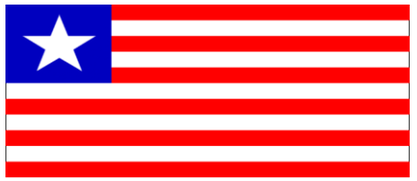

REPUBLIC OF LIBERIA

MINISTRY OF EDUCATION

NATIONAL CURRICULUM FOR GRADES 10 TO 12

MATHEMATICS

February 2011

MESSAGE FROM THE MINISTER OF EDUCATION

I wish to extend my thanks and appreciation to ECSEL, UNESCO and all our partners for their immense contribution to this important task of revising and strengthening of the National Curriculum. Special thanks to USAID through LTTP for their funding and technical support in the harmonization or realignment of the curriculum. We extend sincere thanks and appreciation to the Bureau of Curriculum Development and Textbook Research, the National Curriculum Taskforce, and the subject specialists from various institutions for the level of professionalism that went into this exercise.

The revision and strengthening of our National Curriculum comes at a time when our nation is faced with the Herculean task or challenge of education transformation, national reconstruction, recovery and renewal in the aftermath of a devastating civil war. Hence, critical to this national challenge is the rebuilding of the education sector as Liberians can not achieve the desired socio-economic progress in the absence of a strong, vibrant and productive education and training system.

The revised national curriculum has two features which include the regular core subject areas of Mathematics, Science, Language Arts and Social Studies and emphasis is being given to the global challenge of HIV/AIDS, Peace, Citizenship, Human Rights and Environmental education. Secondly, the new curriculum is developed in line with international standards especially those practiced and enshrined in the curriculum of our sisterly Republic of Nigeria and Ghana who are also members of the West African Examinations Council (WAEC) .

We wish to urge all our education partners including students, teachers, principals, proprietors of schools and members of school boards to use this curriculum in our schools to enhance quality and relevant instruction and to enable our students to be adequately prepared to take the West African Senior Secondary Certificate Examinations (WASSCE) come 2013 as envisaged by us in the education sector.

May I conclude by once again saying big thank-you to all those who contributed to make this project a success.

Hon. E. Othello Gongar
MINISTER

INTRODUCTION

Mathematics is an indispensable tool in our modern world. We use the knowledge of mathematics in our everyday activities, and we see that knowledge applied in practically everything we see around us. It is critical to develop in our students those core skills of computation, translating problems into mathematical language and be able to solve them, and to apply mathematical concepts to everyday activities. This curriculum on Mathematics has been written precisely to develop these skills in Liberian high school students.

A student-centred approach is emphasized in this curriculum. This is based on the firm belief that learning becomes more permanent, meaningful, and exciting when students themselves take ownership of the learning process. Teachers are, therefore, urged to contrive those classroom strategies that would engage students actively in the teaching/learning process.

AIMS AND OBJECTIVES

Upon the completion of this course of study, students will be able to:

1. Become successful in the study of Algebra II, Geometry, Trigonometry, and Precalculus
2. Acquire the necessary skills that will allow them to become problem solvers and informed decision makers.
3. Make connections between Mathematics and the world around us.
4. Bring Mathematics to life with many real-life applications.

GOAL: TO PREPARE STUDENTS TO BECOME SUCCESSFUL IN THE STUDY OF ALGEBRA II, GEOMETRY, TRIGONOMETRY AND PRECALCULUS. ALGEBRA WILL BRING MATHEMATICS TO LIFE WITH MANY REAL-LIFE APPLICATIONS.

INTENDED LEARNING OUTCOMES: Students will acquire the necessary skills that will allow them to become problem solvers and informed decision makers. Students will be able to make connections between mathematics and the world around us.

SENIOR SECONDARY SCHOOL MATHEMATICS SCOPE AND SEQUENCE SUMMARY

MARKING PERIOD	GRADE TEN(Geometry)	GRADE ELEVEN(Trigonometry)	GRADE TWELVE(Pre-Calculus)
First	1. Tools to Geometry 2. Investigating Geometric Figure 3. Transformations: Shapes in Motion	1. Angles and their Measure 2. Right Triangle Trigonometry	Arithmetic and algebra review
Second	1. Triangle Relationships 2. Measuring in the plane and in space	1. Graphs of Trigonometric 2. Function	Exponential and Logarithmic Functions, and Cartesian Coordinates
Third	1. Reasoning and parallel Lines 2. Proving Triangles Congruent 3. Quadrilaterals	1. Trigonometric Identities and their Verifications	Systems of equations and Inequalities
Fourth	1. Similarity 2. Right Triangle Trigonometry	1. Inverse Trigonometric 2. Functions and Trigonometric Equations	The complex number system, sequences, Series, and the Binomial Theorem
Fifth	1. Vectors and Circles	1. Oblique Triangles, the Sine and Cosine Laws, and the Complex Numbers	Probability and Statistics
Sixth	1. Analytic Geometry	Transformations and Vectors	Analytic geometry(Review)

SEMESTER: ONE

PERIOD: I

GRADE: 10

SUBJECT: GEOMETRY

UNIT/TOPICS: 1. TOOLS TO GEOMETRY
2. INVESTIGATING GEOMETRIC FIGURES.
3. TRANSFORMATIONS: SHAPES IN MOTION

SPECIFIC OBJECTIVES:

Upon completion of these topics, students will be able to:

1. Define, draw, and to work with points, lines, planes, segments, rays, parallel lines, and planes.
2. Define, draw, and measure angles and segments.
3. Identify a good definition.
4. Use a compass and straightedge to construct congruent angles, congruent segments, and bisects segments and angles.
5. Define, draw, and to work with points, lines, planes, segments, rays, parallel lines, and planes.
6. Define, draw, and measure angles and segments.
7. Identify a good definition.
8. Use deductive reasoning properties of equality to solve problems and verify conjectures.
9. Use the distance formula to compute the distance between two points and apply the midpoint formula to find the coordinates the midpoint of a segment in a coordinate plane.
10. Measure the angles of a triangle and classify triangles according to angles and also according to sides.
11. Classify polygons and compute the sum of the measures of the interior and exterior angles of polygons.
12. Graph lines in the coordinate plane and recognize parallel and perpendicular lines by their shapes.
13. Define, draw, and classify quadrilaterals.
14. Measure and draw central angles and arcs of circle and display data in a circle graph.
15. Measure congruent and similar figures, and use properties of congruence and similarity.
16. Define and draw isometric and orthographic views of objects.
17. Identify isometrics, locate reflection images of figures.
18. Find translation image of figures and use vectors and matrix addition to represent transactions..

19. Identify and locate rotation images in figures.
20. Show how reflections are related to others isometrics and identify gild reflections.
21. Identify types of symmetry in figure.
22. Identify figures that tessellate and identify symmetries of tessellations.
23. Locate dilation (enlargement and reducing) images of figures and their applications.
24. Use a compass and straightedge to construct congruent angles, congruent segments, and bisects segments and angles.
25. Use deductive reasoning properties of equality to solve problems and verify conjectures.
26. Use the distance formula to compute the distance between two points and apply the midpoint formula to find the coordinates the midpoint of a segment in a coordinate plane.
27. Measure the angles of a triangle and classify triangles according to angles and also according to sides.
28. Classify polygons and compute the sum of the measures of the interior and exterior angles of polygons.
29. Graph lines in the coordinate plane and recognize parallel and perpendicular lines by their shapes.
30. Define, draw, and classify quadrilaterals.
31. Measure and draw central angles and arcs of circle and display data in a circle graph.
32. Measure congruent and similar figures, and use properties of congruence and similarity.
33. Define and draw isometric and orthographic views of objects.
34. Identify isometrics, locate reflection images of figures.
35. Find translation image of figures and use vectors and matrix addition to represent transactions..
36. Identify and locate rotation images in figures.
37. Show how reflections are related to others isometrics and identify gild reflections.
38. Identify types of symmetry in figure.
39. Identify figures that tessellate and identify symmetries of tessellations.
40. Locate dilation (enlargement and reducing) images of figures and their applications.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION	OUTCOMES
Students will entail their seines with building blocks of many geometric figures.	**1. Points, lines, planes, segments, rays, parallel lines, and planes.** **2. Measurement of**	1. Defining, drawing, and working with points, lines, planes, segments, rays, parallel lines, and	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts**	**Essential tasks students should be able to do:** 1. Define, draw, and to work with points,	**Essential tasks students should be able to do:** 1. Define, draw, and to work with points, lines,

Students will reach valid conclusions in geometry and in life. Students will improve their skills such as in map reading.	**angles and segments.** **3. Defined and undefined terms.** **4. Compass and straightedge in the construction of congruent angles, congruent segments, and the bisection of segments and angles.** **5. Deductive reasoning and properties of equality to solve problems and verify conjectures.** **6. The distance formula and the midpoint formula.** **7. Angle measurement and triangle classification according to angles and also according to sides.** **8. Classification of polygons, sum of the measures of the interior and exterior angles of polygons.** **9. Graphs of lines in the coordinate plane, parallel and perpendicular lines**	planes. 2. Defining, drawing, and measuring angles and segments. 3. Identifying a good definition. 4. Using a compass and straightedge to construct congruent angles, congruent segments, and bisect segments and angles. 5. Using deductive reasoning properties of equality to solve problems and verify conjectures. 6. Using the distance formula to compute the distance between two points and apply the midpoint formula to find the coordinates the midpoint of a segment in a coordinate plane. 7. Measuring the angles of a triangle	E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	lines, planes, segments, rays, parallel lines, and planes. 2. Define, draw, and measure angles and segments. 3. Use a compass and straightedge to construct congruent angles, congruent segments, and bisects segments and angles. 4. Define, draw, and work with points, lines, planes, segments, rays, parallel lines, and planes. 5. Define, draw, and measure angles and segments. 6. Use deductive reasoning properties of equality to solve problems and verify conjectures. 7. Use the distance formula to compute the distance between two points and apply the midpoint formula to find the coordinates the midpoint of a segment in a	planes, segments, rays, parallel lines, and planes. 2. Define, draw, and measure angles and segments. 3. Use a compass and straightedge to construct congruent angles, congruent segments, and bisects segments and angles. 4. Define, draw, and work with points, lines, planes, segments, rays, parallel lines, and planes. 5. Define, draw, and measure angles and segments. 6. Use deductive reasoning properties of equality to solve problems and verify conjectures. 7. Use the distance formula to compute the distance between two points and apply the midpoint formula

	and their shapes. **10. Classification and definition of quadrilaterals.** **11. Central angles and arcs of circle.** **12. Congruent and similar figures, and use properties of congruence and similarity.** **13. Isometric and orthographic views of objects.** **14. Isometrics, reflection images of figures.** **15. Translation of image of figures and use of vectors and matrix addition to represent transactions..** **16. Rotation images in figures.** **17. Reflections related to other isometrics and gild reflections.** **18. Types of symmetry in figure.** **19. Figures that tessellate and symmetries of tessellations.** **20. Dilation (enlargement and reducing) images of**	and classify triangles according to angles and also according to sides. 8. Classifying polygons and computing the sum of the measures of the interior and exterior angles of polygons. 9. Graphing lines in the coordinate plane and recognizing parallel and perpendicular lines by their shapes. 10. Defining, drawing, and classifying quadrilaterals. 11. Measuring and drawing central angles and arcs of circle and displaying data in a circle graph. 12. Measuring congruent and similar figures, and using properties of congruence and similarity.		coordinate plane. 8. Measure the angles of a triangle and classify triangles according to angles and also according to sides. 9. Classify polygons and compute the sum of the measures of the interior and exterior angles of polygons. 10. Graph lines in the coordinate plane and recognize parallel and perpendicular lines by their shapes. 11. Define, draw, and classify quadrilaterals. 12. Measure and draw central angles and arcs of circle and display data in a circle graph. 13. Measure congruent and similar figures, and use properties of congruence and similarity. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework	to find the coordinates the midpoint of a segment in a coordinate plane. 8. Measure the angles of a triangle and classify triangles according to angles and also according to sides. 9. Classify polygons and compute the sum of the measures of the interior and exterior angles of polygons. 10. Graph lines in the coordinate plane and recognize parallel and perpendicular lines by their shapes. 11. Define, draw, and classify quadrilaterals. 12. Measure and draw central angles and arcs of circle and display data in a circle graph. 13. Measure

	figures and their applications.	13. Defining and drawing isometric and orthographic views of objects. 14. Identifying isometrics, locating reflection images of figures. 15. Finding translation image of figures and using vectors and matrix addition to represent transactions.. 16. Identifying and locating rotation images in figures. 17. Showing how reflections are related to others isometrics and identifying gild reflections. 18. Identifying types of symmetry in figure. 19. Identifying figures that tessellate and identifying		• Group assignments • Projects	congruent and similar figures, and use properties of congruence and similarity. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

		symmetries of tessellations. 20. Locating dilation (enlargement and reducing) images of figures and their applications.			

