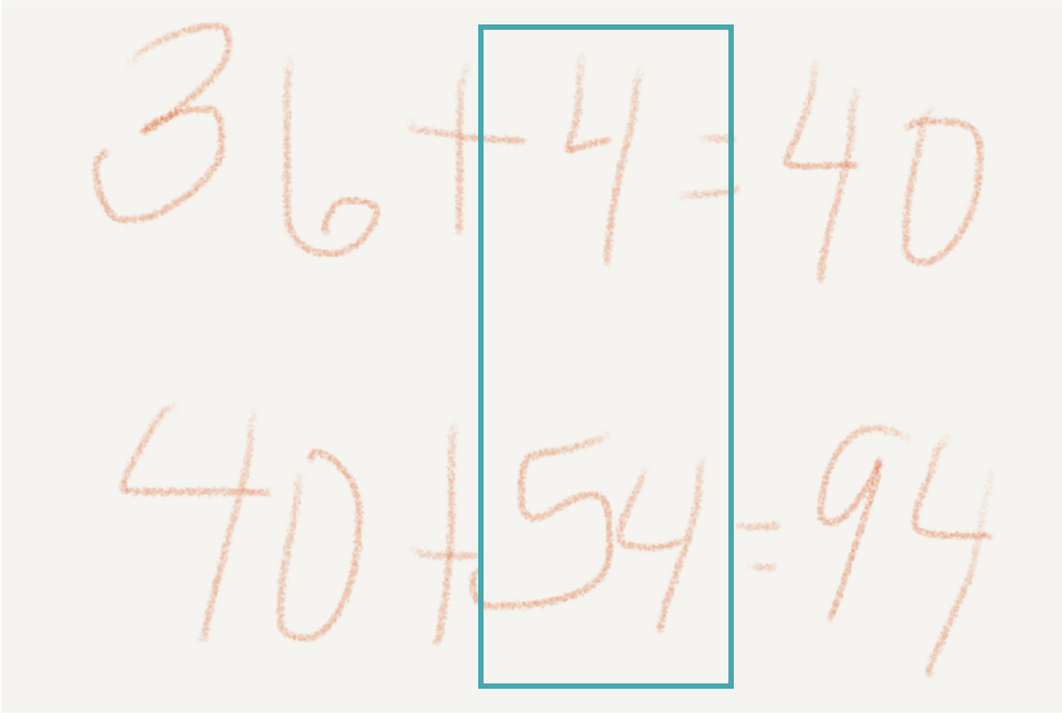
Common Mistake #2

Writing Mathematical Run-on Sentences

36 + 58

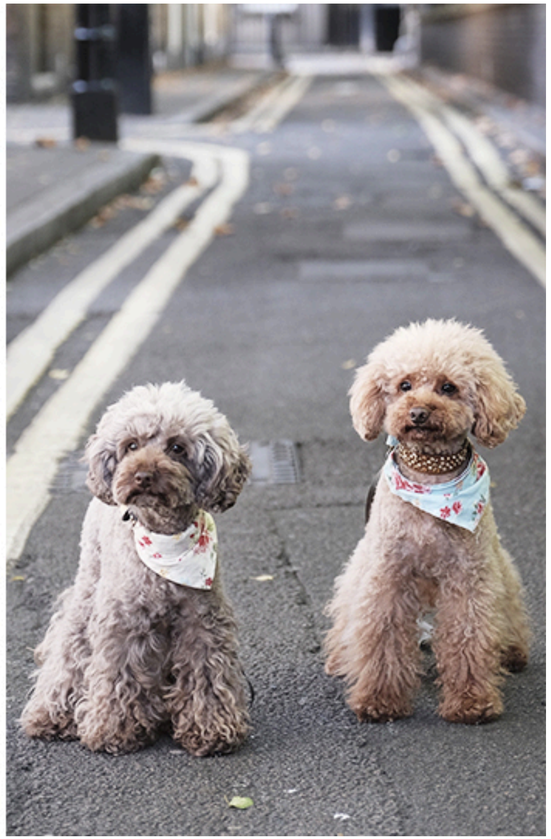
"I added 4 to the 36 and that made 40, then had 54 left to add so that makes 94."

“I added 4 to the 36 and that made 40, then had 54 left to add so that makes 94.”



