This course supports the assessment for DMT1/2. The course covers 4 competency and represents 2 competency units.

Introduction

Overview
The history of mathematics is long, varied, rich, and detailed. Throughout this course, as you engage in the readings and interact with fellow students studying this material, be thinking about how you can make the material your own. That is, how can you incorporate the details into lesson plans so as to contextualize the topics you present to your own students? What sorts of activities might you develop and include that can allow your students to engage in these materials in a meaningful way? Share your ideas with others via the message board. Respond to the questions you find posed there or post your own. Record your reflections and reactions to the material in your study notebook or in the "Notes" section of the web-enabled course. By inserting some relevant mathematics history into your lesson plans, you will be able to breathe life into them, lend context, and motivate your lessons. These skills will serve you well upon entry into a math classroom of your own.

Prior to starting, you should carefully read through the requirements of each section to acquire an overview of what is expected of you. Such an overview will ensure that you are prepared for the PCE during the last section of the course. Upon completing DMT1/DMT2, if you are an initial licensure student entering demonstration teaching, you will need to create a unit plan called a Teacher Work Sample (note that MAME students will not.) The knowledge and many of the skills acquired during the last section of the course will be essential for the creation and implementation of this unit plan while in demonstration teaching. Although you are essentially creating one lesson to be implemented in the classroom for the last section, all of the requirements associated with the completion of this task can be thought of as a mini-Teacher Work Sample.

Competencies
This course provides guidance to help you demonstrate the following 4 competencies:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction.
- **Competency 602.1.5: Instructional Materials Development**
  The graduate creates appropriate instructional materials.
- **Competency 602.3.20: Assessment Administration**
  The graduate administers a variety of assessments to measure student achievement and to evaluate instructional effectiveness.
- **Competency 603.2.3: Teacher Work Sample**
  The graduate provides credible evidence of successful implementation of a two-week standards-based instructional unit.

Teaching Dispositions Statement
Please review the [WGU Statement of Teaching Dispositions](#).
Course Mentor Assistance
As you prepare to successfully demonstrate competency in this subject, remember that course mentors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course mentors are excited to hear from you and eager to work with you.

Successful students report that working with a course mentor is the key to their success. Course mentors are able to share tips on approaches, tools, and skills that can help you apply the content you're studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don't work out on your first try, course mentors act as a support system to guide you through the revision process. You should expect to work with course mentors for the duration of your coursework, so you are welcome to contact them as soon as you begin. Course mentors are fully committed to your success!

Preparing for Success

The information in this section is provided to detail the resources available for you to use as you complete this course.

Learning Resources
The learning resources listed in this section are required to complete the activities in this course. For many resources, WGU has provided automatic access through the course. However, you may need to manually enroll in or independently acquire other resources. Read the full instructions provided to ensure that you have access to all of your resources in a timely manner.

Purchase Learning Resources

Listed below are the learning resource materials you will need to obtain.

Textbooks
Purchase the following textbooks:


*Note: The WGU Bookstore has this book available for immediate purchase and delivery. You may shop at other online bookstores, but be sure to order early and use the correct ISBN to get the correct edition.*

Other Learning Resources

You will use the following learning resources for this course.
Diverse (Non-Western) Cultures' Contributions to Discrete Mathematics

Many diverse cultures have contributed to the development of mathematics over time. During this subject, you will learn about the world of discrete mathematics. The mathematics topics that arise in this branch of mathematics include

- logic,
- set theory,
- number theory,
- combinatorics,
- graph theory,
- algorithmics,
- information theory,
- computability and complexity theories,
- probability theory, and
- Markov chains.

In short, discrete math is all around you every day, even though you may not be aware of it. At the end of this section, you will need to be able to use the prescribed lesson plan template to create an original lesson plan to describe the historical development of selected discrete mathematics topics.
Discrete mathematics deals with mathematical systems or structures that are fundamentally discrete. In other words, the systems and structures are not continuous but, rather, are finite in nature. The primary focus with discrete mathematics is on studying those elements of mathematics that are countable.

Ancient Origins of Mathematics
Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own.

This topic addresses the following competency:

- Competency 602.5.1: Teaching Methods-Mathematics (Secondary)
  The graduate provides effective, research-based mathematics instruction.

Numeral Systems
Read through chapter 1 in *An Introduction to the History of Mathematics* to acquire an understanding of

- primitive counting practices,
- number bases,
- finger numbers and written numbers,
- simple and multiplicative grouping systems,
- ciphered numeral systems,
- positional numeral systems,
- early computing practices,
- the Hindu-Arabic numeral system, and
- arbitrary base systems.

Upon a review of these sections, you should reflect upon the differences between how you currently think about numbers, the process of counting, and the ancient origins of these concepts. It is important to realize that the current perspective has gone through an evolutionary process that spans hundreds of years. How could knowledge of these ancient counting practices enrich the modern mathematics curriculum?