SEMESTER: ONE

PERIOD: II

GRADE: 10

SUBJECT: GEOMETRY

UNIT/TOPICS: 1. TRIANGLE RELATIONSHIPS
2. MEASURING IN THE PLANE AND IN SPACE

GENERAL OBJECTIVES: Students will analyze situations and become better problem solvers; visualize the faces of space figures that they encounter in everyday life.

SPECIFIC OBJECTIVES: Upon the completion of these topics, students will be able to:

1. Write and interpret different types of conditional statements
2. Use and apply properties of isosceles triangles.
3. Use different styles of proofs to write convincing arguments.
4. Use properties of mid segments to solve problems.
5. Write convincing arguments by using indirect reasoning.
6. Use inequalities involving triangle side lengths and angle measures to solve problems.
7. Use properties of angles bisectors and perpendicular bisectors and to solve locus problems.
8. Identify properties of perpendicular bisectors, angle bisector, altitudes, and medians of a triangle.

9. Find area and perimeter of squares, rectangle's, parallelograms and triangles
10. Use the Pythagorean Theorem and its converse
11. Use the properties of 45^0 - 45^0-90^0 and 30^0 - 60^0 - 90^0 triangles.
12. Find the areas of a trapezoid.
13. Find the areas of regular polygons.
14. Find the circumferences of a circle and the e length of an arc.
15. Calculate the areas of circles, sectors, and segments of circles.
16. Recognize nets of various space figures.
17. Find the surface areas and lateral areas of prisms and cylinders.
18. Find the surface areas and lateral areas of pyramids and cones.
19. Find the surface volumes of "prisms" and "cylinders".
20. Find the volume pyramids and cones.
21. Compute the surface areas and volumes of spheres.
22. Recognize composite surface figures, which combine two or more simple figures.
23. Use geometry to find the probability of events.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will describe and explain the kinds of motions they will encounter in their daily lives	**1. Logical reasoning (conditional, hypothesis, conclusion, truth value, biconditional, negation, inverse and contrapositive)** **2. Isosceles triangles (vertex angle, base angles)** **3. Preparing for proofs.** **4. Measurements of triangles** **5. Indirect reasoning** **6. Bisectors and locus (perpendicular bisector theorem and its converse).**	1. Writing and interpreting different types of conditional statements. 2. Using and applying properties of isosceles triangle. 3. Reviewing and discussing Properties of equalities and inequalities, congruence, etc. 4. Measuring angles and	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary**	**Essential tasks students should be able to do:** 1. Use and apply properties of isosceles triangles. 2. Use properties of mid segments to solve problems. 3. Use inequalities involving triangle side lengths and angle measures to solve problems. 4. Use properties of angles bisectors and perpendicular bisectors and to solve locus problems.

	7. Concurrent points and lines(point of concurrency) **8. Inequalities and triangles (median and altitude/height of a triangle)** **9. Area and perimeter of squares, rectangle's, parallelograms and triangles** **10. The Pythagorean Theorem and its converse** **11. Properties of 45^0 - 45^0-90^0 and 30^0 - 60^0 - 90^0 triangles.** **12. Find the areas of a trapezoid.** **13. Areas of regular polygons.** **14. Circumference of a circle and the e length of an arc.** **15. Areas of circles, sectors, and segments of circles.** **16. Nets of various space figures.** **17. Surface areas and lateral areas of prisms and cylinders.** **18. Surface areas and lateral areas of pyramids and cones.** **19. Surface volumes of "prisms" and "cylinders".**	sides of triangles. Using properties of measurements to solve problems. 5. Writing convincing arguments by using indirect reasoning. Using different styles of proofs to write convincing arguments. 6. Bisecting lines and angles; using bisectors and locus properties 7. Using properties of Concurrent points and lines; discussing point of locus properties 8. Using inequalities involving triangle side lengths and angle measures to solve problems 9. Finding area and perimeter of squares, rectangle's, parallelograms and triangles 10. Using the Pythagorean Theorem and its converse in problem solving.	**<u>Readings</u>** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	5. Identify properties of perpendicular bisectors, angle bisector, altitudes, and medians of a triangle. 6. Find area and perimeter of squares, rectangle's, parallelograms and triangles 7. Use the Pythagorean Theorem and its converse 8. Use the properties of 45^0 - 45^0-90^0 and 30^0 - 60^0 - 90^0 triangles. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

	20. Volume pyramids and cones. **21. Surface areas and volumes of spheres.** **22. Composite surface figures, which combine two or more simple figures.** **23. Geometry to find the probability of events.**	11. Using the properties of 45^0 - 45^0- 90^0 and 30^0 - 60^0 - 90^0 triangles 12. Finding the areas of a trapezoid. 13. Finding the areas of regular polygons. 14. Finding the circumference of a circle and the e length of an arc. 15. Calculating the areas of circles, sectors, and segments of circles. 16. Recognize nets of various space figures. 17. Find the surface areas and lateral areas of prisms and cylinders. Measuring how much material (cloth or paper) can cover a prism or cylindrical 18. Find the surface areas and lateral areas of pyramids and cones. 19. Finding the surface volumes of “prisms” and “cylinders”.		

		Measuring how much liquid a prism or cylindrical container can hold. 20. Calculating the volume pyramids and cones. Measuring how much liquid a pyramidal or conical container can hold. Computing the surface areas and volumes of spheres. Measuring how much liquid a spherical container can hold. 21. Defining and Indentifying composite surface figures, which combine two or more simple figures. 22. Using geometry to find the probability of events.		

SEMESTER: TWO

PERIOD: III

GRADE: 10

SUBJECT: GEOMETRY

UNIT/TOPICS: **1. REASONING AND PARALLEL LINES**
2. PROVING TRIANGLES CONGRUENT
3. QUADRILATERALS

GENERAL OBJECTIVES: Students will understand how parallel lines are used in building, city planning, and construction

SPECIFIC OBJECTIVES: Upon the completion of these topics, students will be able to:

1. Identify pairs of angles formed by two lines and a transverse and relate the measures of angles formed by parallel lines and a transversal.
2. Recognize conditions that result in parallel lines, and write proofs that involve parallel lines.
3. Construct parallel and perpendicular lines.
4. Draw objects in one-point perspective.
5. Use some of the basis ideas of spherical geometry.
6. Prove two triangles congruent using the SSS and SAS postulates.
7. Prove two triangles congruent using the SSS and SAS postulates.
8. Prove two triangles congruent using the HL Theorem.
9. Use triangle congruence and "corresponding parts of congruent Triangles we congruent (CPCTC) to prove that parts of two triangles are congruent.
10. Identify congruent overlapping triangles and prove two triangles congruent by first proving two other triangles congruent.
11. Find relationships among angles, and diagonals of parallelograms.
12. Find characteristics of quadrilateral that indicate that they are parallelograms.
13. Find the properties of rectangles, rhombuses, and squares.
14. Find the properties of trapezoids and kites.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will compute distances indirectly in a variety of real world settings Students will model peal-world situations such as those involving velocity Students will become investigators in situation in which equators of circles can be used, such as expressing the range of collection phone towers.	**1. Pairs of angles formed by two lines and transverse and related measures of angles formed by parallel lines and a transversal.** **2. Conditions that result in parallel lines and proofs that involve parallel lines.** **3. Construction of parallel and perpendicular lines.** **4. Objects in one-point perspective.** **5. Some of the basis ideas of spherical geometry.** **6. Two triangles congruence using the SSS and SAS postulates.** **7. Proof of two triangles congruent using the SSS and SAS postulates.** **8. Proof of two triangles congruent using the HL Theorem.** **9. Triangle congruence and "corresponding parts of congruent Triangles congruent (CPCTC) and proofs that parts of two triangles are congruent.** **10. Congruent overlapping triangles and proof of two triangles congruent by first proving two other triangles congruent.** **11. Relationships among**	1. Identifying pairs of angles formed by two lines and a transverse and relating the measures of angles formed by parallel lines and a transversal. 2. Recognizing conditions that result in parallel lines and writing proofs that involve parallel lines. 3. Constructing parallel and perpendicular lines. 4. Drawing objects in one-point perspective. 5. Using some of the basis ideas of spherical geometry. 6. Proving two triangles congruent using the SSS and SAS postulates. 7. Proving two triangles congruent using the SSS and SAS postulates. 8. Proving two triangles congruent using the HL Theorem. 9. Using triangle congruence and "corresponding parts	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Identify pairs of angles formed by two lines and a transverse and relate the measures of angles formed by parallel lines and a transversal. 2. Recognize conditions that result in parallel lines, and write proofs that involve parallel lines. 3. Construct parallel and perpendicular lines. 4. Draw objects in one-point perspective. 5. Use some of the basis ideas of spherical geometry. 6. Prove two triangles congruent using the SSS and SAS postulates. 7. Prove two triangles congruent using the SSS and SAS postulates. 8. Prove two triangles congruent using the HL Theorem. 9. Use triangle congruence and "corresponding parts of congruent Triangles we congruent (CPCTC) to prove that parts of two triangles are congruent. 10. Identify congruent

	angles, and diagonals of parallelograms. **12. Characteristics of quadrilateral that indicate that they are parallelograms.** **13. Properties of rectangles, rhombuses, and squares.** **14. Properties of trapezoids and kites.**	of congruent Triangles we congruent (CPCTC) to prove that parts of two triangles are congruent. 10. Identifying congruent overlapping triangles and prove two triangles congruent by first proving two other triangles congruent. 11. Finding relationships among angles, and diagonals of parallelograms. 12. Using the characteristics of quadrilateral that indicate that they are parallelograms. 13. Applying the properties of rectangles, rhombuses, and squares in problem solving.. 14. Finding the properties of trapezoids and kites.		overlapping triangles and prove two triangles congruent by first proving two other triangles congruent. 11. Find relationships among angles, and diagonals of parallelograms. 12. Find characteristics of quadrilateral that indicate that they are parallelograms. 13. Find the properties of rectangles, rhombuses, and squares. 14. Find the properties of trapezoids and kites. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: <u>TWO</u>

PERIOD: <u>IV</u>

GRADE: 10

SUBJECT: GEOMETRY

UNIT/TOPICS: **1. SIMILARITY**
2. RIGHT TRIANGLE TRIGONOMETRY

GENERAL OBJECTIVES: Students will apply properties of perpendicularity and seminaries in designing and construction.

