**CONSTRUCTING GRAPHS**

All graphs come with three common items that can tell you a lot about a graph or chart.

1. **THE TITLE**: of a graph or chart should tell you what is happening. It should include the manipulated and responding variable.
2. **THE MANIPULATED VARIABLE**: found on the x-axis of a graph, tells you what the experimenter changed on purpose. It is what will **cause** the different results.
3. **THE RESPONDING VARIABLE**: found on the y-axis of a graph, tells you the results due to changing the manipulated variable.

By reading these three items, you should be able to interpret the graph!

**GUIDELINES**

Follow these general guidelines when drawing graphs.

* Always include a title. Use the variables as a title: The effect of distance versus time.
* Always label the manipulated variable on the *x*-axis and the responding variable on
the *y*-axis.
* If there are units, place them with each axis label.
* Use “tick” marks to show which graph lines the scale numbers relate to.

# STEPS

1. Your graph should state the relationship between the planets and distance from the Sun (AU). Make a **title** for your graph.
2. Identify which column from the Data Set is appropriate for the **manipulated variable** (*x*-axis). This is the horizontal line at the bottom of the graph.
3. Identify which column is appropriate for the **responding variable** (*y*-axis). This is the vertical line at the side of your graph.
4. Choose a **scale** for your distances. Each AU is equal to \_\_\_\_\_\_\_\_\_\_\_ grid lines on the graph.
5. On your graph paper, draw and label the *x* and *y* axes. Leaving room for the scale, **label each** **axis** with the following:
* an accurate name, including the type of variable
* the units of measurement
1. Select a suitable scale and label along each axis the following:
* x-axis: the planet name
* y-axis: the distance in AU
1. **Plot the data** from the DATA SET on your graph using a dot surrounded by a small circle for each point.
2. **Draw a line connecting your points.**
3. **OPTIONAL**: Repeat the above steps to create a graph comparing the orbital periods for each planet.

**DATA SET: Our Solar system**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| PLANET | DIAMETER (km) | DISTANCE TO SUN (million km) | MASS COMPARED TO EARTH | AVERAGE SURFACE TEMP. (C) | ROTATIONAL PERIOD (days) | ORBITAL PERIODS (years) | DISTANCE FROM SUN (AU) |
| MERCURY | 4879 | 57.9 | 0.06 | 180 | 58.6 | 0.24 | 0.39 |
| VENUS | 12104 | 108.2 | 0.82 | 460 | 243 | 0.62 | 0.72 |
| EARTH | 12756 | 149.6 | 1 | 14 |  1 day |  1year | 1 |
| MARS | 6794 | 227.9 | 0.11 | -50 | 1.03 | 1.88 | 1.52 |
| JUPITER | 142980 | 778.3 | 318 | -150 | 0.41 | 11.86 | 5.2 |
| SATURN | 120540 | 1429.4 | 95 | -180 | 0.44 | 29.42 | 9.56 |
| URANUS | 51120 | 2875.0 | 15 | -210 | 0.72 | 83.75 | 19.22 |
| NEPTUNE | 49530 | 4504.4 | 17 | -220 | 0.67 | 163.73 | 30.11 |
| PLUTO | 2300 | 5915.8 | 0.002 | -230 | 6.4 | 248.03 | 39.5 |

**DISCUSSION QUESTIONS**

1. What is the manipulated variable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

In a chart there is often more than one responding variable. List three. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Which planet is considered Earth’s twin because it’s size is close to the size of

Earth? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What planet has a rotational period close to a week on Earth? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. What is the shape of your line in your graph comparing distance from the Sun for the planets (straight or curved)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. If there was a planet found between Uranus and Neptune, use your graph to estimate (interpolate) its distance from the sun. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Do you think Pluto follows the expected pattern? ­­­­­­­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Why or why not? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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