SCOPE & SEQUENCE
8th Grade MYP Math

8th Grade Math
2019-2020

Vision for 8th Grade Math
Mathematics courses at Uplift Education aim to build conceptual and procedural understanding of math through four components of instruction: **fluency, inquiry, communication, and real-world application**. The courses should balance explicit, direct instruction of skills and strategies with authentic opportunities for scholar inquiry and reflection. The end goal is to create life-long learners with strong communication and critical thinking skills, which they consistently apply to solve issues in their own local and global communities.

Year at a Glance

August		September	October	November	December	January	February	March	April	May
SLA	1.Real Numbers	2.Equations and Inequalities	3.Similarity and Dilations	4.Proporitonal Relationships and Slope	Break	5.Geometry		STAAR Prep	6.Data Analysis	7.Financial Literacy

Time Frame	Unit Title
6 Lessons	Unit 1: Real Numbers
8 Lessons	Unit 2: Equations and Inequalities
	CA 1
7 Lessons	Unit 3: Similarity and Dilations
12 Lessons	Unit 4: Proportional Relationships and Slope
	CA 2
12 Lessons	Unit 5: Geometry
	STAAR Benchmark
8 Lessons	STAAR Prep
	STAAR Test
6 Lessons	Unit 6: Data Analysis
8 Lessons	Unit 7: Financial Literacy
	RPA

General Resources

- McGraw Hill Course 3 Textbook and online resources
- The National Library of Virtual Manipulatives http://nlvm.usu.edu/
- Thatquiz.org
- ixl.com http://www.ixl.com/math/grade-8
- RegentsPrep.org
- Emathinstruction.com
- Interactive Math Glossary
- Openmiddle.com
- Wyrmath.com
- Wodb.ca
- http://www.projectsharetexas.org/resource-index
- Estimation180.com
- Algebra worksheet generator http://www.math.com/students/worksheet/algebra_sp.htm

Notes

- **TIME FRAME:** Unit time frames are approximate and subject to change dependent on data and scholars' needs, as well as campus testing schedules.
- **TEKS:** All readiness TEKS are represented in bold text. Most supporting TEKS are represented where appropriate and deemed necessary.
- **MYP UP Stage 1:** Global contexts, key concepts, related concepts, and assessment criteria have been selected carefully to ensure Uplift meets IB requirements. If you choose to change any of these to personalize your units, please ensure you are assessing each global context, key concept, and related concept at least 1x per year and each assessment criteria at least 2x per year.
- **PERFORMANCE TASKS:** A minimum of 2 investigations and 2 real world projects are required. The first must be completed before Collaboration Day 2, and the second before the end of the year. You may choose to use the tasks detailed in the scope (indicated as investigations) or you may create your own, but the task must be assessed using MYP Criterion B, C, and D, depending on the assessment.

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REQUIRED			EXAMPLES		
Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
6 Lessons **Aug. 12 – Aug. 28**	**Unit 1: Real Numbers** *Unit 1 establishes knowledge around the real number system. Although 8th grade math standards do not include operations with rational numbers and generating equivalent forms, it is advised to review these fundamental skills in order to ensure scholars grasp that basic knowledge.* **Content and Skills** • **Use Venn Diagrams and writing to classify real numbers** ○ Define and give numerical examples of whole numbers, integers, and rational numbers ○ Classify sets of numbers - *Consider using the Sorting Activity from the Course Structure* • **Review operations with rational numbers and generating equivalent forms of rational numbers** ○ Rational numbers include fractions, decimals and integers ○ Introduce utilizing the calculator • **Order a set real numbers** ○ Numbers may be listed as a set or displayed on a table ○ Show comparisons using inequalities ○ Show comparisons and ordering using a number line • **Estimate the value of square roots and locate the value on a number line** ○ Conceptually connect square roots and area of a square ○ Include square roots of numbers less than 225 • **Convert between standard notation and scientific notation**	8.2A 8.2B 8.2C **8.2D** *Bold = Readiness*	**Global Context** Identities and Relationships **Key Concept** Relationships **Related Concepts** Equivalence Model **Statement of Inquiry** Shared characteristics help us understand complex relationships.	**Unit test (Criterion A)** **Real Number System Representations (Criterion C):** Scholars first sort a set of real numbers into a blank Venn Diagram and provide written justification for which values belong in each set/subset. Scholars then create a number line to order those numbers and describe, in writing, how to compare real numbers in different forms. **Scientific Notation Investigation (Criterion B):** Scholars multiply a given factor by powers of 10 (both positive and negative) to write rules about expressing numbers in scientific notation. Scholars verify their rules using very large and small values in scientific and standard notation.	• *McGraw Hill* RTI chapters 1 and 6 reteach resources • *McGraw Hill* 7th Grade Chapters 1 and 7 • *McGraw Hill* 8th Grade Chapter 1