SPECIFIC OBJECTIVES: Upon the completion of these topics, students will be able to:

1. Choose convenient placement of coordinate axes on figures.
2. Prove theorems using figures in the coordinate plane.
3. Find how to use ratio and proportion with similar polygons.
4. Prove two triangles similar using the AA-postulate and the SAS-and SS-Theorems; and use similarity in indirect measurement to find distances.
5. Find relationship among the lengths of the sides of a right triangle and the attitude to the hypotenuse.
6. Investigate proportional relationship in triangle.
7. Find the relationship between the similarity ratio and the perpendicular and areas of similar angles.
8. Find the relationships between the ratio and the ratios of the areas and volumes of similar solids.
9. Calculate tangent of acute angles in a right triangle and use tangents to determine side lengths in triangles.
10. Compute lines and cosines of acute angles in right triangles, and use sine and cosine to find unknown measures in right triangles.
11. Define and identify angles of devotion and depression, and use them and trigonometric ratios to solve problems.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become builders/city planers Students will become constructors or graphic artists Students will become professionals in arts and analyst	**1. Relationships among angles, and diagonals of parallelograms.** **2. Characteristics of quadrilateral that indicate that they are parallelograms.** **3. Properties of rectangles, rhombuses, and squares.** **4. Properties of trapezoids**	1. Finding relationships among angles, and diagonals of parallelograms. 2. Finding characteristics of quadrilateral that indicate that they are parallelograms.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995)	**Essential tasks students should be able to do:** 1. Choose convenient placement of coordinate axes on figures. 2. Prove theorems using figures in the coordinate plane. 3. Find how to use ratio and proportion with similar

	and kites. **5. Convenient placement of coordinate axes on figures.** **6. Proofs of theorems using figures in the coordinate plane.** **7. Use of ratio and proportion with similar polygons.** **8. Triangles similarity using the AA-postulate and the SAS-and SS-Theorems; and use similarity in indirect measurement to find distances.** **9. Relationship among the lengths of the sides of a right triangle and the attitude to the hypotenuse.** **10. Investigation of proportional relationship in triangles.** **11. Relationship between the similarity ratio and the perpendicular and areas of similar triangles.** **12. Relationships between the ratios of the areas and volumes of similar solids.** **13. Tangent of acute angles in a right triangle and use tangents to determine side lengths in triangles.** **14. Sines and cosines of acute**	3. Finding the properties of rectangles, rhombuses, and squares. 4. Finding the properties of trapezoids and kites. 5. Choosing convenient placement of coordinate axes on figures. 6. Proving theorems using figures in the coordinate plane. 7. Finding how to use ratio and proportion with similar polygons. 8. Proving two triangles similar using the AA-postulate and the SAS-and SS-Theorems; and use similarity in indirect measurement to find distances. 9. Finding relationship among the lengths of the sides of a right triangle and the attitude to the hypotenuse. 10. Investigating proportional relationship in triangle. 11. Finding the relationship	Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **<u>C. Other Resources/Supplementary Readings</u>** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	polygons. 4. Prove two triangles similar using the AA-postulate and the SAS-and SS-Theorems; and use similarity in indirect measurement to find distances. 5. Find relationship among the lengths of the sides of a right triangle and the attitude to the hypotenuse. 6. Investigate proportional relationship in triangle. 7. Find the relationship between the similarity ratio and the perpendicular and areas of similar angles. 8. Find the relationships between the ratio and the ratios of the areas and volumes of similar solids. 9. Calculate tangent of acute angles in a right triangle and use tangents to determine side lengths in triangles. 10. Compute lines and cosines of acute angles in right triangles, and use sine and cosine to find unknown measures in right triangles. 11. Define and identify angles of devotion and depression, and use the

	angles in right triangles, and their use to find unknown measures in right triangles. **15. Definition, identification and application of angles of devotion and depression, and their use in trigonometric ratios to solve problems.**	between the similarity ratio and the perpendicular and areas of similar angles. 12. Finding the relationships between the ratio and the ratios of the areas and volumes of similar solids. 13. Calculating tangent of acute angles in a right triangle and using tangents to determine sides' lengths in triangles. 14. Computing sines and cosines of acute angles in right triangles, and finding unknown measures in right triangles. 15. Defining and identifying angles of elevation and depression, and using them and trigonometric ratios to solve problems.		them and trigonometric ratios to solve problems. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: <u>TWO</u>

PERIOD: <u>V</u>

GRADE: <u>10</u>

SUBJECT: GEOMETRY

UMIT/TOPIC: **VECTORS AND CIRCLES**

GENERAL OBJECTIVE: Students will model real-world situations such as those involving velocity; use tangents to circles in real-world situations, such as working in a

machine shop.

SPECIFIC OBJECTIVES: Upon the completion of this topic, students will be able to:

1. Describe and define vectors using ordered pair notation;
2. Describe, define, and compute the magnitude and direction of vectors.
3. Solve Problems that involve vector addition.
4. Use vector to describe translation,
5. Use trigonometry to find the areas of regular polygons; use the sine ratio to find the areas of acute triangles.
6. Write the equation of a circle and use it to solve real-world problems.
7. Find the relationship between a radius and a tangent, and between two triangles drawn from the same point; circumscribe a circle
8. Find the lengths of chords and measures of a circle; locate the center of a circle using chords.
9. Find the measure of inscribed angles and the arcs they intercept.
10. Find the measures of angles formed by chords, secants, and tangents.
11. Find the measures of segments associated with circles.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will be problem solvers in construction and design. Students will be problem	**1. Describe and define vectors using ordered pair notation;** **2. Describe, define, and**	1. Describing and defining vectors using ordered pair notation;	**<u>A. Primary Text</u>** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson)	**<u>Essential tasks students should be able to do:</u>** 1. Describe and define vectors using ordered pair

solver in navigation and sailing.	**compute the magnitude and direction of vectors.** **3. Solve Problems that involve vector addition.** **4. Use vector to describe translation,** **5. Use trigonometry to find the areas of regular polygons; use the sine ratio to find the areas of acute triangles.** **6. Write the equation of a circle and use it to solve real-world problems.** **7. Find the relationship between a radius and a tangent, and between two triangles drawn from the same point; circumscribe a circle** **8. Find the lengths of chords and measures of a circle; locate the center of a circle using chords.** **9. Measures of inscribed angles and the arcs they intercept.** **10. Measures of angles formed by chords, secants, and tangents.** **11. Measures of segments associated with circles.**	2. Describing, defining, and computing the magnitude and direction of vectors. 3. Solving Problems that involve vector addition. 4. Using vector to describe translation, 5. Using trigonometry to find the areas of regular polygons; use the sine ratio to find the areas of acute triangles. 6. Writing the equation of a circle and using it to solve real-world problems. 7. Finding the relationship between a radius and a tangent, and between two triangles drawn from the same point; circumscribe a circle 8. Finding the lengths of chords and measures of a circle; locate the center of a circle using chords. 9. Finding the measure of inscribed angles and the arcs they intercept.	**B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	notation; 2. Describe, define, and compute the magnitude and direction of vectors. 3. Solve Problems that involve vector addition. 4. Use vector to describe translation, 5. Use trigonometry to find the areas of regular polygons; use the sine ratio to find the areas of acute triangles. 6. Write the equation of a circle and use it to solve real-world problems. 7. Find the relationship between a radius and a tangent, and between two triangles drawn from the same point; circumscribe a circle 8. Find the lengths of chords and measures of a circle; locate the center of a circle using chords. 9. Find the measure of inscribed angles and the arcs they intercept. 10. Find the measures of angles formed by chords, secants, and tangents. 11. Find the measures of segments associated with circles. **Other essential evaluation**

		10. Finding the measures of angles formed by chords, secants, and tangents. 11. Measuring segments associated with circles.		**tools:** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: TWO

PERIOD: VI

GRADE: 10

SUBJECT: GEOMETRY

UNIT/TOPIC: **ANALYTIC GEOMETRY**

GENERAL OBJECTIVE: Students will become technicians using ratios to complete the sizes of objects of planets

SPECIFIC OBJECTIVES:

Upon the completion of this topic, students will be able to:

1. Compute and interpret the slope of a line.
2. Use the distance formula to find the distance between two points.
3. Apply the midpoint formula to find the coordinates of the midpoint between two points.
4. Find and graph the equation given: a. two points; b. points and slope; c. slope and y-intercept; d. general form; e. parallel form or perpendicular form.
5. Define, discuss, and work with a circle and its parts (formula, center, radius, diameter, circumference, chord, secant, sector, arc, arc length} with its center at (0, 0) or at (h, k) and solve applied problems involving circles.
6. Define, discuss, and work with a parabola and its parts (vertex, focus, axis of symmetry, standard form of its equation, and directrix) with center at (0, 0) or at (h, k).
7. Define, discuss, and work with an ellipse and its parts (vertices, foci, major and minor axes of symmetry, standard form of its equation, and formula of its area) with center at (0, 0) or at (h, k).

8. Define, discuss, and work with an hyperbola and its parts (vertices, foci, transverse and conjugate axes, standard form of its equation, and equations of asymptotes) with center at (0, 0) or at (h, k).

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will acquire skills of technicians using ratios to complete the sizes of objects of planets	**1. Computation and interpretation of the slope of a line.** **2. The distance formula to find the distance between two points and the midpoint formula to find the coordinates of the midpoint between two points.** **3. Graph of the equation given: a. two points; b. points and slope; c. slope and y-intercept; d. general form; e. parallel form or perpendicular form.** **4. The circle and its parts (formula, center, radius, diameter, circumference, chord, secant, sector, arc, arc length} with its center at (0, 0) or at (h, k) and solve applied problems involving circles.** **5. The parabola and its parts (vertex, focus, axis of symmetry, standard form of its equation, and directrix) with center at**	1. Computing and interpreting the slope of a line. 2. Using the distance formula to find the distance between two points and the midpoint formula to find the coordinates of the midpoint between two points. 3. Finding and graphing the equation given: a. two points; b. points and slope ; c. slope and y-intercept; d. general form; e. parallel form or perpendicular form. 4. Defining, discussing, and working with a circle and its parts(formula, center, radius, diameter, circumference, chord, secant, sector, arc, arc length} with its center at (0, 0) or at (h, k) and solve applied problems involving circles.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Compute and interpret the slope of a line. 2. Use the distance formula to find the distance between two points. 3. Apply the midpoint formula to find the coordinates of the midpoint between two points. 4. Find and graph the equation given: a. two points; b. points and slope ; c. slope and y-intercept; d. general form; e. parallel form or perpendicular form. 5. Define, discuss, and work with a circle and its parts(formula, center, radius, diameter, circumference, chord, secant, sector, arc, arc length} with its center at (0, 0) or at (h, k) and solve applied problems involving circles. 6. Define, discuss, and work with a parabola and its

	(0, 0) or at (h, k). **6. The ellipse and its parts (vertices, foci, major and minor axes of symmetry, standard form of its equation, and formula of its area) with center at (0, 0) or at (h, k).** **7. The hyperbola and its parts (vertices, foci, transverse and conjugate axes, standard form of its equation, and equations of asymptotes) with center at (0, 0) or at (h, k).**	5. Defining, discussing, and working with a parabola and its parts (vertex, focus, axis of symmetry, standard form of its equation, and directrix) with center at (0, 0) or at (h, k). 6. Defining, discussing, and working with an ellipse and its parts (vertices, foci, major and minor axes of symmetry, standard form of its equation, and formula of its area) with center at (0, 0) or at (h, k). 7. Defining, discussing, and working with a hyperbola and its parts (vertices, foci, transverse and conjugate axes , standard form of its equation, and equations of asymptotes) with center at (0, 0) or at (h, k).		parts (vertex, focus, axis of symmetry, standard form of its equation, and directrix) with center at (0, 0) or at (h, k). 7. Define, discuss, and work with an ellipse and its parts (vertices, foci, major and minor axes of symmetry, standard form of its equation, and formula of its area) with center at (0, 0) or at (h, k). 8. Define, discuss, and work with an hyperbola and its parts (vertices, foci, transverse and conjugate axes, standard form of its equation, and equations of asymptotes) with center at (0, 0) or at (h, k). **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: ONE

PERIOD: I

GRADE: 11

UNIT/TOPICS: 1. ANGLES AND THEIR MEASURE
2. RIGHT TRIANGLE TRIGONOMETRY

GENERAL OBJECTIVE: Students will measure angles and solve real-life problems, such as calculating the height of a mountain.