Reflect upon the changes that have occurred over time. Record your reflections in your study notebook or post them to the message board.

Babylonian and Egyptian Mathematics
Read through chapter 2 in *An Introduction to the History of Mathematics* to acquire an understanding of how the Babylonians and Egyptians perceived selected areas of mathematics.
These cultures used mathematics to generate many architectural and agricultural creations that have yet to be fully understood. What are some differences and similarities between how the Babylonians and the Egyptians counted and performed simple arithmetic operations? Are there mathematical insights that you can glean from their way of thinking?

Reflect upon the changes that have occurred over time. Record your reflections in your study notebook or post them to the message board.

**Mathematics History and Pedagogy**

You will explore the role that selected history of mathematics topics should play in the curriculum. Being able to bring in the historical development of these topics will allow you to contextualize the topic for your students. It will also allow you to motivate and inspire your students.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction.

**Mathematics Education and the History of Mathematics**

Read through the “Can Mathematics Education and History of Mathematics Coexist?” article and reflect upon whether or not mathematics and the history of mathematics can coexist within pedagogy.

Think about the role that mathematics history should play in mathematics education. Do you think that teaching selected topics from the history of mathematics has value in the modern mathematics curriculum? If so, how much time should you commit to the teaching of such topics?

Reflect upon these questions. Record your reflections in your study notebook or post them to the message board.

**Construction of Lesson Plan Framework**

The lesson plan construction for this section will require you to

- identify the lesson title, purpose, and objectives;
- discuss a selected contribution from a diverse (non-Western) culture and explain how this culture used this aspect of mathematics;
- provide instructional procedures (i.e., script or description of class participation); and
- discuss the implications that these contributions have had on modern mathematics.

The selected contribution should focus on a specific topic that led to the historical development of the branch of mathematics called discrete mathematics. The activities in this topic should
help you construct the framework for this lesson.

Note: The websites listed in this topic will be referenced throughout this course. It is a good idea to bookmark them or add them to the favorites list in your web browser.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction.

**Non-Western Cultures Identification**

Review the following website:

- [Understanding Non-Western Cultures](#)

Explore which cultures are classified as *non-Western*. This classification is not always straightforward and may change over time. Which cultures are classified as *non-Western*? Which cultures would you classify as *Western*? Armed with this information, you will be able to move on to the next activity.

Reflect upon the differences found in various cultures. How have those differences influenced the development of mathematics over time? Record your reflections in your study notebook or share them on the message board.

**Lesson Plan Topic**

Review the following website:

- [The MacTutor History of Mathematics Archive](#)

The provided link leads to the MacTutor History of Mathematics Archive. You should explore potential discrete mathematics topics for your lesson plan by accessing the provided indexes, which include

- birthplaces,
- anniversaries for the year,
- chronologies,
- timelines,
- quotations, and
- mathematical societies.

This site is used as a reference for many of the tasks you are required to complete in this
assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, discrete mathematics), and visit those sites which appear to be most related.

Reflect upon the contributions of the mathematicians outlined at this site. Record your reflections in your study notebook or post them to the message board.

Further Refinement of Lesson Plan Topic

Review the following website:

- **BSHM**

The provided link leads to the British Society for the History of Mathematics website, which includes additional resources to help you identify a relevant topic for your lesson plan. The contents are organized according to general sites, web resources, biographies, regional mathematics, museums with mathematics exhibits, special exhibits, online books and articles, student presentations, bibliography, societies, journals, philosophies of mathematics, history of statistics, history of computing, education, and miscellaneous.

This site is used as a reference for many of the tasks you are required to complete in this assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, discrete mathematics), and visit those sites which appear to be most related.

As you explore some of the sites you see listed on the website, keep track of and describe those which you find especially helpful. Record them in your study notebook or post them to the message board.

**Mathematical Association of America: Modern Mathematics**

Review the following website:

- **MAA**

You will need to make relevant connections between your chosen history of mathematics topic and modern mathematics. Since there are numerous ways in which you can approach this topic, there is not one authoritative source that can address all of your needs. For that reason, the website for the Mathematics Association of America has been provided. This is one of the largest professional societies that provides many up-to-date mathematics resources to both undergraduate and graduate students.

For the chosen topic, you should perform a search using this website to identify up-to-date
information to help you start to make connections between your chosen topic and how your topic plays a role in modern mathematics. Go to the "Search MAA" section, type in an appropriate search topic, and then click "Go." The results of your search should identify many relevant starting points to make the aforementioned connections.

Reflect upon what content might be relevant to a lesson on a discrete math topic. What sorts of activities might you design to include in such a lesson? Record your reflections in your study notebook or post them to the message board.

**Lesson Plan Construction**

Now that you have reached this point in this course, it is time to apply the knowledge you have acquired by drafting a response to task 602.5.1-07, part 1. Carefully read through the given task directions. Be sure to address each of the parts of the prompt.

