



MATH-110: PRE-CALCULUS

Effective Term

Fall 2022

BOT Approval Date

12/16/2021

Discipline

MATH - Mathematics

Course Number

110

Course Title

Pre-Calculus

Short Title

Pre-Calculus

Credit Status (CB 04)

D - Credit - Degree applicable

Units

Lecture Units

4.00

Total Units

4.00

Hours

Lecture Contact Hours

64-72

Out of Class Hours Lecture

128-144

Total Contact Hours

64 - 72

Total Out of Class Hours

128 - 144

Total Student Learning Hours

192 - 216

Distance Education

Yes

Distance Education

Distance Education Type

Both Fully Online and Hybrid Online

Fully Online Delivery Requirements:

- a. Students must be notified via the college schedule of classes and the syllabus for the class if proctored tests are required for this course
- b. Any planned face-to-face meetings, such as an orientation or study session, must be optional



c. The MSJC curriculum committee requires the use of accessible, asynchronous discussion as a component of every fully online course

Are you using publisher content?

Yes

Link to VPAT

https://p.widencdn.net/d0znzn/VPAT_webassign.pdf

Attach VPAT

VPAT_webassign.pdf

Regular effective contact

It should be the same as on course revisions: Orientation at start of course - Students will be oriented to the online and face-to-face portions of the course on the first day of class. Announcements/Bulletin Boards - Announcements using the course management system will be posted at least weekly to keep students current on course events, due dates, materials, etc. Chat Rooms - Chat rooms on course questions, various genres, and student reading groups will be utilized to give students a place to complete group work and work on group projects. Discussion Boards - Communication via discussion boards will be initiated and maintained, with timely feedback provided. At least two discussion forums a week should be utilized for students to have a forum for discussion about the content of the course. Teleconferencing - Teleconferencing between students and the instructor to discuss assigned essays and projects will take place via telephone, CCCconfer, or email. Office hours - Instructors will hold regular office hours online using discussion forums, instant messaging, telephone, etc. Scheduled Face-to-Face Meetings - Hybrid courses will meet at regularly scheduled times (at least 5 times per semester).

Catalog Description

This course is designed to prepare students for Calculus. The topics covered include a review of selected algebra topics: polynomial, rational, exponential, and logarithmic functions, conic sections, and sequences and series. The course also introduces students to new topics in analytic trigonometry: trigonometric functions and their graphs and applications.

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)

MATH-105 (with a grade of C or better) or appropriate placement.

Codes

TOP Code (CB 03)

1701.00 - Mathematics, General

CIP Code

27.0101 - Mathematics, General.

Student Accountability Model (SAM) Priority Code (CB 09)

E - Non-Occupational

Noncredit Category (CB 22)

Y - Credit Course

Repeatability Code

No

Grading Option

Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Mathematics (Masters Required)	End

GE Information

Check GE Types Requested

AA/AS G - Math Competency

CSU Area(s)

Approved CSU Area

B4

IGETC Area(s)

Approved IGETC Area

2A

Learning Objectives

Learning Objectives

Learning Objective

1. Graph functions and relations in rectangular coordinates and polar coordinates;
2. Apply transformations to the graphs of functions and relations;
3. Recognize the relationship between functions and their inverses graphically and algebraically;
4. Solve rational, linear, polynomial, exponential, absolute value, radical, logarithmic, and trigonometric equations
5. Solve linear, polynomial, rational, and absolute value inequalities;
6. Apply functions to model real world applications through the lens of equity and diversity;
7. Prove trigonometric identities;
8. Identify special triangles and their related angle and side measures;
9. Evaluate the trigonometric function at an angle whose measure is given in degrees and radians;
10. Manipulate and simplify a trigonometric expression;
11. Apply Law of Sines and Cosines to solve triangles;
12. Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs;
13. Evaluate and graph inverse trigonometric functions;
14. Convert between polar and rectangular coordinates;
15. Calculate powers and roots of complex numbers using DeMoivre's Theorem; and
16. Represent a vector in the form of $a_i + b_j$.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome

1. Find the difference quotient given a function;
2. Find the values of the remaining five trigonometric functions given the value for the sixth;
3. Solve a trigonometric equation.
4. Implement a solution that thoroughly addresses multiple contextual factors of the problem.

