

A PARENTS' GUIDE

to

STEM

SCIENCE • TECHNOLOGY • ENGINEERING • MATHEMATICS



Everything You Need
to Know to Help
Your Child:

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Get
Inspired
•
Succeed
in School
•

Map a Path Forward

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What Is **STEM** *All About?*



In New York City public schools, students are experimenting with solar energy in urban greenhouses and scuba diving in local waters to experience environmental science up close. Fifth-graders in Georgia are proposing ways to redesign a local zoo with plants and animals, while high schoolers in Ohio are shadowing physicians on rounds at area hospitals to see what they're learning in biology classes firsthand. At a Kentucky community college, students spend more time on the factory floor of local manufacturers working with cutting-edge machines and tools than they do learning about the processes through books or lectures. Across the country, girls are taking computer programming and meeting with female software engineers and tech entrepreneurs to see what these hot jobs look like.



It's no secret why there is so much emphasis at schools nationwide on science, technology, engineering and math, or "STEM," as those fields are often referred to collectively: Simply put, that's where the jobs are. From coast to coast, employers big and small are actively seeking workers with specific STEM skills. Companies can't find qualified employees to fill the many job openings that exist today, and they are worried that there won't be enough

tech-savvy employees for the workforce of the future. Indeed, math, science and computer skills are becoming increasingly essential for just about every industry, from manufacturing to health care to finance to education. Government and business leaders are championing the innovative power of STEM as vital to the nation's economy and looking for ways to equip students and professionals from all backgrounds with these abilities.

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Job opportunities

Why is the United States facing such a critical dearth of employees with STEM skills? In short, far too few youngsters have been choosing to take science and math classes and to stick with the subjects in college. Some students show promise in these disciplines but often lose interest; others are not being exposed to role models or mentors. Nor are students getting enough opportunities to gain valuable hands-on experience in these fields. As a result, educators, employers, government officials and other advocates are making a strong push to get children, particularly those from underrepresented groups and underserved communities, involved in science and math.

There's good news for your child. In the years ahead, jobs in the STEM fields are projected to grow about twice as fast as those in other industries. What's more, many of these careers are among the highest-paying: College STEM graduates typically make about \$500,000 more over their lifetimes than their peers who studied other subjects. And many STEM jobs don't even require a four-year degree, but instead are being filled by those with industry certifications or degrees from community colleges that often partner with businesses to make sure workers learn exactly the right skills needed for the workforce.

But getting a good job isn't the only reason you should help your child develop a solid grounding in STEM. In an age of smartphones, the Internet, remote health care and computers, your child needs to master basic STEM skills to thrive in today's world. A little bit of engineering and computer science can go a long way no matter one's future career. The key is to get kids excited about science at an early age –

even as young as preschool – and find ways to help them keep learning it. Dozens of schools across the country are transforming their curricula to better tackle STEM and help ensure that students are college- and career-ready. Numerous after-school and summer programs are cropping up that give students of all ages and backgrounds extra access to tutoring, mentoring and hands-on science activities – from building robots to designing mobile apps and websites to performing basic experiments in biology and geology.

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How you can help

Fortunately, you can be one of your child's best advocates for STEM, no matter what your own educational background is. That's why U.S. News & World Report has created "A Parent's Guide to STEM." On the following pages, you'll find tips on how to introduce youngsters to science and math by, say, taking a nature field trip, cooking or reading a biography of female scientists; advice on picking the right high school and classes for your child; and words of encouragement from young professionals and STEM role models. You'll also find some leads to help you and your child launch a college search, an idea of what students can expect from the new SAT, a sampling of STEM scholarships, a list of hot STEM college majors and advice on how to land an internship.

Perhaps the best strategy of all: Find a way to make STEM fun and help your child understand how it works in the real world. He or she could soon be on the way to becoming a biochemist, video game designer, physicist, electrical engineer, automotive technician, cybersecurity analyst – you name it. The opportunities are just about endless. ●



A Journey of Discovery

If you want to inspire an appreciation of science and math in your kids, you don't have to go farther than your home or a city park. A simple walk outside can become a journey of discovery, whether it involves grabbing a dandelion puff to blow or examining a caterpillar and discussing how it will soon become a butterfly.