Being able to bring in the historical development of topics will allow you to contextualize the topic for your students. By contextualizing your lesson topic, you will also be able to motivate and inspire your students.

**Complete: Task 602.5.1-07, Part 1 Performance Task**

Complete the following task in [TaskStream](#):

- STP: Math History and Contributions: Task 602.5.1-07, Part 1

For details about this performance assessment, see the "Assessment" tab in this course.

You will then need to

- identify the lesson title, purpose, and objectives;
- discuss a selected discrete mathematics contribution from a diverse (non-Western) culture and explain how this culture used this aspect of mathematics;
- provide instructional procedures (i.e., script or description of class participation); and
- discuss the implications that these contributions have had on modern mathematics.

Be sure to include substantial supporting detail in each of the areas found in the lesson plan template.

**Diverse (Non-Western) Cultures' Contributions to Measurement and Measurement Systems**
There is a rich history behind many of the questions that are taken for granted today, such as:

- How long is this object?
- How much does it weigh?
- How long does this process take?
- How much energy does it take to run a particular process?
- What are standards for measurement?

You are probably most familiar with measurement systems that include the metric system and U.S. customary units. At the end of this section, you will need to be able to use the prescribed lesson plan template to create an original lesson plan to describe the historical development of the selected measurement and measurement systems.

Measurement and measurement systems is a branch of mathematics that deals with the methods that are used to quantify "how much of something" you have. This branch of mathematics includes the development of a variety of ways to quantify length, area, volume, mass, weight, time, energy, work, torque, etc. Measurement and measurement systems is a branch of mathematics that is probably one of the most important since you use it in your daily life. It is the one that has direct relevance in helping to answer the most fundamental of daily questions.

**Algebraic Geometry and Measurement**

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Presented in this topic are several chapters to read and an e-reserve article to use as a reference. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction.

**Pythagorean Mathematics**

Read through chapter 3 in *An Introduction to the History of Mathematics* to acquire an understanding of the origins of Pythagorean mathematics. An understanding of the historical origins of this area of mathematics will provide a framework upon which you can build when exploring the historical development of relevant geometric measurement and algebraic geometry concepts.

In the absence of the algebraic notation that you use today, how were numbers represented by lengths or measures to solve mathematics problems of historical relevance? Record your thoughts, reflections, and ideas for potential lesson plan activities in your study notebook or record your responses in the online "Notes" section of the web-enabled course.
Reflect upon what content might be relevant to a lesson on geometry or measurement. What sorts of activities might you design to include in such a lesson? Record your reflections in your study notebook or post them to the message board.

**Duplication, Trisection, and Quadrature**

Read through chapter 4 in *An Introduction to the History of Mathematics* to acquire an understanding of the origins of some well-known geometry, algebra, and measurement problems, including

- duplication of a cube,
- trisection of an angle,
- quadrature of a circle, and
- chronology of ?

An understanding of the historical origins of these types of problems will provide a framework upon which you can build when you are exploring possible non-Western contributions to the understanding of similar problems.

From a historical standpoint, what was the logic that was employed to explore the duplication of a cube and the trisection of an angle? Record your response in your study notebook or post it to the message board for this topic.

**Mathematics History and Pedagogy**

You will explore the role that selected mathematics history topics should play in the curriculum. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  
  The graduate provides effective, research-based mathematics instruction.

**Mathematics Education and the History of Mathematics**

Read through the "World Histories: Melding Mathematics and Meanings" article in the WGU Library E-Reserves and reflect upon ways teachers can integrate the history of mathematics into instruction across mathematics content areas.

Can you think of ways that this article can help you integrate selected mathematics content into your lesson plans that will be constructed over the next few weeks? Record your thoughts,
reflections, and ideas for potential lesson plan activities in your study notebook or record your ideas in the online "Notes" section of the web-enabled course.

Construction of Lesson Plan Framework

Please review the following websites:

- Mathematical Association of America
- British Society for the History of Mathematics
  This site is used as a reference for many of the tasks you are required to complete in this assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, measurement and measurement systems), and visit those sites which appear to be most related.
- MacTutor History of Mathematics Archive
  This site is used as a reference for many of the tasks you are required to complete in this assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, measurement and measurement systems), and visit those sites which appear to be most related.
- Non-Western Cultures

The lesson plan construction for this section will require you to

- identify the lesson title, purpose, and objectives;
- discuss a selected contribution from a non-Western culture and explain how this culture used this aspect of mathematics;
- provide instructional procedures (i.e., script or description of class participation); and
- discuss the implications that these contributions have had on modern mathematics.

The selected contribution should focus on a specific topic that led to the historical development of measurement and measurement systems. The following activities should help you construct the framework for this lesson.

Refer to the websites listed above, but this time, explore links for measurement and measurement systems, as needed.