Experiences

Same but Different



samebutdifferentmath.com/

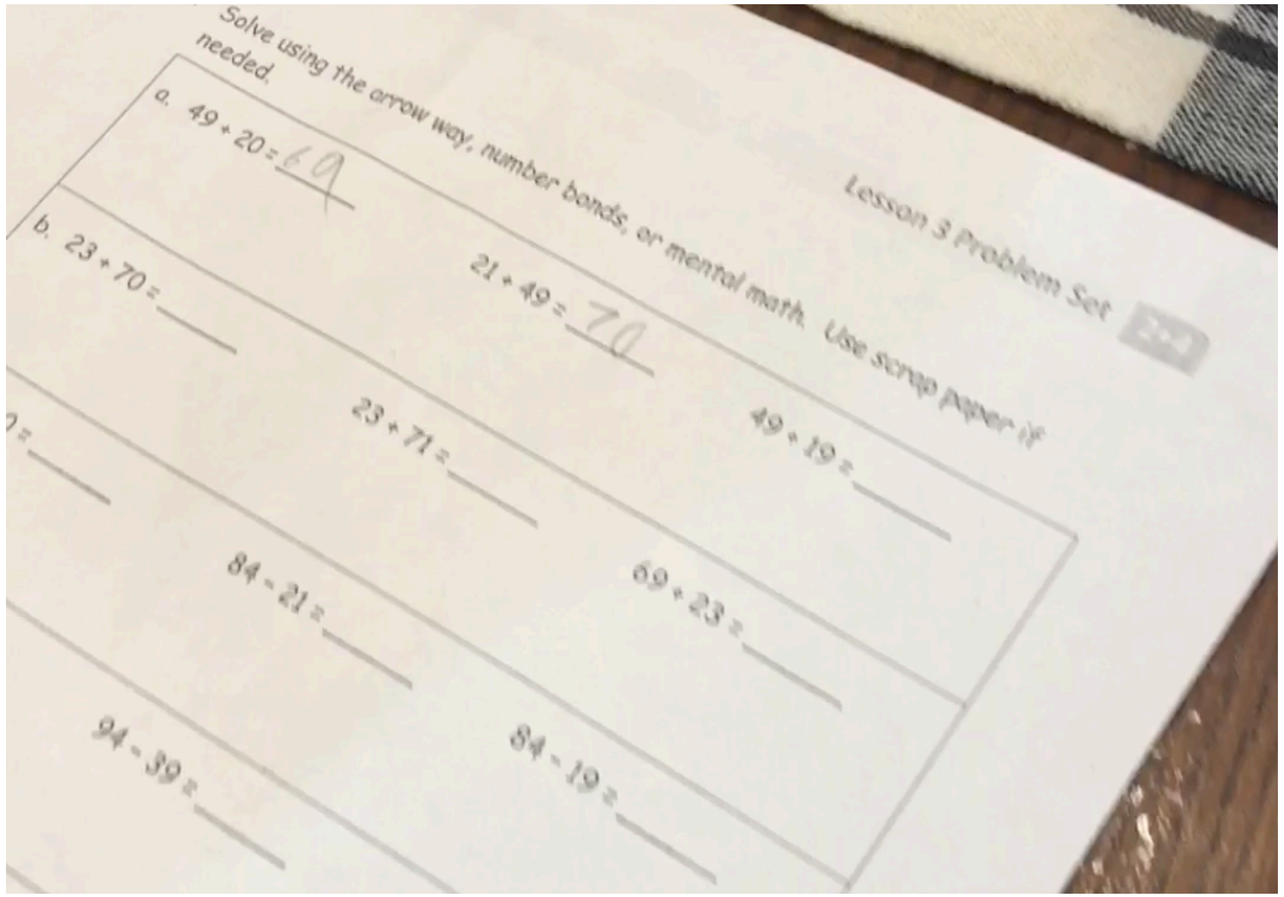
Vary the way you write equations

$3 + 6 = 9$

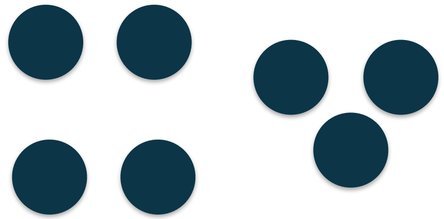
$9 = 3 + 6$

$9 = 9$

Related Problem Sets

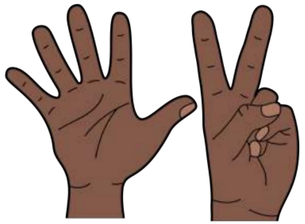


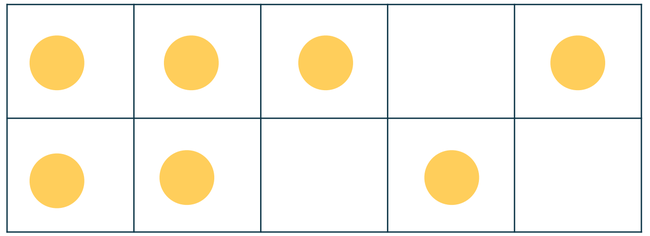
