

Understanding Your Child's Math Homework

Concrete-Representational-Abstract



Has your child's math teacher sent home blocks, cubes, or other items to help them complete their math work? Have they asked your child to draw pictures to show their work? If so, they may be using a strategy called Concrete-Representational-Abstract (CRA).

Did you know?

There are a lot of fun activities you can do at home to help your child practice math skills – playing with toys, reading books, cooking, eating pizza, playing games, or going shopping together can all be great opportunities to build math skills.



*Your child uses objects (**concrete**) they can move around to help them solve math problems.*

Examples might include blocks, fraction bars, dried beans, coins, Legos, or shapes. Concrete items are used when your child is learning something new.



*Once your child understands a math concept using concrete methods, they can move on to using drawings or pictures (**representational**) to help them solve math problems.*

Think about when you might have seen your child drawing groups of dots or shapes to represent the steps in solving a math problem. These representations are used by your child as they are deepening their understanding.



*Once your child understands a math concept using representational methods, they can move on to using numbers and symbols (**abstract**) only when solving math problems.*

Think about how you do math. You can probably look at the problem $5+5$ and solve it without needing to count out using your fingers, or blocks, or drawing marks on a page. Solving problems without the need for items or pictures through “mental math” will demonstrate that your child has strong mathematical understanding.

Practicing CRA at Home: Division

Ask your child to help figure out how many cookies each family member could have from a batch of 12.

“We have 12 cookies that we’ve made – there are four people in our family, how many cookies can each person have?”



Concrete

You could use cookies (real or play cookies; popsicle sticks, dry beans, or blocks are also a good choice) to help your child divide 12 cookies onto 4 plates. Ask “If we divide 12 cookies equally onto these 4 plates, how many cookies does each person get?”



Representational

Your child could draw a picture that shows the group of 12 cookies divided into 4 equal groups. “How many cookies are in each group?”

Abstract

Now show the problem using only numbers and symbols “We can show this same problem using numbers $12 \div 4 = 3$. This equation shows the work we just did using pictures and cookies.”

Practicing CRA at Home: Fractions

To help your child visualize fractions, you might work together on an activity that involves dividing up something into pieces, identifying which fractional pieces are bigger or smaller, and how pieces add up to a whole. When students first learn about fractions, it is common to think that a fraction with a larger bottom number (*denominator*) is bigger than a fraction with a smaller denominator – for example, thinking that $\frac{1}{4}$ is larger than $\frac{1}{2}$.



CONCRETE



"I can put these two halves of a candy bar together to make a whole or I can see that four eighths together is the same as one half."

Begin by using physical objects that you and your child can cut up into equal pieces. This might be paper circles, fraction strips, or food such as pizza, pie, cake, or a candy bar. Practice exploring how different fraction pieces relate to each other.



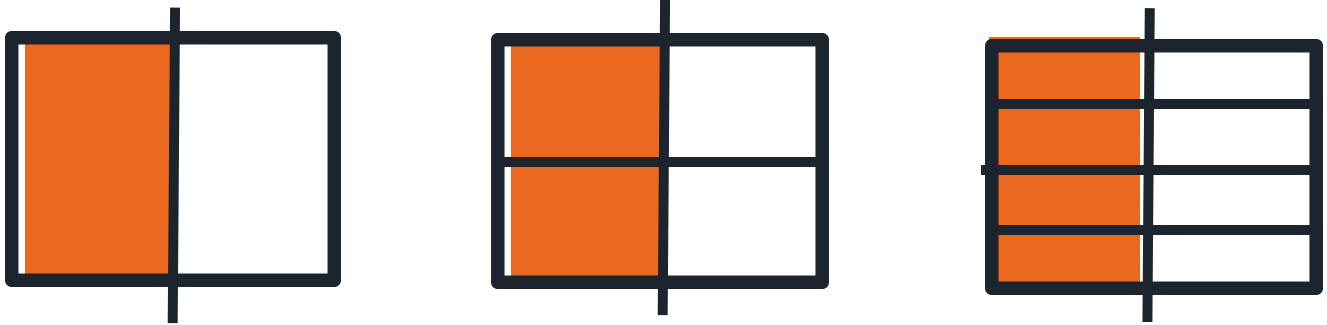
Depending on your child's grade level and understanding of fractions, you can also use objects to practice adding and subtracting fractions, identifying equivalent (*equal*) fractions, simplifying fractions, or working with improper fractions (when the top number is larger than the bottom number).

$$\frac{1}{2} + \frac{1}{2} = \frac{4}{2}$$

For example, I can see that if I have four halves and put them together – $\frac{4}{2}$, is the same as 2 whole candy bars.

REPRESENTATIONAL

Work with your child to draw simple drawings of circles and rectangles to divide them up into halves, thirds, fifths, eighths, etc. Shade in sections of the drawings to compare fractions in the same way you did with the physical objects.



$$\frac{1}{2} = \frac{2}{4} = \frac{4}{8}$$

ABSTRACT

Have a conversation with your child comparing fractions to see which is larger (or smaller) or work with improper fractions.

"What do you think, which fraction is larger - one half or four eighths? How do you know?"

Practicing CRA at Home: Ratios and Proportions



Cooking or baking is a great way to help your child understand ratios and proportions. Many chefs use ratios for basic recipes such as bread, muffins, rice, and pancakes as a starting point for designing recipes, and to make it easy to scale a recipe up or down.

For example, if you know that a basic vinegar and oil salad dressing is 3 parts oil to 1 part vinegar, you can easily make a little bit (3 Tablespoons of oil and 1 Tablespoon of vinegar) or a lot of dressing (3 cups of oil to 1 cup of vinegar).



CONCRETE

Start by making a recipe that you and your child would enjoy, this could be lemonade, pizza dough, rice, or a pie crust.

To make lemonade, you need 1 cup of lemon juice, 1 cup of sugar and 2 cups of cold water, which can be talked about as parts – 1 part lemon juice, 1 part sugar, and 2 parts of cold water.



You can show that parts can be any measurement – you could make a tiny glass of lemonade for a mouse by mixing 1 teaspoon lemon juice, 1 teaspoon sugar, and 2 teaspoons of water (ratio of 1:1:2). Show how to make a larger recipe by doubling or tripling ingredients while keeping proportions the same – 1 cup of lemon juice doubles to 2 cups, etc.



REPRESENTATIONAL



Draw the lemonade recipe showing 1 cup (1 part) lemon juice, 1 cup (1 part) sugar, and 2 cups (2 parts) of cold water.

Lemon
Juice

Sugar

Cold
Water

Cold
Water

ABSTRACT

Solve problems with making a recipe bigger. For example:

9 cups of lemon juice: _____ cups of sugar: _____ cups of cold water
Makes _____ cups of lemonade.

Try More Cooking Ratios!



Pie crust: 3 parts flour, 2 parts fat, 1 part water

Bread - 5 parts flour, 3 parts liquid

Pound cake - 1 part flour, 1 part egg, 1 part fat,
1 part sugar

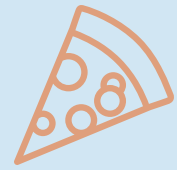




Math Fun at Home



Cooking Ratios



BREAD



5 parts flour
3 parts liquid

POUND CAKE



1 part flour
1 part egg
1 part fat
1 part sugar

PIE CRUST



3 parts flour
2 parts fat
1 part liquid

LEMONADE



1 part lemon
1 part sugar
2 parts water