

IS ALGEBRAIC REASONING THE SAME AS ALGEBRA 1

IS ALGEBRAIC REASONING THE SAME AS ALGEBRA 1 IS A COMMON QUESTION AMONG STUDENTS, EDUCATORS, AND PARENTS NAVIGATING THE COMPLEXITIES OF MATH EDUCATION. WHILE THEY MAY SEEM INTERCHANGEABLE AT FIRST GLANCE, ALGEBRAIC REASONING AND ALGEBRA 1 SERVE DISTINCT PURPOSES IN MATHEMATICS EDUCATION. THIS ARTICLE WILL DELVE INTO THE DIFFERENCES AND SIMILARITIES BETWEEN ALGEBRAIC REASONING AND ALGEBRA 1, EXPLORING THEIR DEFINITIONS, APPLICATIONS, AND IMPORTANCE IN DEVELOPING MATHEMATICAL PROFICIENCY. ADDITIONALLY, WE WILL DISCUSS HOW THESE CONCEPTS INTERRELATE WITHIN EDUCATIONAL CURRICULA AND THEIR IMPLICATIONS FOR STUDENT LEARNING. BY THE END OF THIS ARTICLE, READERS WILL GAIN A COMPREHENSIVE UNDERSTANDING OF THESE TWO VITAL COMPONENTS OF MATHEMATICS EDUCATION.

- UNDERSTANDING ALGEBRAIC REASONING
- DEFINING ALGEBRA 1
- KEY DIFFERENCES BETWEEN ALGEBRAIC REASONING AND ALGEBRA 1
- IMPORTANCE OF ALGEBRAIC REASONING IN MATHEMATICS EDUCATION
- HOW ALGEBRA 1 FITS INTO THE CURRICULUM
- CONCLUSION

UNDERSTANDING ALGEBRAIC REASONING

ALGEBRAIC REASONING REFERS TO THE ABILITY TO UNDERSTAND AND MANIPULATE ALGEBRAIC EXPRESSIONS, EQUATIONS, AND RELATIONSHIPS. IT IS A FUNDAMENTAL SKILL THAT ENABLES STUDENTS TO ANALYZE MATHEMATICAL SITUATIONS AND SOLVE PROBLEMS USING ALGEBRAIC METHODS. THIS FORM OF REASONING IS NOT CONFINED TO A SPECIFIC CURRICULUM BUT IS A CRITICAL COMPONENT OF MATHEMATICAL THINKING THAT APPLIES ACROSS VARIOUS CONTEXTS.

COMPONENTS OF ALGEBRAIC REASONING

ALGEBRAIC REASONING ENCOMPASSES SEVERAL KEY COMPONENTS THAT CONTRIBUTE TO A STUDENT'S OVERALL MATHEMATICAL PROFICIENCY. THESE COMPONENTS INCLUDE:

- **UNDERSTANDING VARIABLES:** RECOGNIZING THAT LETTERS CAN REPRESENT NUMBERS AND UNDERSTANDING THEIR ROLE IN EQUATIONS.
- **FORMULATING EQUATIONS:** THE ABILITY TO CREATE EQUATIONS BASED ON WORD PROBLEMS OR REAL-LIFE SITUATIONS.
- **SOLVING EQUATIONS:** USING ALGEBRAIC METHODS TO FIND THE VALUES OF VARIABLES THAT SATISFY GIVEN EQUATIONS.
- **INTERPRETING SOLUTIONS:** UNDERSTANDING THE IMPLICATIONS OF SOLUTIONS IN THE CONTEXT OF REAL-WORLD PROBLEMS.
- **GENERALIZING PATTERNS:** IDENTIFYING AND APPLYING GENERAL PRINCIPLES TO SOLVE A RANGE OF MATHEMATICAL PROBLEMS.

THESE SKILLS ARE NOT ONLY VITAL FOR SUCCESS IN ALGEBRA BUT ALSO LAY THE GROUNDWORK FOR ADVANCED MATHEMATICAL CONCEPTS ENCOUNTERED IN HIGHER EDUCATION.

