Mathematics

Knowledge and Skills for Environmental Technology Education

High School – Math Knowledge and Skills

The mathematics knowledge and skill concepts below are part of a comprehensive integrated high school program.

Unifying Concepts:

- Translate real world problems into math relationships (i.e. functions, equations).
- Convert among fractions, decimals and percents.
- Recognize order (greater than, less than, and equal to) with whole numbers, fractions & decimals.
- Compare numerical values for decision making.
- Estimate answers to problems.
- Use a calculator to solve problems that have more than one step and involve fractions, decimals and percents.
- Construct, read, and interpret graphs.

Algebra Concepts:

- Apply ratios and proportions to solve problems.
- Manipulate and substitute variables to solve formulas.
- Use formulas to calculate perimeter, circumference, surface area, cross sectional areas, and volumes.
- Perform unit conversions, including English/metric, C/F, kg/lbs, gpd/MGD, etc.
- Extrapolate and interpolate data.
- Calculate the slope of a line.
- Interpret and apply linear relationships.
- Solve literal equations.

Statistics Concepts:

- Calculate mean, median, mode, and range.
- Draw a histogram to represent frequency distribution of data.
- Apply principles of accuracy and precision.

Geometry Concepts:

- Apply concepts of perimeter, area, and volume for basic plane and solid figures.
- Recognize properties of angles, polygons, and circles.
- Use coordinate geometry to make connections between algebra and geometry.
- Visualize and mentally manipulate objects.
- Construct simple fundamental proofs.
- Recognize valid and invalid forms of mathematical arguments.

Trigonometry Concept:

- Apply right triangle trigonometry.

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Two-Year College – Math Knowledge and Skills

Note: Reinforce the Unifying Concepts Listed for High School Math

Technical/Applied Math (course number: 100-level or equivalent):

- Apply ratios and proportions to solve problems.
- Use formulas to calculate perimeter, circumference, surface area, cross-sectional areas, and volumes.
- Perform calculations involving exponents, roots, and scientific notation.
- Solve literal equations.
- Calculate the slope of a line.
- Interpret and apply linear and exponential relationships.
- Perform calculations involving logarithms.
- Interpret and extrapolate data.
- Distinguish between geometric and arithmetic progression.
- Relate the slope of the line to gradients on topographic maps.

Statistics:

- Calculate mean, median, mode, standard deviation, standard error, and range.
- Use random sampling chart and random number generation methods.
- Draw a histogram to represent frequency distributions of data.
- Interpret the characteristics of a normal statistical bell curve.
- Apply statistical analysis; calculate probability.
- Explain confidence intervals.
- Extrapolate trends in data.

Critical Thinking Skills

The following skills, which are adapted from SCANS (**Secretary's Commission on Achieving Necessary Skills, U.S. Department of Labor, 1990)**, should cut across all years of math instruction.

- Draw conclusions from a set of facts (i.e. data).
- Correlate results and plan action needed.
- Make comparative judgments from data.
- Diagnose problems from a set of data and observations, and identify solutions.
- Interpret data generated for records, files, reports.
- Analyze data for accuracy.
- Identify, assimilate, integrate, and evaluate information from diverse sources.
- Make decisions based on large and small amounts of information, some of which may be ambiguous.
- Recognize one's limitations.
- Recognize and correct discrepancies.

Generate new ideas by being able to:

- Use imagination freely;
- Combine ideas or information in new ways;
- Make connections between seemingly unrelated ideas; and
- Reshape goals in ways that reveal new possibilities.

Discover a rule or principle underlying the relationship between two or more sets of data and apply it in solving a problem by being able to:

- Use logic to draw conclusions from available information;
- Extract rules or principles from a set of data or written text;
- Apply rules and principles to a new situation; and
- Determine which conclusions are correct when given a set of facts and a set of conclusions.