Decomposing Numbers



7

6 + 1





True or False?

$$10 + 6 = 4 + 12$$

True or False?

$$10 + 6 = 4 + 12$$

True or False?

This is 2 less than the 6

And this is 2 more than the 10, so it balances out

$$10 + 6 = 4 + 12$$

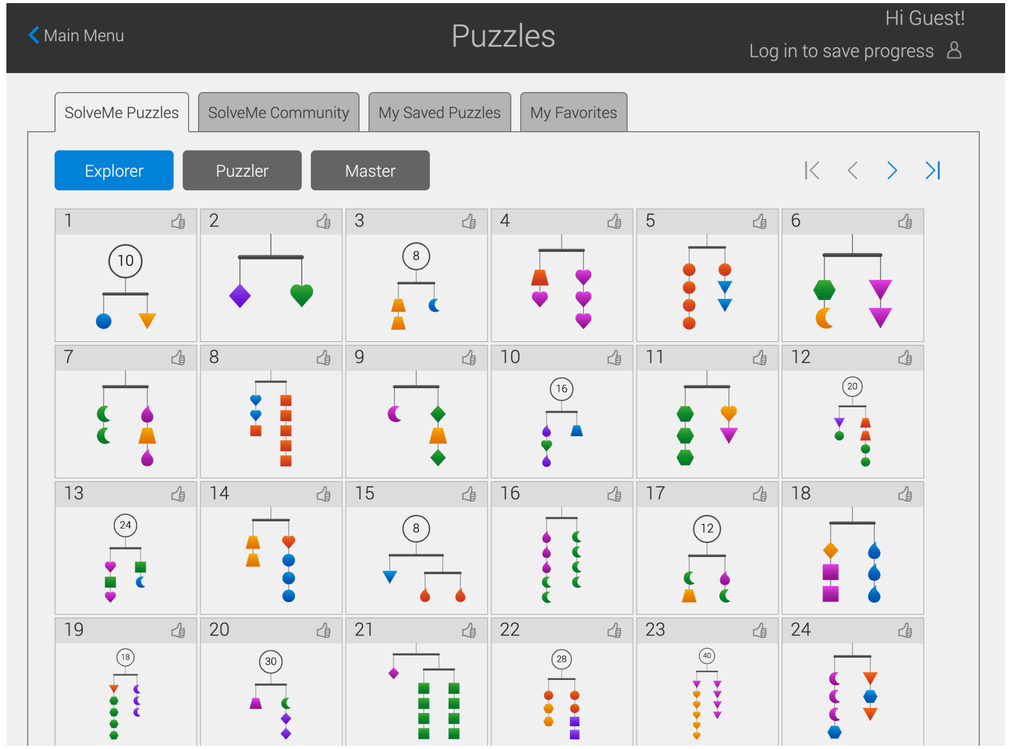
In the box?