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Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
8 Lessons **Sep. 3 - Sep. 20**	**Unit 2: Equations and Inequalities** *Unit 2 introduces solving more complex equations and inequalities. Ensure scholars can determine the differences and similarities of equations and inequalities through verbal descriptions, graphs, and symbols.* • **Review solving one- and two-step one-variable equations, if needed** ○ Solve equations using inverse operations to isolate the variable • **Model and solve one-variable equations with variables on both sides and rational coefficients and constants** ○ Model equations using tiles and counters ○ Solve equations using inverse operations to isolate the variable ○ Utilize real-world problems to model mathematical situations and solve the equations that represent the situation • **Write equations and inequalities given word problems or real-world problems given equations and inequalities** ○ Highlight key terms that mean certain mathematical processes and operations (i.e. more than, split, increase) • **Solve systems of equations by graphing and understand the meaning of a solution to a system of equations** ○ Review the parts of a graph (coordinates, origin, x-axis, y-axis) and how to read a graph ○ Explore and define the solution of a system of equations is indicated by the intersecting point on the graph	8.8A 8.8B **8.8C** 8.9A *Bold = Readiness*	**Global Context** Fairness and Development **Key Concept** Relationships **Related Concepts** Models Representation **Statement of Inquiry** Relationships between individuals or groups of people can be unequal, yet this does not mean they are unfair.	**Sales Pitch Project (Criterion C and D):** Scholars work in pairs and each take on the role of a sales representative trying to sell a new blended learning product to their campus to help scholars with math. They use both a graph and equation to determine when their product is cheaper than the competitor and when they are equal. They then deliver a written or oral pitch to their director about why they should buy their product. In their pitch, scholars may employ real-world sales tactics (for example, if their product is not the better deal, they may come up with a discount which will make their product more desirable).	• *McGraw Hill* Chapter 6 • Use manipulatives (real or virtual) to model solving one-variable equations.

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Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
7 Lessons **Oct. 8 – Oct. 25**	**Unit 3: Similarity and Dilations** *The concept of similarity is not new knowledge for scholars in 8th grade, including ratio and scale factor. Unit 3 establishes the connection between the concepts of similarity and dilations. Emphasize representing dilated figures as an algebraic rule involving the scale factor.* • **Review the attributes of similar figures** ○ Same shape, different size ○ Congruent corresponding angles, proportional corresponding sides ○ Angle-angle similarity as criterion for similar triangles • **Represent dilations using an algebraic expression (x, y) → (kx, ky)** ○ Establish k is the constant or scale factor ○ Explore and establish reduction occurs when scale factor (k) is less than 1 ○ Explore and establish enlargement occurs when scale factor (k) is greater than 1 ○ Utilize graphs of dilated figures to determine the algebraic rule representing the dilation ○ Utilize listed coordinates of shapes and the coordinates of its dilated image to determine the algebraic rule representing the dilation • **Describe the effect on area based on changes in dimensions** • **Use informal arguments to establish facts about:** ○ The angle sum and exterior angle of triangles, ○ The angles created when parallel lines are cut by a transversal	8.3A 8.3B **8.3C** 8.8D 8.10D *Bold = Readiness*	**Global Context** Orientation in Space and Time **Key Concept** Form **Related Concepts** Measurement Space Justification **Statement of Inquiry** Strong relationships can withstand changes	**Unit test (Criterion A)** **Dilation Investigation (Criterion B):** Scholars investigate dilations on the coordinate plane in order to generate the algebraic representation for dilations. Scholars also verify that dilations produce similar figures using rulers and protractors. (Extension: scholars compare the area and perimeter of dilations in order to generate rules for the perimeter/area changes based on the scale factor).	• *McGraw Hill* Chapter 2

