



# **Irvine Unified School District K-12 Mathematics Pathways**

Feb. 1, 2017

[http://iusd.org/education\\_services/math-pathways/](http://iusd.org/education_services/math-pathways/)

Click hyperlinks throughout this presentation to explore additional resources

# Mathematically Literate for College & Career Success

The CA Mathematics Standards are not a list of topics to be covered or taught.

These Standards are a description of the mathematics students are expected to understand and use, not a curriculum. The standards are not the building blocks of curriculum, they are the achievements we want students to attain as the result of curriculum.

# How are the CA Mathematics Standards Different?

They are reverse-engineered from an analysis of what students need to be college and career ready.

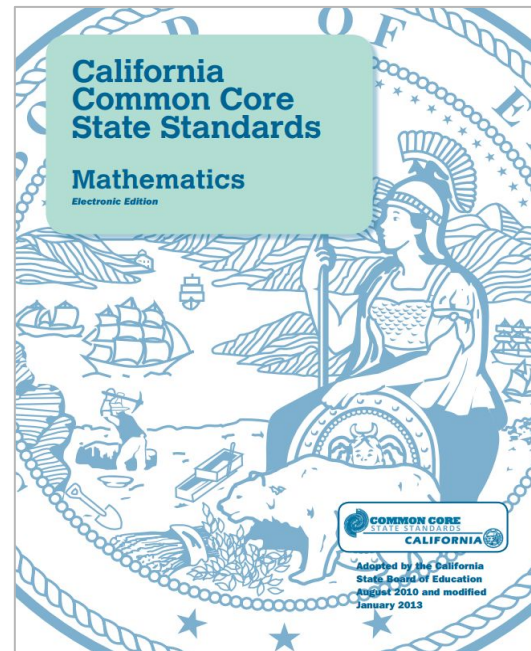
The design principles are rigor, coherence and focus.

Real life applications and mathematical modeling are essential.

# Rigor

## Standards for Mathematical Practice (MP)

- MP.1** Make sense of problems and persevere in solving them.
- MP.2** Reason abstractly and quantitatively.
- MP.3** Construct viable arguments and critique the reasoning of others.
- MP.4** Model with mathematics.
- MP.5** Use appropriate tools strategically.
- MP.6** Attend to precision.
- MP.7** Look for and make use of structure.
- MP.8** Look for and express regularity in repeated reasoning.

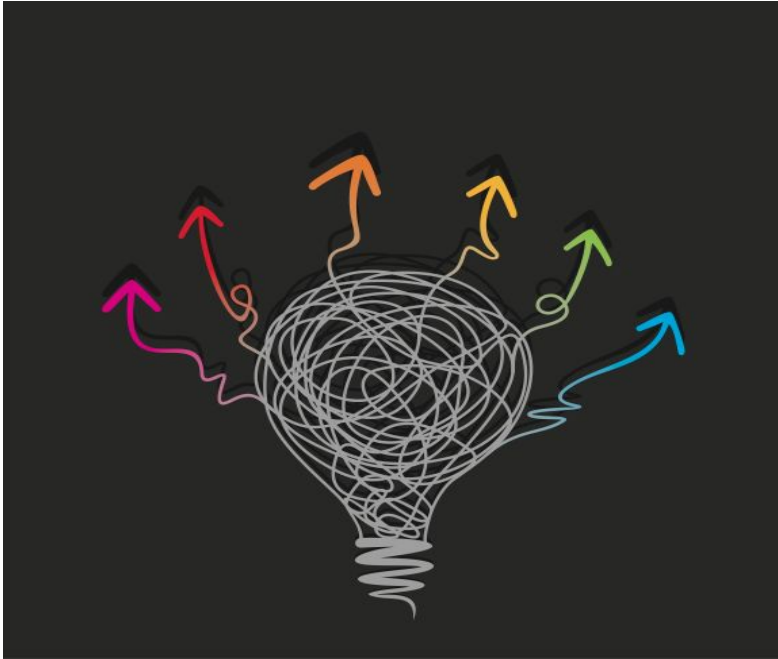


# Coherence

Grade	K	1	2	3	4	5	6	7	8	Higher Mathematics Conceptual Categories
<b>K-8 Domains</b>	Counting and Cardinality (CC)						Ratios and Proportional Relationships (RP)		Functions (F)	Functions (F)
	Operations and Algebraic Thinking (OA)						Expression and Equations (EE)			Algebra (A)
	Number and Operations in Base Ten (NBT)						The Number System (NS)			Number and Quantity (N)
				Number and Operations - Fractions (NF)						
	Measurement and Data (MD)						Statistics and Probability (SP)			Statistics and Probability (SP)
	Geometry (G)						Geometry (G)			Geometry (G)
<b>Modeling (★)</b>										

