Text: CORD Applied Math
Unit number 10
Title: Orbital Speed of Planets
Short Description: Students will calculate the Speed of planetary orbits around the Sun
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Lab Title
Orbital Speed of Planets

LAB PLAN

TEACHER: Teacher Prep/

- **Lab Objective**
  Students will learn to calculate the speeds of three planets; Venus, Earth and Mars, as they orbit around the sun.
- **Statement of pre-requisite skills needed,** Student will need to understand how speed is calculated.
- **Speed = Distance / Time.**
- Circumference of Circle, C = Pi x Diameter.
- Mph = Miles/Hour , Miles/Min., Miles/sec.
-

State Standard addressed
8.4.B Solve problems involving operations with
- numbers in scientific notation and verify solutions.
- Units include those associated with technology, such
- as nanoseconds, gigahertz, kilobytes, teraflops, etc.

- **Vocabulary**

Speed vs. Velocity, Distance, Circumference, Pi, Orbit.

- **Materials List**
  Paper pencil, calculator, links to
- **Lesson Strategies**
- Introduce Planetary distances from the sun and orbital period (year)

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Speed = Distance / Time

Distance

Distance earth travels in one orbit around the sun ***(circumference)***

Circumfernce = 2 x Radius x ***pi***

Center of Earth to Center of Sun 93,500,000 miles = radius

C = 2 x 93,500,000 mi x 3.1416 (pi) = 587,500,000 mi orbit

Time

365.25 days (accounts for leap year.)

24 hr/day x 365.25 days/year = 8766 hr./year

Calculate Speed

587,500,000 mi / 8,766 hr./year = **67,000 mi/hr**.

or

587,500,000 mi/ 31,557600sec = 18.6 mi/sec

Venus 67,232,360 miles 225 days (all days are earth days)
6.72 x10\7

Diameter 135,000,000 mi x 2 = 134,000,000 + 1,000,000 sun dia.

135,000,000 mi x 3.14 = 424,000,000 mi
424,000,000 /5376 hr. = **78,870 mi/hr.**

Mars 141,635,399 688 days
1
Dia. 284,000,000 mi / 16,512hr. = **17,200m/hr** ***(what if Mars was the same mass as earth)***

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- **GLEs (State Standards) addressed**

Math: **COMPONENT 1.1: Understand and apply concepts and procedures from number sense.**

1.1.1 Understand and use scientific notation. W

EXAMPLES

- EX Explain the meaning of scientific notation using words, pictures, symbols, or numbers.
- EX Express and/or use equivalents among fractions, decimals, percents, integers, positive integer exponents, square roots, and/or numbers written in scientific notation.
- EX Read and translate numbers represented in scientific notation from calculators and other technology, texts, tables, and charts.
- EX Use scientific notation in a given situation.

Reading: **COMPONENT 1.1: Understand and apply concepts and procedures from number sense.**

1.1.1 Understand and use scientific notation. W

EXAMPLES

- EX Explain the meaning of scientific notation using words, pictures, symbols, or numbers.
- EX Express and/or use equivalents among fractions, decimals, percents, integers, positive integer exponents, square roots, and/or numbers written in scientific notation.
- EX Read and translate numbers represented in scientific notation from calculators and other technology, texts, tables, and charts.
- EX Use scientific notation in a given situation.

Writing: **Component 1.1: Prewrites to generate ideas and plan writing. W**

1.1.1 Analyzes and selects effective strategies for generating ideas and planning writing.
2.1.4 Apply <u>comprehension monitoring strategies</u> for informational and technical materials, complex narratives, and expositions: use <u>prior knowledge</u>.

- **Leadership Skills**
  Students work in teams to solve multi-step large problems
  Students will need to consult team members to detemine if answers are reasonable
- **SCAN Skills/Workplace Skills**
  Team building
- **Set-up information**
  Instructor will need to solve similar problem ie. speed of the moon around the earth.
- **Lab organization**(-Grouping/leadership opportunities/cooperative learning expectations; -**Timeline required)**

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- **Teacher Assessment of student learning** (scoring guide, rubric)
  Students will solve this problem using both Scientific Notation and conventional number analysis
- **Summary of learning** (to be finished after student completes lab)
  -discuss real world application of learning from lab
  -opportunity for students to share/present learning

- **Optional activities**
  Find speed of different Planets. Compute time to travel distance if traveling at the Speed of light.
- **Career Applications**
  Science or Technical fields

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