Sample ESSENTIAL QUESTIONS for MATH

PATTERNS AND NUMERICAL RELATIONSHIPS
How can you use a prime factorization to find the greatest common factor of two or more numbers?
Why can you use either a fraction or a decimal to name the same rational number?
How are operations with fractions similar to and different from operations with whole numbers?
What kinds of numbers do you know about and how do mathematical properties apply to operations with different kinds of numbers?
Why are order of operations important when performing mathematical computations?
Why is it important to understand properties and operations involving integers and negative rational numbers?
How can number lines and diagrams be used to interpret solutions of real-word problems?
How are fractions, percents and decimals related?
Why is it important to understand the procedures for working with different kinds of numbers?

PATTERNS AND EQUATIONS
How are patterns, equations, and graphs related?
Why are the properties of real numbers important when solving equations?
How can you use equations to solve real-word problems?

EXPRESSIONS, EQUATIONS, AND INEQUALITIES
How are the properties of real numbers useful when solving equations and simplifying expressions?
What are the similarities and differences in the procedures for solving and expressing the solutions of equations and inequalities?
Why is it important to understand how to solve linear equations and inequalities?

RATIO, RATES, AND PROPORTIONAL RELATIONSHIPS
Why are proportional relationships an important part of mathematics?
How is percent related to fractions and decimals, and why is it such a useful tool in everyday life?
How is proportional reasoning used to solve real-world problems?
What are transformations and how are they useful in solving real-world problems?

LINEAR FUNCTIONS
Why are tables, graphs, and equations useful for representing relationships?
How can you show mathematical relationships?
Why are linear functions useful in real-world settings?
Why would you use multiple representations of linear equations and inequalities?
How are systems of linear equations and inequalities useful in interpreting real world situations?
Why is it important to consider slope, domain, and range in problem situations?
How can graphs be used to interpret solutions of real world problems?

EXPONENTS, RADICALS, AND POLYNOMIALS
How do multiplicative patterns model the physical world?
How are adding and multiplying polynomial expressions different from each other?

QUADRATIC FUNCTIONS
How are quadratic functions used to model, analyze and interpret mathematical relationships?
Why is it advantageous to know a variety of ways to solve and graph quadratic functions?

DATA ANALYSIS, SURVEYS, AND PROBABILITY AND STATISTICS

Source: Springboard, College Board

How do sampling methods affect the evaluation of survey results?
How can displays and summaries be used to interpret and communicate the results of surveys?
How do different displays help you interpret data?
Why is it important to be able to represent data using graphs and measures of central tendency?
How can data and probabilities be used to predict the outcome of future events?
How does understanding probability help you make decisions?
Why is it important for you to understand how data is organized and presented in real-world situations?
Why is it important to know if events are dependent or independent when calculating probabilities?

TWO- AND THREE-DIMENSIONAL GEOMETRY
What characteristics do various quadrilaterals share, and why is it possible to determine perimeter and area of quadrilaterals using related formulas?
In what ways is symmetry important in real-world situations?
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Why is it important to understand properties of angles and figures to solve problems?
How can diagrams be used to interpret solutions to real world problems?
Why is it important to be able to relate two-dimensional drawings with three-dimensional figures?
How are two- and three- dimensional figures related?
How do changes in dimensions of a geometric figure affect area, surface area, and volume?
How can surface area and volume be used to find answers to real-world problems?

PROOF, PARALLEL AND PERPENDICULAR LINES
Why are properties, postulates, and theorems important in mathematics?
How are angles and parallel and perpendicular lines used in real-world settings?

CONGRUENCE, TRIANGLES, AND QUADRILATERALS
How does proving theorems extend your understanding of Geometry?
How are patterns, algebra and geometry related?
What connections exist between transformations and dilations and congruence and similarity?
How are transformations and tessellations used in real world settings?

SIMILARITY, RIGHT TRIANGLES, AND TRIGONOMETRY
How are similar triangles used in solving problems in every day life?
What mathematical tools do I have to solve right triangles?

CIRCLES AND CONSTRUCTIONS
Why is it important to understand geometric constructions?
How are the geometric properties of circles, their angles and their arcs used to model and describe real world phenomena?

MEASUREMENT
How do two-dimensional figures help you visualize three-dimensional figures?
Why are geometric formulas useful in solving real-world problems?

Source: Springboard, College Board