DEFINING ALGEBRA 1

ALGEBRA 1 IS A SPECIFIC HIGH SCHOOL COURSE THAT INTRODUCES STUDENTS TO THE FOUNDATIONAL PRINCIPLES OF ALGEBRA. IT TYPICALLY COVERS A STANDARDIZED CURRICULUM DESIGNED TO PREPARE STUDENTS FOR HIGHER-LEVEL MATHEMATICS, INCLUDING ALGEBRA 2 AND CALCULUS. THE COURSE IS STRUCTURED TO PROVIDE STUDENTS WITH A COMPREHENSIVE UNDERSTANDING OF ALGEBRAIC CONCEPTS AND TECHNIQUES.

CORE TOPICS IN ALGEBRA 1

ALGEBRA 1 ENCOMPASSES VARIOUS TOPICS THAT ARE ESSENTIAL FOR DEVELOPING ALGEBRAIC SKILLS. SOME OF THE CORE TOPICS INCLUDE:

- **LINEAR EQUATIONS:** UNDERSTANDING HOW TO SOLVE AND GRAPH LINEAR EQUATIONS AND INEQUALITIES.
- **FUNCTIONS:** INTRODUCTION TO THE CONCEPT OF FUNCTIONS, INCLUDING LINEAR, QUADRATIC, AND EXPONENTIAL FUNCTIONS.
- **SYSTEMS OF EQUATIONS:** METHODS FOR SOLVING SYSTEMS OF LINEAR EQUATIONS, SUCH AS SUBSTITUTION AND ELIMINATION.
- **POLYNOMIALS:** OPERATIONS WITH POLYNOMIALS, INCLUDING ADDITION, SUBTRACTION, MULTIPLICATION, AND FACTORING.
- **RATIONAL EXPRESSIONS:** SIMPLIFYING AND MANIPULATING RATIONAL EXPRESSIONS AND EQUATIONS.

ALGEBRA 1 NOT ONLY EQUIPS STUDENTS WITH ESSENTIAL ALGEBRAIC SKILLS BUT ALSO ENHANCES THEIR PROBLEM-SOLVING ABILITIES, LOGICAL REASONING, AND ANALYTICAL THINKING.

KEY DIFFERENCES BETWEEN ALGEBRAIC REASONING AND ALGEBRA 1

WHILE ALGEBRAIC REASONING AND ALGEBRA 1 ARE INTERCONNECTED, THEY SERVE DIFFERENT ROLES IN MATHEMATICS EDUCATION. UNDERSTANDING THESE DIFFERENCES IS CRUCIAL FOR STUDENTS AND EDUCATORS ALIKE.

SCOPE OF STUDY

ALGEBRAIC REASONING IS A BROADER CONCEPT THAT ENCOMPASSES VARIOUS SKILLS AND THOUGHT PROCESSES INVOLVED IN UNDERSTANDING ALGEBRA, WHILE ALGEBRA 1 IS A SPECIFIC COURSE FOCUSED ON TEACHING THOSE SKILLS IN A STRUCTURED MANNER. ALGEBRAIC REASONING CAN BE APPLIED IN DIVERSE MATHEMATICAL CONTEXTS, WHILE ALGEBRA 1 IS LIMITED TO THE CURRICULUM DEFINED FOR THAT COURSE.

APPLICATION IN EDUCATION

ALGEBRAIC REASONING IS OFTEN EMPHASIZED IN EARLIER GRADES AS STUDENTS BEGIN TO ENGAGE WITH MATHEMATICAL CONCEPTS. IT IS A SKILL THAT CONTINUES TO DEVELOP THROUGHOUT A STUDENT'S EDUCATIONAL JOURNEY. IN CONTRAST, ALGEBRA 1 IS TYPICALLY A FORMAL COURSE TAKEN IN HIGH SCHOOL, WHERE STUDENTS APPLY THEIR ALGEBRAIC REASONING SKILLS IN A STRUCTURED ENVIRONMENT.

CURRICULUM RELEVANCE

ALGEBRAIC REASONING IS AN ESSENTIAL PART OF THE MATHEMATICS CURRICULUM AT ALL LEVELS, SUPPORTING VARIOUS TOPICS BEYOND ALGEBRA, INCLUDING GEOMETRY AND STATISTICS. ALGEBRA 1, HOWEVER, SERVES AS A PREREQUISITE FOR MORE ADVANCED COURSES IN MATHEMATICS AND IS SPECIFICALLY TAILORED TO MEET EDUCATIONAL STANDARDS SET BY STATE OR NATIONAL GUIDELINES.