SPECIFIC OBJECTIVES:
Upon the completion of these topics, students will be able to:

1. Define and give examples of close half line, ray, angle, initial and terminal sides of angles, positive and negative angles, acute angle, right angle, obtuse angle, straight angle, reflex angle, and angles in standard position.
2. Convert between degrees, minutes, seconds, and decimal.
3. Find the arc length of a circle.
4. Convert from degree to radian, and conversely.
5. Find the area of a sector.
6. Find the linear speed of an object traveling in circular motion.

Define and compute the values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of acute angles ($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$) using the right triangle ratios approach.

1. Define and compute the values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles ($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$)and their co-terminal angles , using the Cartesian plane approach .
2. Define and compute the values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles ($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$) and their co-terminal angles, using the unit circle approach.
3. Find the remaining trigonometric function value, given the value of one of those functions.
4. Compute the exact values of the trigonometric functions for general angles.

5. Define and use co- terminal angles to find exact values of trigonometric functions.
6. Define and find the reference angle and reference triangle of a general angle.
7. Determine the signs of the trigonometric functions of an angle, in a given quadrant.
8. Use calculator to compute the value of any trigonometric function.
9. Model and Solve right triangles and their applications, such as indirect measurements using angles of depression and elevation.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life-long learners.	**1. Close half line, ray, angle, initial and terminal sides of angles, positive and negative angles, acute angle, right angle, obtuse angle, straight angle, reflex angle, and angles in standard position.** **2. Degrees, minutes, seconds, and decimal.** **3. Arc length of a circle.** **4. Conversion from degree to radian, and conversely.** **5. Area of a sector.** **6. Linear speed of an object traveling in circular motion.** **7. Values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of acute angles (** $\frac{\pi}{4} = 45^o, \frac{\pi}{6} = 30^o, \frac{\pi}{3} = 60^o$ **)**	1. Defining and giving examples of close half line, ray, angle, initial and terminal sides of angles, positive and negative angles, acute angle, right angle, obtuse angle, straight angle, reflex angle, and angles in standard position. 2. Converting between degrees, minutes, seconds, and decimal. 3. Finding the arc length of a circle. 4. Converting from degree to radian, and conversely. 5. Finding the area of a sector. 6. Finding the linear speed of an object traveling in circular motion. 7. Defining and computing the values of trigonometric functions (sine, cosine, tangent, cosecant, secant,	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass,	**Essential tasks students should be able to do:** 1. Define and give examples of close half line, ray, angle, initial and terminal sides of angles, positive and negative angles, acute angle, right angle, obtuse angle, straight angle, reflex angle, and angles in standard position. 2. Convert between degrees, minutes, seconds, and decimal. 3. Find the arc length of a circle. 4. Convert from degree to radian, and conversely. 5. Find the area of a sector. 6. Find the linear speed of an object traveling in circular motion. **Other essential evaluation tools:** • Quizzes • Tests • Homework

	using the right triangle ratios approach . **8. Values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles(** $\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$ **)and their co-terminal angles , using the Cartesian plane approach.** **9. Values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles(** $\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$ **) and their co-terminal angles, using the unit circle approach.** **10. Finding the remaining trigonometric function value, given the value of one of those functions.** **11. Exact values of the trigonometric functions for general angles.** **12. Definition of and use of co- terminal angles to find**	and cotangent) of acute angles ($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$) using the right triangle ratios approach . 8. Defining and computing the values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$)and their co-terminal angles , using the Cartesian plane approach . 9. Defining and computing the values of trigonometric functions (sine, cosine, tangent, cosecant, secant, and cotangent) of special acute angles($\frac{\pi}{4}=45^o,\frac{\pi}{6}=30^o,\frac{\pi}{3}=60^o$) and their co-terminal angles, using the unit circle approach . 10. Finding the remaining trigonometric function value, given the value of one of those functions. 11. Computing the exact values	• Tracing papers	• Group assignments • Projects

	exact values of trigonometric functions. **13. Reference angle and reference triangle of a general angle.** **14. The signs of the trigonometric functions of an angle, in a given quadrant.** **15. The use of calculator to compute the value of any trigonometric function.** **16. Models and Solution of right triangles and their applications, such as indirect measurements using angles of depression and elevation.**	of the trigonometric functions for general angles. 12. Defining and using co-terminal angles to find exact values of trigonometric functions. 13. Defining and finding the reference angle and reference triangle of a general angle. 14. Determining the signs of the trigonometric functions of an angle, in a given quadrant. 15. Using calculator to compute the value of any trigonometric function. 16. Modeling and Solving right triangles and their applications, such as indirect measurements using angles of depression and elevation.		

SEMESTER: <u>ONE</u>

PERIOD: <u>II</u>

GRADE: <u>11</u>

UNIT/TOPIC: GRAPHS OF TRIGONOMETRIC FUNCTION

GENERAL OBJECTIVE: Students will solve problems involving Graphs of Trigonometric Function.

SPECIFIC OBJECTIVES:

Upon the completion of this topic, students will be able to:

1. Graph the sine and cosine functions
2. Determine the domain and range of sine and cosine functions.
3. Relate angles to the x coordinates and values of the trigonometric functions to the y coordinates.
4. Determine the amplitude and period of sinusoidal functions.
5. Explain why the graphs of sine and cosine are called sinusoidal graphs.
6. Explain the cyclic nature of periodic functions.
7. Determine the phase shift of a sinusoidal function.
8. Model harmonic motion with sinusoidal functions.
9. Solve harmonic motion problems.
10. Determine the domain and range of tangent, cotangent, secant, and cosecant functions.
11. Relate domain restrictions to vertical asymptotes.
12. Graph basic tangent, cotangent, secant, and cosecant functions.
13. Analyze the pattern that vertical asymptotes follow.
14. Determine the period of tangent, cotangent, secant, and cosecant functions.
15. Use translation to graph tangent, cotangent, secant, and cosecant functions.
16. Explain the relationship between the graphs of cosine/secant and sine/cosecant.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers.	**1. Graph the sine and cosine functions.**	1. Graphing the sine and cosine functions.	**<u>A. Primary Text</u>** *Mathematics for Senior High*	**<u>Essential tasks students should be able to do:</u>**

Students will become informed decision makers. Students will become life-long learners.	**2. Determination of the domain and range of sine and cosine functions.** **3. Relationship of angles to the x coordinates and values of the trigonometric functions to the y coordinates.** **4. Amplitude and period of sinusoidal functions.** **5. Understand why the graphs of sine and cosine are called sinusoidal graphs.** **6. Understand the cyclic nature of periodic functions.** **7. The phase shift of a sinusoidal function.** **8. Models of harmonic motion with sinusoidal functions.** **9. Solution of harmonic motion problems.** **10. The domain and range of tangent, cotangent, secant, and cosecant functions.**	2. Determining the domain and range of sine and cosine functions. 3. Associating angles to the x coordinates and values of the trigonometric functions to the y coordinates. 4. Determining the amplitude and period of sinusoidal functions. 5. Activities to show why the graphs of sine and cosine are called sinusoidal graphs. 6. Activities to show why the cyclic nature of periodic functions. 7. Determining the phase shift of a sinusoidal function. 8. Modeling harmonic motion with sinusoidal functions. 9. Solving harmonic motion problems. 10. Determining the domain and range of tangent, cotangent, secant, and	*School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	1. Graph the sine and cosine functions 2. Determine the domain and range of sine and cosine functions. 3. Relate angles to the x coordinates and values of the trigonometric functions to the y coordinates. 4. Determine the amplitude and period of sinusoidal functions. 5. Explain why the graphs of sine and cosine are called sinusoidal graphs. 6. Explain the cyclic nature of periodic functions. 7. Determine the phase shift of a sinusoidal function. 8. Model harmonic motion with sinusoidal functions. 9. Solve harmonic motion problems. 10. Determine the domain and range of tangent, cotangent, secant, and cosecant functions. 11. Relate domain restrictions to vertical asymptotes. 12. Graph basic tangent, cotangent, secant, and cosecant functions. 13. Analyze the pattern that vertical asymptotes follow. 14. Determine the period of

	11. Relationship between domain restrictions and vertical asymptotes. **12. Graphs of basic tangent, cotangent, secant, and cosecant functions.** **13. Pattern that vertical asymptotes follow.** **14. The period of tangent, cotangent, secant, and cosecant functions.** **15. Using translation to graph tangent, cotangent, secant, and cosecant functions.** **16. The relationship between the graphs of cosine/secant and sine/cosecant.**	cosecant functions. 11. Relating domain restrictions to vertical asymptotes. 12. Graphing basic tangent, cotangent, secant, and cosecant functions. 13. Understanding the pattern that vertical asymptotes follow. 14. Determining the period of tangent, cotangent, secant, and cosecant functions. 15. Using translation to graph tangent, cotangent, secant, and cosecant functions. 16. Understanding the relationship between the graphs of cosine/secant and sine/cosecant.		tangent, cotangent, secant, and cosecant functions. 15. Use translation to graph tangent, cotangent, secant, and cosecant functions. 16. Explain the relationship between the graphs of cosine/secant and sine/cosecant. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: ONE

PERIOD: III

GRADE: 11

UNIT/TOPIC: TRIGONOMETRIC IDENTITIES AND THEIR VERIFICATIONS

GENERAL OBJECTIVE: Students will solve problems involving Trigonometric Identities and their Verifications.

