Unit 2: Measurement and Geometry

Content Area: **Mathematics**
Course(s): **College Math I**
Time Period: **November**
Length: **8 weeks**
Status: **Published**

Unit Overview

This unit investigates the different ways that things are measured in our world with an emphasis on the differents units used. This unit also investigates Euclidian Geometry and Right Triangle Trigonometry.

Transfer

Students will be able to independently use their learning to...

Convert and calculate within the different measurement systems in our world.

Use Euclidian Geometry and Right triangle trigonometry to assist with everyday things like projects around the home.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- Converting measurements is an essential life skill.
- Euclidian Geometry can help in real world problems solving involving household projects.
- Triangles can be used to solve many practical problems.

Essential Questions

- What are the basic units of length, capacity and weight in the English measurement system?
- What importance do prefixes play in different units of measure in the metric system?
- What is the conncetion between the base units of length and capacity in the metric system?
- What does it mean for a geometric figure to be closed?
- How can you find the sum of the angle measures for a polygon?
- What is the connection betweenthe number *pi* and the dimensions of a circle?
- What is the difference between volume and surface area?

Application of Knowledge and Skill

Students will know...

Students will know...

- Converting measurements is an essential life skill.
- Euclidian Geometry can help in real world problems solving involving household projects.
- Triangles can be used to solve many practical problems.

Students will be skilled at...

Students will be skilled at...

- Converting and computing within the different measurement systems
- Identify types of triangles.
- Using the Pythagorean Theorem.
- Finding perimeter/area/volume/capacity.
- Using trigonometric ratios to solve real world problems.

Academic Vocabulary

dimensional analysis	meter	liter
gram	linear unit	square unit
cubic unit	Fahrenheit	Celsius
point	line	plane
angle	vertex	degree
acute angle	obtuse angle	complementary
supplementary	parallel	transversal
isosceles triangle	equilateral triangle	scalene triangle
theorem	hypotenuse	perimeter
radius	diameter	circumference

===> LEARNING GOAL 2.1 - Measurement

Convert and computate within the metric system and the english system of measurement.

Objective 2.1.1 (Length) (level of difficulty: Retrieval - executing)

SWBAT:

(9.1)

- Convert measurements of lenght in the english system
- Convert measurements in the metric system
- Convert between english and metric units of length.

MA.K-12.2	Reason abstractly and quantitatively.
MA.N-Q.A	Reason quantitatively and use units to solve problems.
MA.N-Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

Objective 2.1.2 (Area and Volume) (level of difficulty: Retrieval - executing)

SWBAT:

(9.2)

- Convert units of area
- convert units of volume

MA.G-GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
MA.G-MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

Objective 2.1.3 (Weight and Temperature) (level of difficulty: Retrieval - executing)

SWBAT:

(9.3)

- Converting weight within the metric system
- Converting weights within the english system
- Converting temperature
- Converting betweenthe metric and english systems od measures.

MA.K-12.2	Reason abstractly and quantitatively.

===> LEARNING GOAL 2.2 - Geometry

Use Euclidian Geometry to solve real world problems

Objective 2.2.1 (Points/Lines/Planes/Angles) (level of difficulty: Comprehension)

SWBAT

- Write names for angles
- Use vertical angles to find angle measures
- Find measures of angles formed by a transversal.

MA.G-CO.A.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

Objective 2.2.2 (Triangles) (level of difficulty: Comprehension)

SWBAT

(10.2)

- Identify types of triangles
- Find missing angles in a triangle

- Use the Pythagorean Theorem to find side lengths
- Use similar triangles to find side lengths

MA.G-CO.B.7	Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.
MA.G-SRT.A.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
MA.G-SRT.A.3	Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
MA.G-SRT.B.4	Prove theorems about triangles.
MA.G-SRT.B.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Objective 2.2.3 (Polygons and Perimeter) (level of difficulty: Comprehension)

SWBAT

(10.3)

- Find the sum of angle measures of a polygon
- Find the angle measures of a regular polygon
- Find the perimeter of a polygon.

MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Objective 2.2.4 (Polygons and Circles) (level of difficulty: Comprehension)

SWBAT:

(10.4)

- Find areas of rectangles, parallelograms, triangles and trapezoids
- Find circumference and area of circles.

MA.G-C.A.1	Prove that all circles are similar.
MA.G-GPE.B.7	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.

Objective 2.2.5 (Volume and Surface Area) (level of difficulty: Comprehension)

SWBAT:

(10.5)

- Find the volumes and surface areas of solid figures

MA.G-GMD.A.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.
MA.G-GMD.A.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.
MA.G-MG.A.2	Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

Objective 2.2.6 (Trigonometry) (level of difficulty: Comprehension)

SWBAT:

(10.6)

- Find basic trigonometric ratios
- Use trigonometric ratios to find sides and angles of a right triangle
- Solve problems using trigonometric ratios

MA.G-SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
MA.G-SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
MA.G-SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.

Summative Assessment

Tests, quizzes, End of Unit Benchmark, Projects

21st Century Life and Careers

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CAEP.9.2.12.C.3	Identify transferable career skills and design alternate career plans.

Formative Assessment and Performance Opportunities

Classroom discussion

class/homework

class closure

class openers

group work

presentations

projects

student teacher discussions

Accommodations and Modifications

504 Accomodations

IEPs

challenge problems

heterogeneous grouping

Problems of the week

projects

small group instruction

technology

Unit Resources

- Textbook: Math in Our World, 2nd Edition (McGraw Hill, 2011)
- Kuta Software
- Examview Software

Additional Websites:

- Dan Meyer's 3-Act Math Tasks: https://docs.google.com/spreadsheet/pub?key=0AjIqyKM9d7ZYdEhtR3BJMmdBWnM2YWxWYVM1UWowTEE&output=html
- NCTM Illuminations Website: Resources for Teaching Math:

http://illuminations.nctm.org/Default.aspx

- PARCC Educator Resources: http://www.parcconline.org/for-educators
- The Geometer's Sketchpad Resource Center: http://www.dynamicgeometry.com/
- Khan Academy: https://www.khanacademy.org/