IMPORTANCE OF ALGEBRAIC REASONING IN MATHEMATICS EDUCATION

THE ROLE OF ALGEBRAIC REASONING IN MATHEMATICS EDUCATION CANNOT BE OVERSTATED. IT IS FOUNDATIONAL FOR STUDENTS AS THEY PROGRESS THROUGH THEIR MATHEMATICAL STUDIES AND SERVES SEVERAL IMPORTANT FUNCTIONS.

DEVELOPMENT OF CRITICAL THINKING SKILLS

ALGEBRAIC REASONING FOSTERS CRITICAL THINKING BY ENCOURAGING STUDENTS TO ANALYZE PROBLEMS, RECOGNIZE PATTERNS, AND DEVISE SOLUTIONS. THIS SKILL IS INVALUABLE NOT ONLY IN MATHEMATICS BUT ALSO IN VARIOUS FIELDS SUCH AS SCIENCE, ENGINEERING, AND ECONOMICS.

PREPARATION FOR ADVANCED MATHEMATICS

STRONG ALGEBRAIC REASONING SKILLS ARE CRUCIAL FOR SUCCESS IN HIGHER-LEVEL MATHEMATICS COURSES. CONCEPTS LEARNED THROUGH ALGEBRAIC REASONING DIRECTLY APPLY TO SUBJECTS SUCH AS ALGEBRA 2, CALCULUS, AND BEYOND, MAKING IT ESSENTIAL FOR STUDENTS AIMING FOR STEM CAREERS.

REAL-WORLD APPLICATIONS

ALGEBRAIC REASONING EQUIPS STUDENTS WITH THE ABILITY TO SOLVE REAL-WORLD PROBLEMS INVOLVING QUANTITATIVE RELATIONSHIPS. WHETHER IN FINANCE, TECHNOLOGY, OR EVERYDAY DECISION-MAKING, THE SKILLS GAINED THROUGH ALGEBRAIC REASONING ARE WIDELY APPLICABLE.

HOW ALGEBRA 1 FITS INTO THE CURRICULUM

ALGEBRA 1 IS A CORNERSTONE OF THE HIGH SCHOOL MATHEMATICS CURRICULUM. IT IS STRATEGICALLY PLACED TO ENSURE STUDENTS HAVE A SOLID FOUNDATION BEFORE ADVANCING TO MORE COMPLEX TOPICS.

CURRICULAR STRUCTURE

TYPICALLY, ALGEBRA 1 IS TAUGHT IN THE 9TH GRADE OR AS A FOUNDATIONAL COURSE IN HIGH SCHOOL. IT SERVES AS A PREREQUISITE FOR ALGEBRA 2, GEOMETRY, AND OTHER ADVANCED MATHEMATICS COURSES. THE STRUCTURED NATURE OF THE ALGEBRA 1 CURRICULUM ALLOWS FOR SYSTEMATIC PROGRESSION THROUGH KEY ALGEBRAIC CONCEPTS, ENSURING THAT STUDENTS ARE WELL-PREPARED FOR FUTURE STUDIES.

ASSESSMENT AND EVALUATION

ASSESSMENT IN ALGEBRA 1 OFTEN INCLUDES STANDARDIZED TESTS, QUIZZES, AND PROJECTS THAT EVALUATE STUDENTS' UNDERSTANDING OF THE MATERIAL. THESE ASSESSMENTS NOT ONLY GAUGE KNOWLEDGE RETENTION BUT ALSO ENCOURAGE THE APPLICATION OF ALGEBRAIC REASONING SKILLS IN VARIOUS CONTEXTS.