[Executive Summary: CA Math Framework](#), p. 3

# Focus within Course & Across Grade Spans



**Pursue with equal intensity:**

1. Conceptual Understanding
2. Procedural Skills & Fluency
3. Problem Solving / Modeling & Data Analysis
4. Communicating Reasoning

# Why is appropriate math placement in middle school so important?

- These are especially important years for students to master their skills with operations on rational numbers and delve into the multiplicative thinking demanded by proportional reasoning.
  - Proportional reasoning is the concept that links arithmetic and algebra.
- Preparing for future mathematics and science coursework in High School

# Course Expectations

- Math 7 and Math 8 are rigorous courses which require students to develop a greater depth of knowledge (DOK)
- Enhanced Math 7/8 and Enhanced Math 1 hold students to the same rigor and depth of knowledge as Math 7 and Math 8
  - Enhanced courses include grade level and additional standards which require a faster pace.

## *Math 7 DOK 3 Example Question*

Directions: Use the whole numbers 1 through 9 only one time each to find the largest (or smallest) possible values for the sum of x and y. Justify your answer by solving each equation you created.

$$\square x - \square = \square$$

$$\square y + \square = \square$$



# Appropriate Placement

Placement is based on a student's mastery and understanding of 6th grade standards.

A student who is ready for acceleration:

- Has demonstrated mastery of all 6th grade standards at a high depth of knowledge (see example at right)
- Learns and applies new concepts at a fast pace
- Is proactive in ensuring that they understand and can apply new concepts

Topic	Dividing Fractions
CCSS Standard(s)	• 6.NS.1
DOK 1 Example	Evaluate. $\frac{4}{9} \div \frac{2}{5}$
DOK 2 Example	Use the digits 1 to 9, at most one time each, to fill in the boxes to make two different pairs of fractions that have a quotient of $\frac{2}{3}$ . $\frac{\square}{\square} \div \frac{\square}{\square} = \frac{2}{3}$
DOK 3 Example	Use the digits 1 to 9, at most one time each, to fill in the boxes to make two fractions that have a quotient that is as close to $\frac{4}{11}$ as possible. $\frac{\square}{\square} \div \frac{\square}{\square}$

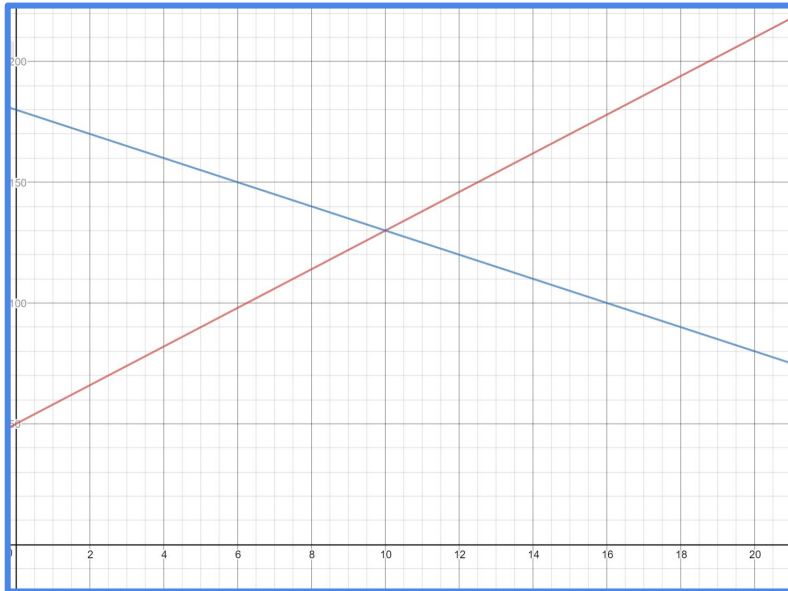
# High School Mathematics

High School Mathematics extends topics that students learned in their middle grades and supports their skill development for college, career readiness, and advanced math courses (Calculus, Advanced Statistics, Discrete Mathematics, etc).