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Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
12 Lessons **Oct. 28 – Dec. 6**	**Unit 4: Proportional Relationships and Slope** *Unit 4 allows scholars to investigate the differences between proportional and non-proportional relationships given various representations. Slope and functions are also critical concepts within the unit.* • **Review the concept of unit rates and similarity in order to develop an understanding of slope** ○ The slope of any line is a number equivalent to its rate of change which, when written with a denominator of 1, is called the unit rate ○ Develop an understanding that slope, m, given as the rate comparing similar triangles' change in y-values to the change in x-values, $(y2 – y1)/(x2 – x1)$, • **Differentiate between proportional (y=kx) and non-proportional (y = mx + b) linear relationships given various representations of data or real-world situations** ○ Represent proportional and non-proportional situations with tables, graphs, and equations • **Determine the slope and the y-intercept given a table or graph** ○ Utilize the slope formula or rise over run ○ Establish the slope of horizontal line is zero ○ Establish the slope of vertical line does not exist • **Solve problems involving direct variation** • **Write and graph equations of linear functions given various representations of data** • **Determine functions given multiple representations** ○ Utilize ordered pairs, tables, mappings and graphs	8.4A **8.4B** **8.4C** 8.5A 8.5B 8.5E 8.5F **8.5G** 8.5H **8.5I** *Bold = Readiness*	**Global Context** Identities and Relationships **Key Concept** Relationships **Related Concepts** Representation Pattern Change **Statement of Inquiry** As human beings, we represent ourselves in different ways for different situations	**Assessment(s)** **Similar Triangle Investigation (Criterion B):** Use similar triangles on the coordinate plane to develop an understanding of slope as a constant rate of change. Scholars will describe how to find slope on the coordinate plane and verify their process by answering questions about slopes and similar triangles on the coordinate plane. **Ramp Project (Criterion C and D):** Scholars read about the ADA Standards for ramp construction (http://www.adawheelchairramps.com/) and discuss the importance of the requirements. They then explore the slope of various ramps (physically at their campus or measurements provided by the teacher of key places in DFW) and calculate the slope to ensure they meet the requirements. Scholars then read a building plan for Uplift Pinnacle MS and calculate the height and length of ramps for that campus. They put their findings in a persuasive letter to the construction company responsible for the new building.	• *McGraw Hill* Chapters 3 and 4

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Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
12 Lessons **Jan 9 – Feb. 21**	**Unit 5: Geometry** *Unit 5 covers geometric concepts such as angles, graph transformations, surface area, and volume. Pythagorean theorem is introduced to scholars in multiple ways. Scholars should utilize the STAAR Reference charts as a guide while working through these problems in the unit.* • **Determine the measures of angle pairs** ○ Formed by parallel lines cut by a transversal ○ Triangle Sum Theorem ○ Exterior angles of a triangle • **Apply the Pythagorean Theorem and its converse** ○ Use models/diagrams to explain the Pythagorean Theorem in terms of equal areas ○ Apply to find distance on the coordinate plane • **Graph and describe transformations on the coordinate plane using an algebraic representation** ○ Review dilations and differentiate between dilations and congruence transformations • **Calculate surface area and lateral surface area of rectangular prisms, triangular prisms, and cylinders** ○ Use previous knowledge of nets and the concept of LA and SA to understand why the formulas work • **Calculate volume of cylinders, cones, and spheres** ○ Understand the volume of a cylinder as Bh, area of the base times the height of the cylinder	8.6A 8.6C **8.7A** **8.7B** **8.7C** 8.7D 8.8D 8.10A 8.10B **8.10C** *Bold = Readiness*	**Global Context** Scientific and Technical Innovation **Key Concept** Form **Related Concepts** Congruence Measurement Generalization Equivalence **Statement of Inquiry** Strength comes from structure	**Assessment(s)** **Surface Area Investigation (Criterion B and C):** Scholars cut apart real world objects in the shape of rectangular prisms, triangular prisms, and cylinders in order to derive their surface area formulas. Scholars compare their generated formulas to those on the formula sheets and reflect on why they may look the same or different. **Volume Investigation (Criterion B):** Scholars compare the volumes of cylinders and cones with the same radius and height in order to derive the formula for the volume of a cone based on that of a cylinder. **Angle Investigation (Criterion B):** Scholars use protractors and in order to derive rules for the angle pairs formed by parallel lines or triangles. **Pythagorean Theorem Investigation (Criterion B):** Scholars graph right triangles and squares on the coordinate plane to derive the Pythagorean Theorem. **Art Design Project (Criterion C and D):** Scholars choose a piece of artwork with various transformations (reflections, rotations, translations, dilations) and plots it on the coordinate plane. Scholars write algebraic representations of the transformations to describe the artwork. Scholars may include a description of the artwork and how transformations are used in art and design.	• *McGraw Hill* Chapters 5, 7, and 8

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Time Frame	**Unit & Key Components**	**TEKS**	**MYP UP: Stage 1**	**Assessment(s)/MYP Objective(s)**	**Resources**
8 Lessons **Mar 16– Apr 10**	**STAAR Prep** *Start to prepare for the first administration of the STAAR test by reviewing all readiness concepts while spiraling in supporting content. Refer to STAAR resources, such as blueprints and performance indicators* • **Briefly cover trend lines, simple and compound interest before the STAAR test.**	**8.5D** **8.12D** *Bold = Readiness*		Extended Do Nows Daily Exit Tickets Differentiated Stations and Assessments Continual mini-assessments with STAAR Resources	McGraw Hill Resources McGraw Hill Assessment Masters TEA released sample items/tests STAAR-aligned Resources: Motivation Math, STAAR Master, TEKSing Towards STARR, STAAR Ready STAAR Ready State STAAR Resources: https://tea.texas.gov/student.assessment/staar/math/
6 Lessons **Apr 16– May 1**	**Unit 6: Data Analysis** *Unit 6 introduces the concept of Mean Absolute Deviation using no more than 10 data points. Scholars should review scatterplots by construction examples and describing the data.* • Construct scatterplots using given or self-collected data sets • Analyze scatterplots ○ Differentiate between linear, non-linear, and no association data ○ Make predictions using trend lines • Calculate the Mean Absolute Deviation (MAD)	8.5C **8.5D** 8.11A 8.11B *Bold = Readiness*	**Global Context** Globalization and sustainability **Key Concept** Relationships **Related Concepts** Model Pattern Generalization **Statement of Inquiry** Examining trends can help us make predictions about the future	**Unit test (Criterion A)** **Scatterplot Investigation (Criterion B):** Scholars investigate a relationship of their choosing to see if an association exists (i.e. height and shoe size). They collect data and represent it in a table and using a scatterplot. Scholars then describe in writing, if there is a relationship between the two quantities. They can verify their relationship by approximating a measure on another individuals (i.e. an NBA player) and may calculate the percent error from their approximation.	• *McGraw Hill* Chapter 9 • Read to Learn: MAD (Blackboard)

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7 Lessons **May 5– May 22**	**Unit 7: Financial Literacy** *In Unit 7, review differences between simple and compound interest. The unit also includes financial concepts involving loans, interest rates, investments and college finances.* • Calculate simple and compound interest • Compare the effect of interest rates and length of a loan on the total cost of a loan • Discuss the benefits of various investments and compare investments to the cost of college ○ Explain how investments grow over time ○ Devise a savings plan for attending at least one year of college	8.12A 8.12C **8.12D** 8.12G *Bold = Readiness*	**Global Context** Personal and Cultural Expression **Key Concept** Logic **Related Concepts** Quantity Change System **Statement of Inquiry** Actions taken in the present will impact your options in the future	**Unit test (Criterion A)** **Recurring Performance Assessment (RPA) – Mandatory Uplift RPA scholar deadline during this unit.** **RPA: College and Career Project (Criterion C and D):** Scholars research college and the associated costs to attend. Then scholars will research and decide on both a college-required and noncollege-required career. Scholars will then create a written-piece of work describing the college and careers in addition to their rationale and mathematical reasoning for the path they hope to take.	• *McGraw Hill* Chapter 10 • http://bizworld.org/ • RTC department • Rice University RUSMP resources

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Appendix A:

MYP MATH OBJECTIVES – YEAR 3			
Criterion A: Knowing and Understanding	**Criterion B: Investigating Patterns**	**Criterion C: Communicating**	**Criterion D: Applying mathematics in real-life contexts**
i. **select** appropriate mathematics when solving problems in both familiar and unfamiliar situations	i. **select** and **apply** mathematical problem-solving techniques to discover complex patterns	i. **use** appropriate mathematical language (notation, symbols and terminology) in both oral and written explanations	i. **identify** relevant elements of authentic real-life situations
ii. **apply** the selected mathematics successfully when solving problems	ii. **describe** patterns as relationships and/or general rules consistent with findings	ii. **use** different forms of mathematical representation to present information	ii. **select** appropriate mathematical strategies when solving authentic real-life situations
iii. **solve** problems correctly in a variety of contexts.	iii. **verify** and **justify** relationships and/or general rules.	iii. **move** between different forms of mathematical representation	iii. **apply** the selected mathematical strategies successfully to reach a solution
		iv. **communicate** complete and coherent mathematical lines of reasoning	iv. **explain** the degree of accuracy of a solution
		v. **organize** information using a logical structure.	v. **explain** whether a solution makes sense in the context of the authentic real-life situation.

Reporting Categories are based on the STAAR Grade 8 Mathematics Blueprint. Highlighted TEKS are aligned with STAAR Readiness assessed curriculum.