CONCLUSION

IN SUMMARY, WHILE **IS ALGEBRAIC REASONING THE SAME AS ALGEBRA 1** IS A QUESTION THAT MAY ARISE, THE TWO CONCEPTS SERVE UNIQUE YET COMPLEMENTARY ROLES IN MATHEMATICS EDUCATION. ALGEBRAIC REASONING IS A VITAL SKILL SET THAT UNDERPINS THE UNDERSTANDING AND APPLICATION OF ALGEBRAIC PRINCIPLES, WHILE ALGEBRA 1 PROVIDES A STRUCTURED CURRICULUM TO SYSTEMATICALLY TEACH THESE PRINCIPLES. BOTH ARE ESSENTIAL FOR DEVELOPING MATHEMATICAL PROFICIENCY AND PREPARING STUDENTS FOR FUTURE ACADEMIC AND CAREER OPPORTUNITIES. UNDERSTANDING THEIR DIFFERENCES AND INTERCONNECTIONS CAN HELP EDUCATORS TAILOR THEIR TEACHING STRATEGIES TO SUPPORT STUDENT LEARNING EFFECTIVELY.

Q: WHAT IS THE MAIN FOCUS OF ALGEBRAIC REASONING?

A: ALGEBRAIC REASONING FOCUSES ON UNDERSTANDING AND MANIPULATING ALGEBRAIC EXPRESSIONS AND EQUATIONS, AS WELL AS ANALYZING RELATIONSHIPS AND SOLVING PROBLEMS USING ALGEBRAIC METHODS.

Q: IS ALGEBRA 1 NECESSARY FOR ADVANCED MATH COURSES?

A: YES, ALGEBRA 1 IS OFTEN A PREREQUISITE FOR ADVANCED MATH COURSES SUCH AS ALGEBRA 2, GEOMETRY, AND CALCULUS, MAKING IT ESSENTIAL FOR STUDENTS PLANNING TO PURSUE HIGHER-LEVEL MATHEMATICS.

Q: HOW CAN STUDENTS IMPROVE THEIR ALGEBRAIC REASONING SKILLS?

A: STUDENTS CAN IMPROVE THEIR ALGEBRAIC REASONING SKILLS THROUGH PRACTICE WITH PROBLEM-SOLVING, ENGAGING IN MATHEMATICAL DISCUSSIONS, AND APPLYING ALGEBRA TO REAL-WORLD SITUATIONS.

Q: WHAT TOPICS ARE TYPICALLY INCLUDED IN AN ALGEBRA 1 CURRICULUM?

A: AN ALGEBRA 1 CURRICULUM TYPICALLY INCLUDES LINEAR EQUATIONS, FUNCTIONS, SYSTEMS OF EQUATIONS, POLYNOMIALS, AND RATIONAL EXPRESSIONS.

Q: WHY IS ALGEBRAIC REASONING IMPORTANT BEYOND ALGEBRA 1?

A: ALGEBRAIC REASONING IS IMPORTANT BEYOND ALGEBRA 1 BECAUSE IT LAYS THE GROUNDWORK FOR CRITICAL THINKING AND PROBLEM-SOLVING SKILLS APPLICABLE IN VARIOUS FIELDS, INCLUDING SCIENCE, TECHNOLOGY, AND EVERYDAY DECISION-MAKING.

Q: CAN ALGEBRAIC REASONING BE TAUGHT BEFORE ALGEBRA 1?

A: YES, ALGEBRAIC REASONING CAN AND IS OFTEN TAUGHT BEFORE ALGEBRA 1, AS IT IS A FOUNDATIONAL SKILL THAT SUPPORTS UNDERSTANDING IN EARLIER MATHEMATICS COURSES.

Q: ARE THERE STANDARDIZED ASSESSMENTS FOR ALGEBRA 1?

A: YES, MANY EDUCATIONAL SYSTEMS IMPLEMENT STANDARDIZED ASSESSMENTS TO EVALUATE STUDENTS' UNDERSTANDING OF ALGEBRA 1 CONCEPTS AND THEIR ALGEBRAIC REASONING ABILITIES.

Q: HOW DOES ALGEBRAIC REASONING RELATE TO REAL-WORLD PROBLEMS?

A: ALGEBRAIC REASONING RELATES TO REAL-WORLD PROBLEMS BY ENABLING INDIVIDUALS TO MODEL AND SOLVE QUANTITATIVE RELATIONSHIPS, WHICH IS ESSENTIAL IN FINANCE, ENGINEERING, AND EVERYDAY LIFE SCENARIOS.

