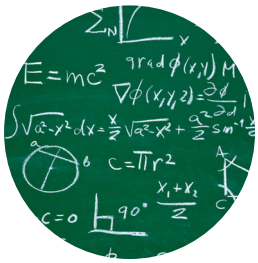
Don't Quote Me on That: Math Attitude Card Sort

A Carolina Essentials™ Activity



Overview

It has often been said that mathematics is the language of science. Consequently, science teachers also play the role of mathematics teachers. Using mathematics and logic is a science practice common to all Advanced Placement® science courses and the NGSS Dimension 1: Practices. Your students' preconceived notions about their skills can be as large a stumbling block as the lack of skill mastery itself. This short activity helps students identify their applied mathematics strengths, weaknesses, and fears.

Life Science, Physical Science, Earth and Space Science
Grades: 9–12

Essential Question

What mathematical skills and fears do students have when applying math to science content?

Activity Objective

1. Determine math skills and weaknesses.
2. Determine attitudes toward applied math.

Next Generation Science Standards* (NGSS)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Using Mathematics and Computational Thinking • Students will complete a skills and attitude self-assessment to inform teacher practice.	• Applies to data analysis in all core ideas.	**Scale, Proportion, and Quantity** • Students will identify areas of strength and weakness in applied mathematics.

Procedure

This activity has 42 cards—38 have quotes conveying attitudes about math and science, and 4 require a written response. Have students sort the cards into 2 piles: **agree** (this is me) and **disagree** (this is not me). Consider adding a **neutral** pile (this doesn't apply to me at all).

After students have sorted the cards, have them compile and summarize the quotes, then describe their attitudes, strengths, and weaknesses. Use the information to tailor your instruction involving math concepts.

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TIME REQUIREMENTS

PREP	ACTIVITY
10–15 min	15–30 min

Teacher Prep: 10–15 min
Student Activity: 15–30 min

MATERIALS

1 set of cards per student or pair of students

HELPFUL LINKS

Improving Students' Math Skills for Science Class

Very Trendy: Analyzing Data

The Basics of Graphs and Charts

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Student Procedure

1. Sort cards into piles:
   Agree (this is me)
   Disagree (this is not me)
2. Compile and summarize the quotes.
3. Describe math attitudes, strengths, weaknesses, and preconceptions.

Teacher Preparation and Tips

You may also use a third category—neutral (this doesn't apply to me at all).

Write categories on the board.

Discussion and journaling are ways students can reflect on the card sort results.

Ask students what help they need from you. Ask what type of math instruction works for them.

As a result, try grouping students with varying attitudes/skills.

Copy and laminate the cards for use with multiple classes.

Analysis and Discussion

Student answers will vary.

1. My attitude toward using math in science is:
2. My math strengths are:
3. My math weaknesses are:

TEACHER NOTES

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"Do not worry too much about your difficulties in mathematics, I can assure you that mine are still greater."

Albert Einstein

"Pure mathematics is, in its way, the poetry of logical ideas."

Albert Einstein

"So far as the theories of mathematics are about reality, they are not certain; so far as they are certain, they are not about reality."

Albert Einstein

"Since the mathematicians have invaded the theory of relativity, I do not understand it myself anymore."

Albert Einstein

"A person who never made a mistake never tried anything new."

Albert Einstein

"It has become almost a cliché to remark that nobody boasts of ignorance of literature, but it is socially acceptable to boast ignorance of science and proudly claim incompetence in mathematics."

Richard Dawkins

"The most painful thing about mathematics is how far away you are from being able to use it after you have learned it."

James Newman

"Mathematics is the music of reason."

James Joseph Sylvester

"Mathematics is a game played according to certain simple rules with meaningless marks on paper."

David Hilbert

"Things like the financial markets—a proper grounding in mathematics could help the common man. I believe that if people are more familiar with mathematical concepts . . . it can help deal with modern life, which is increasingly complex."

Viswanathan Anand

"The traditional mathematician recognizes and appreciates mathematical elegance when he sees it. I propose to go one step further, and to consider elegance an essential ingredient of mathematics: if it is clumsy, it is not mathematics."

Edsger Dijkstra

"All science requires mathematics. The knowledge of mathematical things is almost innate in us. This is the easiest of sciences, a fact which is obvious in that no one's brain rejects it; for laymen and people who are utterly illiterate know how to count and reckon."

Roger Bacon

"Mathematics has beauty and romance. It's not a boring place to be, the mathematical world. It's an extraordinary place; it's worth spending time there."

Marcus du Sautoy

"Thinking—in particular abstract thinking, which most of us are introduced to through the study of mathematics and literature—helps us learn that we can become problem solvers."

Kathryn Lasky

"In my own research when I'm working with equations, I never feel like I really understand what I'm doing if I'm solely relying on the mathematics for my understanding. I need to have a visual picture in my mind. I'm constantly translating from the math to some intuitive mind's-eye picture."

Brian Greene

"You want to know how to rhyme, then learn how to add. It's mathematics."

Mos Def

"Mathematics is a place where you can do things, which you can't do in the real world."

Marcus du Sautoy

"I find all of my performances come down to mathematics in a sense—how do you approach the problem of this character? Sometimes I crack that problem, sometimes I don't."

Brad Pitt

"The longer mathematics lives the more abstract—and therefore, possibly also the more practical—it becomes."

E. T. Bell

"Not a lot of people know this, but I'm very good at mathematics. When I was an angry teenager, I used to sit in my room and do quadratic equations to calm myself down."

Samantha Bond

"We are servants rather than masters in mathematics."

Charles Hermite

"I am interested in mathematics only as a creative art."

G. H. Hardy

"I've always enjoyed mathematics. It is the most precise and concise way of expressing any idea."

N. R. Narayana Murthy

"Why do children dread mathematics? Because of the wrong approach. Because it is looked at as a subject."

Shakuntala Devi

"I hated science in high school. Technology? Engineering? Math? Why would I ever need this? Little did I realize that music was also about science, technology, engineering and mathematics, all rolled into one."

Mickey Hart

"We in science are spoiled by the success of mathematics. Mathematics is the study of problems so simple that they have good solutions."

Whitfield Diffie

"Film is one of the three universal languages, the other two: mathematics and music."

Frank Capra

"Every child should try everything: sport, music, art, mathematics; they can do it all. Copying and competition are now seen as twin evils, but they are both useful tools."

Tony Buzan

"I was a mathematician by nature, and still am—I just knew I didn't want to be a mathematician. So I decided not to take any mathematics courses."

Stephen Sondheim

I can do math but I don't like it.

Math has always been my best subject.

My math grades are good, but I really don't understand what I'm doing.

I don't remember any of my Algebra I or Math I concepts.

I can't do science because I can't do math.

Math makes me crazy!

I can do math on a calculator but not on paper or in my head.

I can do most math problems in my head and don't need to show my work.

I can explain math to my classmates.

My strengths in math are:

My weaknesses in math are:

I need help with:

I am confident with: