The Robertson Center
at Success Academy

# Carry the One:
## A Guide to At-Home Math Help

Nothing can cause a meltdown quite like math homework. This has been true for decades, but families these days find themselves in a particularly tricky spot. Today, the way kids learn math looks very different than how their parents and grandparents did. That means, mathematically speaking:

**Parents telling kids to carry the one** + **Kids shooting back that they need to make a box and whiskers plot** = **Tears and frustration for all**

It doesn't have to be this way.

Our Carry the One programming aims to help parents understand the basics of today's approach to math learning, the why behind it, the purpose of homework (it's not what you think!), and how to help. Parents are children's first and most important teachers. They deserve to feel confident and supported in their (very important!) roles. We hope this guide serves as a useful tool.

### In This Guide:

## Why Math Matters

We all know the everyday things that math comes in handy for — calculating the tip on a bill, making change for a customer, or figuring out how much cash we'll have left after bills are paid.

We also know that most life activities don't require the kinds of math found in most textbooks. Friends don't usually ask us to find the square root of a negative number or the tangent of an angle. So why do kids need to learn how to do things like this in school?

The answer is that, while the ability to answer specific, complex math problems is super important, its practical applications to life aren't always immediately obvious (though for engineers, accountants, and computer programmers they certainly are!). In addition to the math itself, the skills and mindsets a child develops while solving problems are key — whether they grow up to be nurses or painters or lawyers or business owners. The math itself hasn't changed. But the "new" math focuses less on memorizing the procedures (the stuff a calculator can do) and more on understanding why the procedures work, in addition to skills like critical thinking, perseverance, and creative problem solving. These are abilities that set people up to live rewarding, happy lives.

## "Old Math" vs "New Math"

For most grown-ups, math education came as a series of tricks and strategies (remember learning to "carry the one" and cross multiply?). Today, many schools strive to teach math in a much more conceptual way. This means that instead of memorizing tricks and shortcuts, kids learn big ideas about math and the way numbers work. This is great for fueling interest in STEM fields, and gives kids a strong foundation to build on as the math gets harder, from one grade to the next.

Neither of these approaches is "right" or "wrong." Ultimately, the way a child solves a problem and the way their parent solves a problem will bring them both to the right answer. One of the goals of the "new" conceptual math approach is to teach kids that there is more than one way to arrive at an answer. Conceptual math celebrates the diverse ways kids' brains work, pushes kids to learn from each other, and even helps them find joy in puzzling over something tricky. It's about the journey, not just the destination.

The icing on the cake? The skills that conceptual math develops — critical thinking, constructing and critiquing arguments, making sense of problems and pushing through to solving them — are the skills kids need for the jobs of the future.

## A Parent's Role in Math Homework

Despite what the average American child might say, homework is not meant to be a punishment — and it's important that parents be positive about it. If parents groan every time the math folder comes out, kids will follow suit. When assigned thoughtfully, homework gives students a chance to practice what they learned in class that day, and

lets teachers see how well students are grasping the concepts. If there are some feelings about math homework, parents can think about it like eating veggies or going to bed on time. It's healthy and helps us grow.

Now, onto some very good news. With all the things parents have on their plates, it is not a parent's job to teach math. This can be hard to remember, with a stumped-looking kid trying to convince mom, dad or grandma that they've never seen a problem like the one in front of them. But it's true. Teaching mathematical concepts is the school's job. Parents should reach out often to teachers about what's going well and what's not, so those teachers can spring into action.

The parent's (very important!) job is different. It also changes over time. We love this framework from Damon Korb, a developmental-behavioral pediatrician, who recommends parents think about their role shifting over time from "coach" to "manager" to "advisor." Here's how that might look:

**Elementary School:** For little ones, parents can think of their role as a coach. They decide where and when practice is, maybe giving kids a little bit of choice (ex. before or after dinner), if do-able, to make kids feel like they have a say. The coach thinks about the schedule, plans ahead, cheers kids on, recognizes how they are feeling, and encourages them to keep trucking. If there's an issue, a good coach notices. In this case, that might mean jotting a quick note on the homework, so the teacher is aware as well.

**Middle School:** As kids become pre-teens, parents get promoted to manager. They hold their kids accountable and keep their eye on the big picture. In middle school, parents should ask kids things like: "What's your plan to get your homework done today?" They should be patient and wait for a response. If kids need help managing their time, parents should provide suggestions (but not tell them what to do). In middle school, homework is an opportunity for parents to see their kid's work habits, flag concerns for teachers, and get involved as needed.

**High School:** By high school, parents should think of their role as key advisor. They're not supervising homework every day, but they should make crystal clear that they're there when needed. They should check in with their child from time to time and make sure their child knows they're available to troubleshoot. If a high schooler needs additional help, parents can definitely go back a stage, leaning in more heavily, but the goal is to be in that low-touch advisory role by the end of high school. That way, the student has some practice being independent before heading off to college.