Q: WHAT IS THE RELATIONSHIP BETWEEN ALGEBRAIC REASONING AND CRITICAL THINKING?

A: THE RELATIONSHIP BETWEEN ALGEBRAIC REASONING AND CRITICAL THINKING IS STRONG; ALGEBRAIC REASONING ENHANCES CRITICAL THINKING BY ENCOURAGING LOGICAL ANALYSIS, PATTERN RECOGNITION, AND SOLUTION FORMULATION FOR COMPLEX PROBLEMS.

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is algebraic reasoning the same as algebra 1: Algebra in the Early Grades James J. Kaput, David W. Carraher, Maria L. Blanton, 2017-09-25 This volume is the first to offer a comprehensive, research-based, multi-faceted look at issues in early algebra. In recent years, the National Council for Teachers of Mathematics has recommended that algebra become a strand flowing throughout the K-12 curriculum, and the 2003 RAND Mathematics Study Panel has recommended that algebra be "the initial topical choice for focused and coordinated research and development [in K-12 mathematics]." This book provides a rationale for a stronger and more sustained approach to algebra in school, as well as concrete examples of how algebraic reasoning may be developed in the early grades. It is organized around three themes: The Nature of Early Algebra Students' Capacity for Algebraic Thinking Issues of Implementation: Taking Early Algebra to the Classrooms. The contributors to this landmark volume have been at the forefront of an effort to integrate algebra into the existing early grades mathematics curriculum. They include scholars who have been developing the conceptual foundations for such changes as well as researchers and developers who have led empirical investigations in school settings. Algebra in the Early Grades aims to bridge the worlds of research, practice, design, and theory for educators, researchers, students, policy makers, and curriculum developers in mathematics education.

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1997, at the National Academy of Sciences in Washington, D.C.

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Denisse R Thompson, Mary Ann Huntley, Christine Suurtamm, 2024-09-01 This volume focuses on research related to mathematics curriculum. But rather than focusing on results of research, it focuses on lessons learned about conducting research on curriculum, whether about design and development, analysis of curriculum in the form of official standards or textbook instantiations, teacher intentions related to curriculum implementation, or actual classroom enactment. For scholars interested in curriculum research, the volume offers lessons about conducting curriculum research that have been learned by others engaged in such work, including frameworks, tools, and techniques, as well as challenges and issues faced, with solutions to address them. Sharing lessons from authors of different countries strengthens the broader mathematics research community and provides insights that can help researchers make important strides forward in research on mathematics curriculum.

is algebraic reasoning the same as algebra 1: Approaches to Algebra N. Bednarz, C. Kieran, L. Lee, 2012-12-06 In Greek geometry, there is an arithmetic of magnitudes in which, in terms of numbers, only integers are involved. This theory of measure is limited to exact measure. Operations on magnitudes cannot be actually numerically calculated, except if those magnitudes are exactly measured by a certain unit. The theory of proportions does not have access to such operations. It cannot be seen as an arithmetic of ratios. Even if Euclidean geometry is done in a highly theoretical context, its axioms are essentially semantic. This is contrary to Mahoney's second characteristic. This cannot be said of the theory of proportions, which is less semantic. Only synthetic proofs are considered rigorous in Greek geometry. Arithmetic reasoning is also synthetic, going from the known to the unknown. Finally, analysis is an approach to geometrical problems that has some algebraic characteristics and involves a method for solving problems that is different from the arithmetical approach. 3. GEOMETRIC PROOFS OF ALGEBRAIC RULES Until the second half of the 19th century, Euclid's Elements was considered a model of a mathematical theory. This may be one reason why geometry was used by algebraists as a tool to demonstrate the accuracy of rules otherwise given as numerical algorithms. It may also be that geometry was one way to represent general reasoning without involving specific magnitudes. To go a bit deeper into this, here are three geometric proofs of algebraic rules, the first by Al-Khwarizmi, the other two by Cardano.