Now that you have reached this point in this course, it is time to apply the knowledge you have acquired by drafting a response to task 602.5.1-07, part 2. Carefully read through the given task directions. Being able to bring in the historical development of these topics will allow you to contextualize the topic for your students. It will also allow you to motivate and inspire your students.
Complete: Task 602.5.1-07, Part 2 Performance Task

Complete the following task in TaskStream:

- STP: Math History and Contributions: Task 602.5.1-07, Part 2

For details about this performance assessment, see the "Assessment" tab in this course.

For this task, first download the lesson plan template found at the bottom of the task prompt.

You will then need to

- identify the lesson title, purpose, and objectives;
- discuss selected measurement and measurement systems contributions from a diverse (non-Western) culture and explain how this culture used this aspect of mathematics;
- provide instructional procedures (i.e., script or description of class participation); and
- discuss the implications that these contributions have had on modern mathematics.

Be sure to include substantial supporting detail in each of the areas found in the lesson plan template.

Diverse (Non-Western) Cultures' Contributions to Number and Number Systems; Algebra; Euclidean and Non-Euclidean Geometries; Calculus; and Statistics and Probability

You will need to be able to use a prescribed lesson plan template to create an original lesson plan to describe the historical development of a selected number and number systems; algebra; Euclidean and non-Euclidean geometries; calculus; or statistics and probability topic.

Note: You need to create a lesson plan that deals with one topic, not all five topics, as per the task directions in TaskStream.

Mathematics is an immense field containing many branches. During this section of the course, you will explore the historical development of a selected topic from one of five branches of mathematics, which are briefly described below.

Number and Number Systems
Number and number systems is a branch of mathematics that deals with the study of how you use numbers to achieve certain goals. The set of real numbers is a number system composed of a collection of subsets that include the set of all natural numbers, whole numbers, integers, rational numbers, and irrational numbers. Reflect upon the following questions:

- What is a number?
- What is a number system?
- How many number systems can you describe?
- How many relationships can you identify between various number systems?
- How is a number system constructed?
- Where do irrational numbers come from?
- What is the relationship between the complex number system and the real number system?
- Was this number system structure and the existing relationships always understood?
- What are some other number systems?
- Is it possible to identify all possible prime numbers?

These are just a few of the questions that have relevance in this branch of mathematics. Write your answers to these questions in your study notebook.

**Algebra**

Algebra is a branch of mathematics that deals with a variety of constructs that allow you to manipulate numbers and symbols in prescribed ways. For instance, the development of such algebraic constructs as the group, ring, and field allow you to function in the mathematics classroom. Without such constructs, you would not have mathematics as you know it today. Reflect upon the following questions:

- Why is the group concept important when constructing numbers systems?
- Can you have a number system without satisfaction of the closure property?
- Why is the field concept important when you factor polynomials?
- In what ways can you use groups, rings, and fields to better understand the concepts found in other branches of mathematics (i.e., geometry or topology)?

These are just a few of the questions that have relevance in this branch of mathematics. Write your answers to these questions in your study notebook.

**Euclidean Geometry**

Euclidean geometry deals with a mathematical system that is attributed to the Greek mathematician Euclid of Alexandria. Euclid's text, *Elements*, is considered by many as the first systematic discussion of geometry. This system is based upon a small set of axioms (postulates) that are used to prove a collection of propositions (theorems). The essential difference between Euclidean and non-Euclidean geometry resides in the application of Euclid's fifth postulate. As you explore different non-Euclidean geometries, attempt to contrast their findings with those found in Euclidean geometry. For instance, the sum of interior angles in a
given triangle within hyperbolic or spherical geometry (non-Euclidean geometries) is not 180 degrees. There are many differences, which are interesting and also thought provoking. Write your thoughts about this topic in your study notebook.

**Calculus**

Calculus is a branch of mathematics that is often used to study the change in processes or systems. This branch can be further broken down into areas that deal with differential calculus and integral calculus. Applications of calculus can be found in the fields of physics, engineering, medicine, biology, etc. Some of the questions that arise in this branch of mathematics include the following:

- What is the slope of the tangent line to a given point on a curve?
- How do you mathematically define continuity at a point on a curve?
- Where did the fundamental theorem of calculus come from? Why is it important?
- How do you find the true area under a curve?
- What is the relevance of the mean value theorem for differentiation and integration in the field of mathematics?

**Statistics and Probability**

Statistics and probability are two branches of mathematics. Statistics is a branch of mathematics that deals with the collection, analysis, interpretation, explanation, and presentation of data. This branch can be further broken down into areas that deal with descriptive statistics, inferential statistics, and mathematical statistics.

Probability is the branch of mathematics that attempts to make predictions with regard to the chance or likelihood that a particular outcome or set of outcomes will occur or not occur. This branch can be further broken down into areas that deal with theoretical probability and experimental probability.

The questions that arise in both branches of mathematics involve a central theme. How can you use mathematics to analyze and describe a system under study with the intent of making predictions regarding future events? What is the truth as it pertains to the system that you are studying?

