

COLLEGE ALGEBRA FOR PHILOSOPHY MAJORS

COLLEGE ALGEBRA FOR PHILOSOPHY MAJORS IS A SUBJECT THAT OFTEN SPARKS CURIOSITY AND SOMETIMES APPREHENSION. WHILE PHILOSOPHY MAJORS ARE RENOWNED FOR THEIR PROWESS IN ABSTRACT THOUGHT, LOGICAL REASONING, AND CRITICAL ANALYSIS, THE QUANTITATIVE ASPECTS OF COLLEGE ALGEBRA MIGHT SEEM TANGENTIAL TO THEIR CORE DISCIPLINES. HOWEVER, A DEEPER EXAMINATION REVEALS A PROFOUND AND OFTEN OVERLOOKED SYNERGY BETWEEN ALGEBRAIC PRINCIPLES AND PHILOSOPHICAL INQUIRY. THIS ARTICLE AIMS TO DEMYSTIFY COLLEGE ALGEBRA FOR THOSE PURSUING PHILOSOPHY, ILLUSTRATING ITS RELEVANCE, EXPLORING KEY CONCEPTS, AND DEMONSTRATING HOW A SOLID FOUNDATION IN ALGEBRAIC THINKING CAN PROFOUNDLY ENHANCE PHILOSOPHICAL UNDERSTANDING AND ARGUMENTATION. WE WILL DELVE INTO THE LOGICAL UNDERPINNINGS OF ALGEBRA, ITS APPLICATION IN FORMAL LOGIC AND EPISTEMOLOGY, AND THE TRANSFERABLE SKILLS IT CULTIVATES.

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WHY COLLEGE ALGEBRA MATTERS FOR PHILOSOPHY MAJORS

THE PERCEIVED DISCONNECT BETWEEN MATHEMATICS AND PHILOSOPHY IS LARGELY A MISCONCEPTION. BOTH DISCIPLINES, AT THEIR CORE, ARE DEDICATED TO UNDERSTANDING FUNDAMENTAL TRUTHS, EXPLORING COMPLEX RELATIONSHIPS, AND CONSTRUCTING RIGOROUS ARGUMENTS. COLLEGE ALGEBRA, WITH ITS EMPHASIS ON SYMBOLIC MANIPULATION, LOGICAL DEDUCTION, AND THE CONSTRUCTION OF ABSTRACT MODELS, PROVIDES A POWERFUL TOOLKIT THAT CAN SIGNIFICANTLY ENRICH A PHILOSOPHY STUDENT'S INTELLECTUAL ARSENAL. IT'S NOT ABOUT BECOMING A MATHEMATICIAN, BUT ABOUT LEVERAGING ALGEBRAIC THINKING TO SHARPEN PHILOSOPHICAL INSIGHTS.

THE STUDY OF COLLEGE ALGEBRA CULTIVATES A PRECISE AND DISCIPLINED APPROACH TO THOUGHT THAT IS INVALUABLE IN PHILOSOPHY. BY ENGAGING WITH VARIABLES, EQUATIONS, AND FUNCTIONS, STUDENTS LEARN TO ABSTRACT PROPERTIES, IDENTIFY PATTERNS, AND DERIVE CONCLUSIONS FROM A SET OF AXIOMS. THIS PROCESS MIRRORS THE PHILOSOPHICAL ENDEAVOR OF DISSECTING COMPLEX CONCEPTS, IDENTIFYING UNDERLYING PRINCIPLES, AND BUILDING COHERENT THEORIES. THE LOGICAL STRUCTURE INHERENT IN ALGEBRA DIRECTLY SUPPORTS THE CONSTRUCTION OF SOUND PHILOSOPHICAL ARGUMENTS, HELPING TO AVOID FALLACIES AND ENSURE CLARITY.

FOUNDATIONAL ALGEBRAIC CONCEPTS AND PHILOSOPHICAL PARALLELS

AT ITS HEART, ALGEBRA DEALS WITH SYMBOLS REPRESENTING UNKNOWN QUANTITIES AND THE RULES FOR MANIPULATING THEM TO SOLVE FOR THOSE UNKNOWN. THIS FUNDAMENTAL CONCEPT OF REPRESENTATION AND DEDUCTION HAS DIRECT PARALLELS IN PHILOSOPHICAL DISCOURSE. FOR INSTANCE, VARIABLES IN ALGEBRA CAN BE SEEN AS AKIN TO ABSTRACT CONCEPTS OR PROPOSITIONS IN PHILOSOPHY THAT WE AIM TO DEFINE, UNDERSTAND, AND RELATE TO OTHER CONCEPTS.

ABSTRACT REASONING AND PROBLEM-SOLVING SKILLS

COLLEGE ALGEBRA IS A PRIME ARENA FOR DEVELOPING ABSTRACT REASONING. STUDENTS ARE CONSTANTLY ASKED TO MOVE BEYOND CONCRETE EXAMPLES AND WORK WITH GENERALIZED PRINCIPLES. THIS ABILITY TO THINK ABSTRACTLY IS PARAMOUNT IN PHILOSOPHY, WHERE CONCEPTS LIKE JUSTICE, CONSCIOUSNESS, OR THE NATURE OF REALITY ARE INHERENTLY ABSTRACT. THE PROCESS OF SOLVING ALGEBRAIC PROBLEMS OFTEN INVOLVES BREAKING DOWN A COMPLEX SITUATION INTO SMALLER, MANAGEABLE PARTS, IDENTIFYING THE RELEVANT RELATIONSHIPS, AND APPLYING A SYSTEMATIC APPROACH TO REACH A SOLUTION. THIS METHODICAL PROBLEM-SOLVING STRATEGY IS DIRECTLY TRANSFERABLE TO TACKLING COMPLEX PHILOSOPHICAL

DILEMMAS.

THE ITERATIVE NATURE OF SOLVING ALGEBRAIC EQUATIONS, WHERE ONE STEP LOGICALLY FOLLOWS ANOTHER, REINFORCES THE IMPORTANCE OF CAREFUL PROGRESSION IN REASONING. PHILOSOPHY MAJORS OFTEN GRAPPLE WITH INTRICATE ARGUMENTS THAT REQUIRE A SIMILAR STEP-BY-STEP ANALYSIS TO FULLY COMPREHEND AND EVALUATE. THE CONFIDENCE GAINED FROM SUCCESSFULLY NAVIGATING ALGEBRAIC CHALLENGES CAN TRANSLATE INTO GREATER ASSURANCE WHEN CONFRONTING DIFFICULT PHILOSOPHICAL TEXTS OR FORMULATING ONE'S OWN ARGUMENTS.

FORMAL LOGIC AND SYMBOLIC REPRESENTATION

PERHAPS THE MOST DIRECT LINK BETWEEN COLLEGE ALGEBRA AND PHILOSOPHY LIES IN FORMAL LOGIC. ALGEBRA UTILIZES SYMBOLS TO REPRESENT QUANTITIES AND OPERATIONS, CREATING A PRECISE LANGUAGE THAT ELIMINATES AMBIGUITY. THIS IS PRECISELY WHAT FORMAL LOGIC DOES WITH PROPOSITIONS AND LOGICAL CONNECTIVES. UNDERSTANDING ALGEBRAIC NOTATION FOR EQUATIONS AND INEQUALITIES CAN PROVIDE A NATURAL BRIDGE TO UNDERSTANDING SYMBOLIC LOGIC, WHICH USES SYMBOLS TO REPRESENT STATEMENTS AND LOGICAL RELATIONSHIPS (E.G., CONJUNCTION, DISJUNCTION, NEGATION, IMPLICATION).

LEARNING TO MANIPULATE ALGEBRAIC EXPRESSIONS IS AKIN TO LEARNING TO MANIPULATE LOGICAL FORMULAS. BOTH INVOLVE UNDERSTANDING A SET OF RULES AND APPLYING THEM CONSISTENTLY TO DERIVE VALID CONCLUSIONS. THIS TRAINING IN SYMBOLIC MANIPULATION ENHANCES A STUDENT'S ABILITY TO ANALYZE ARGUMENTS FOR THEIR LOGICAL VALIDITY, IDENTIFY HIDDEN ASSUMPTIONS, AND CONSTRUCT CLEAR, UNAMBIGUOUS PHILOSOPHICAL STATEMENTS. THE RIGOR OF ALGEBRAIC PROOF, WHERE EACH STEP MUST BE JUSTIFIED, INSTILLS A SIMILAR APPRECIATION FOR EVIDENTIAL SUPPORT AND LOGICAL COHERENCE IN PHILOSOPHICAL REASONING.

EPISTEMOLOGY AND THE NATURE OF KNOWLEDGE

ALGEBRA'S RELIANCE ON AXIOMS AND DEDUCTIVE REASONING TOUCHES UPON FUNDAMENTAL QUESTIONS IN EPISTEMOLOGY, THE BRANCH OF PHILOSOPHY CONCERNED WITH THE NATURE OF KNOWLEDGE, JUSTIFICATION, AND THE RATIONALITY OF BELIEF. IN ALGEBRA, WE START WITH ACCEPTED TRUTHS (AXIOMS) AND BUILD COMPLEX THEOREMS THROUGH LOGICAL DEDUCTION. THIS MIRRORS PHILOSOPHICAL INQUIRIES INTO HOW WE ACQUIRE KNOWLEDGE AND WHAT CONSTITUTES JUSTIFIED BELIEF. UNDERSTANDING THE CERTAINTY DERIVED FROM DEDUCTIVE PROCESSES IN ALGEBRA CAN OFFER INSIGHTS INTO THE NATURE OF NECESSARY TRUTHS AND THE LIMITS OF EMPIRICAL KNOWLEDGE.

THE DEVELOPMENT OF MATHEMATICAL MODELS IN ALGEBRA, WHICH REPRESENT REAL-WORLD PHENOMENA THROUGH ABSTRACT RELATIONSHIPS, ALSO HAS EPISTEMOLOGICAL IMPLICATIONS. HOW DO WE KNOW THAT OUR ABSTRACT MODELS ACCURATELY REFLECT REALITY? THIS QUESTION IS CENTRAL TO BOTH PHILOSOPHY OF SCIENCE AND EPISTEMOLOGY. BY ENGAGING WITH HOW ALGEBRAIC MODELS ARE CONSTRUCTED AND VALIDATED, PHILOSOPHY STUDENTS CAN GAIN A MORE NUANCED UNDERSTANDING OF KNOWLEDGE CLAIMS AND THE PROCESSES BY WHICH THEY ARE JUSTIFIED, EVEN IN NON-MATHEMATICAL DOMAINS.

SET THEORY AND PHILOSOPHICAL APPLICATIONS

SET THEORY, A FUNDAMENTAL CONCEPT OFTEN INTRODUCED IN COLLEGE ALGEBRA, PROVIDES POWERFUL TOOLS FOR PHILOSOPHICAL ANALYSIS. SETS ARE COLLECTIONS OF DISTINCT OBJECTS, AND THE RELATIONSHIPS BETWEEN SETS (UNION, INTERSECTION, SUBSET) CAN BE USED TO MODEL AND CLARIFY COMPLEX PHILOSOPHICAL IDEAS. FOR INSTANCE, IN POLITICAL PHILOSOPHY, ONE MIGHT ANALYZE THE SET OF CITIZENS AND THE SET OF RIGHTS, EXPLORING THEIR INTERSECTIONS AND SUBSETS TO UNDERSTAND CONCEPTS OF CITIZENSHIP AND ENTITLEMENT.

IN METAPHYSICS, SET THEORY CAN BE USED TO EXPLORE CONCEPTS OF CATEGORIES, UNIVERSALS, AND PARTICULARS. FOR EXAMPLE, A UNIVERSAL PROPERTY LIKE "REDNESS" COULD BE CONCEIVED AS THE SET OF ALL RED THINGS. UNDERSTANDING THE LOGICAL OPERATIONS ON SETS – HOW THEY CAN BE COMBINED, DIVIDED, AND COMPARED – OFFERS A PRECISE FRAMEWORK FOR CONCEPTUAL ANALYSIS THAT IS HIGHLY VALUABLE IN PHILOSOPHICAL ARGUMENTATION. THE RIGOR OF SET-THEORETIC OPERATIONS HELPS TO AVOID VAGUENESS AND AMBIGUITY WHEN DEFINING AND ANALYZING PHILOSOPHICAL CATEGORIES.

CALCULUS: A GATEWAY TO ADVANCED PHILOSOPHICAL CONCEPTS

WHILE THIS ARTICLE FOCUSES ON COLLEGE ALGEBRA, IT'S WORTH NOTING THAT A FIRM GRASP OF ALGEBRA IS A PREREQUISITE FOR CALCULUS. CALCULUS, IN TURN, OPENS DOORS TO UNDERSTANDING ADVANCED PHILOSOPHICAL TOPICS. FOR EXAMPLE, THE CONCEPT OF LIMITS IN CALCULUS IS FOUNDATIONAL TO UNDERSTANDING INFINITE SERIES AND CONTINUITY, WHICH HAVE IMPLICATIONS IN METAPHYSICS (E.G., THE NATURE OF TIME AND SPACE) AND PHILOSOPHY OF MATHEMATICS. THE STUDY OF

CHANGE AND RATES OF CHANGE IN CALCULUS CAN ALSO INFORM DISCUSSIONS IN THE PHILOSOPHY OF SCIENCE AND DYNAMIC SYSTEMS.

THE MATHEMATICAL MODELS DEVELOPED USING CALCULUS ARE OFTEN USED TO REPRESENT COMPLEX SYSTEMS AND PHENOMENA. PHILOSOPHY MAJORS ENGAGING WITH THE PHILOSOPHY OF PHYSICS, FOR INSTANCE, WILL ENCOUNTER DIFFERENTIAL EQUATIONS AND INTEGRAL CALCULUS, WHICH ARE ESSENTIAL FOR UNDERSTANDING CONCEPTS LIKE MOTION, FIELDS, AND QUANTUM MECHANICS. A SOLID ALGEBRAIC FOUNDATION ENSURES THAT THESE MORE ADVANCED MATHEMATICAL CONCEPTS, AND THEIR PHILOSOPHICAL IMPLICATIONS, ARE ACCESSIBLE.

PRACTICAL APPLICATIONS AND TRANSFERABLE SKILLS

BEYOND THE DIRECT CONCEPTUAL LINKS, THE PROCESS OF LEARNING COLLEGE ALGEBRA CULTIVATES A SUITE OF TRANSFERABLE SKILLS CRUCIAL FOR ANY ACADEMIC DISCIPLINE, INCLUDING PHILOSOPHY. THE DISCIPLINE REQUIRED TO MASTER ALGEBRAIC TECHNIQUES, THE PERSEVERANCE NEEDED TO SOLVE CHALLENGING PROBLEMS, AND THE ABILITY TO COMMUNICATE MATHEMATICAL IDEAS CLEARLY ALL CONTRIBUTE TO A WELL-ROUNDED INTELLECTUAL DEVELOPMENT.

PHILOSOPHY MAJORS WHO ARE COMFORTABLE WITH ALGEBRAIC THINKING OFTEN FIND THEMSELVES BETTER EQUIPPED TO ANALYZE COMPLEX DATA SETS, UNDERSTAND STATISTICAL REASONING, AND ENGAGE WITH FIELDS THAT HAVE A STRONG QUANTITATIVE COMPONENT. THIS INTERDISCIPLINARY AGILITY CAN BE A SIGNIFICANT ASSET IN BOTH ACADEMIC AND PROFESSIONAL PURSUITS. THE STRUCTURED APPROACH TO PROBLEM-SOLVING LEARNED IN ALGEBRA CAN BE APPLIED TO ANALYZING ETHICAL DILEMMAS, DISSECTING POLITICAL ARGUMENTS, OR UNDERSTANDING THE HISTORICAL DEVELOPMENT OF IDEAS.