Program Learning Outcomes

Learning Outcome

1. Students will develop problem-solving and scientific and technological modeling skills to solve mathematical problems. They will be able to reflect on their own thoughts, question and propose problems, and apply past knowledge to new situations;
2. Students will develop the ability to think critically, independently, as well as interdependently, express ideas concisely, and reason logically;

3. Students will be able to synthesize ideas and apply mathematical reasoning and logic to relevant real-world applications;
4. Students will be able to understand, write, and communicate mathematical information symbolically, visually, and numerically with clarity and precision.

Institutional Learning Outcomes

Personal

and Professional Responsibility

Civic

Communication: The student will effectively express and exchange ideas through listening, speaking, reading, writing, visual works, and other modes of interpersonal expression.

Critical Thinking: The student will analyze problems, gather and synthesize relevant information, evaluate ideas, information, and evaluate alternative points of view to create, innovate and implement effective solutions.

Cultural Awareness and Humility: The student will demonstrate knowledge of and sensitivity toward individuals of diverse ethnicity, age, gender, sexual orientation, and religious affiliations, as well as toward those individuals with diverse abilities and socio-economic classes to respectfully interact with individuals of diverse perspectives, beliefs and values while being mindful of the limitation of their own cultural frameworks.

Scientific Awareness: The student will apply the scientific method of inquiry to assess potential solutions for real-life challenges by employing science-based knowledge and methodologies in daily life.

Content

Course Lecture Content

1. Selected Algebra Topics
 - a. Solving Quadratic Inequalities
 - b. Solving Rational Inequalities
 - c. Solving Absolute Value Inequalities
 - d. Definition of a function
 - e. Domain and Range
 - f. Translations and Reflections of Graphs
 - g. Composition of functions
 - h. One-to-One functions
 - i. Inverse functions
 - j. Diverse cultural origins and applications of algebra
2. Polynomial Functions
 - a. Graph
 - b. Degree
 - c. The Fundamental Theorem of Algebra
 - d. Rational Root Theorem
 - e. Zeros, Roots, and Intercepts
3. Rational Functions
 - a. Ratio of Two Polynomials
 - b. Asymptotes: Vertical, Horizontal, Slant
 - c. Holes
 - d. Graphs
4. Exponential And Logarithmic Functions
 - a. Exponential Graphs
 - b. Domain and Range of Exponential Functions
 - c. The Inverse of An Exponential Function
 - d. Logarithmic and natural logarithmic graphs
 - e. Domain and Range of Logarithmic graphs and natural logarithm graphs
 - f. Laws of Logarithms
 - g. Change of Base Formula
 - h. Solving Exponential and Logarithmic Equations
5. Trigonometry
 - a. Trigonometric Functions of Acute Angles
 - b. Definition of Radian Measure
 - c. Trigonometric Functions of Any Angle

- d. Co-terminal Angles
 - e. Reference Angles
 - f. Reciprocal Identities
 - g. Trig Functions in Terms of Sine and Cosine
 - h. Pythagorean Identities
 - i. Solving Right Triangles
 - j. Graphs
 - k. Diverse cultural origins of Trigonometry
6. Analytic Trigonometry
- a. Inverse Trigonometric Functions
 - b. Graph Inverse Trigonometric Functions
 - c. Deriving Sum and difference Formulas
 - d. Deriving double-angle and half-angle Formulas
 - e. Proving Identities
 - f. Solving Trigonometric Equations
7. Applications of Trigonometry
- a. The Law of Sines and the Law of Cosines
 - b. Solving triangles
 - c. Applications utilizing Right Triangles
 - d. Diverse cultural applications of Trigonometry
8. Polar Coordinates; Vectors
- a. Polar coordinates
 - b. Graph polar equations
 - c. Convert a Complex Numbers into Polar Form
 - d. DeMoivre's Theorem
 - e. vectors $ai + bj$.
9. Additional Topics in Algebra (Optional if time permits):
- a. Proof by Mathematical Induction

Methods of Instruction

Method

Discussion

Integration

Instructors will guide the class in discussion of how to graph the basic trigonometric functions and apply changes in period, phase, and amplitude to generate new graphs. Instructors will encourage student interaction to discuss the cultural origins of trigonometry and algebra.