You should explore the activities shown in this section with the intent of selecting one relevant historical development from one of these branches of mathematics. It is not expected that you complete all of the available activities. Only engage in those activities most closely aligned with your chosen topic. You should attempt to immerse yourself in each activity to acquire a sufficient familiarity with the content so that your choice of topic is an informed one.
Number and Number Systems

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction

Numbers and Number Theory Index

Review the following website:

- **History Topics: Numbers and Number Theory Index**

At the website listed above, you should explore a variety of mathematics history topics that are relevant to the historical development of numbers and number systems. Some of these topics will be listed according to culture (i.e., Arabic, Babylonian, Egyptian, Greek, Inca, Indian, or Mayan) or by subject (e.g., Fermat's last theorem, perfect numbers, prime numbers, history of zero, history of pi, the golden ratio, the number e, Pell's equation, infinity, etc.).

You should focus on the selection of a relevant topic by culture or subject and follow the historical development of the selected topic. Such an exploration should lead to the identification of additional references, thereby leading to a further in-depth exploration of the selected topic. Which topic do you find interesting and relevant to modern mathematics?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook. When might you include some history of math in a lesson plan of your own?

Algebra

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own. As you engage in the material in this topic, think about how you might go about incorporating this math history into your lesson plans.

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction

Chinese, Hindu, and Arabian Mathematics
Review chapter 7 in *An Introduction to the History of Mathematics* to acquire an appreciation for some relevant developments in selected non-Western cultures. What are some relevant mathematics contributions made by the Chinese, Hindu, and Arabian cultures?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook. When might you include some history of math in a lesson plan of your own?

**Algebra Index**

Review the following website:

- [History Topics: Algebra Index](#)

You should explore a variety of mathematics history topics that are relevant to the historical development of algebra. These topics will be listed by subject (i.e., the abstract group concept; abstract linear spaces; fundamental theorem of algebra; matrices and determinants; quadratic, cubic, and quartic equations; history of set theory; history of the Burnside problem; ring theory; etc.).

You should focus on selecting a relevant topic by culture or subject and follow the historical development of the selected topic. Such an exploration should lead to the identification of additional references, thereby leading to a further in-depth exploration of the selected topic. Which topic do you find interesting and relevant to modern mathematics?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.

**Euclidean Geometry**

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own. As you engage in the material in this topic, think about how you might go about incorporating this math history into your lesson plans. When might it be appropriate to do so?

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction

**Euclid's Elements**

Review chapter 5 in *An Introduction to the History of Mathematics* to acquire an appreciation for some of the very early developments that led to the development of Euclid's *Elements* and other works.
As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.

**Greek Mathematics After Euclid**

Read through chapter 6 in *An Introduction to the History of Mathematics* to acquire an appreciation for some of the very early developments in Greek mathematics after the time of Euclid.

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.

**Non-Euclidean Geometry**

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own. Non-Euclidean geometry presents a very different way to look at the world than you have seen to date. Pay particular attention to what it is that differentiates Euclid's view of geometry from that of other possible systems. Can you put these differences into your own words?

This topic addresses the following competency:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction

**Non-Euclidean Geometry Introduction**

Review the following website:

- **NonEuclid**

Explore the introductory topics and activities that are provided on this website. After clicking on the above link, go to the bottom of the page to the "Contents" section and select from the available topics, which include a discussion of what non-Euclidean geometry is, a variety of non-Euclidean geometries (i.e., hyperbolic geometry), and some interactive activities that will allow you to perform geometric constructions in non-Euclidean geometries. Can you construct a triangle in hyperbolic geometry?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook. Can you explain some of the differences between Euclidean and non-Euclidean geometries in your own words?
**Brief History of Non-Euclidean Geometry**

Read through the "A Brief History of Non-Euclidean Geometry" in the WGU Library E-Reserves article to review a brief history of non-Euclidean geometry. What have you learned as a result of reading this article?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.

**Non-Euclidean Geometry**

Review the following website:

- Non-Euclidian Geometry

You should explore the introductory topics as they pertain to the history of non-Euclidean geometry. If a further exploration of these topics is desired, there are many additional references that are provided on this website. Which topic do you find interesting and relevant to modern mathematics?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.

**Calculus**

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own. As you engage in the material in this topic, think about how you might go about incorporating this math history into your lesson plans.

This topic addresses the following competency:

- Competency 602.5.1: Teaching Methods-Mathematics (Secondary)
  The graduate provides effective, research-based mathematics instruction

**History of the Calculus**

Read through the "The History of the Calculus" article in the WGU Library E-Reserves to review a brief history of calculus. What have you learned as a result of reading this article?