Math I, II, and III concepts include: Algebra, Functions, Modeling, Geometry, Statistics and Probability, and Number and Quantitative Reasoning. Each course emphasizes conceptual understanding, problem solving, and collaboration.

# High School Course Content Example – Math 1

Team Sunshine is filling an inflatable kiddie pool from a garden hose. The pool has 50 gallons in it and Team Sunshine is adding 8 gallons per minute with a garden hose. Next door, Team Breeze's pool is already filled with 180 gallons of water, and they are emptying the pool at 5 gallons per minute with buckets. Find how long it takes until both pools have the same amount of water. How much water will be in the pool at that time?



Minutes	Team Sunshine	Team Breeze
0	50	180
1	58	175
2	66	170
3	74	165
4	82	160
5	90	155
6	98	150
7	106	145
8	114	140
9	122	135
10	130	130

$$W_S = 50 + 8x$$

$$W_B = 180 - 5x$$

$$50 + 8x = 180 - 5x$$

$$\begin{array}{r} +5x \qquad +5x \\ \hline 50 + 13x = 180 \end{array}$$

$$-50 \qquad -50$$

$$\begin{array}{r} \hline 13x = 130 \end{array}$$

$$13x = 130$$

$$\frac{13x}{13} = \frac{130}{13}$$

$$x = 10$$

$$x = 10$$

$$W_S = 50 + 8(10)$$

$$W_S = 130 \text{ gallons}$$

# High School Course Content Example – Math 1

Solve for  $x$  and graph the solution on a number line.

$$10 - 2(x - 3) \geq -8$$

$$10 - 2x + 6 \geq -8$$

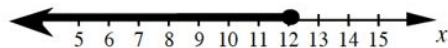
$$16 - 2x \geq -8$$

$$\begin{array}{r} -16 \\ \hline 16 - 2x \geq -8 \\ -16 \end{array}$$

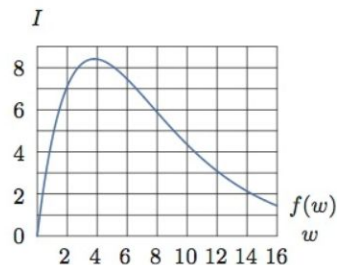
$$-2x \geq -24$$

$$\frac{-2x}{-2} \geq \frac{-24}{-2}$$

$$x \leq 12$$



An epidemic of influenza spreads through a city. The figure below is the graph of  $I = f(w)$ , where  $I$  is the number of individuals (in thousands) infected  $w$  weeks after the epidemic begins.



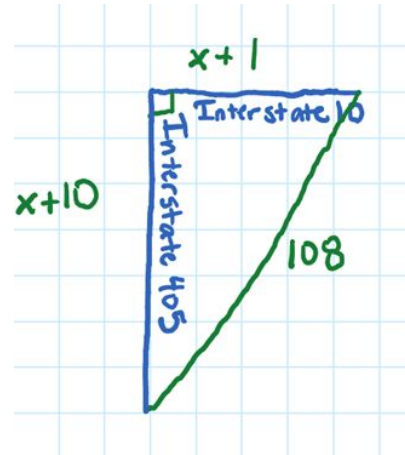
- Estimate  $f(2)$  and explain its meaning in terms of the epidemic.
- Approximately how many people were infected at the height of the epidemic? When did that occur? Write your answer in the form  $f(a) = b$ .
- For approximately which  $w$  is  $f(w) = 4.5$ ; explain what the estimates mean in terms of the epidemic.
- An equation for the function used to plot the image above is  $f(w) = 6w(1.3)^{-w}$ . Use the graph to estimate the solution of the inequality  $6w(1.3)^{-w} \geq 6$ . Explain what the solution means in terms of the epidemic.