## What Math Help Should Sound Like

Math homework shouldn't be torture... but it shouldn't be a walk in the park either. The goal is "productive struggle," a mode in which kids are puzzling, questions assumptions and trying new things. It's important to know that it's in this effort that the most meaningful learning is happening. If a grown-up swoops in with the answer or a handy short cut, it doesn't happen! Research studies show that we learn more from trying more challenging problems and failing, then correcting our mistakes, than we do when the problems are at our level of comfort.

Struggle is also where kids develop independence and confidence. Lots of kids will ask for help the second they sit down, before they've even read the question, to see if they

can get the nearest grown-up to give them the answer. Don't fall for it! In this critical, critical moment, parents can turn the table on kids — nudging them to use their very capable brains to crack the case. In elementary school, we like these six phrases, which put the "thinking work" back on the kid. These can be used again and again (and again) when a child is struggling over a problem:

- Draw a picture.
- How do you know?
- Convince me.
- Explain that, please.
- Prove it.
- Why?

Each of these can give kids the jumpstart they need to start unpacking the question, and even move towards possible solutions. The puzzling and pondering is the good stuff. Don't rush it. It's where the most learning is happening.

Of course, indefinite struggle is not productive, and every child has a different tolerance for frustration. Luckily, parents know their child best. They should look for cues that their child is at their limit and, at that point, make a note of what's tripping them up to discuss with the teacher. Ultimately, it's the teacher's job to make sure kids are understanding the homework — parents are just the messenger.

Sometimes it's the parent struggling with frustration. At some point, every parent is likely to feel like the math their kids are doing is a bit out of reach. More good news: whether or not parents understand the math, they're in a great position to help their student make a "mind movie" of what's happening in the problem — whether that student is six or 16. Parents can talk to their child about what's happening in the problem. They can help their kids paint a picture in their head of what it is they need to figure out. The ability to conceptualize a problem is what separates strong math students from weaker students (and that divide gets wider as the math gets harder). It also happens to be something parents are better set up to support with. As much as possible, focus on the mind movie.

## Building Teacher-Parent Relationships

A strong parent-teacher relationship will help parents communicate struggles as soon as they arise, as well as get feedback from teachers about the child's classroom progress. We recommend parents get to know their child's teacher early in the year. Some schools may have a formal process for that — open houses or parent/teacher conferences — that parents should certainly take advantage of. If there is no formal process, parents can reach out to the school to request the teacher's contact information and preferred method of contact. Then, parents can introduce themselves via the preferred method (whether that's a phone call, in-person meeting, text, or email) to let the teacher know how excited the child is to be in her class and how much she's looking forward to the year. If a child had any specific struggles last year, in math or any other subject, it's great to let the teacher know right away. If a parent notices their child struggling during homework, they should make a note of the exact problem or technique that is stumping her. Then the parent should send the teacher a message letting her know about the issue. She'll be able to work with the child in class, and then the parent can check in with the child during the next homework session to figure out whether she's still struggling.

# Let's Practice!

Here are a few examples of problems a child might get, and what parents can do in each situation. Remember, the parent's job is not to do the math, but to help get the child's juices flowing. These examples are designed to help parents think about how they might go about doing that.

## Problem 1: On your paper, draw a combination of coins that equals 77 cents.

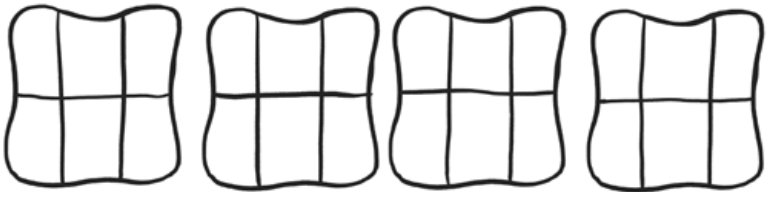
There are lots of different ways to get to this answer. A child could draw three quarters and two pennies; seven dimes, a nickel, and two pennies; two quarters, two dimes, a nickel, and two pennies; or one of any other number of combinations (examples below). Ultimately, it doesn't matter what combination they choose — it matters that they can explain their thought process clearly. Once a child produces an answer, a parent might try a prompt like "How do you know?" or "Prove it" and should wait until the child is able to clearly articulate the why behind the solution.

If a child solves this in an instant, a parent might encourage him/her to solve it another way. Doing so will push kids to use what they already know to ladder up to more complex mathematical ideas. This is key!

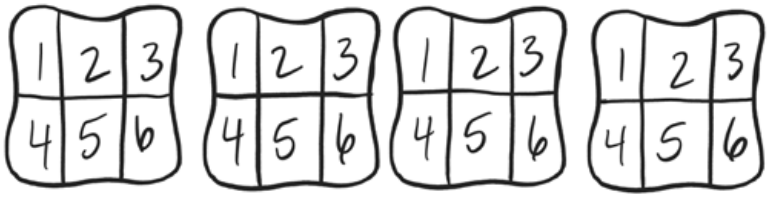
## Problem 2: Six kids shared four sandwiches. How much sandwich would each kid get?