As you engage in the material, think about what you consider to be the most interesting fact(s) presented. Record your reflections in your study notebook.
Calculus and Related Topics

Read through chapter 11 in *An Introduction to the History of Mathematics* to acquire an understanding of

- Zeno's paradoxes,
- Eudoxus' method of exhaustion,
- Archimedes' method of equilibrium,
- the beginnings of the theory of integration into Western Europe,
- Cavalieri's method of indivisibles, and
- the contributions of Newton and Leibniz to the development of calculus.

Upon a review of these sections, you should acquire an appreciation for some of the very early developments that led to the creation of calculus. As you engage in the material, think about how you might incorporate this math history into your lesson plans.

History of Calculus

Review the following website:

- [A History of the Calculus](#)

You should explore a variety of mathematics history topics that were relevant to the historical development of calculus. The topics are listed according to the individual who made the contribution (i.e., Zeno of Elea, Archimedes, Fermat, etc.). Such an exploration should lead to the identification of additional references, thereby leading to a further in-depth exploration of the selected topic that will be used in your lesson plan. Which topic do you find interesting and relevant to modern mathematics?

As you engage in the material, think about how you might incorporate this math history into your lesson plans.

Statistics and Probability

Prior to constructing any lesson focusing on a selected topic in the history of mathematics, it is important to review the relevant literature. Via the message board, interact with other students that are studying this topic. See what others have written, post responses to questions posed, or ask questions of your own. As you engage in the material, think about how you might go about incorporating this math history into your lesson plans.

This topic addresses the following competency:
• Competency 602.5.1: Teaching Methods-Mathematics (Secondary)
The graduate provides effective, research-based mathematics instruction

History of Statistics and Probability

Please review the following website:

• **History of Statistics and Probability**

You should explore a variety of mathematics history topics that were relevant to the historical development of statistics and probability by using this website. The topics on the website are listed according to the individual who made the contribution (i.e., Mahalanobis, Quetelet, Bayes, etc.). Your exploration should lead you to identifying additional references and to a further in-depth exploration of the selected topic that will be used in your lesson plan. Which contribution do you find interesting and relevant to modern mathematics?

As you engage in the material, think about how you might incorporate this math history into your lesson plans.

Figures From the History of Statistics and Probability

Please review the following website:

• **Figures From the History of Statistics and Probability**

This website provides additional information with regard to those individuals who made substantial contributions to the historical development of statistics and probability. The topics on this website are listed according to the individual who made the contribution (i.e., Gauss, de Moivre, Chebyshev, Bayes, etc.). Your exploration should lead you to identifying additional references and to a further in-depth exploration of the selected topic that will be used in your lesson plan. Which contribution do you find interesting and relevant to modern mathematics?

As you engage in the material, think about how you might incorporate this math history into your lesson plans.

Construction of Lesson Plan Framework

Review the following websites:

• **Mathematical Association of America**
• **British Society for the History of Mathematics**

_This site is used as a reference for many of the tasks you are required to complete in this assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, you have several from which to choose), and visit those sites which appear to_
be most related.

- MacTutor History of Mathematics Archive

This site is used as a reference for many of the tasks you are required to complete in this assessment. You are encouraged to explore the site, which contains descriptions of other sites that are linked to via this site. Keep in mind the topic you are researching (in this case, you have several from which to choose), and visit those sites which appear to be most related.

Refer to the websites listed above, but this time, explore links for number and number systems, algebra, Euclidean and non-Euclidean geometries, calculus, and probability and statistics, as needed.

Now that you have reached this point in this course, it is time to apply the knowledge you have acquired by drafting a response to task 602.5.1-07, part 3. Carefully read through the given task directions. Being able to bring in the historical development of these topics will allow you to contextualize the topic for your students. It will also allow you to motivate and inspire your students.

Task 602.5.1-07, Part 3 Performance Task

Complete the following task in TaskStream:

- STP: Math History and Contributions: Task 602.5.1-07, Part 3

For details about this performance assessment, see the "Assessment" tab in this course.

You will then need to

- identify the lesson title, purpose, and objectives;
- discuss selected number and number systems; algebra; Euclidean and non-Euclidean geometries; calculus; or statistics and probability contributions from a diverse (non-Western) culture and explain how this culture used this aspect of mathematics;
- provide instructional procedures (i.e., script or description of class participation); and
- discuss the implications that these contributions have had on modern mathematics.

Be sure to include substantial supporting detail in each of the areas found in the lesson plan template.
Pre-Clinical Experience

At this point, you need to reflect upon the previous sections of the course and use a prescribed lesson plan template and format to create an original and relevant lesson that emphasizes the contributions of diverse (non-Western) cultures to a selected area of mathematics within the framework of a pre-clinical experience. Since the created lesson plan will be presented in a pre-clinical experience, it is very important that you work with the teacher(s) who will be supervising this experience during your lesson plan construction.

Remember that the lessons created during the previous sections were focused on the requirements set forth in the corresponding tasks. It is important that you create an original lesson plan that incorporates some of the most relevant elements from one or more of these prior lessons. The final lesson you use in the classroom should be developed from scratch to meet the unique and diverse learning styles and needs of the students you will be working with.