DEVELOPING A ROBUST ANALYTICAL FRAMEWORK

IN ESSENCE, COLLEGE ALGEBRA FOR PHILOSOPHY MAJORS IS NOT ABOUT ACQUIRING A NEW SET OF UNRELATED SKILLS, BUT ABOUT DEEPENING AND BROADENING THE EXISTING ANALYTICAL TOOLKIT. IT PROVIDES A COMPLEMENTARY PERSPECTIVE THAT EMPHASIZES PRECISION, LOGICAL RIGOR, AND ABSTRACT MODELING. BY EMBRACING THE QUANTITATIVE REASONING INHERENT IN ALGEBRA, PHILOSOPHY STUDENTS CAN UNLOCK NEW AVENUES OF THOUGHT, STRENGTHEN THEIR ARGUMENTATIVE CAPABILITIES, AND GAIN A MORE PROFOUND UNDERSTANDING OF THE FUNDAMENTAL QUESTIONS THAT DRIVE PHILOSOPHICAL INQUIRY. THE MASTERY OF ALGEBRAIC PRINCIPLES FOSTERS A ROBUST ANALYTICAL FRAMEWORK THAT BENEFITS EVERY ASPECT OF PHILOSOPHICAL EXPLORATION.

FAQ

Q: HOW DOES LEARNING ALGEBRA BENEFIT A PHILOSOPHY MAJOR'S ABILITY TO CONSTRUCT LOGICAL ARGUMENTS?

A: LEARNING ALGEBRA PROVIDES A CONCRETE AND SYSTEMATIC WAY TO PRACTICE DEDUCTIVE REASONING. BY WORKING WITH VARIABLES AND EQUATIONS, STUDENTS LEARN TO FOLLOW LOGICAL STEPS, IDENTIFY ASSUMPTIONS, AND ENSURE THAT CONCLUSIONS ARE VALIDLY DERIVED FROM PREMISES. THIS RIGOROUS PROCESS DIRECTLY TRANSLATES TO CONSTRUCTING MORE SOUND AND COHERENT PHILOSOPHICAL ARGUMENTS, MINIMIZING LOGICAL FALLACIES AND ENHANCING CLARITY.

Q: WHAT ROLE DOES SYMBOLIC REPRESENTATION IN ALGEBRA PLAY IN UNDERSTANDING FORMAL LOGIC FOR PHILOSOPHY?

A: ALGEBRA USES SYMBOLS TO REPRESENT QUANTITIES AND OPERATIONS, CREATING A PRECISE LANGUAGE DEVOID OF AMBIGUITY. THIS MIRRORS THE USE OF SYMBOLS IN FORMAL LOGIC TO REPRESENT PROPOSITIONS AND LOGICAL CONNECTIVES. FAMILIARITY WITH ALGEBRAIC NOTATION AND MANIPULATION CAN EASE THE TRANSITION TO UNDERSTANDING AND WORKING WITH SYMBOLIC LOGIC, WHICH IS A CRUCIAL TOOL IN ANALYTICAL PHILOSOPHY.

Q: CAN COLLEGE ALGEBRA CONCEPTS BE APPLIED TO SPECIFIC BRANCHES OF PHILOSOPHY, SUCH AS ETHICS OR METAPHYSICS?

A: YES, CONCEPTS LIKE SET THEORY, OFTEN COVERED IN COLLEGE ALGEBRA, CAN BE APPLIED TO VARIOUS PHILOSOPHICAL BRANCHES. FOR EXAMPLE, SETS CAN MODEL ETHICAL DILEMMAS BY CATEGORIZING ACTIONS OR CONSEQUENCES. IN METAPHYSICS, SET THEORY CAN HELP IN ANALYZING CATEGORIES OF BEING OR RELATIONSHIPS BETWEEN ABSTRACT ENTITIES. ALGEBRAIC MODELING CAN ALSO BE USED TO REPRESENT COMPLEX PHILOSOPHICAL SYSTEMS OR ARGUMENTS.

Q: HOW DOES COLLEGE ALGEBRA FOSTER ABSTRACT THINKING, A KEY SKILL FOR PHILOSOPHY MAJORS?

A: COLLEGE ALGEBRA REQUIRES STUDENTS TO MOVE BEYOND CONCRETE EXAMPLES AND WORK WITH GENERALIZED PRINCIPLES AND VARIABLES. THIS CONSTANT ENGAGEMENT WITH ABSTRACT CONCEPTS TRAINS THE MIND TO THINK HYPOTHETICALLY, TO IDENTIFY UNDERLYING STRUCTURES, AND TO GENERALIZE FROM SPECIFIC INSTANCES. THIS ABILITY TO GRASP AND MANIPULATE ABSTRACT IDEAS IS FUNDAMENTAL TO PHILOSOPHICAL INQUIRY.