By feeding your child's natural curiosity, you can foster a love of learning and exploration that can lay the groundwork for studying and excelling in science and math at school. Research has shown that kids' fast-growing brains allow them to take in huge deposits of information. They are eager to learn, and supporting that hunger is key to setting them up for future success. Here are some ideas for converting commonplace items and experiences in your own home and neighborhood into learning adventures.

Turn your home into a laboratory

Almost any common utensils can be used for ready-made science experiments or math lessons. For example, in the winter, you can fill

a plastic cup with water and freeze it outside overnight to teach a lesson about temperature. Pouring water back and forth between different-sized containers can help illustrate what "volume" means.

Your local library boasts a number of books that can help you conduct science experiments at home, such as "The Kid's Book of Simple Everyday Science" ("Curl Up With a Great Read," Page 25). You can also tap into free interactive resources such as Code.org, a site that enables kids as young as 4 years old to learn the basics of computer science by doing coding exercises. For example, one activity invites kids to use the character Elsa from the Disney film "Frozen" to create a snowflake.

Cooking is another great way to engage kids, suggests Sophia Kraus, interim director of the Center for Child Development at

Psst! The Secret to Sticking With Math



Middle school can be a scary time for kids. Hormones are raging and math, which once seemed easy and related to the real world (like dividing a pie into equal parts or counting by tens), has suddenly become abstract. Students find themselves wrestling with dividing fractions and solving equations and can begin to lose confidence. Here are some ways you can help your child work through these all-too-common slumps:



Engage your child

Often, just reading a book beside your child during homework time can have a calming effect. If your son can't figure out an assignment, don't do the work but ask questions to zero in on problem areas: "What part do you understand?" "What don't you understand?" "Can you make a drawing to explain your thinking?" Sometimes rewording an assignment question can help, too. If he is getting frustrated, then suggest he go shoot baskets for 20 minutes, perhaps, and then come back. If something is still unclear, then he can write down a question for the teacher (most will be very pleased to help), who then can more easily provide the needed support. You can also investigate websites like Khan Academy, which has terrific video tutorials (that parents can take too!), practice problems and articles covering many math concepts.

Be positive

If your child is struggling in class, keep encouraging her that she can do the work. Praise her effort, not her ability. Contrary to popular belief, there is no math gene. Learning is a matter of time, effort and practice. When kids believe they can succeed, their minds are more open to learning. Nurture their curiosity while providing support and encouragement.

Learn from mistakes

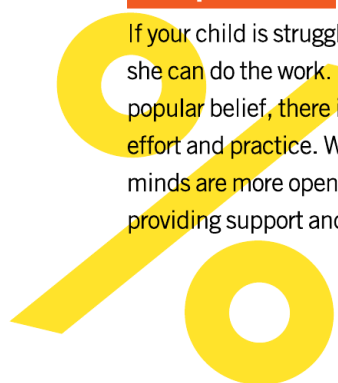
Part of learning math also comes by working through failure. The better you get, the more your confidence builds. Don't panic over a poor test result. Most teachers are willing to raise a grade if a child does extra work and later demonstrates mastery of the material that tripped him up on the test.

Go beyond the classroom

The Internet has so many learning opportunities. If your child wants to find out more about imaginary numbers, say, suggest she Google the phrase and then tell you what she discovered. Many extracurricular activities are also available to apply math concepts, like robotics clubs or summer STEM camps.

And you can always talk about math in everyday life, whether it's comparing cellphone plans or looking at how architects use geometric shapes in building structures, like skyscrapers or a neighbor's home. Construction toys like Legos and games like checkers or Minecraft are also great vehicles for conveying math concepts and the problem-solving process. ●

By Jane Porath, a board member of the National Council of Teachers of Mathematics who teaches math at East Traverse Middle School in Michigan.



MyStory

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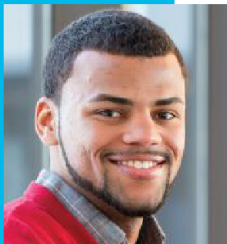
Marissa Amaya

*Watson UX Designer/
Software Developer, IBM*

I've always enjoyed math, but growing up I was more interested in the performance arts—acting, singing, dancing. I even dreamed of being on Broadway. In college, I decided to use my math skills by majoring in electrical engineering. I still wanted to pursue the arts, though, and even took a six-month internship at Walt Disney World. It was fun, but I wasn't sure how stable it would be. So I searched for something else a bit more practical while still being true to myself. After taking computer science classes, I realized that fields involving computers drew on the creativity and inspiration I used in performing, but the final products could reach many more people and have a more lasting impact. When you're designing an application, the same principles of giving a good performance apply, but with a higher level of scrutiny— which creates fun challenges for developers.