DE Adaptations for MOI

Students will discuss the techniques used to graph functions and relations in rectangular coordinates and polar coordinates and the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs. And also synthesize results from the graphs and/or equations of functions and relations. Apply transformations to the graphs of functions and relations. Discussions are asynchronous using the discussion boards in the CMS or synchronous via accessible video conferencing tools. Instructor feedback can be posted in the gradebook comments and / or in the discussions.

Method

Activity

Integration

Students will work in groups of 3 to 4 people to prove trigonometric identities and recognize the relationship between trigonometric functions and their inverses graphically and algebraically. Students will work in groups to solve trigonometric application problems of a diverse nature.

DE Adaptations for MOI

Students will work in groups of 3 to 4 people to prove trigonometric identities and identify special triangles and their related angle and side measures and to recognize the relationship between functions and their inverses graphically and algebraically and represent a vector (a quantity with magnitude and direction) in the form $ai + bj$. Group activities will be completed using group discussions &

group conversations through the CMS. Synchronous group interactions will take place via accessible video conferencing tools that allow for online document sharing.

Method

In-class Exercises

Integration

Students will complete in-class exercises to develop the ability to prove trigonometric identities and manipulate and simplify a trigonometric expression. Students will also convert between polar and rectangular coordinates and calculate powers and roots of complex numbers using DeMoivre's Theorem.

DE Adaptations for MOI

Students will complete in-class exercises to develop the ability to evaluate the trigonometric function at an angle whose measure is given in degrees and radians along with evaluating and graphing inverse trigonometric functions. As well as manipulate and simplify a trigonometric expression as well as convert between polar and rectangular coordinates and calculate powers and roots of complex numbers using DeMoivre's Theorem. In class accessible exercises are posted using CMS tools such as course pages and/or delivered synchronously via accessible video conferencing tools. Instructor feedback can be posted in the gradebook comments and/or during synchronous meetings.

Method

Lecture

Integration

Instructors will lecture to present algebraic terminology and demonstrate how to solve absolute value, quadratic, and rational inequalities as well as exponential and logarithmic equations. Instructors will also lecture to present trigonometric equations, triangles, and apply functions to model real world applications. Lecture will support the infusion of student feedback and interaction with the instructor.

DE Adaptations for MOI

The instructor will present definitions, theorems, and example problems in support of the definitions and theorem. During the lecture, students will gain a better understanding of how to solve rational, linear, polynomial, exponential, absolute value, radical, and logarithmic, and solve linear, nonlinear, and absolute value inequalities and systems of equations and inequalities as well as trigonometric equations, triangles, and apply functions to model real world applications. Lectures will be delivered in accessible written or video format and presented by the instructor in the CMS using course pages and/or synchronously using video conferencing tools.

Methods of Evaluation**Method**

Final Performance

Integration

The final exam will be used as a required summative assessment and will be graded on accuracy and completeness. Students will be evaluated on course objectives such as graphing functions in rectangular and polar coordinates, and transforming the graph of basic trigonometric functions using changes in period, phase and amplitude to generate new graphs. Students will be evaluated on algebraic concepts such as polynomial, rational, one-to-one, inverse, exponential and logarithmic functions.

DE Adaptations for MOE

The final exam will be used as a required summative assessment and will be graded on accuracy and completeness. Students will be evaluated on course objectives such as graphing functions in rectangular and polar coordinates, and transforming the graph of basic trigonometric functions using changes in period, phase and amplitude to generate new graphs. Students will be evaluated on algebraic concepts such as polynomial, rational, one-to-one, inverse, exponential and logarithmic functions. The comprehensive final exam will be submitted via the CMS and delivered online. There is no requirement for proctored on campus exams/tests. Final exam grades are delivered privately to students via the CMS. Final course grades will only be available requesting a transcript or using Self-Service.

Method

Class Work

Integration

Class work will be used as a formative assessment and will be graded on their correctness when proving trigonometric identities, identify special triangles and their related angle and side measures. Additional topics for class work evaluation can include recognizing the relationship between functions and their inverses graphically and algebraically.

DE Adaptations for MOE

Class work will be used as a formative assessment and will be graded on their correctness when proving trigonometric identities, identify special triangles and their related angle and side measures. Additional topics for class work evaluation can include recognizing the relationship between functions and their inverses graphically and algebraically.

Evaluation of student or group projects are done by observing projects posted in the CMS. Written feedback are returned to the student/group via CMS. Rubrics and clear instructions are provided.

Method

Homework

Integration

All homework will be used as formative assessments and will be graded on completeness and accuracy. Students will be graded on their ability to accurately solve assigned problems on rational, linear, polynomial, exponential, absolute value, radical, and logarithmic as well as trigonometric equations. Students will be graded on their ability to apply the above topics to model culturally diverse real world applications.

DE Adaptations for MOE

All homework will be used as formative assessments and will be graded on completeness and accuracy. Students will be graded on their ability to accurately solve assigned problems on rational, linear, polynomial, exponential, absolute value, radical, and logarithmic as well as trigonometric equations. Students will be graded on their ability to apply the above topics to model culturally diverse real world applications.

Homework assignments are submitted through the CMS and are evaluated via rubric and/or individual instructor feedback.

Method

Quizzes

Integration

Quizzes will be used as formative assessments and will be graded on completeness and accuracy. Students will be graded on trigonometric topics such as graphing trigonometric functions and solving triangles using the Law of Sines and Law of Cosines. Students will be graded on accurately translating graphs of polynomial and rational functions.

DE Adaptations for MOE

Quizzes will be used as formative assessments and will be graded on completeness and accuracy. Students will be graded on trigonometric topics such as graphing trigonometric functions and solving triangles using the Law of Sines and Law of Cosines. Students will be graded on accurately translating graphs of polynomial and rational functions.

Quizzes are submitted via the course management software.

Method

Exams/Tests

Integration

Exams will be used as required summative assessments and will be graded on completeness and correctness. Students will be evaluated for their conceptual understanding and the correct application of evaluating trigonometric functions along with evaluating and graphing inverse trigonometric functions, as well as manipulating and simplifying trigonometric expressions. They will also be graded on their ability to convert between polar and rectangular coordinates and calculate powers and roots of complex numbers using DeMoivre's Theorem.

DE Adaptations for MOE

Exams will be used as required summative assessments and will be graded on completeness and correctness. Students will be evaluated for their conceptual understanding and the correct application of evaluating trigonometric functions along with evaluating and graphing inverse trigonometric functions, as well as manipulating and simplifying trigonometric expressions. They will also be graded on their ability to convert between polar and rectangular coordinates and calculate powers and roots of complex numbers using DeMoivre's Theorem.

Exams and/or tests are submitted via the CMS and delivered online. There is no requirement for proctored on campus exams/tests. Exam/test grades are delivered privately to students via the CMS. Final course grade will only be available requesting a transcript or using Self-Service.

Method

Self-Evaluation

Integration

Self-evaluation essays will be used as formative assessments and will be graded on thoughtfulness, completeness of self-reflection, application of critical thinking and clarity of presentation. Students will reflect on study skills and habits to be successful in math classes. Students will recognize their personal growth by analyzing how math concepts apply to their every-day-life.

DE Adaptations for MOE

Self-evaluation essays will be used as formative assessments and will be graded on thoughtfulness, completeness of self-reflection, application of critical thinking and clarity of presentation. Students will reflect on study skills and habits to be successful in math classes. Students will recognize their personal growth by analyzing how math concepts apply to their every-day-life. Self-Evaluation Essays will be submitted via the CMS as an assignment.