During this section, the provided activities review current foundational education and mathematics education concepts to help you with the reflection process and the creation of the target lesson plan for the upcoming pre-clinical experience.

Note: Later in your program, initial licensure students entering demonstration teaching will need to create a unit plan called a Teacher Work Sample, where the knowledge and many of the skills acquired during this section will be essential for the creation and implementation of the Teacher Work Sample while in demonstration teaching. Although you are essentially creating one lesson to be implemented in the classroom, all of the requirements associated with the completion of this task can be thought of as a mini-Teacher Work Sample.

Constructivism, Pedagogy, the Learning Process, and Mathematics Education

You will engage in a pre-clinical experience, which will include:

- appropriate professional communications with representatives from the school that you will be working in;
- reflective activities as they pertain to classroom observations; and
- the use of a prescribed lesson plan format to create an original and relevant lesson that emphasizes the contributions of non-Western cultures to a selected area of mathematics within the framework of a pre-clinical experience.

Prior to engaging in the activities in this section, you should carefully review the directions for task 602.5.1-07, part 4. As you engage in each of the following activities, attempt to answer each of the posed questions (e.g., What is the role of prior belief in acquiring new knowledge?) and then make relevant connections to the lesson that you are constructing for this section.
(e.g., Which perquisite skills are important for your students to have? How do you plan to infuse in your lesson ways to address these most essential skills?). The purpose of the activities in this section is to refine your understanding of the best mathematics pedagogy practices to use in diverse classroom settings by using a research-driven, constructivism theoretical framework.

This topic addresses the following competencies:

- **Competency 602.5.1: Teaching Methods-Mathematics (Secondary)**
  The graduate provides effective, research-based mathematics instruction.

- **Competency 602.1.5: Instructional Materials Development**
  The graduate creates appropriate instructional materials.

- **Competency 602.3.20: Assessment Administration**
  The graduate administers a variety of assessments to measure student achievement and to evaluate instructional effectiveness.

- **Competency 603.2.3: Teacher Work Sample**
  The graduate provides credible evidence of successful implementation of a two-week standards-based instructional unit.

**Lev Vygotsky (1896-1934), Part 1**

Review the following website:

- **Lev Vygotsky**

The website listed above will allow you to explore and review the contributions of Lev Vygotsky. You have access to biographical information, theories, relevant information for teachers, connections of Vygotsky’s work to best teaching practices, and a variety of other useful resources. Vygotsky provided a theoretical pedagogical framework where social interaction plays a fundamental role in cognition. This theoretical framework can be very helpful when teaching children how to construct target understandings within selected social dynamics.

- How can teachers construct a classroom dynamic so that it promotes effective student-to-student and student-to-teacher communications?
- How can teachers construct lesson plans where students construct their own understanding of content via social interactions?

You should be thinking about the classroom that you will be doing your pre-clinical experience in. In what ways can you use this information to create a lesson plan suitable for the children you will be working with?

**Lev Vygotsky (1896-1934), Part 2**

Review the following website:
The Virtual Faculty's Second Project

The website listed above will allow you to explore and review the contributions of Lev Vygotsky. You have access to selected faculty publications, which allow you to further explore the central concepts in education.

- What are higher and lower mental functions?
- What is the zone of proximal development?
- What is the role of culture in the Vygotskian-informed psychology?

You should be thinking about the classroom that you will be doing your pre-clinical experience in. In what ways can you use this information to create a lesson plan suitable for the children you will be working with?

Constructivism and Education

Read through the "Constructivism and Education: Misunderstandings and Pedagogical Implications" article in the WGU Library E-Reserves to refine your understanding of constructivism (its limitations and strengths) and to acquire some concrete pedagogical strategies for the application of constructivism in the classroom. Think about the following questions and topics:

- What is the role of prior belief in acquiring new knowledge?
- Compare and contrast John Dewey's and Lev Vygotsky's approach to constructivism.
- What are the similarities and differences between each approach?
- What are the pedagogical implications of constructivism?
- How can you implement constructivist practices in the classroom to make a significant contribution to student learning?

You should be thinking about the classroom that you will be doing your pre-clinical experience in. In what ways can you use this information to create a lesson plan suitable for the children you will be working with?

Meeting the Needs of All Students

Read through the "Educational Reform, Mathematics, and Diverse Learners: Meeting the Needs of All Students" article in the WGU Library E-Reserves to review selected mathematics education topics that focus on exploring ways to meet the needs of all of your students. During your pre-clinical experience, it is very important to be sensitive to the unique and diverse learning styles and needs of your students. Think about the following questions:

- What is the role of student language, culture, and community in the learning of mathematics?
- How is mathematics a specialized language?
What mathematical pedagogical strategies can teachers use to teach mathematics to diverse populations?
What language and cultural factors play a role in the development of mathematics itself?

