

Addressing Misconceptions of the Equal Sign

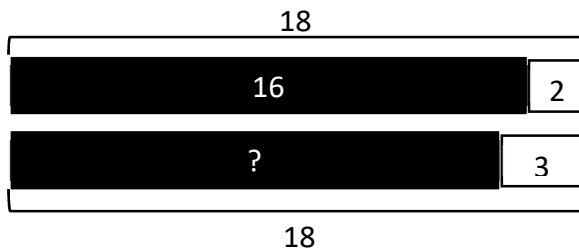
Amber Van Vooren- NCTM 2019

RELATIONAL INTERPRETATIONS OF THE EQUAL SIGN

Basic Relational

$$16 + 2 = \boxed{15} + 3$$

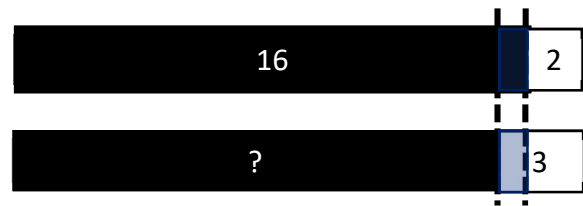
18 18



Comparative Relational

$$16 + 2 = \boxed{15} + 3$$

-1 +1



EXAMPLE CONTEXTS FOR RELATIONAL THINKING

TWO MISSING ADDENDS

Oh no! 10 ants got into our classroom! Some are on the table and some are on the floor. What are all of the ways there could be ants on the table and ants on the floor?

$$10 = \underline{\quad} + \underline{\quad}$$

OPEN EQUATIONS

Maria and Kim are making bracelets. Maria used 9 red beads and some blue beads. Kim used 10 red beads and 3 blue beads. If Maria and Kim used the same amount of beads, how many blue beads did Maria use?

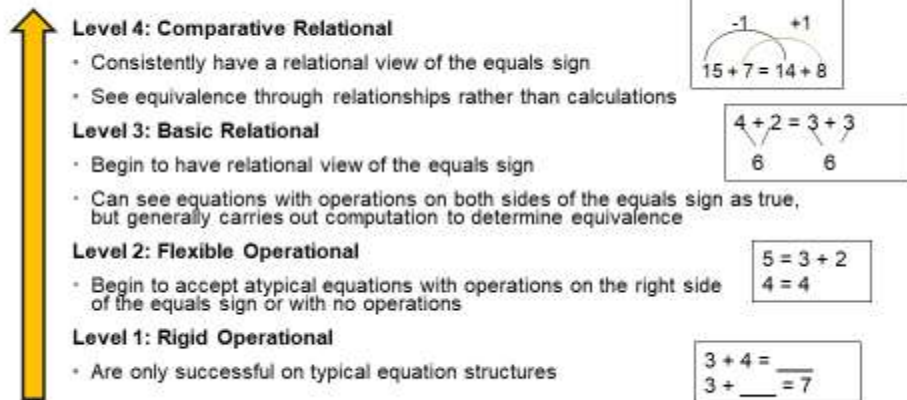
$$9 + \underline{\quad} = 10 + 3$$

TRUE FALSE EQUATIONS

Maria and Kim are making bracelets. Maria used 10 red beads and 3 blue beads. Kim used 9 red beads and 4 blue beads. Did they use the same amount of beads?

True/False $10 + 3 = 9 + 4$?

SPECTRUM OF UNDERSTANDING



Created from the work of Carpenter et al. (2003), Hunter (2004), and Matthews et al. (2012)

USING "TWO MISSING ADDEND" PROBLEMS TO BUILD RELATIONAL THINKING

Oh no! 10 ants got into our classroom! Some are on the table and some are on the floor. What are all of the ways there could be ants on the table and ants on the floor?

Always be sure to connect the symbolic equations to the visual model to help students visualize what is happening in the problem.

$$10 = \underline{\quad} + \underline{\quad}$$

Flexible operational view:

Start by placing the total amount first in the equation.
 $10 = 10 + 0$, $10 = 9 + 1$, etc.

Basic relational view:

Start with separate equations.
 Then ask students, if $10 = 9 + 1$ and $10 = 8 + 2$ are both true, could I say $9 + 1 = 8 + 2$?

Comparative relational view:

Possible questions to ask:

- What relationships or patterns can you find?
- What is staying the same?
- What is changing? How is it changing?

If the pattern continues, what do you predict the next equation might look like?