Eeeek, fractions! Fractions produce a lot of anxiety but, in some ways, they actually come naturally to kids (kids know what's "fair"). Check out this example of a conversation using the six prompts (see page 4) that plugs into what kids already know.

**Child:** Dad, I have no clue how to do this. I don't know where to start.
**Dad:** Well, what do you know from the question?
**Child:** I don't know anything!
**Dad:** Yes, you do. The problem tells you something. What does it tell you?
**Child:** Six kids are planning to share four sandwiches. How much sandwich should each kid get?
**Dad:** Could drawing a picture help?
**Child draws:**



**Child:** Okay, they each get six pieces.
**Dad:** How do you know?
**Child:** Each kid gets a piece of each sandwich. See...1, 2, 3, 4. Oh, wait! They each get 4 pieces.

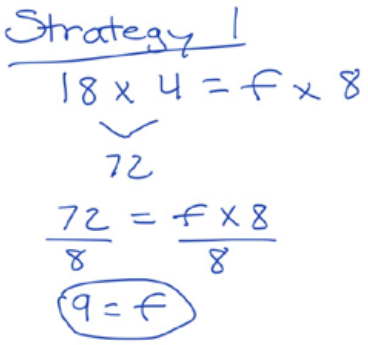



**Dad:** Prove it.
**Child:** So if I am one of the kids, I get 1/6 of this sandwich, 1/6 of the second sandwich, 1/6 of the third sandwich and 1/6 of the last sandwich. So each kid would get 1, 2, 3, 4...4/6!

# Problem 3: What is the value of f?
# 18 x 4 = f x 8

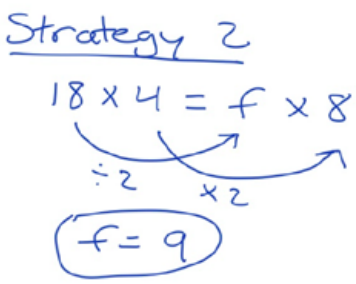
Remember, parents shouldn't be doing the math. They should be supporting their kids to draw on what they know, encouraging them to think about problems in the way that feels most natural. A child faced with this problem, might try any of the strategies below (or countless others), all of which are totally valid. Getting families familiar with the sample strategies below might help soothe anxieties about complex math and/or help parents fight the temptation to just grab the pencil and take over.

**Strategy 1:**
Here's one approach. This is how many of us learned to solve in algebra.




We "isolate the variable" or, in other words, get 'f' by itself, to see what it equals.

**Strategy 2:**
A student might also try it this way — which could look less familiar.

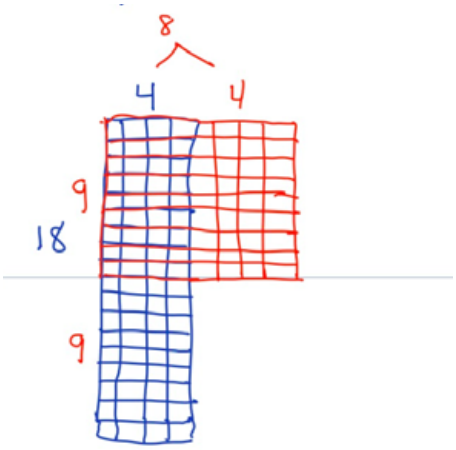



Here's the thinking behind an approach like this:

- Remember, "equals" means "the same as." We want the two sides to be the same.
- Looking at the equation, you might notice that 8, on the right, is twice as big as 4, on the left.
- Since we're multiplying the number on the left side (4) by 2 to get to the number on the other side (8), that means we can divide the other number on the left side (18) by 2 and still keep both sides the same.
- When we do that — dividing 18 by 2 — we see that f equals 9

Some kids would get here using something called an "array" — an image of rows and columns that can be used as a way to visually represent multiplication and division. For a simple example of an array, think of a carton of eggs that has an arrangement of 6 across and 2 down. Rather than count each one, a person could draw an array that's six boxes tall enad 2 boxes wide (i.e. 6 X 2), then easily determine the number of eggs in the carton.

**Strategy 3:**
A student might also try it this way — which could look less familiar.




In this problem, here's how a kid might try an array:

- Looking at the numbers on the left side of the equation, they draw (in blue) a grid that's 18 boxes high and 4 boxes wide (18 X 4).
- They know that, on the right side (the red boxes), the total number of boxes has to stay the same, but that the top is changing from 4 to 8.
- Aha! Eight is twice the size of 4 — they're doubling the top. Since we are adding twice as many boxes to the top, we know that we can cut the number in the bottom by half and still have the same total number of boxes.
- That leaves them with a remaining 9 X 4 blue section at the bottom, which can be moved up to become the red section on the right.
- The resulting array is 9 X 4, which means that f = 9.
- Some kids may notice that the original 18 X 4 array is composed of two equal arrays that are each 9 X 4. The new 9 X 8 is also composed of two equal arrays that are each 9 X 4.