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Robert Reys, Mary Lindquist, Diana V. Lambdin, Nancy L. Smith, 2014-10-20 The 11th Edition of Helping Children Learn Mathematics is designed to help those who are or will be teachers of mathematics in elementary schools help children develop understanding and proficiency with mathematics so they can solve problems. This text is built around three main themes: helping children make sense of mathematics, incorporating practical experiences, and using research to guide teaching. It also integrates connections and implications from the Common Core Standards: Mathematics (CCSS-M).

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Mathematics Education Birgit Pepin, Ghislaine Gueudet, Jeffrey Choppin, 2024-06-21 This handbook presents the state-of-the art scholarship on theoretical frames, mathematical content, learning environments, pedagogic practices, teacher professional learning, and policy issues related to the development and use of digital resources in mathematics education. With the advent of more and more open access digital resources, teachers choose from the web what they see fit for their classroom; students choose 'in the moment' what they need for their projects and learning paths. However, educators and students often find it difficult to choose from the abundance of materials on offer, as they are uncertain about their quality and beneficial use. It is clear that at a time of bouleversement of the teaching-learning processes, it is crucial to understand the quality and the (potentially) transformative aspects of digital resources. This book provides comprehensive analyses of and insights into the transformative aspects of digital resources.

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Alan Graham, Sue Johnston-Wilder, 2005-03-15 'This is an incredibly interesting and thought provoking book. Intended for anyone interested in developing their own mathematical thinking, or of the students they teach, whether at a primary level or right through to FE. The book is a delightful blend of theory and practice - encouraging the reader to participate, to solve problems and to develop their own thinking' - Peter Hall, Imberhorne School, East Grinstead' Mason, Graham, and Johnston-Wilder have admirably succeeded in casting most of school algebra in terms of generalisation activity? not just the typical numerical and geometric pattern-based work, but also solving quadratics and simultaneous equations, graphing equations, and factoring. The authors raise our awareness of the scope of generalization and of the power of using this as a lens not just for algebra but for all of mathematics!' - Professor Carolyn Kieran, Departement de Mathematiques, Universite du Quebec a Montreal Algebra has always been a watershed for pupils learning mathematics. This book will enable you to think about yourself as a learner of algebra in a new way, and thus to teach algebra more successfully, overcoming difficulties and building upon skills that all learners have. This book is based on teaching principles developed by the team at The Open University's Centre for Mathematics Education which has a 20-year track record of innovative approaches to teaching and learning algebra. Written for teachers working with pupils aged 7-16, it includes numerous tasks ready for adaption for your teaching and discusses principles that teachers have found useful in preparing and conducting lessons. This is a 'must have' resource for all teachers of mathematics, primary or secondary, and their support staff. Anyone who wishes to create an understanding and enthusiasm for algebra, based upon firm research and effective practice, will enjoy this book. This book is the course reader for The Open University Course ME625 Developing Algebraic Thinking

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is algebraic reasoning the same as algebra 1: Mathematical Reasoning of Children and Adults Alina Galvão Spinillo, Síntria Labres Lautert, Rute Elizabete de Souza Rosa Borba, 2021-05-24 This book adopts an interdisciplinary approach to investigate the development of mathematical reasoning in both children and adults and to show how understanding the learner's cognitive processes can help teachers develop better strategies to teach mathematics. This contributed volume departs from the interdisciplinary field of psychology of mathematics education and brings together contributions by researchers from different fields and disciplines, such as cognitive psychology, neuroscience and mathematics education. The chapters are presented in the light of the three instances that permeate the entire book: the learner, the teacher, and the teaching and learning process. Some of the chapters analyse the didactic challenges that teachers face in the classroom, such as how to interpret students' reasoning, the use of digital technologies, and their knowledge about mathematics. Other chapters examine students' opinions about mathematics, and others analyse the ways in which students solve situations that involve basic and complex

mathematical concepts. The approaches adopted in the description and interpretation of the data obtained in the studies documented in this book point out the limits, the development, and the possibilities of students' thinking, and present didactic and cognitive perspectives to the learning scenarios in different school settings. *Mathematical Reasoning of Children and Adults: Teaching and Learning from an Interdisciplinary Perspective* will be a valuable resource for both mathematics teachers and researchers studying the development of mathematical reasoning in different fields, such as mathematics education, educational psychology, cognitive psychology, and developmental psychology.

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