Assignments**Assignment Type**

Writing

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

Solve the following algebraic problems:

1. Solve: $3 | 2x - 1 | + 7 > 13$
2. Given the graph $y = f(x)$ graph $y = 2f(x - 3)$
3. Find the composition give $f(x) = 1/(x + 2)$ and $g(x) = 2x^2 - 3$, find $g(f(x))$ and state the domain;
4. Find the inverse function of $f(x) = x^2 - 3$ with the domain $x < 0$
5. Sketch a graph of this polynomial: $y = 2x^3 - 5x^2 - 4x + 12$
6. For $y = (x + 2)/(x^2 + 3x + 2)$ find:
 - a. Any Vertical and Horizontal asymptotes.
 - b. All intercepts.
 - c. Graph

How assignment will be adapted in online format

Write this down using a content rich editor program with a math based symbol bank to type it out and submit it through the CMS, or Scan your answer either with a scanner or your phone and submit it as a pdf through the CMS. Instructor feedback can be posted in the gradebook comments and/or in the discussions.

Assignment Type

Writing

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

Solve the following Exponential and Logarithmic Function problems and equations:

1. Solve: $4^x = 32^{(3x - 2)}$
2. Solve: $\log(x - 1) = 7$

- Solve: $\log(x - 1) + \log(x) = 2$
- For $y = 3^x(x - 2)$, graph, find the domain and range, and find any asymptotes and intercepts;
- For $y = \log(x) - 2$, graph, find the domain and range, and find any asymptotes and intercepts;
- How long does it take for a deposit of \$15,000 to double at 4% compounded continuously.

How assignment will be adapted in online format

Write this down using a content rich editor program with a math based symbol bank to type it out and submit it through the CMS, or Scan your answer either with a scanner or your phone and submit it as a pdf through the CMS.

Assignment Type

Writing

In-class and/or outside of class

In-class

Formative or Summative

Summative

Assignment

Solve the following Trigonometric problems:

- Find the exact value of the six trigonometric functions for the given angles: a. $\sin(\pi/3)$ b. $\tan 0$
- Find the exact value for the other five trigonometric functions given that: $\cos(x) = -1/2$
- Graph $y = 3 \csc(x/2 - \pi)$ over two periods;
- Use the half-angle identities to find the exact value: $\sin(7\pi/8)$
- Prove the identity: $\sin^4(x) - \cos^4(x) = 2 \sin^2(x) - 1$
- Find the exact values of given expression $\sin^{-1}(\tan(3\pi/4))$
- Solve, giving exact answers, if possible. Restrict your answers to $0 < x < 2\pi$.
 $2\cot(x)\cos(2x) + \cot(x) = 0$
- Solve the triangle using the Law of Sines or the Law of Cosines:
 $a = 7$
 $b = 9$
 $c = 12$

How assignment will be adapted in online format

Write this down using a content rich editor program with a math based symbol bank to type it out and submit it through the CMS, or Scan your answer either with a scanner or your phone and submit it as a pdf through the CMS. Instructor feedback can be posted in the gradebook comments and/or in the discussions.

Assignment Type

Writing

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

In your group, discuss, analyze and solve the following problems:

- Express the complex number $\sqrt{2} + \sqrt{2}i$ in trigonometric form:
- Utilize DeMoivre's Theorem to write cube roots of 64 in rectangular form $a + bi$.
- Transform the equation $r = \cos\theta + 2 \sin\theta$ to an equation in rectangular coordinates;
- Graph: $r \sin(\theta) = 4$

How assignment will be adapted in online format

In the discussion board in the CMS, write the problems using a content rich editor program with a math based symbol bank to type it out and submit it through the CMS, or Scan your answer either with a scanner or your phone and submit it as a pdf through the CMS. Students will interact with each other in the discussion board on the CMS. Instructor feedback can be posted in the gradebook comments and/or in the discussions.

Assignment Type

Writing

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Complete the following application problems:

1. Use the internet to find the population for the country of your choice for years 2000 and 2020. Write the exponential growth function that describes the population of that country.

2. Solve the following Trigonometric Application:

The latitude of a point P on the surface of the Earth is specified by means of the angle θ in the figure. For instance, the latitude of Paris, France, is $48^{\circ}52'$ N. The letter N is used here to indicate that the location is north of, rather than south of, the equator. (Recall that the notation $52'$ indicates $52/60$ of one degree.) Use the arc length formula (and your calculator) to determine the distance PE from the given location P to the equator. Assume that the Earth is a sphere with radius $OP = OE = 3960$ miles. Round the answer to the nearest 10 miles. The location P is Honolulu: $21^{\circ}19'$ N

How assignment will be adapted in online format

Write this down using a content rich editor program with a math based symbol bank to type it out and submit it through the CMS, or Scan your answer either with a scanner or your phone and submit it as a pdf through the CMS. Instructor feedback can be posted in the gradebook comments and/or in the discussions.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Research and read about the cultural origins of trigonometry and algebra using materials in the library. You will use your research to engage in a discussion with your peers in class.