At IBM, much of my job entails dreaming up futuristic applications for the Watson computer system that once won “Jeopardy!” We're exploring how it can tackle challenges like finding more effective, personalized treatments for cancer. It's the kind of stuff people once only dreamed about in science fiction. Though my title is software developer, I think of myself more as a creative person who brings that creativity to any role I tackle. To succeed, I think you should always remain true to yourself and not let other people define what you're capable of. ”

“



Dayton Rhymes

*Systems Engineer, Integrated
Defense Systems, Raytheon*

I first thought of engineering on a family visit to see my cousin. I asked what he did, and he said he was a computer systems engineer for a defense contractor. I had close friends in the military, so I thought, “This is great. This is what I want to do.” In school, math was my best subject, and I always fooled around with building blocks like Legos. Both Legos and math require you to be a problem solver to put things together, and this is what engineers do.

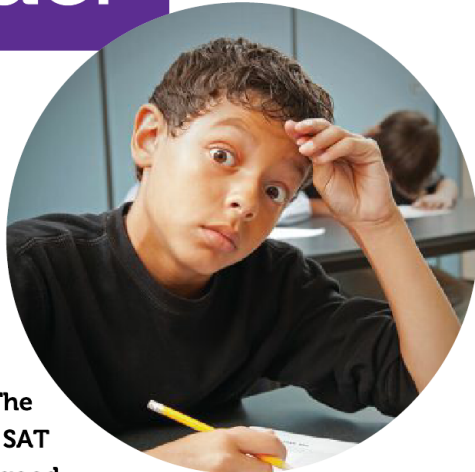
I did well in my classes and never had problems with teachers. Those came more from some of the kids. They used to say, “You're not black. The way you speak. The way you act.” Society often has an idea of how a black person should be. I just shrugged it off. I am black, but I don't have to talk in stereotypical ways. I decided that if people were going to single me out it would be for my performance. I

was one of only three black students in honors classes. I worked hard and got into Stevens Institute of Technology where I majored in mechanical engineering.

I believe in seizing opportunities, so when the National Society of Black Engineers had a career fair, I went. There was a Raytheon booth. Ever since my cousin's talk, I was interested in joining the defense industry. I introduced myself and shared my résumé. That's how I got my job. Today, I help test radar surveillance systems for the military used to detect missile launches, which has given me a chance to give back. ”

A Word to Students:

You Can Conquer Test Anxiety



Test day is on the horizon, and the thought is making you sweat. How to get a grip? Take a deep breath and tell yourself it's normal to be anxious – in fact, some anxiety will provide incentive to prepare. The problem is that being really anxious about taking the SAT or the ACT may actually hurt your performance. The good news: You can do quite a bit to stop test anxiety before it stops you!



TIP 1 Practice to get a feel for the test. However you feel about the ACT and SAT, you have to give them this: They are consistent. (Thus the name standardized tests.) So the test you take will be a heck of a lot like previous ones. You already may have a feel for what to expect if you sat for the PSAT last year, or the similar preview of the ACT, known as ACT Aspire. Now you want to work through lots of practice tests, on your own and under conditions that mimic as much as possible the conditions and the stresses of the real thing. Be strict about time. Do the whole test to develop stamina. Take it in a library to add the distractions of other people. As they say in sports, “Practice like you’ll play, so you can play like you’ve practiced.”

Research shows that one of the best antidotes for students who suffer from excessive test anxiety is more practice tests. In light of this research, The College Board recently launched a collaboration with Khan Academy to offer numerous practice opportunities for the SAT online. Free! Many students approach these tests as if they're school exams. They are not. Your job is to figure out (and get used to) the ways they differ.