Q: ARE THERE ANY PRACTICAL BENEFITS FOR PHILOSOPHY MAJORS WHO HAVE A GOOD UNDERSTANDING OF COLLEGE ALGEBRA, EVEN IF THEY DON'T PLAN TO WORK IN A QUANTITATIVE FIELD?

A: ABSOLUTELY. A SOLID FOUNDATION IN COLLEGE ALGEBRA DEVELOPS CRITICAL THINKING, PROBLEM-SOLVING ABILITIES, AND METICULOUS ATTENTION TO DETAIL. THESE ARE HIGHLY TRANSFERABLE SKILLS VALUED IN ANY PROFESSION. MOREOVER, IT EQUIPS PHILOSOPHY MAJORS TO BETTER UNDERSTAND AND ENGAGE WITH INTERDISCIPLINARY FIELDS THAT INCORPORATE QUANTITATIVE REASONING, SUCH AS PHILOSOPHY OF SCIENCE OR COGNITIVE SCIENCE.

Q: IS IT NECESSARY FOR PHILOSOPHY MAJORS TO EXCEL IN CALCULUS AFTER ALGEBRA, AND HOW MIGHT CALCULUS RELATE TO THEIR STUDIES?

A: WHILE NOT ALWAYS MANDATORY, A STRONG ALGEBRAIC FOUNDATION IS ESSENTIAL FOR CALCULUS, WHICH IN TURN CAN UNLOCK DEEPER PHILOSOPHICAL DISCUSSIONS. CONCEPTS IN CALCULUS, LIKE LIMITS AND CONTINUITY, ARE RELEVANT TO METAPHYSICS (E.G., DISCUSSIONS ON INFINITY AND TIME) AND THE PHILOSOPHY OF MATHEMATICS. UNDERSTANDING CALCULUS IS ALSO BENEFICIAL FOR ENGAGING WITH ADVANCED SCIENTIFIC THEORIES THAT INFORM PHILOSOPHICAL DISCOURSE.

Q: HOW CAN UNDERSTANDING ALGEBRAIC PROOF METHODS IMPROVE A PHILOSOPHY STUDENT'S APPROACH TO PHILOSOPHICAL JUSTIFICATION?

A: ALGEBRAIC PROOFS REQUIRE EACH STEP TO BE LOGICALLY JUSTIFIED AND DERIVED FROM ESTABLISHED AXIOMS OR PREVIOUSLY PROVEN THEOREMS. THIS MIRRORS THE PHILOSOPHICAL DEMAND FOR RIGOROUS JUSTIFICATION OF CLAIMS. LEARNING TO CONSTRUCT AND EVALUATE ALGEBRAIC PROOFS INSTILLS AN APPRECIATION FOR EVIDENTIAL SUPPORT, LOGICAL COHERENCE, AND THE IMPORTANCE OF AVOIDING UNSUBSTANTIATED ASSERTIONS, WHICH ARE VITAL FOR PHILOSOPHICAL ARGUMENTATION.

Q: WHAT IS THE CONNECTION BETWEEN ALGEBRAIC FUNCTIONS AND PHILOSOPHICAL CONCEPTS OF RELATIONSHIPS AND CAUSALITY?

A: ALGEBRAIC FUNCTIONS DESCRIBE RELATIONSHIPS BETWEEN VARIABLES. THIS CAN BE A POWERFUL ANALOGY FOR UNDERSTANDING PHILOSOPHICAL CONCEPTS OF CAUSALITY, DEPENDENCE, AND CORRELATION. BY STUDYING HOW ONE VARIABLE'S CHANGE AFFECTS ANOTHER IN AN ALGEBRAIC FUNCTION, STUDENTS CAN DEVELOP A MORE NUANCED UNDERSTANDING OF HOW PHILOSOPHICAL CONCEPTS MIGHT RELATE TO OR INFLUENCE ONE ANOTHER.

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