$3 + 6 = 7 + \square$

$3 + \square = 7 + \square$

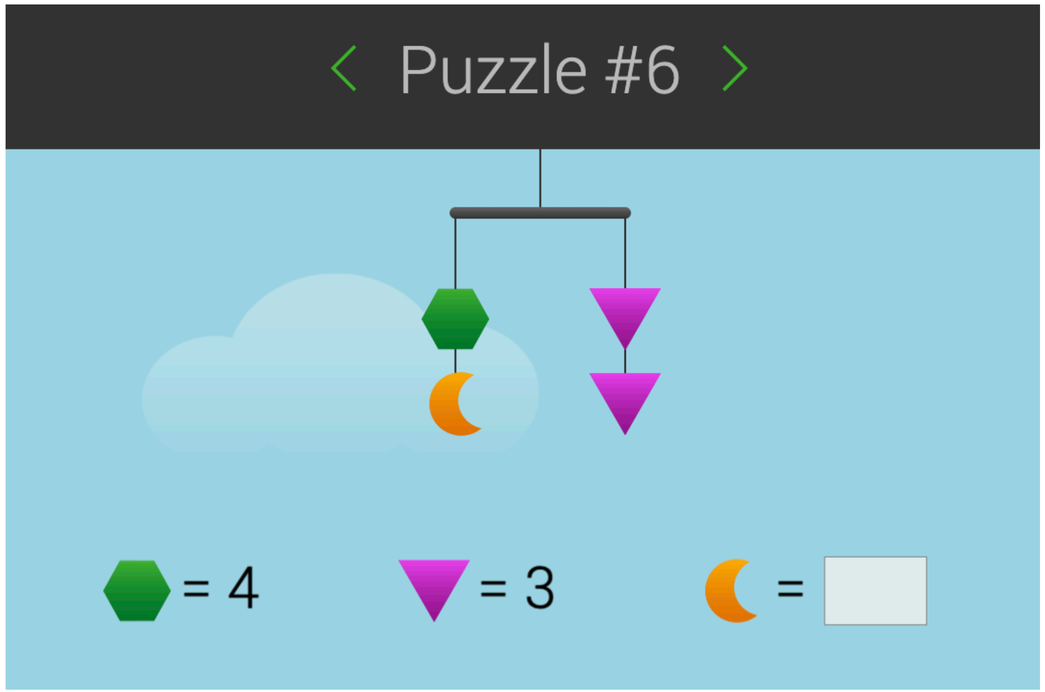
$3 + 6 = \square + 7$

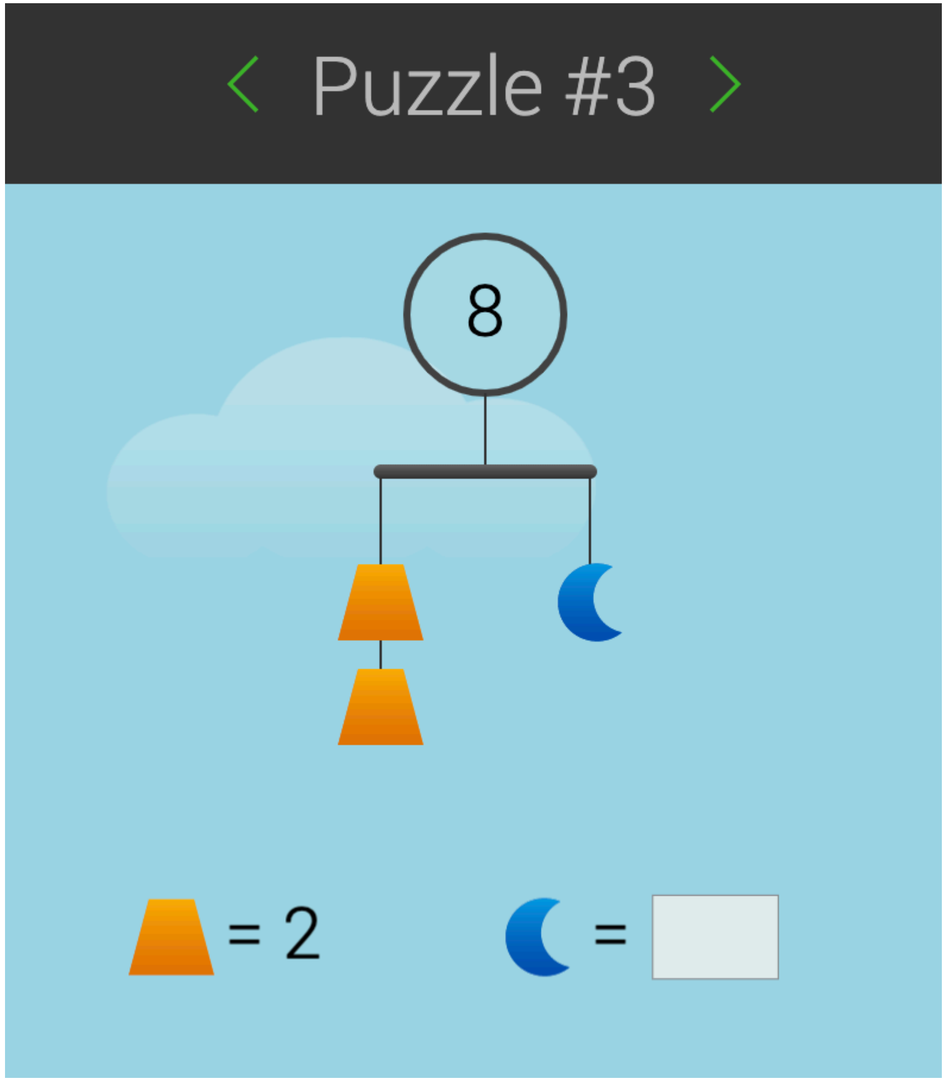
Solve Me Mobiles



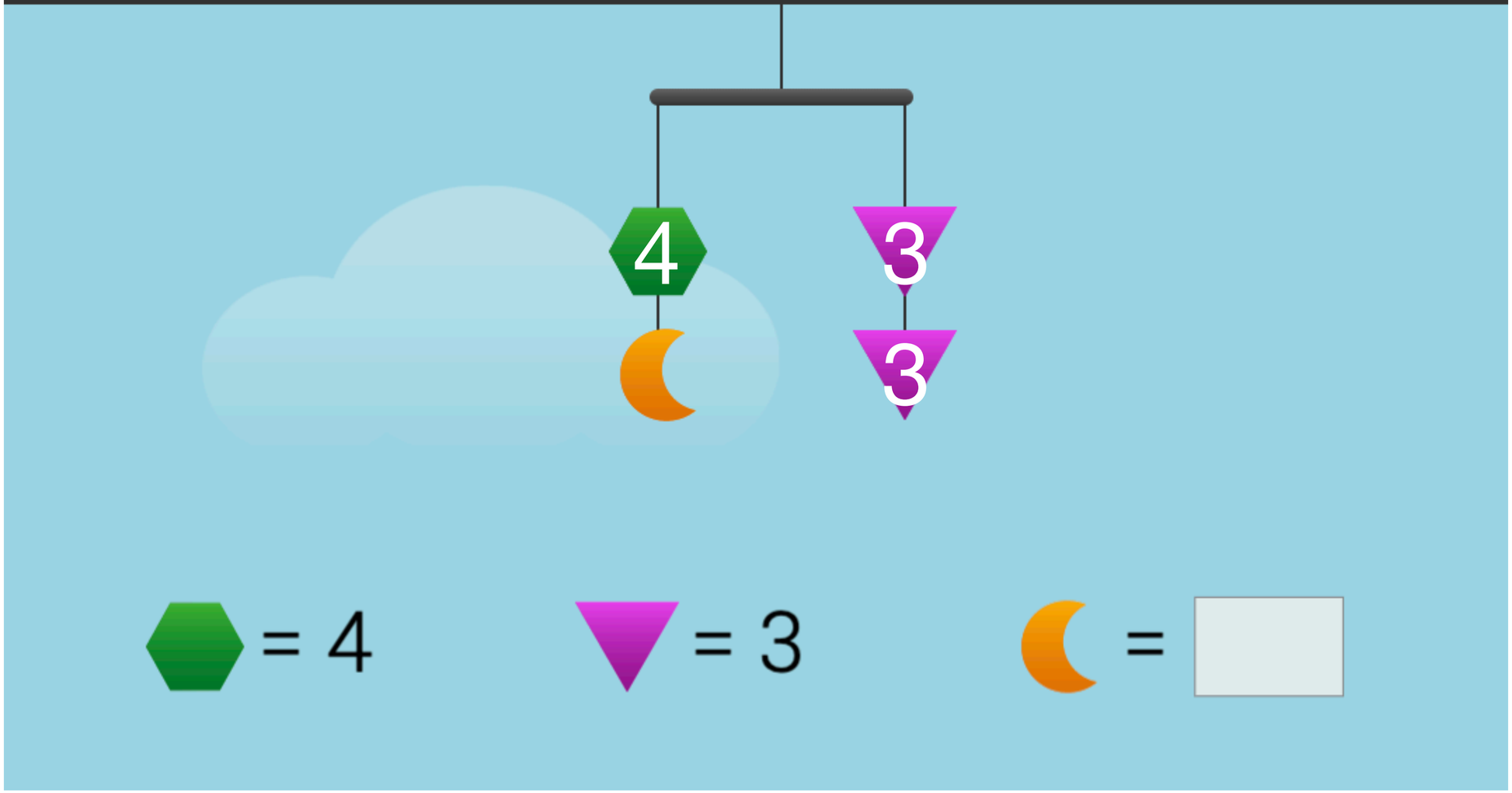
https://solveme.edc.org/mobiles/

Solve Me Mobiles





Puzzle #6



Comparison Context Problems

	Result Unknown	Change Unknown	Start Unknown
Add To (Join)	John had 4 balloons blown up. His brother blew up 8 more for him. How many balloons does he have blown up now?	John had 4 balloons blown up. His brother blew up some more. Now he has 12 balloons blown up. How many balloons did his brother blow up?	John had some balloons blown up. His brother blew up 8 more. Now he has 12 balloons blown up. How many balloons did he have blown up to start?
Take From (Separate)	John had 12 balloons blown up. His brother popped 8 of them. How many balloons does he have blown up now?	John had 12 balloons blown up. His brother popped some of them. Now he has 4 balloons blown up. How many balloons did his brother pop?	John had some balloons blown up. His brother popped 8 of them. Now he has 4 balloons blown up. How many balloons did he have before his brother popped some?