SPECIFIC OBJECTIVES:

Upon the completion of this topic, students will be able to:

1. Explain the reciprocal, quotient, and Pythagorean identities.
2. Argue that the reciprocal and quotient identities are not always defined.
3. Use the basic identities to simplify trigonometric expressions, and demonstrate that there is more than one way to verify an identity..
4. Demonstrate that identities must hold for all values in the domain of the functions.
5. Find exact values of functions for rational multiples of Type equation here.π by using the sum and difference identities.
6. Develop new identities from the sum and difference identities.
7. Derive the sum and difference identities for the cosine function by using the distance formula.
8. Use the sum and difference identities for the cosine function to obtain the co function identities.
9. Use the co function identities and the sum and difference identities for the cosine function to derive the sum and difference identities for the sine function.
10. Use the cosine and sine sum and difference identities with the quotient identity to obtain the tangent sum and difference identities.
11. Use the double-angle identities to find exact values of trigonometric functions.
12. Use the double-angle identities to simplify or verify identities.
13. Derive the double-angle identities from the sum identities.
14. Use the half-angle identities to find the exact values of trigonometric functions.
15. Use the half-angle identities to verify other trigonometric identities.
16. Derive the half-angle identities from the double-angle identities.
17. Express products of trigonometric functions as sums of trigonometric functions.
18. Express sums of trigonometric functions as products of trigonometric functions.
19. Use the sum and difference identities to derive product-to-sum identities.
20. Use the product-to-sum identities to derive sum-to-product identities.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life-long learners.	**1. The reciprocal, quotient, and Pythagorean identities.** **2. Understand that the reciprocal and quotient identities are not always defined.** **3. The use of the basic identities to simplify trigonometric expressions, and understand that there is more than one way to verify an identity.** **4. Understand that identities must hold for all values in the domain of the functions.** **5. Exact values of functions for rational multiples of π by using the sum and difference identities.** **6. Development of new identities from the sum and difference identities.** **7. Derivation the sum and difference identities for the cosine function by using the distance**	1. Learning the reciprocal, quotient, and Pythagorean identities. 2. Understanding that the reciprocal and quotient identities are not always defined. 3. Using the basic identities to simplify trigonometric expressions, and understand that there is more than one way to verify an identity.. 4. Understanding that identities must hold for all values in the domain of the functions. 5. Finding exact values of functions for rational multiples of Type equation here. π by using the sum and difference identities. 6. Developing new identities from the sum and difference identities. 7. Deriving the sum and difference identities for the cosine function by using the distance formula.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Explain the reciprocal, quotient, and Pythagorean identities. 2. Argue that the reciprocal and quotient identities are not always defined. 3. Use the basic identities to simplify trigonometric expressions, and demonstrate that there is more than one way to verify an identity.. 4. Demonstrate that identities must hold for all values in the domain of the functions. 5. Find exact values of functions for rational multiples of Type equation here. π by using the sum and difference identities. 6. Develop new identities from the sum and difference identities. 7. Derive the sum and difference identities for the cosine function by using the distance formula. 8. Use the sum and difference identities for the cosine function to obtain the co function identities.

	formula. **8. The use of the sum and difference identities for the cosine function to obtain the co-function identities.** **9. The use the co-function identities and the sum and difference identities for the cosine function to derive the sum and difference identities for the sine function.** **10. The use of the cosine and sine sum and difference identities with the quotient identity to obtain the tangent sum and difference identities.** **11. The use of the double-angle identities to find exact values of trigonometric functions.** **12. The use of the double-angle identities to simplify or verify identities.** **13. Derivation of the double-angle identities from the sum identities.**	8. Using the sum and difference identities for the cosine function to obtain the co-function identities. 9. Using the co-function identities and the sum and difference identities for the cosine function to derive the sum and difference identities for the sine function. 10. Using the cosine and sine sum and difference identities with the quotient identity to obtain the tangent sum and difference identities. 11. Using the double-angle identities to find exact values of trigonometric functions. 12. Using the double-angle identities to simplify or verify identities. 13. Deriving the double-angle identities from the sum identities. 14. Using the half-angle identities to find the exact values of trigonometric functions.		9. Use the co function identities and the sum and difference identities for the cosine function to derive the sum and difference identities for the sine function. 10. Use the cosine and sine sum and difference identities with the quotient identity to obtain the tangent sum and difference identities. 11. Use the double-angle identities to find exact values of trigonometric functions. 12. Use the double-angle identities to simplify or verify identities. 13. Derive the double-angle identities from the sum identities. 14. Use the half-angle identities to find the exact values of trigonometric functions. 15. Use the half-angle identities to verify other trigonometric identities. 16. Derive the half-angle identities from the double-angle identities. 17. Express products of trigonometric functions as sums of trigonometric functions.

	14. The use of the half-angle identities to find the exact values of trigonometric functions. **15. The use of the half-angle identities to verify other trigonometric identities.** **16. Derivation of the half-angle identities from the double-angle identities.** **17. The products of trigonometric functions as sums of trigonometric functions.** **18. The sums of trigonometric functions as products of trigonometric functions.** **19. Use of the sum and difference identities to derive product-to-sum identities.** **20. Use of the product-to-sum identities to derive sum-to-product identities.**	15. Using the half-angle identities to verify other trigonometric identities. 16. Deriving the half-angle identities from the double-angle identities. 17. Expressing products of trigonometric functions as sums of trigonometric functions. 18. Expressing sums of trigonometric functions as products of trigonometric functions. 19. Using the sum and difference identities to derive product-to-sum identities. 20. Using the product-to-sum identities to derive sum-to-product identities.		18. Express sums of trigonometric functions as products of trigonometric functions. 19. Use the sum and difference identities to derive product-to-sum identities. 20. Use the product-to-sum identities to derive sum-to-product identities. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: <u>TWO</u>

PERIOD: <u>IV</u>

GRADE: <u>11</u>

UNIT/TOPIC: 1. INVERSE TRIGONOMETRIC FUNCTIONS AND TRIGONOMETRIC EQUATIONS

GENERAL OBJECTIVE: Students will solve real-life problems involving Trigonometric Identities and their Verifications

SPECIFIC OBJECTIVES:

Upon the completion of this topic, students will be able to:

1. Define and develop inverse trigonometric functions.
2. Use the different notations for inverse trigonometric functions.
3. Graph inverse trigonometric functions.
4. Explain why domain restrictions on trigonometric functions are needed for inverse trigonometric functions to exist.
5. Extend properties of inverse of functions to develop inverse trigonometric functions.
6. Solve trigonometric equations by inspection.
7. Solve trigonometric equations using algebraic techniques.
8. Demonstrate that solving trigonometric equations is similar to solving algebraic equations.
9. Solve trigonometric equations using inverse functions.
10. Solve trigonometric equations (involving more than one trigonometric functions) using trigonometric identities.
11. Realize that the goal in solving trigonometric equations is to find the value(s) for the independent variable that makes the equation true.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life-long learners.	**1. Definition and development inverse trigonometric functions.** **2. Different notations for inverse trigonometric functions.**	1. Defining and developing inverse trigonometric functions. 2. Using the different notations for inverse trigonometric functions.	**<u>A. Primary Text</u>** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **<u>B. Secondary Texts</u>** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary*	**<u>Essential tasks students should be able to do:</u>** 1. Define and develop inverse trigonometric functions. 2. Use the different notations for inverse trigonometric functions.

	3. Graphs of inverse trigonometric functions. **4. Understand why domain restrictions on trigonometric functions are needed for inverse trigonometric functions to exist.** **5. Extension of properties of inverse of functions to develop inverse trigonometric functions.** **6. Solution of trigonometric equations by inspection.** **7. Solution of trigonometric equations using algebraic techniques.** **8. Understand that solving trigonometric equations is similar to solving algebraic equations.** **9. Solution of trigonometric equations using inverse functions.** **10. Solution of trigonometric equations (involving more than one trigonometric function)**	3. Graphing inverse trigonometric functions. 4. Understanding why domain restrictions on trigonometric functions are needed for inverse trigonometric functions to exist. 5. Extending properties of inverse of functions to develop inverse trigonometric functions. 6. Solving trigonometric equations by inspection. 7. Solving trigonometric equations using algebraic techniques. 8. Discussing the fact that solving trigonometric equations is similar to solving algebraic equations. 9. Solving trigonometric equations using inverse functions. 10. Solving trigonometric equations (involving more than one trigonometric function) using trigonometric identities.	*Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	3. Graph inverse trigonometric functions. 4. Explain why domain restrictions on trigonometric functions are needed for inverse trigonometric functions to exist. 5. Extend properties of inverse of functions to develop inverse trigonometric functions. 6. Solve trigonometric equations by inspection. 7. Solve trigonometric equations using algebraic techniques. 8. Demonstrate that solving trigonometric equations is similar to solving algebraic equations. 9. Solve trigonometric equations using inverse functions. 10. Solve trigonometric equations (involving more than one trigonometric functions) using trigonometric identities. 11. Argue that the goal in solving trigonometric equations is to find the value(s) for the independent variable that makes the equation true. **Other essential evaluation**

	using trigonometric identities. **11. Realize that the goal in solving trigonometric equations is to find the value(s) for the independent variable that makes the equation true.**	11. Discussing that the goal in solving trigonometric equations is to find the value(s) for the independent variable that makes the equation true.		**tools:** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: TWO

PERIOD: V

GRADE: 11

UNIT/TOPIC: OBLIQUE TRIANGLES, THE SINE AND COSINE LAWS, AND THE COMPLEX NUMBERS

GENERAL OBJECTIVE: Students will use the laws of sines and cosines in problem solving; and use the complex plane to illustrate relationships between complex numbers,

such as fractal geometry.

SPECIFIC OBJECTIVES: Upon the completion of this unit, students will be able to:

1. Solve application problems involving bearing and heading.
2. Derive the law of sines.
3. Derive the law of cosines.
4. Develop a strategy for which angles to select (longer or shorter) and which (the law of sines or law of cosines) to use to solve oblique triangles.
5. Classify the ambiguous case as “no triangle”, one triangle or “two triangles”.
6. Solve SAA or ASA triangle problems using the law of sines or cosines
7. Solve SSA triangles problems, applying the law of sines or cosines.
8. Solve SAS problems using the law of cosines or sines.

9. Use the law of sines to derive a formula for an area of a triangle (SAS case).
10. Use the law of cosines to derive a formula for an area of a triangle (SSS case: Heron's formula).
11. Solve ambiguous SSA triangle cases.
12. Classify an oblique triangle as one of four cases.
13. Solve application problems involving oblique triangles.
14. Define, identify, add, subtract, and multiply imaginary and complex numbers.
15. Plot complex numbers in the complex plane.
16. Identify the imaginary and real axes and graph on a coordinate grid or Argand diagram.
17. Express a complex number in trigonometric and standard forms.
18. Find the product of two complex numbers in trigonometric form.
19. Divide complex numbers in trigonometric form.
20. Find the power of a complex number using Demoivre's Theorem.
21. Find complex roots.
22. Use the properties of the conjugate and modulus in problem solving.
23. Convert from polar coordinate to rectangular coordinate.
24. Transformation of equations from polar to rectangular form and conversely.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life-long learners.	**1. Angle of elevation and depression problems** **2. Applications problems involving bearing and or heading** **3. AAS and ASA triangle and the law of sines** **4. SAS and the law of cosine problems** **5. Addition, subtraction, and multiplication of**	1. Solving angle of elevation and angle of depression problem. 2. Solving applications problem involving bearing and /or heading 3. Solving applications using the law of sines or cosines 4. Defining, identifying, adding, subtracting, and multiplying imaginary and complex numbers.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998).	**Essential tasks students should be able to do:** 1. Solve application problems involving bearing and heading. 2. Derive the law of sines. 3. Derive the law of cosines. 4. Develop a strategy for which angles to select (longer or shorter) and which (the law of sines or law of cosines) to use to solve oblique triangles. 5. Classify the ambiguous case as "no triangle", one

	complex numbers. **6. Complex numbers in the complex plane.** **7. The imaginary and real axes and graph on a coordinate grid or Argand diagram.** **8. Complex number in trigonometric and standard forms.** **9. Product of two complex numbers in trigonometric form.** **10. Division of complex numbers in trigonometric form.** **11. Power of a complex number using Demoivre's Theorem.** **12. Complex roots.**	5. Plotting complex numbers in the complex plane. 6. Identifying the imaginary and real axes and graph on a coordinate grid or Argand diagram. 7. Expressing a complex number in trigonometric and standard forms. 8. Finding the product of two complec numbers in trigonometric form. 9. Dividing complex numbers in trigonometric form. 10. Finding the power of a complex number using Demoivre's Theorem. 11. Finding complex roots.	**C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	triangle or "two triangles". 6. Solve SAA or ASA triangle problems using the law of sines or cosines 7. Solve SSA triangles problems, applying the law of sines or cosines. 8. Solve SAS problems using the law of cosines or sines. 9. Use the law of sines to derive a formula for an area of a triangle (SAS case). 10. Use the law of cosines to derive a formula for an area of a triangle (SSS case: Heron's formula). 11. Solve ambiguous SSA triangle cases. 12. Classify an oblique triangle as one of four cases. 13. Solve application problems involving oblique triangles. 14. Define, identify, add, subtract, and multiply imaginary and complex numbers. 15. Plot complex numbers in the complex plane. 16. Identify the imaginary and real axes and graph on a coordinate grid or Argand diagram. 17. Express a complex number in trigonometric and

				standard forms. 18. Find the product of two complex numbers in trigonometric form. 19. Divide complex numbers in trigonometric form. 20. Find the power of a complex number using Demoivre's Theorem. 21. Find complex roots. 22. Use the properties of the conjugate and modulus in problem solving. 23. Convert from polar coordinate to rectangular coordinate. 24. Transformation of equations from polar to rectangular form and conversely. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

SEMESTER: TWO

PERIOD: VI

GRADE: 11

UNIT/TOPIC: TRANSFORMATIONS AND VECTORS

GENERAL OBJECTIVE: To describe and explain the various kinds of motions one encounters in daily life, such as arts, computer graphics, navigation, manufacturing, music and other fields one endeavor as a citizen. To model real-world situations such as those involving velocity.

