Graphing Worksheet

Complete this assignment in your lab notebook. Complete all these steps for each of the lab situations:

1. Determine which variable is independent, and which is dependent.
2. Create a data table with the correct units in the headings.
3. Create a graph and plot data, choosing axes scales for the data to completely fill the entire space.
4. Label the axes (with units) and appropriately title the graph.
5. If the data is linear, draw the best fits line, and find the equation of the line. Make sure to use points from the best fits line – NOT data points. Skip to step 9.
6. If the data is not linear, determine the correct nonlinear relationship between the variables and create another column in your data table for the variable that needs to be linearized.
7. Plot these new numbers in a second graph. Use new labels, units and title for the new data.
8. Draw the best fits line and find the equation using points from the line – NOT data points.
9. Use your linearized variables, slope and y-intercept to write the equation that correctly models the data from this lab.
10. Compare equation to the physics formula provided to find the physical quantities for each lab.

Lab #1 – In this lab you measured the velocity (*v*) of a car (in meters per second) at several time intervals (*t*, in seconds). At the beginning of the lab (*t* = 0.0 s), the car had a *v* = 5.0 m/s. At *t* = 2.0 s, the car was moving at 10.1 m/s. At *t* = 4.0 s, the car was moving at 14.9 m/s. At *t* = 6.0 s, the car was moving at 20.2 m/s. Finally, at *t* = 10.0 s, the car was moving at 30.0 m/s. The actual physics formula is $\boldsymbol{v = v_0 + at}$. Comparing this formula to the equation of your best fits line, predict the initial velocity (v_0) and acceleration (*a*) of the car from this lab. Answers should have correct units.

Lab #2 – In this lab you measured the kinetic energy of a car (*KE*, in Joules) at several velocities (m/s). At the beginning of the lab the car was at rest (*v* = 0 m/s) and had no kinetic energy. At *v* = 1.0 m/s, the car had *KE* = 5.1 J. At *v* = 2.0 m/s, the car had *KE* = 19.6 J. At *v* = 3.0 m/s, the car had *KE* = 45.1 J. Finally, at *v* = 4.0 m/s, the car had *KE* = 79.9 J. The real physics formula is $\boldsymbol{KE = \frac{1}{2}mv^2}$. Relating this formula to the equation of your best fits line, predict the mass (*m*, in kg) of the car from this lab.

Lab #3 – In this lab you measured the velocity (m/s) of a roller coaster at various distances (*d*, in m) from the top of the first big hill. At the top of the hill (*d* = 0 m), the coaster was at rest (*v* = 0 m/s). At *d* = 5.0 m, the coaster had a velocity of 4.5 m/s. At *d* = 10.0 m, the coaster had *v* = 6.3 m/s. Next at *d* = 15.0 m, the coaster had a velocity of 7.7 m/s. Finally, at *d* = 20.0 m, the coaster had a velocity of 9.0 m/s. The real physics formula is $\boldsymbol{v^2 = v_0^2 + 2ad}$. Relating this formula to the equation of your best fits line, predict the initial velocity (v_0) and acceleration (*a*) of the roller coaster from this lab.

Lab #4 – In this lab you measured the electrical current (*I*, Amps) in a circuit with various electrical resistances (*R*, Ohms (Ω)). With the resistance at 10.0 Ω, the current was 12.0 A. With the resistance at 20.0 Ω, the current was 6.1 A. With the resistance at 30.0 Ω, the current was 4.0 A. With the resistance at 40.0 Ω, the current was 2.9 A. Finally, with the resistance at 60.0 Ω, the current was 2.0 A. The actual physics formula is $\boldsymbol{V = IR}$. Comparing this formula to the equation of your best fits line, predict the voltage (*V*, in volts) used in this lab.