Put Together/ Take Apart (Part-Part-Whole)	Total Unknown	Addend Unknown	Both Addends Unknown
	John had 8 red balloons and 4 blue balloons. How many balloons does he have?	John had 8 red balloons and the rest are blue. If he has 12 total balloons, how many blue balloons does he have?	John has 12 balloons some are red and some are blue. How many of each color could he have?
Compare	Difference Unknown	Bigger Unknown	Smaller Unknown
	(more version) John has 12 balloons. His brother has 8. How many more balloons does John have than his brother? *(fewer version)* John has 12 balloons. His brother has 8. How many fewer balloons does his brother have than John?	*(more version)* John has 4 more balloons than his brother. His brother has 8 balloons. How many balloons does John have? *(fewer version)* John's brother has 4 fewer balloons than John His brother has 8 balloons. How many balloons does John have?	*(more version)* John has 4 more balloons than his brother. John has 12 balloons. How many balloons does his brother have? *(fewer version)* John's brother has 4 fewer balloons than John John has 12 balloons. How many balloons does his brother have?

Comparison Context Problems

	Difference Unknown	Bigger Unknown	Smaller Unknown
Compare	*(more version)* John has 12 balloons. His brother has 8. How many more balloons does John have than his brother? *(fewer version)* John has 12 balloons. His brother has 8. How many fewer balloons does his brother have than John?	*(more version)* John has 4 more balloons than his brother. His brother has 8 balloons. How many balloons does John have? *(fewer version)* John's brother has 4 fewer balloons than John His brother has 8 balloons. How many balloons does John have?	*(more version)* John has 4 more balloons than his brother. John has 12 balloons. How many balloons does his brother have? *(fewer version)* John's brother has 4 fewer balloons than John John has 12 balloons. How many balloons does his brother have?

This doesn’t just matter now, it’s important for later as well. It leads into how kids solve and think about algebra problems.

$$K + 27 = K + K + 5$$

Computational Thinking

$K + 27 = K + K + K + 5$

$K + 27 = 3K + 5$

$-5 \qquad -5$

$K + 22 = 3k$

$-K \qquad -K$

$22 = 2k$

$\div 2 \quad \div 2$

$11 = k$

Relational Thinking

~~K~~ $+$ ~~27~~ $=$ ~~K~~ $+ K + K +$ ~~5~~

$22 = K + K$

$11 = K$

CHRISTINA TONDEVOLD
@BuildMathMinds
BuildMathMinds.com