SPECIFIC OBJECTIVES: Upon the completion of this unit, students will be able to:

1. Identify isometries.
2. Locate reflection images of figures.
3. Find translation images of figures.
4. Use vectors and matrix addition to represent translation.
5. Identify and locate rotation images of figures.
6. Show how reflections are related to other isometries.
7. Identify glide reflections.
8. Identify types of symmetry in figures.
9. Locate dilation images of figures.
10. Describe vector using ordered pair notation
11. Describe the magnitude and direction of vectors.
12. Solve problems that involve vector addition and subtraction (resultant).
13. Multiply vectors by a number (scalar product).
14. Define and use unit vector and position vector.
15. Determine a vector from its direction and magnitude of vector.
16. Work with objects in static equilibrium.
17. Find the angle between two vectors.
18. Determine whether two vectors are parallel or orthogonal.
19. Determine Latitudes, longitudes, and bearings.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life-long learners.	**1. Reflections(transformation, isometries, image, pre-image prime notation , orientation,** **2. Translations (Locate reflection images of figures.** **3. Rotations** **4. Composition of reflections(glide reflection)** **5. Symmetry(reflectional symmetry)** **6. Tessellations(tiling, pure tessellation, translational symmetry, glide reflectional symmetry)** **7. Dilations (scale factor, dilation, enlarge3ment, reduction, scalar multiplication)** **8. Vectors and trigonometry** **9. Find translation images of figures.** **10. Use vectors and matrix addition to represent translation.**	1. Identifying isometries. 2. Locating reflection images of figures. 3. Finding translation images of figures. 4. Using vectors and matrix addition to represent translation. 5. Identifying and locating rotation images of figures. 6. Show ing how reflections are related to other isometries . 7. Identify ing glide reflections. 8. Identifying types of symmetry in figures. 9. Locating dilation images of figures. 10. Describing vector using ordered pair notation. 11. Describing the magnitude and direction of vectors.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Identify isometries. 2. Locate reflection images of figures. 3. Find translation images of figures. 4. Use vectors and matrix addition to represent translation. 5. Identify and locate rotation images of figures. 6. Show how reflections are related to other isometries . 7. Identify glide reflections. 8. Identify types of symmetry in figures. 9. Locate dilation images of figures. 10. Describe vector using ordered pair notation 11. Describe the magnitude and direction of vectors. 12. Solve problems that involve vector addition and subtraction (resultant). 13. Multiply vectors by a number (scalar product). 14. Define and use unit vector and position vector. 15. Determine a vector from

	11. Identify and locate rotation images of figures. **12. Show how reflections are related to other isometries.** **13. Identify glide reflections.** **14. Identify types of symmetry in figures.** **15. Locate dilation images of figures.** **16. Describe vector using ordered pair notation** **17. Describe the magnitude and direction of vectors.** **18. Solve problems that involve vector addition and subtraction.** **19. Multiply vectors by a number (scalar product).** **20. Define and use unit vector and position vector.** **21. Determine a vector from its direction and magnitude of vector.** **22. Work with objects in static equilibrium.**	12. Solving problems that involve vector addition and subtraction. 13. Multiplying vectors by a number (scalar product). 14. Defining and using unit vector and position vector. 15. Determining a vector from its direction and magnitude of vector. 16. Working with objects in static equilibrium. 17. Finding the angle between two vectors. 18. Determining whether two vectors are parallel or orthogonal. 19. Identifying isometries. 20. Locating reflection images of figures. 21. Finding translation images of figures. 22. Using vectors and matrix addition to represent translation. 23. Identifying and locating		its direction and magnitude of vector. 16. Work with objects in static equilibrium. 17. Find the angle between two vectors. 18. Determine whether two vectors are parallel or orthogonal. 19. Define Latitudes, longitudes, and bearings. **<u>Other essential evaluation tools:</u>** • Quizzes • Tests • Homework • Group assignments • Projects

	23. Find the angle between two vectors. **24. Determine whether two vectors are parallel or orthogonal.** **25. Latitudes, longitudes, and bearings.**	rotation images of figures. 24. Showing how reflections are related to other isometrics. 25. Identifying glide reflections. 26. Identifying types of symmetry in figures. 27. Locating dilation images of figures. 28. Describing vector, using ordered pair notation 29. Describing the magnitude and direction of vectors. 30. Solving problems that involve vector addition and subtraction. 31. Multiplying vectors by a number (scalar product). 32. Defining and using unit vector and position vector. 33. Determining a vector from its direction and magnitude of vector. 34. Working with objects in		

		static equilibrium. 35. Finding the angle between two vectors. 36. Determining whether two vectors are parallel or orthogonal. 26. Defining and finding Latitudes, longitudes, and bearings and distance along lines of latitudes, longitudes, and bearings. 27. Latitudes, longitudes, and bearings.		

SEMESTER: ONE

PERIOD: I

GRADE: 12

UNIT/TOPIC: ARITHMETIC AND ALGEBRA REVIEW

GENERAL OBJECTIVES: Students will sharpen their skills at manipulating numeric and algebraic expressions. Students will concentrate on concepts rather than computations when studying arithmetic and algebra.

SPECIFIC OBJECTIVES: Upon completion of this Unit, students will be able to:

1. Discuss and work with the system of real numbers and their properties (reflexive, symmetric, transitive, substitution, commutative, associative, distributive, additive and multiplicative identities, additive and multiplicative inverse, etc.)
2. Solve and graph inequalities.
3. Evaluate numerical expressions.
4. Define and perform operation on functions,

5. Define and perform operations on polynomials.
6. Factor polynomials.
7. Define and solve equations and inequalities.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers Students will become informed decision makers. Students will become lifelong learners.	**1. The real Number System** **2. Exponents Radical (surd) and Scientific Notation** **3. Algebraic Expressions, Polynomials, and Factoring Rational and other Fractional Expressions** **4. Composition of Algebraic Expressions** **5. Solving Equations** **6. Linear and Absolute Value inequalities: Interval and set builder Notations** **7. Quadratic and Other Inequalities**	Activities involving: 1. Properties of Addition and Multiplication 2. Properties of Quotients 3. The order Relation and Arithmetic 4. Properties of the Absolute value 5. Distance between Two Points on the Real Number Line 6. Properties of Integral of Exponents 7. Properties of Radicals 8. Procedure for simplifying Expressions involving Radicals 9. Converting from Standard to Scientific Notation and Vice Versa 10. Products of Polynomials 11. Procedure for finding a	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Discuss and work with the system of real numbers and their properties (reflexive, symmetric, transitive, substitution, commutative, associative, distributive, additive and multiplicative identities, additive and multiplicative inverse, etc.) 2. Solve and graph inequalities. 3. Evaluate numerical expressions. 4. Define and perform operation on functions, 5. Define and perform operations on polynomials. 6. Factor polynomials. 7. Define and solve equations and inequalities.

		least Common Denominator 12. Composition of s(y) with r(x) 13. Factoring 14. Completing the square 15. The Quadratic Equation Formula 16. Making decision from the discriminate 17. Solving Quadratic and other inequalities		**Other essential evaluation tools:** • Quizzes • Test • Homework • Graded assignments • Project • Individual • Assessment • Group assessment • Informal assessment

SEMESTER: ONE

PERIOD: II

GRADE: 12

UNIT/TOPIC: EXPONENTIAL & LOGARITHMIC FUNCTIONS, AND CARTESIAN COORDINATES

GENERAL OBJECTIVES: Students will use coordinate to plane to visualize the relationship between two variables and computations when studying composition of functions. Their applications to real-life situations (such as profits from sales of two different items, etc.)

SPECIFIC OBJECTIVES: Upon completion of this Unit, students will be able to:

1. Evaluate exponential functions.
2. Graph exponential functions.
3. Solve application problems involving exponential functions (doubling time growth model, radioactive decay, compound interest).
4. Distinguish between algebraic and exponential functions.
5. Define base e.
6. Graph exponential functions with base e.
7. Review growth and decay with base e.
8. Solve application problems involving interest compounding continuously.
9. Change expressions to logarithmic expressions, and conversely.
10. Evaluate logarithmic functions.
11. Evaluate common and natural logarithms using calculator.
12. Graph logarithmic functions.
13. Interpret logarithmic functions as inverse of exponential functions.
14. Determine domain restrictions on logarithmic functions.
15. Express a single logarithm as a sum or difference of logarithms.
16. Express a logarithmic expression as a single logarithm.
17. Evaluate logarithms of a general base (other than base 10 or e).
18. Derive the seven basic logarithmic properties.
19. Derive the change-of-base formula.
20. Solve exponential and logarithmic equations.
21. Solve application problems using exponential and logarithmic equations.
22. Demonstrate how exponential and logarithmic equations are solved using properties of one-to-one functions and inverses.
23. Plot points in the Cartesian plane. Use distance and midpoint formulas to solve problems

24. Find the slope find a equation of a line: a. given two points; b. given a point and a slope; c. given a slope and the y intercept.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers Students will become informed makers students will become	**1. Evaluation exponential functions.** **2. Graph of exponential functions.** **3. Solution of application problems involving exponential functions (doubling time growth model, radioactive decay, compound interest).** **4. Distinguish between algebraic and exponential functions.** **5. Definition of base e.** **6. Graph of exponential functions with base e.** **7. Review of growth and decay with base e.** **8. Solution of application problems involving interest compounding continuously.** **9. Change of exponential expressions to logarithmic expressions,**	1. Evaluating exponential functions. 2. Graphing exponential functions. 3. Solving application problems involving exponential functions (doubling time growth model, radioactive decay, compound interest) . 4. Distinguishing between algebraic and exponential functions. 5. Defining base e. 6. Graphing exponential functions with base e. 7. Reviewing growth and decay with base e. 8. Solving application problems involving interest compounding continuously. 9. Changing expressions to logarithmic expressions, and conversely. 10. Evaluating logarithmic	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Graph exponential functions. 2. Solve application problems involving exponential functions (doubling time growth model, radioactive decay, compound interest) . 3. Distinguish between algebraic and exponential functions. 4. Define base e. 5. Graph exponential functions with base e. 6. Review growth and decay with base e. 7. Solve application problems involving interest compounding continuously. 8. Change expressions to logarithmic expressions, and conversely.

