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Description automatically generated with medium confidenceStrategies to Help Every Student Learn and Enjoy Math

**Tip Sheet**



**What to do:** Carefully consider the strengths and challenges of the students who participate in your program. Then use this tool to discover ways to target their needs more specifically.

**Why it matters:** Each of us learns a bit differently, so traditional methods of presenting material may not work for every student. Some may have a learning disability while others are still acquiring the necessary English vocabulary. Being aware of these differences and knowing strategies to address them will help students succeed.

You can help all children learn and enjoy math by using what educators call “universal design for learning.” For example, [the National Council of Teachers of Mathematics identified four evidence-based strategies that can help students who are having difficulties in math](https://www.nctm.org/Research-and-Advocacy/Research-Brief-and-Clips/Effective-Strategies-for-Teaching-Students-with-Difficulties/), but these strategies can work with all students: (1) structured, peer-assisted learning activities, (2) visual representations, (3) modifying instruction based on formative assessment of students, and (4) providing opportunities for students to think aloud as they work. Here are some ideas that can work with various student groups, along with suggestions for putting them into practice.

# Supporting English Learners

Students who aren’t native English speakers:

* May need help with [math words (e.g., *figure* and *volume* have multiple meanings](https://luminouslearning.com/blogs/sped-math/math-vocabulary)).
* May need help with English in general to explain how they solved a math problem.
* Need opportunities to discuss strategies, approaches, and assumptions about math.
* Need visuals to support understanding the context of a problem and instructions.
* May need to build background knowledge to understand the context of a problem.

# Recognizing Special Needs of Immigrants Who Learned Math in Another Country

Many people say, “Math is a universal language.” But that’s not really true. Students from another country:

* May or may not be English learners.
* May use different mathematical symbols (e.g., decimal comma instead of a period).
* May write numerals differently (e.g., draw a horizontal line through the numeral 7).
* May know the metric system but not the U.S. systems of weights and measurements.
* May recognize the numbers in a word problem, but not grasp the context of the situation presented, and thus be unable to solve the problem.

# Appealing to Various Play Personalities

Make math learning spontaneous and playful. Math treasure hunts, games, riddles, jokes, stories, and creations are ways to bring a sense of play to activities involving math. Creating a fun, relaxed environment can be especially important for students with math anxiety.

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Description automatically generatedKeep in mind that “play” can mean different things to different people. Dr. Stuart Brown says there are eight different “play personalities.” You can learn more by visiting the [National Institute for Play](https://www.nifplay.org/what-is-play/play-personalities/) website. Here are the eight play personalities and examples of activities each type might enjoy:

1. **Collector:** Collect measuring devices or collect statistics about a sports team, the weather, or another interest area, or do a math treasure hunt.
2. **Competitor:** Do math puzzles or play math games (alone or with others).
3. **Creator/artist:** Create abstract art using geometric shapes.
4. **Director:** Plan a trip, including the number of miles per day, number of stops, and the budget.
5. **Explorer:** Visit a new science museum or try out different virtual math tools.
6. **Joker**: Create or share math jokes. *(Why did the student do multiplication problems on the floor? Because the teacher told him not to use tables.)*
7. **Kinesthete (someone who likes to move):** Roll two dice and add the numbers to decide how many jumping jacks to do.
8. **Storyteller**: Tell a story, read a book, or watch a video that involves math or mathematicians.

# Supporting Students With Learning Disabilities

**Learning disabilities (in general):** Use specific strategies suggested in the child’s Individualized Education Program or IEP (if one exists) and by the child’s school-day teacher and family; focus on the child’s strengths and interests; engage multiple senses, not just sight.

**ADHD and autism spectrum disorders:** Pick a quiet spot for homework or study time; alternate short “learning bursts” and movement; establish a routine; make it fun; point to specific words, numbers, or objects as you talk about them during a math activity; celebrate “little victories.”

**Speech and language difficulties:** Talk about new words before you use them during an activity. Provide safe opportunities for students to learn and practice reading and pronouncing math terms.

**Dyslexia:** This is a learning difference that mainly involves difficulty with reading. Dyslexia can affect writing and spelling, too. It can also impact math. Students with dyslexia may struggle with reading and try to avoid reading aloud, have trouble sounding out words and memorizing sight words, confuse the order of letters, have poor spelling and grammar, and have trouble remembering phone numbers or items in a short list. Here are some strategies to use:

* Use simplified oral and written instructions, with pictures of directions or schedules.
* Provide response options that involve little or no writing (e.g., thumbs up or down).
* Engage multiple senses.

**Dyscalculia:** This is a learning difference that causes trouble with [making sense of numbers](https://www.understood.org/en/learning-thinking-differences/child-learning-disabilities/math-issues/number-sense-what-you-need-to-know) and math concepts. Here are some signs of dyscalculia:

* Has trouble learning to count and doing basic computation.
* Doesn’t understand math concepts like greater than, less than, and equal to.
* Struggles to make sense of graphs and charts.
* Doesn’t remember phone numbers or items in a short list.
* Tries to avoid games and activities that involve numbers.
* Struggles to make change or figure out a tip.

Here are some strategies to help students with dyscalculia:

* Use graph paper to line up numbers and problems.
* Highlight key words and numbers in word problems.
* Break homework down into small chunks with breaks in between.
* When possible, provide a calculator and a table of simple math facts and formulas needed to do the work.
* Use multisensory, hands-on activities; tutoring; and direct instruction in problem-solving strategies and ways to learn and retrieve math facts.

# Using Technology Wisely

* Use technology to help students **practice** math in fun ways. See the [*Teacher Digital Learning Guide*](https://files.eric.ed.gov/fulltext/ED628152.pdf) from the Office of Educational Technology at the U.S. Department of Education. The section titled Personalize Learning for Students suggests evidence-based technology tools and strategies.
* Help students make **real-life connections** to math by having them research a product or service they want (like online movie and music platforms) and create a short video discussing which are the best deals, and why.
* Show students where and how to find short online **videos that explain various math** concepts. Invite each student to find a video they think is especially helpful in explaining a math concept they’re learning about in school.
* Let students use a **calculator** instead of pulling them out of stimulating math activities and using “drill-and-kill” forms of remediation that may deprive students of experiencing math success and developing conceptual understandings.

# Working With the School Day

* Check with school-day teachers to see if they have math software they’d like students to use but don’t have time in class to offer, or students don’t have available at home. Your 21stCCLC program can provide opportunities and support.
* Make academic and interdisciplinary connections by having students explore interesting or practical connections between math and other topics like history, music, the arts, science, and various career fields (including the trades).
* Intentionally design activities to provide support in math areas students need to master.

# Motivating and Supporting Students Who’ve “Given Up” on Math

These students may benefit from:

|  |  |
| --- | --- |
| * Messaging * Coaching | * Direct instruction to build knowledge, understanding, strategies, and skills |
| * Encouragement | * Stress-free experiences where they can have success with math |

Try using these “hooks” to snag student interest in math:

* **Life skills:** Teach and practice life skills related to math (like understanding credit cards, savings, and compound interest), self-regulation (like breaking large tasks into “doable” chunks and taking breaks), and anxiety management (like self-talk, exercise, and breathing techniques). Emphasize that these are skills they can use throughout their lives.
* **Patterns:** Look for connections and patterns. Point them out, and encourage students to do the same. Encourage them to use all five senses: *What connections or patterns do you see, hear, smell, taste, or feel?*
* **I-R-A experiences:** Support school-day learning by planning interesting, relevant, and amazing (I-R-A) enrichment experiences related to the math your students are learning in school.
* **Quick wins:** Use downtime to bring math to life with math-related games, riddles, questions, stories, demonstrations, and fun facts. Keep them light and fun — and connect them to the needs and goals you’ve identified for your students.
* **The thrill of success:** When you provide activities that hit a student’s “sweet spot,” meaning the activity is challenging enough to be intriguing but not so hard that it’s frustrating, you have your end goal in sight! When you do that, it starts a chain reaction:
  + When students put forth effort, stretch, and succeed, they experience the thrill of success.
  + That feeling of personal victory releases endorphins, whether the success involves solving a math problem or calming their own anxiety.
  + The thrill of one success, even a small one, reinforces the idea that success is within reach and worth the effort. It’s a powerful motivator. That’s why it’s called “productive struggle.” That’s also why they say, “Nothing breeds success like success.”

# Engaging Families in Math Awareness and Activities

Research shows that family members’ frustration while providing homework help can feed math negativity and reduce a child’s motivation and achievement. Here are some ideas for supporting families:

* Host events where families can learn math terms and concepts and ideas for providing or getting appropriate homework help for their child.
* Share tips in your program newsletter or in take-home sheets to help families learn about math concepts, teaching methods, and ways to support their child. Make these materials available in families’ home language if possible.
* Create or share short instructional videos for families on your program’s social media page. Or you could create a downloadable set of cards tips families can use to help their child learn or practice a basic math skill, messages they can use to build confidence in their child’s ability to learn new things with effort, everyday ways to build “math muscles” at home, and links to websites that offer a daily math problem or other useful tools at no cost.
* Share positive personal messages about their child, either in person or (if the family gives permission) by phone or text. For example, you might say, “Chris said your family used to play ‘I Spy’ with numbers on road trips, and it made him aware of numbers in everyday life. Great idea! We never know when little things can make a big difference for kids.”

# Celebrating Progress, Achievements, and Successes

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Description automatically generatedWhen it comes to learning math and overcoming math anxiety, those little victories along the way add up. Some students are motivated by internal rewards like more confidence, while others need external rewards to spur them on. Be sure to recognize and celebrate successes, large and small.

**Along the way:**

* As students make progress, provide small incentives such as pencils or stickers for younger students, or certificates of achievement for older students.
* Highlight student projects, growth, and achievements in your newsletter or on social media.
* Recognize students’ effort and persistence in front of their peers and family members.
* Build in time for students to “chill out” after they’ve been working hard.

**At the end of a project, semester, or school year:**

* Have an awards ceremony to honor all students and staff. Students can share how staff have helped them as an added bonus.
* Provide awards for different kinds of student progress and achievements.
* Make a presentation to the school board.
* Have a family event like a picnic or barbeque where students can share the skills and strategies they’ve learned.

Differentiation is simply a teacher attending to the learning needs of a particular student or small groups of students, rather than teaching a class as though all individuals in it were basically alike.

— Carol Ann Tomlinson



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