TIP 2 Learn your patterns, too. If you didn't do well on a practice test, ask: Why not? Did you run out of time? If so, where and why? Identify questions that were difficult for further practice. Did you make silly errors that you can avoid making next time? When you take the test the first time, notice if something about the exam situation affected your concentration. Showing up late or forgetting to bring snacks, for example, can throw you off balance. Recognizing

How to Get Financial Aid



Each year the federal government hands out billions in grants and loans to young people headed to college – some \$138 billion in fiscal year 2013 alone. States and colleges and other organizations make big handouts, too. Here are six things families need to know to be sure of getting their share:

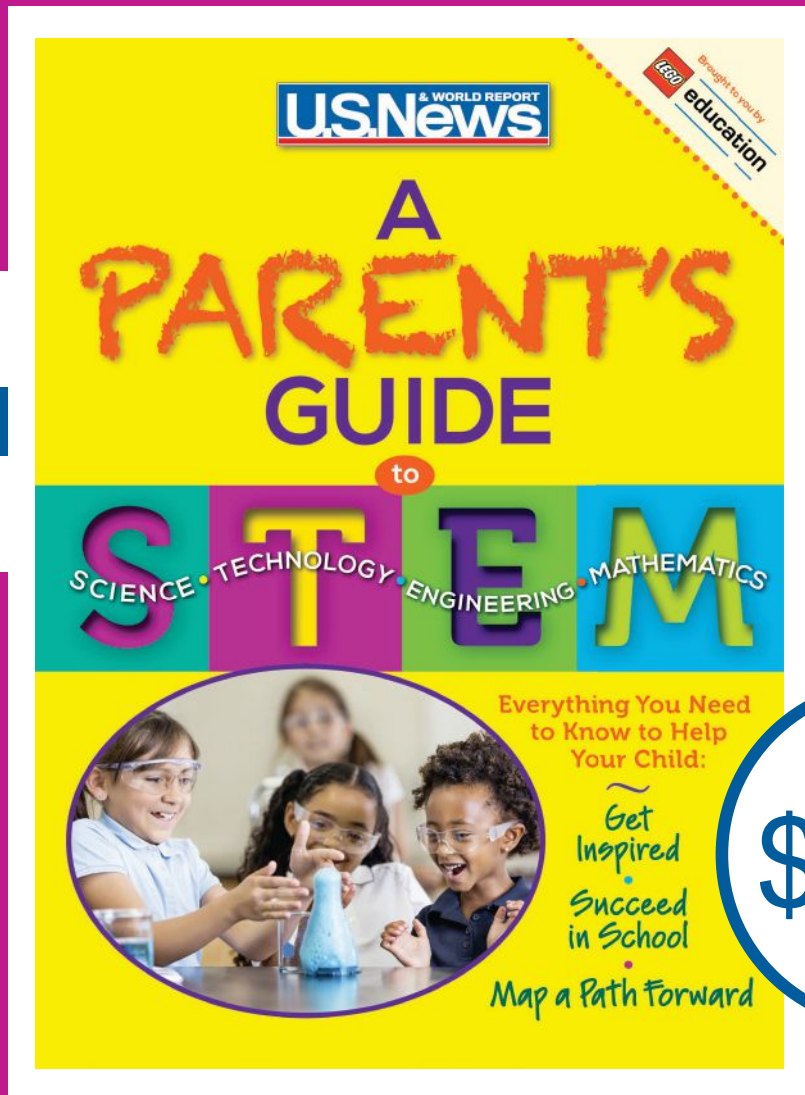
1. You don't have to automatically rule out high-priced colleges

New York students enjoy a relative bargain in The State University of New York and The City University of New York systems; room and board aside, tuition at the four-year colleges now runs just over \$6,000 a year for state residents. Still, many colleges with large endowments want to enroll smart, capable students regardless of their ability to pay, and have the deep pockets to make that happen. A number of schools, such as Princeton, the University of Pennsylvania and the University of Chicago, have adopted no-loan or minimal-loan policies for many or all students with need. So a college with a high sticker price can sometimes be the cheapest choice.

2. You do have to fill out the FAFSA

The Free Application for Federal Student Aid determines how much a family is expected to contribute to college costs and must be completed for a student to receive any money from federal government coffers. You provide information about your income and assets (if the student is your dependent) and your child's at fafsa.gov; the result is an "expected family contribution," or EFC, that colleges use to put together an aid package. The value of your home and your retirement savings aren't held against you in the federal aid formula. Many colleges require an additional form, the CSS/Financial Aid Profile, to calculate whether your student is eligible for nonfederal awards.

We hope you have enjoyed this preview of our guidebook, *A Parent's Guide to STEM*, from *U.S. News & World Report*.



Order the 100-page guidebook today.

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