You should be thinking about the classroom that you will be doing your pre-clinical experience in. In what ways can you use this information to create a lesson plan suitable for the children you will be working with?

Is There a Best Pedagogical Approach?

Upon reflection on the previous activities, you should have refined your understanding of the best mathematics pedagogy practices to use in diverse classroom settings by using a constructivism theoretical framework. You will need to be able to use a prescribed lesson plan template to create an original and relevant lesson that emphasizes the contributions of diverse (non-Western) cultures to a selected area of mathematics that is most commensurate with your pre-clinical experience.

Is there a best pedagogical approach? This is a tough question to answer. At this point, you should be sensitive to the fact that there are many factors that must be considered during lesson plan construction. The articles that were assigned throughout this course were intended to immerse you in the current and relevant literature. Such immersion should provide you with a knowledge base from whence you can now make informed decisions regarding how to best modify the lessons from previous sections of this course to best suit the needs of your pre-clinical experience. Think about the following questions:

- What is the age of your students?
- What prerequisite skills do your students have?
- What content area will you be teaching?
- What are your learning goals?
- What types of assessments do you plan to use?

The best pedagogical method for one teacher may not be the best for another. The theoretical framework you will be working in will provide you with the capacity to modify your lesson accordingly to best suit your pre-clinical experience.

Read through the "History of Mathematics and Problem Solving: A Teaching Suggestion" article in the WGU Library E-Reserves to review a suggested method of teaching selected history of mathematics topics. The authors provide a three-phase pedagogical approach that may help you create your lesson for the upcoming pre-clinical experience. Do you find this three-phase approach useful? Can you modify it to better suit your needs? Did you use a similar approach in the lessons constructed during previous sections? You are not required to use this three-phase pedagogical methodology. It is just provided as an example of one strategy to use during your pre-clinical experience.

What is really important is that you select a pedagogical methodology that is research driven
and best suits the needs of diverse learning styles and the needs of your classroom. You should be thinking about the classroom that you will be doing your pre-clinical experience in. In what ways can you use this information to create a lesson plan suitable for the children you will be working with?

Lesson Plan Construction and Pre-Clinical Experience

Now that you have reached this point in this course, it is time to apply the knowledge you have acquired by drafting a response to task 602.5.1-07, part 4. Carefully read through the given task directions.

It is strongly recommended that you complete and submit this task at least six to eight weeks prior to the end of your term to allow time for scoring, revision if necessary, and posting to your Degree Plan.

Complete: Task 602.5.1-07, Part 4 Performance Task

Complete the following task in TaskStream:

- STP: Math History and Contributions: Task 602.5.1-07, Part 4

For details about this performance assessment, see the "Assessment" tab in this course.

For this task, you will need to complete a series of components, which include the proper timing of professional communications with an appropriate school representative regarding your pre-clinical experience and using a prescribed lesson plan template to create an original and relevant lesson that emphasizes the contributions of diverse (non-Western) cultures to a selected area of mathematics within the framework of a pre-clinical experience. You are directed to the task directions for further clarification with regard to the specific requirements for each component of this task.

Final Steps

Congratulations on completing the activities in this course! This course has prepared you to complete the assessment associated with this course. If you have not already been directed to complete the assessment, schedule and complete your assessment now.

The WGU Library

The WGU Library is available online to WGU students 24 hours a day.

For more information about using the WGU Library, view the following videos on The WGU Channel:
Introducing the WGU library

*Note: To download this video, right-click the following link and choose "Save as...": [download video](#).*

Searching the WGU library

*Note: To download this video, right-click the following link and choose "Save as...": [download video](#).*

**Center for Writing Excellence: The WGU Writing Center**

If you need help with any part of the writing or revision process, contact the Center for Writing Excellence (CWE). Whatever your needs—writing anxiety, grammar, general college writing concerns, or even ESL language-related writing issues—the CWE is available to help you. The CWE offers personalized individual sessions and weekly group webinars. For an appointment, please e-mail [writingcenter@wgu.edu](mailto:writingcenter@wgu.edu).

**Feedback**

WGU values your input! If you have comments, concerns, or suggestions for improvement of this course, please submit your feedback using the following form:

- [Course Feedback](#)

**Accessibility Policy**

Western Governors University recognizes and fulfills its obligations under the Americans with Disabilities Act of 1990 (ADA), the Rehabilitation Act of 1973 and similar state laws. Western Governors University is committed to provide reasonable accommodation(s) to qualified disabled learners in University programs and activities as is required by applicable law(s). The Office of Student Accessibility Services serves as the principal point of contact for students seeking accommodations and can be contacted at [ADASupport@wgu.edu](mailto:ADASupport@wgu.edu). Further information on WGU’s Accessibility policy and process can be viewed in the student handbook at the following link:

- [Policies and Procedures for Students with Disabilities](#)