	and conversely. **10. Evaluation of logarithmic functions.** **11. Evaluation of common and natural logarithms using calculator.** **12. Graph of logarithmic functions.** **13. Interpretation of logarithmic functions as inverse of exponential functions.** **14. Domain restrictions on logarithmic functions.** **15. Expression of a single logarithm as a sum or difference of logarithms.** **16. Expression of a logarithmic expression as a single logarithm.** **17. Evaluation of logarithms of a general base (other than base 10 or e).Derivation and use of the seven basic logarithmic properties.** **18. Derivation and use of the change-of-base formula.**	functions. 11. Evaluating common and natural logarithms using calculator. 12. Graphing logarithmic functions. 13. Interpreting logarithmic functions as inverse of exponential functions. 14. Determining domain restrictions on logarithmic functions. 15. Expressing a single logarithm as a sum or difference of logarithms. 16. Expressing a logarithmic expression as a single logarithm. 17. Evaluating logarithms of a general base (other than base 10 or e). 18. Deriving the seven basic logarithmic properties. 19. Deriving the change-of-base formula. 20. Solving exponential and logarithmic equations.		9. Evaluate logarithmic functions. 10. Evaluate common and natural logarithms using calculator. 11. Graph logarithmic functions. **<u>Other essential evaluation tools:</u>** • Quizzes • Test • Homework • Graded Assignments • Project • Individual • Assessment • Group Assessment 8. Informal Assessment

	19. Solution of exponential and logarithmic equations. **20. Solution of application problems using exponential and logarithmic equations.** **21. Investigation of how exponential and logarithmic equations are solved using properties of one-to-one functions and inverses.** **22. Points in the Cartesian plane.** **23. Distance and midpoint formulas in solving problems** **24. The slope and equation of a line: a. given two points; b. given a point and a slope; c. given a slope and the y intercept.**	21. Solving application problems using exponential and logarithmic equations. 22. Investigating how exponential and logarithmic equations are solved using properties of one-to-one functions and inverses. 23. Plotting points in the Cartesian plane. Use distance and midpoint formulas to solve problems 24. Finding the slope find a equation of a line: a. given two points; b. given a point and a slope; c. given a slope and the y intercept.		

SEMESTER: ONE

PERIOD: III

GRADE: 12

UNIT/TOPIC: SYSTEMS OF EQUATIONS AND INEQUALITIES

GENERAL OBJECTIVES: Students will use coordinate to plane to visualize the relationship between two variables and computations when studying systems of equations and inequalities and their applications to everyday issues.

SPECIFIC OBJECTIVES: Upon completion of this unit, students will be able to:

1. Solve and graph systems of linear equations in two variables algebraically (substitution and elimination) or graphically.
2. Solve applications involving systems of linear equations.
3. Discuss the fact that a system of linear equations has either one solution, no solution, or infinitely many solutions.
4. Discuss the fact that two lines intersect at one point, no points(parallel lines), or infinitely many points (same line).
5. Solve and graph systems of three (or more) equations using matrices or determinants.ve application problems using systems of multivariable linear equations.
6. Identify three types of solutions: one solution, no solution, or infinitely many solutions.
7. Decompose rational expressions into sums of partial fractions when the denominator contains: distinct linear factors; repeated linear factors; distinct irreducible quadratic factors; repeated irreducible quadratic factors.
8. Associate between partial fraction and systems of linear equations.
9. Solve a system of nonlinear equations, using elimination or substitution method (and eliminate extraneous solutions).
10. Graph a linear inequality in two variables.
11. Graph a nonlinear inequality in two variables.
12. Graph a system of inequalities in two variables.
13. Interpret the difference between solid lines and dashed lines, overlapping shaded region as a solution.
14. Write an objective function that represents a quantity to be minimized or maximized.
15. Use inequalities to describe constraints.
16. Solve optimization problem, which combine minimizing or maximizing a function subject to constraints, using linear programming.
17. Interpret the vertices as maxima or minima.
18. Write the augmented matrix of a system of linear equations and conversely.
19. Perform row operations on a matrix.
20. Solve and graph systems of inequalities.
21. Evaluates two by two determine.
22. Use Cramer’s rule to sole systems in two or three variables.

23. Apply or use properties of determine in solving real-life problems.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will use coordinate to plane to visualize the relationship between two variables and computations when studying systems of equations and inequalities and their applications to everyday issues.	**1. Solutions and graphs of systems of linear equations in two variables algebraically (substitution and elimination) or graphically.** **2. Solutions of applications involving systems of linear equations.** **3. Discussion regarding the fact that a system of linear equations has either one solution, no solution, or infinitely many solutions.** **4. Discussion of the fact that two lines intersect at one point, no points (parallel lines), or infinitely many points (same line).** **5. Solution and graph of systems of three (or more) equations using matrices or determinants.ve application problems using systems of**	1. Solving and graphing systems of linear equations in two variables algebraically (substitution and elimination) or graphically. 2. Solving applications involving systems of linear equations. 3. Discussing the fact that a system of linear equations has either one solution, no solution, or infinitely many solutions. 4. Investigating the fact that two lines intersect at one point, no points (parallel lines), or infinitely many points (same line). 5. Solving and graphing systems of three (or more) equations using matrices or determinants.ve application problems using systems of multivariable linear equations. 6. Identifying three types of	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Solve and graph systems of linear equations in two variables algebraically (substitution and elimination) or graphically. 2. Solve applications involving systems of linear equations. 3. Discuss the fact that a system of linear equations has either one solution, no solution, or infinitely many solutions. 4. Discuss the fact that two lines intersect at one point, no points(parallel lines), or infinitely many points (same line). 5. Solve and graph systems of three (or more) equations using matrices or determinants.ve

	multivariable linear equations. **6. Identification of three types of solutions: one solution, no solution, or infinitely many solutions.** **7. Decomposition of rational expressions into sums of partial fractions when the denominator contains: distinct linear factors; repeated linear factors; distinct irreducible quadratic factors; repeated irreducible quadratic factors.** **8. Association between partial fraction and systems of linear equations.** **9. Solution of a system of nonlinear equations, using elimination or substitution method (and eliminate extraneous solutions).** **10. Graph of a linear inequality in two variables.** **11. Graph of a nonlinear**	solutions: one solution, no solution, or infinitely many solutions. 7. Decomposing rational expressions into sums of partial fractions when the denominator contains: distinct linear factors; repeated linear factors; distinct irreducible quadratic factors; repeated irreducible quadratic factors. 8. Associating between partial fraction and systems of linear equations. 9. Solving a system of nonlinear equations, using elimination or substitution method (and eliminate extraneous solutions). 10. Graphing a linear inequality in two variables. 11. Graphing a nonlinear inequality in two variables. 12. Graphing a system of inequalities in two variables.		application problems using systems of multivariable linear equations. 6. Identify three types of solutions: one solution, no solution, or infinitely many solutions. 7. Decompose rational expressions into sums of partial fractions when the denominator contains: distinct linear factors; repeated linear factors; distinct irreducible quadratic factors; repeated irreducible quadratic factors. 8. Associate between partial fraction and systems of linear equations. 9. Solve a system of nonlinear equations, using elimination or substitution method (and eliminate extraneous solutions). 10. Graph a linear inequality in two

	inequality in two variables. **12. Graph of a system of inequalities in two variables.** **13. Interpretation of the difference between solid lines and dashed lines, overlapping shaded region as a solution.** **14. Objective function that represents a quantity to be minimized or maximized.** **15. Inequalities that describe constraints.** **16. Solution optimization problem, which combine minimizing or maximizing a function subject to constraints, using linear programming.** **17. Vertices as maxima or minima.** **18. Augmented matrix of a system of linear equations and conversely.**	13. Interpreting the difference between solid lines and dashed lines, overlapping shaded region as a solution. 14. Writing an objective function that represents a quantity to be minimized or maximized. 15. Using inequalities to describe constraints. 16. Solving optimization problem, which combine minimizing or maximizing a function subject to constraints, using linear programming. 17. Interpreting the vertices as maxima or minima. 18. Writing the augmented matrix of a system of linear equations and conversely. 19. Performing row operations on a matrix. 20. Solving and graphing systems of inequalities. 21. Evaluating two by two determine.		variables. **<u>Other essential evaluation tools:</u>** • Quizzes • Test • Homework • Graded Assignments • Project • Individual • Assessment • Group assessment • Informal assessment

	19. Row operations on a matrix. **20. Solutions and graphs systems of inequalities.** **21. Evaluation of two by two determines.** **22. Cramer's rule to sole systems in two or three variables.** **23. Properties of determinants in solving real-life problems.**	22. Using Cramer's rule to sole systems in two or three variables. 23. Applying or use properties of determine in solving real-life problems.		

SEMESTER: <u>TWO</u>

PERIOD: <u>IV</u>

GRADE: <u>12</u>

UNIT/TOPIC: THE COMPLEX NUMBER SYSTEM, SEQUENCES, SERIES, AND THE BINOMIAL THEOREM

GENERAL OBJECTIVES: Students will use coordinate to plane to visualize the relationship between two variables and computations when studying USE THE COMPLEX plane to illustrate relations between complex numbers, such as fractal geometry.

SPECIFIC OBJECTIVES: Upon completion of this period, students will be able to:

1. State the arithmetic of complex numbers
2. State the conjugate of a complex number and complex division
3. Compute complex solution to quadratic equations
4. State the trigonometric form of a complex number

5. Demonstrate De Moivre's Roots of a Complex Number
6. Solve quadratic equations with negative discriminates
7. Define a sequence and find a sequence given the general term.
8. Look for a pattern in a sequence and find the general term.
9. Use factorial notation'.
10. Use recursive formulas.
11. Use summation (sigma) notation to represent a series.
12. Find the sum of a series.
13. Differentiate between a sequence and a series.
14. Recognize a geometric sequence.
15. Find the general, nth term, of a geometric sequence.
16. Compute the sum of a finite geometric series.
17. Find the sum of an infinite geometric series, if it exists.
18. Use geometric sequences and series to model real-world problems.
19. Differentiate between a geometric sequence and a geometric series.
20. Differentiate between an arithmetic sequence and a geometric sequence.
21. Identify the steps required to prove mathematical induction.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become life long learner.	**1. The Arithmetic of Complex Numbers** **2. The Conjugate of a Complex Number and Complex Division** **3. Complex Solution to Quadratic Equations** **4. The Trigonometric form of a Complex Number** **5. De Moivre's Roots of a Complex Number** **6. Quadratic equations**	1. The Arithmetic of Complex Numbers 2. The Conjugate of a Complex Number and Complex Division 3. Complex Solution to Quadratic Equations 4. The Trigonometric form of a Complex Number 5. De Moivre's Roots of a Complex Number 6. Solve quadratic equations	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary**	**Essential tasks students should be able to do:** 1. State the arithmetic of complex numbers 2. State the conjugate of a complex number and complex division 3. Compute complex solution to quadratic equations 4. State the trigonometric form of a complex number 5. Demonstrate De Moivre's Roots of a Complex Number 6. Solve quadratic equations with negative discriminates

	with negative discriminates **7. Definition of a sequence and calculation of a sequence given the general term.** **8. Patterns in a sequence and find the general term.** **9. Factorial notation'.** **10. Recursive formulas.** **11. Summation (sigma) notation to represent a series.** **12. The sum of a series.** **13. The difference between a sequence and a series.** **14. Recognize a geometric sequence.** **15. Find the general, nth term, of a geometric sequence.** **16. Compute the sum of a finite geometric series.** **17. Find the sum of an infinite geometric series, if it exists.**	with negative discriminates 7. Define a sequence and find a sequence given the general term. 8. Look for a pattern in a sequence and find the general term. 9. Use factorial notation'. 10. Use recursive formulas. 11. Use summation (sigma) notation to represent a series. 12. Find the sum of a series. 13. Differentiate between a sequence and a series. 14. Recognize a geometric sequence. 15. Find the general, nth term, of a geometric sequence. 16. Compute the sum of a finite geometric series. 17. Find the sum of an infinite geometric series, if it exists.	**<u>Readings</u>** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	7. Define a sequence and find a sequence given the general term. 8. Look for a pattern in a sequence and find the general term. 9. Use factorial notation'. 10. Use recursive formulas. **<u>Other essential evaluation tools:</u>** • Quizzes • Test • Homework • Graded Assignments • Project • Individual • Assessment • Group Assessment • 8. Informal Assessment

