PLANET PATHS
Teaching Guidelines

Subject: Mathematics

Topics: Algebra--Coordinate Systems; Fractional Exponents; Patterns, Equations and Functions

Grades: 8 – 12

Concepts:

- Fractional exponents

Knowledge and Skills:

- Can solve equations involving fractional exponents
- Can plot a point in a two-dimensional coordinate system, given the coordinates, or determine the coordinates of a given point
- Can identify and describe patterns in a collection of related numerical data

Subject: Science

Topics: Astronomy

Grades: 8 - 12

Concepts:

- Orbit

Knowledge and Skills:

- Can describe the characteristics of the orbits of planets in the solar system

Materials: None

Procedure: The investigation is best done by students working individually or in teams of 2.

Distribute the handout and ensure that students understand the question. Graphing calculators may be used if available.

Planet Paths

Step 1. Do research to fill out the chart below:

Planet	Average distance from the sun, in millions of miles *d*	Time duration of orbit, in years *t*
Mercury		
Venus		
Earth	93.0	1.00
Mars		
Jupiter		
Saturn		
Neptune		
Uranus		

Step 2. Graph the data from the chart, with *average distance from the sun* as the independent variable and *time* as the dependent variable. Describe the pattern you see.

_____

_____

_____

_____

_____

Step 3. Try to find a value of k for each of these functions which creates a curve that matches the graph of planet paths. To do this:

a) Put in the data for one planet to get a value of k.

b) Use that value of k to plot the function.

c) See how closely your function matches the function of planet paths.

Function #1: $t = kd$

Function #2: $t = kd^2$

Function #3: $t = kd^3$

Function #4: $t = kd^{1/2}$

Function #5 $t = kd^{3/2}$

Which is the correct function? _____

What is the value of k? _____