# High School Course Content Example – Math 2

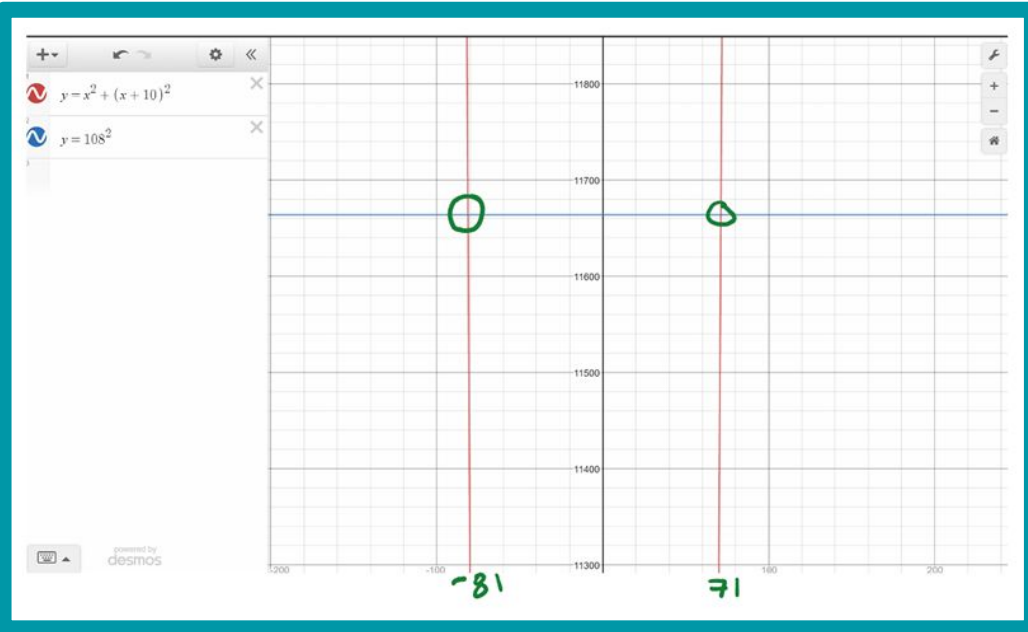
Karen drives due south on Interstate 405 from the Santa Monica interchange going 10 miles per hour faster than Melinda, who leaves the same interchange at the same time going due east in Interstate 10. After one hour they are 108 miles apart, measured by a straight line drawn between them. How fast is each driver going? State any assumptions you make.

$$\begin{aligned}(x + 10)^2 + (x + 1)^2 &= 108^2 \\ x^2 + 20x + 100 + x^2 + 2x + 1 &= 11664 \\ 2x^2 + 22x + 101 &= 11664 \\ \underline{-11664 \quad -11664} & \\ 2x^2 + 22x - 11563 &= 0 \\ x &= \frac{-22 \pm \sqrt{22^2 - 4(2)(-11563)}}{2(2)} \\ x &= \frac{-22 \pm \sqrt{92988}}{4} \\ x &\approx 70.7 \text{ or } \cancel{-81.73}\end{aligned}$$

Karen is traveling about 80.7 mph and Melinda is traveling about 71.7 mph.