	18. Use geometric sequences and series to model real-world problems. **19. Differentiate between a geometric sequence and a geometric series.** **20. Differentiate between an arithmetic sequence and a geometric sequence.** **21. Identify the steps required to prove mathematical induction.** **22. Prove mathematical statements using mathematical induction.** **23. Evaluate a binomial coefficient using the binomial theorem or Pascal's triangle.** **24. Expand a binomial raised to a power.** **25. Find a specific term of a binomial expansion.** **26. Recognize patterns in a binomial expansion.** **27. Write the first several terms of sequence**	18. Use geometric sequences and series to model real-world problems. 19. Differentiate between a geometric sequence and a geometric series. 20. Differentiate between an arithmetic sequence and a geometric sequence. 21. Identify the steps required to prove mathematical induction. 22. Prove mathematical statements using mathematical induction. 23. Evaluate a binomial coefficient using the binomial theorem or Pascal's triangle. 24. Expand a binomial raised to a power. 25. Find a specific term of a binomial expansion. 26. Recognize patterns in a binomial expansion. 27. Write the first several terms of sequence		

	28. Write terms defined by a recursive formula **29. Solve annuity and amortization problems.** **30. Find the Partial Sums of a Sequence** **31. Apply the infinite Series an introduction to Limits.**	28. Write terms defined by a recursive formula 29. Solve annuity and amortization problems. 30. Find the Partial Sums of a Sequence 31. Apply the infinite Series an introduction to Limits.		

SEMESTER: TWO

PERIOD: V

GRADE: 12

UNIT/TOPIC: PROBABILITY AND STATISTICS

GENERAL OBJECTIVES: Students will sharpen their skills in probability and statistics to answer questions about real-life estimations. Students will concentrate on concepts rather than computations.

SPECIFIC OBJECTIVES: Upon completion of this unit, students will be able to:

1. Use the fundamental counting principle to solve counting problems.
2. Compute factorials, permutations, and combinations.
3. Differentiate between permutations and combinations.
4. Review the basic concepts of sets, Venn , tree diagrams, and contingency tables.
5. Define a sample space and events of an experiment
6. Define and find the probability of an event, complementary events, mutually exclusive events, independent events, and conditional events.
7. Find the odds of an event.
8. Calculate the expected value.

9. Collect and display data using frequency tables, cumulative frequency histogram, cumulative percentage polygon or ogive charts, stem plot, etc.
10. Classified sample and pop data as measures of central tendency (mean/averages, mode, median) and
11. Compute measures of variability (range, variance, standard deviation) and apply then to problem solving
12. Compute percentiles, quartiles, the five numbers summery and box plot, inter quartile range, mid-hinge, mid-range, etc.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers using probability and statistics Students will become informed decision makers 1. Students will become lifelong learners	**1. The fundamental counting principle and applications.** **2. Factorials, permutations, and combinations.** **3. Differentiation between permutations and combinations.** **4. Review of the basic concepts of sets, Venn, tree diagrams, and contingency tables.** **5. Sample space and events of an experiment.** **6. The probability of an event, complementary events, mutually exclusive events, independent events, and conditional events.** **7. The odds of an event.**	1. Using the fundamental counting principle to solve counting problems. 2. Computing factorials, permutations, and combinations. 3. Differentiating between permutations and combinations. 4. Reviewing the basic concepts of sets, Venn, tree diagrams, and contingency tables. 5. Defining a sample space and events of an experiment 6. Defining and finding the probability of an event, complementary events, mutually exclusive events, independent events, and conditional events. 7. Finding the odds of an event.	**A. Primary Text** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **B. Secondary Texts** E.B. Dogbe, K.A. Morrison & Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	**Essential tasks students should be able to do:** 1. Use the fundamental counting principle to solve counting problems. 2. Compute factorials, permutations, and combinations. 3. Differentiate between permutations and combinations. 4. Review the basic concepts of sets, Venn, tree diagrams, and contingency tables. 5. Define a sample space and events of an experiment 6. Define and find the probability of an event, complementary events, mutually exclusive events, independent events, and conditional events. 7. Find the odds of an event. 8. Calculate the expected value.

	8. Expected values. **9. Collect and display data using frequency tables, cumulative frequency histogram, cumulative percentage polygon or ogive charts, stem plot, etc.** **10. Sample and population data as measures of central tendency (mean/averages, mode, median).** **11. Measures of variability (range, variance, standard deviation) and apply then to problem solving.** **12. Percentiles, quartiles, the five numbers summery and box plot, inter quartile range, mid-hinge, mid-range, etc.**	8. Calculating the expected value. 9. Collecting and displaying data using frequency tables, cumulative frequency histogram, cumulative percentage polygon or ogive charts, stem plot, etc. 10. Classifying sample and population data as measures of central tendency (mean/averages, mode, median) and 11. Computing measures of variability (range, variance, standard deviation) and apply then to problem solving 12. Computing percentiles, quartiles, the five numbers summery and box plot, inter quartile range, mid-hinge, mid-range, etc.		9. Collect and display data using frequency tables, cumulative frequency histogram, cumulative percentage polygon or ogive charts, stem plot, etc. 10. Classified sample and pop data as measures of central tendency (mean/averages, mode, median) and 11. Compute measures of variability (range, variance, standard deviation) and apply then to problem solving 12. Compute percentiles, quartiles, the five numbers summery and box plot, inter quartile range, mid-hinge, mid-range, etc. **<u>Other essential evaluation tools:</u>** • Quizzes • Test • Homework • Graded Assignments • Project • Individual • Assessment • Group Assessment • 8. Informal Assessment

SEMESTER: <u>TWO</u>

PERIOD: <u>VI</u>

GRADE: <u>12</u>

UNIT/TOPIC: PROBABILITY AND STATISTICS

UNIT: ANALYTIC GEOMETRY (REVIEW)

GENERAL OBJECTIVES: Students will sharpen their skills at manipulating algebraic expressions. Students will concentrate on concepts rather than computations when

studying Cartesian geometry use the conics model to solve real-life problems.

SPECIFIC OBJECTIVES: Upon completion of this Unit, students will be able to:

1. Calculate and interpret the slope of a line; Find and graph the equation of a line given:
   A. Two points, B. Point and the slope C. Slope and y-intercept; D. General form, E. Parallel and perpendicular forms, Distance and midpoint formula.
2. Define, and discuss and work with circle and its parts (center, radius, diameter, and circumference) with the center at the origin or at (h, k) and solve applied problems involving circles.
3. Define discuss and work with the parabola and its part (vertex, locus, axis, and directrix with the vertex at (0,0) or (h, k) and solve applied problems involving parabolas.
4. Define, discuss and work with the ellipse and its parts (center, verticals and foci, major and minor axes and eccentricity) with the center at (0,0) or (h, k) and solve applied problems involving ellipse.
5. Define, discuss, and work with the hyperbola and its parts (center, vertices, foci, transverse and conjugate axes and their length, eccentricity, equations of asymptotes with center at (0,0) or (h, k) and solve applied problems involving hyperbolas.

OUTCOMES	CONTENTS	ACTIVITIES	MATERIALS/ RESOURCES	EVALUATION
Students will become problem solvers. Students will become informed decision makers. Students will become	**1. Graph and write an equation of lines, given a) a point and slope b) vertical or horizontal c) slope and y-intercept d) general former x- and y-intercepts f) parallel**	Finding graphing and interpreting the slope of a line given two points. 1. Find and graphing an equation of a line, given: a) a point and a slope	**<u>A. Primary Text</u>** *Mathematics for Senior High School (Books 1,2 & 3)* (Pearson) **<u>B. Secondary Texts</u>** E.B. Dogbe, K.A. Morrison &	1. **<u>Essential tasks students should be able to do:</u>** 1. Calculate and interpret the slope of a line; Find and graph the equation of a line given: a) Two points

lifelong learners.	**lines g) perpendicular lines.** **2. The distance and midpoint formulas of graph.** **3. Definition and discussion of a circle, center at (0,0) or (h, k) radius, equation, diameter, and graph.** **4. Definition and discussion of a parabolas equation and its parts vertex at (0,0) or (h, k) vertical or horizontal axis forms and directrix of equations, graph, and applications.** **5. Definition and discussion of an ellipse, its equation and parts (center at (0,0) or (h, k) vertices, foci, lengths of major and minor axis) graph and its applications to real life situations.** **6. Definition and discussions of a hyperbola, its equation and parts (center at (0,**	b) vertical or horizontal c) slope and y-intercept d) x- and y- intercept e) parallel f) Perpendicular lines. 2. Finding and graphing the distance and coordinates of midpoint. 3. Writing the standard equation, calculating the area, circumference he area, circumference, radius, diameter, center, intercepts and graphing a circle 4. Working and graphing a parabola with vertex at (0,) or (h, k), foci, directrix, and solving applied problems involving parabolas. 5. Working and graphing a hyperbola, its equations, and part (center at (0,0) or (h, k), vertices, foci, lengths at axes. asymptotes and solving problems involving hyperbolas.	Brian Speed, *Senior Secondary Guide – (Core) Mathematics* (Sedco, 1995) Laurie E. Bass, Et al. *Geometry: Tools for a Changing World* (Prentice Hall 1998). **C. Other Resources/Supplementary Readings** Mathematical Association of Ghana, *Effective Elective Mathematics for (Books 1,2 & 3)* (Pearson) • Graph paper, • Geo-board, • Colored pencils, • Tape. • Protractor rules • Compass, • Tracing papers	b) Point and the slope c) Slope and y-intercept d) General form e) Parallel and perpendicular forms. Distance and midpoint formula. 2. Define, and discuss and work with circle and its parts (center, radius, diameter, and circumference) with the center at the origin or at (h, k) and solve applied problems involving circles. 3. Define discuss and work with the parabola and its part (vertex, locus, axis, and directrix with the vertex at (0,0) or (h, k) and solve applied problems involving parabolas. 4. Define, discuss and work with the ellipse and its parts (center, verticals and foci, major and minor axes and eccentricity) with the center at (0,0) or (h, k) and solve applied problems involving ellipse. 5. Define, discuss, and work with the hyperbola and its parts (center, vertices, foci, transverse and conjugate axes and their length, eccentricity, equations of

	0) or (h, k), vertices, foci, lengths of transverse and conjugate axes, asymptotes), graph, and solving applied problems involving hyperbolas.			asymptotes with center at (0,0) or (h, k) and solve applied problems involving hyperbolas. **<u>Other essential evaluation tools:</u>** • Quizzes • Test • Homework • Graded Assignments • Project • Individual • Assessment • Review of WAEC • Exam. Papers • 8. Informal Assessment

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