How assignment will be adapted in online format

Research and read about the cultural origins of trigonometry and algebra using materials in the library. You will use your research to engage in a discussion with your peers in the CMS environment.

Assignment Type

Reading

In-class and/or outside of class

Outside of class

Formative or Summative

Formative

Assignment

Research women or multiracial contribution to trigonometry and algebra using materials in the library. You will use your research to engage in a discussion with your peers in class.

How assignment will be adapted in online format

Research women or multiracial contribution to trigonometry and algebra using materials in the library. You will use your research to engage in a discussion with your peers using the CMS environment.

Course Materials

Textbooks

Cohen, David; Lee, Theodore B. ; Sklar, David (2017). Precalculus, 7th Cengage. ISBN: 13: 9781305663107

Open Educational Resources

Hoffman, Douglas, (2016) Essential Precalculus, Part 1, Rice University (OpenStax CNX) and Hoffman, Douglas, (2016) Essential Precalculus, Part 2, Rice University (OpenStax CNX)

Class Size Information

Class Size

40

Class Size Category

A - Lecture/discussion 40

Diversity and Inclusion

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

In the objectives, we included the necessity to apply functions to model real world applications through the lens of equity and diversity. The content includes multicultural origins and applications of algebra and trigonometry. Assignments give students the opportunity to research and discuss multicultural origins of algebra and trigonometry, and contribution from mathematicians of different genders and races.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

To better support diverse learners, we incorporated formative and summative active learning strategies and included in-class and out-of-class assignments that explored content material through the lens of equity and diversity. In instruction, we have specified that discussions and class activities are spaces in which students can bring in their own cultural experiences through the application of mathematical concepts. The methods of evaluation feature the necessity of formative and summative assessments that align with the revised course objectives and content. Discussions, group activities, and lectures have been revised to support the infusion of student feedback and interaction with the instructor. The course materials have been revised to include an OER option.

Interactions

Explain how the course will incorporate student-to-student interaction.

For both face-to-face and online modalities, group work will give students the opportunity to collaborate on different algebraic and trigonometric concepts, such as proofs of trigonometric identities, and recognizing the relationship between trigonometric functions and their inverses both graphically and algebraically. In both modalities, students will be given frequent opportunities to engage in peer-to-peer discussions designed to foster community and encourage students to experience different ways to solve trigonometric application problems of a diverse nature.

Explain how the course will incorporate instructor-to-student interaction.

In both face-to-face and online modalities, Instructors will use discussions to interact with students asking them to graph the basic trigonometric functions and apply changes in period, phase, and amplitude to generate new graphs. Instructors will clarify concepts, pose questions, and or/encourage students to make connections between algebraic and trigonometric concepts. Instructors will encourage students to make connections between course concepts and their application in real-world problems. Instructors will also encourage discussions on the cultural origins of trigonometry and algebra.

Explain how the course will incorporate student-to-content interaction.

In both face-to-face and online modalities, students will reference accessible materials such as textbooks, written lecture materials or transcripts of lectures, illustrative images, charts and graphs, video or audio lectures. In-class exercises and/or at-home assignments will allow students to practice content material such as proving trigonometric identities, manipulating and simplifying a trigonometric expressions, converting between polar and rectangular coordinates, and calculating powers and roots of complex numbers using DeMoivre's Theorem.

Explain how the course will incorporate student-to-self interaction (metacognitive).

In both face-to-face and online modalities, students will use self-evaluation essays to reflect on study skills and habits to be successful in math classes. Students will recognize their personal growth by analyzing and exploring connections between algebraic and trigonometric concepts and their real-world applications. The course emphasizes thinking flexibly and considering different method of solutions by engaging in discussions, assessments, and writing activities.

Key: 2097