# High School Course Content Example – Math 2

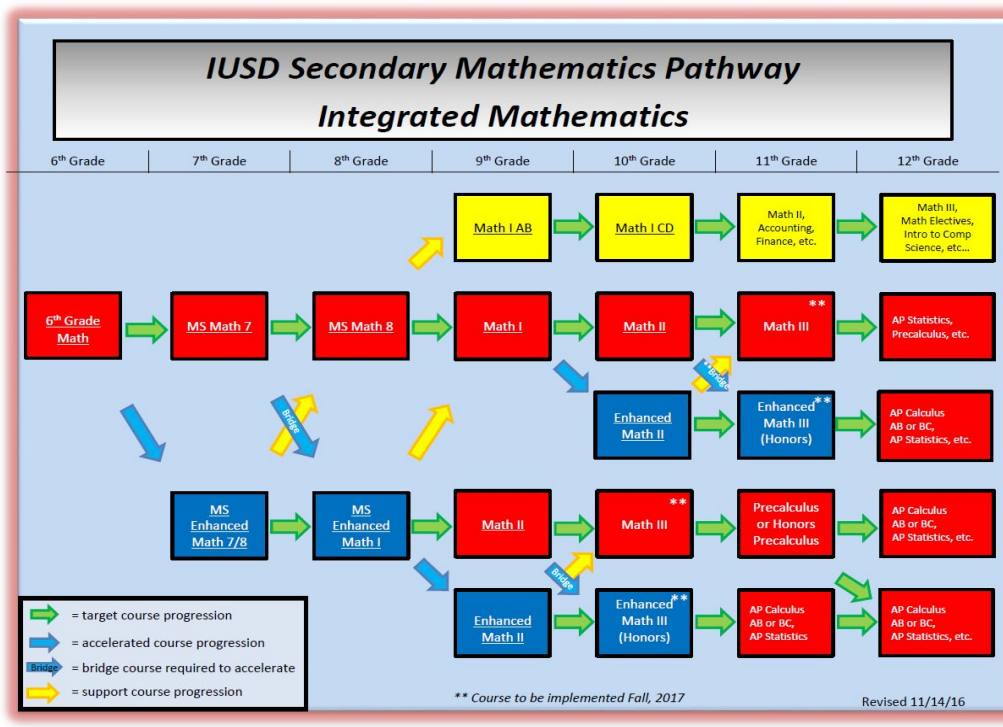


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X	Y1	Y2			
68	10845	11664			
68.5	10993	11664			
69	11141	11664			
69.5	11291	11664			
70	11441	11664			
70.5	11593	11664			
71	11745	11664			
71.5	11899	11664			
72	12053	11664			
72.5	12209	11664			
73	12365	11664			

X=70.5

# IUSD Secondary Math Pathway



# Getting into Elite Universities

## The Holistic Review

The applicant's full record of achievement in college preparatory work in high school, including the number and rigor of courses taken and grades earned in those courses

## What is Rigor?

- Explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency
- Solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies
- Analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems
- Clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others



# SAT: It's About the Real World



CollegeBoard: [SAT Math Test](#)

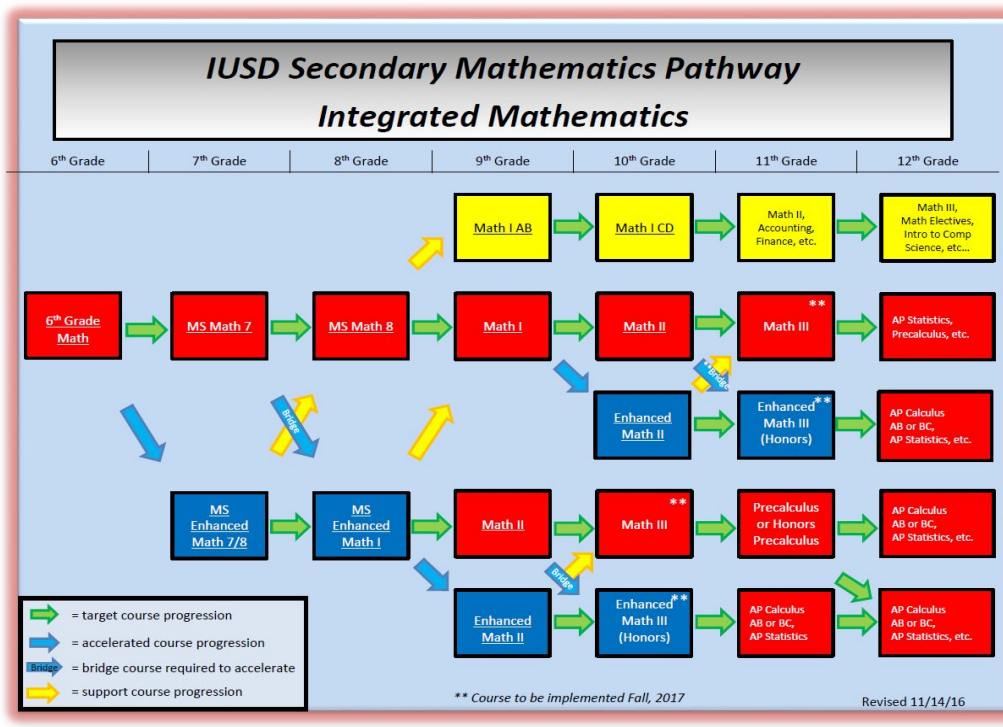
## Fluency, Conceptual Understanding, Application

The Math Test will focus in depth on the three areas of math that play the biggest role in a wide range of college majors and careers:

- **Problem Solving and Data Analysis**  
which is about being quantitatively literate
- **Heart of Algebra**  
Which focuses on the mastery of linear equations and systems
- **Passport to Advanced Math**  
Which features questions that require the manipulation of complex equations

The Math Test also draws on [Additional Topics in Math](#), including the geometry and trigonometry most relevant to college and career readiness.

# IUSD Secondary Math Pathway



# Math Placement and Timeline

Appropriate Placement for All

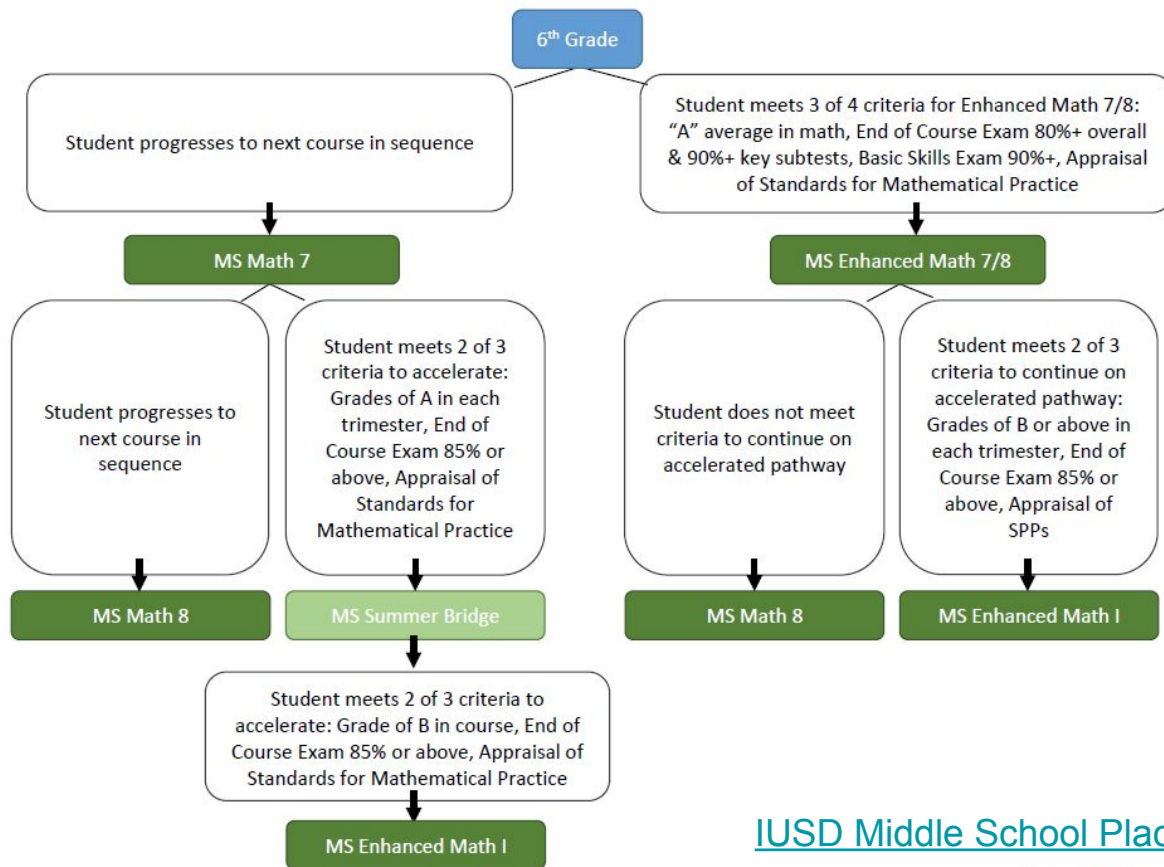
Criteria - Multiple Measures

Math Placement for Grade 6

**Pursue with equal intensity:**

1. Conceptual Understanding
2. Procedural Skills & Fluency
3. Problem Solving /  
Modeling & Data Analysis
4. Communicating Reasoning

## Middle School Student Math Placement (Grades 6-8)



[IUSD Middle School Placement Criteria](#)

# Q & A

## Question

Regarding Grade/Course: \_\_\_\_\_

Name \_\_\_\_\_

Email \_\_\_\_\_



# IUSD Math Team



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IUSD K-12 Mathematics

[http://iusd.org/education\\_services/math-pathways/](http://iusd.org/education_services/math-pathways/)