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8th Grade TEKS						
Mathematical Process Standards						
8.1A – apply mathematics to problems arising in everyday life, society, and the workplace	8.1B – use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem solving process and the reasonableness of the solution	8.1C – select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems	8.1D – communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate	8.1E – create and use representations to organize, record, and communicate mathematical ideas	8.1F – analyze mathematical relationships to connect and communicate mathematical ideas	8.1G – display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication
Reporting Category 1: Numerical Representations and Relationships						
8.2A – Extend previous knowledge of sets and subsets using a visual representation to describe relationships between sets of real numbers.				8.2C – Convert between standard decimal notation and scientific notation.		
8.2B – Approximate the value of an irrational number, including π and square roots of numbers less than 225, and locate that rational number approximation on a number line.				**8.2D – Order a set of real numbers arising from mathematical and real-world contexts.**		
Reporting Category 2: Computations and Algebraic Relationships						
8.4A – Use similar right triangles to develop an understanding that slope, m, given as the rate comparing the range in y-values to the change in x – values, $(y2 – y1)/(x2-x1)$, is the same for any two points $(x1, y1)$ and $(x2, y2)$ on the same line.				**8.5G – Identify functions using sets of ordered pairs, tables, mappings, and graphs.**		
8.4B – Graph proportional relationships, interpreting the unit rate as the slope of the line that models the relationship.				8.5H – Identify examples of proportional and non-proportional functions that arise from mathematical and real-world problems.		
8.4C – Use data from a table or graph to determine the rate of change or slope and y-intercept in mathematical and real-world problems.				**8.5I – Write an equation in the form y = mx + b to model a linear relationship between two quantities using verbal, numerical, tabular, and graphical representations.**		
8.5A – Represent linear proportional situations with tables, graphs, and equations in the form of y=kx.				8.8A – Write one-variable equations or inequalities with variables on both sides that represent problems using rational number coefficients and constants.		
8.5B – Represent linear non-proportional situations with tables, graphs, and equations in the form of y=mx+b, where b ≠ 0.				8.8B – Write a a corresponding real-world problem when given a one-variable equation or inequality with variables on both sides of the equal sign using rational number coefficients and constants.		
8.5E – Solve problems involving direct variation.				**8.8C – Model and solve one-variable equations with variables on both sides of the equal sing that represent mathematical and real-world problems using rational number coefficients and constants.**		
8.5F – Distinguish between proportional and non-proportional situations using tables, graphs, and equations in the form y=kx or y=mx+b, where b≠0.				8.9A – Identify and verify the values of x and y that simultaneously satisfy two linear equations in the form y=mx+b from the intersections of the graphed equations.		
Reporting Category 3: Geometry and Measurement						
8.3A – Generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation.				**8.7C – Use the Pythagorean theorem and its converse to solve problems.**		

8.3B – Compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane.	8.7D – Determine the distance between two points on a coordinate plane using the Pythagorean Theorem.
8.3C – Use an algebraic representation to explain the effect of a given positive rational scale factor applied to two-dimensional figures on a coordinate plane with the origin as the center of dilation.	8.8D – Use informal arguments to establish facts about the angle sum and exterior angle of triangles, the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.
8.6A – Describe the volume formula V = Bh of a cylinder in terms of its base area and its height.	8.9A – Identify and verify the values of x and y that simultaneously satisfy two linear equations in the form y=mx+b from the intersections of the graphed equations.
8.6C – Use models and diagrams to explain the Pythagorean Theorem.	8.10A – Generalize the properties of orientation and congruence of rotations, reflections, translations, and dilations of two-dimensional shapes on a coordinate plane.
8.7A – Solve problems involving the volume of cylinders, cones, and spheres.	8.10B – Differentiate between transformations that preserve congruence and those that do not.
8.7B – Use previous knowledge of surface area to make connections to the formulas for lateral and total surface area and determine solutions for problems involving rectangular prisms, triangular prisms, and cylinders.	**8.10C – Explain the effect of translations, reflections over the x- or y- axis, and rotations limited to 90°, 180°, 270°, and 360° as applied to two-dimensional shapes on a coordinate plane using an algebraic representation.**
	8.10D – Model the effect on linear and area measurements of dilated two-dimensional shapes.
Reporting Category 4: Data Analysis and Personal Financial Literacy	
8.5C – Contrast bivariate sets of data that suggest a linear relationship with bivariate sets of data that do not suggest a linear relationship from a graphical representation.	8.12A – Solve real-world problems comparing how interest rates and loan length affect the cost of credit.
8.5D – Use a trend line that approximates the linear relationship between bivariate sets of data to make predictions.	8.12C – Explain how small amounts of money invested regularly, including money saved for college and retirement, grow over time.
8.11A – Construct a scatterplot and describe the observed data to address questions of association such as linear, non-linear, and no association between bivariate data.	**8.12D – Calculate and compare simple interest and compound interest earnings.**
8.11B – Determine the mean absolute deviation and use this quantity as a measure of the average distance data are from the mean using a data set of no more than 10 data points.	8.12G – Estimate the cost of a two year and four year college education, including family contribution, and devise a periodic savings plan for accumulating the money needed to contribute to the total cost of attendance of at least the first year of college.