

Conduction of Heat Energy Through Metal

Part I - Time vs Distance Study for Heat Conduction

Create a testing device for heat conduction through a metal rod as per the directions from your teacher.

1. Create a table using the following headings to present your data. Measure distance in cm and time in seconds*

Distance from Heat Source (cm)	Time Required (s)
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* Be sure to correctly calculate the seconds. Every minute is 60 seconds. Therefore a time of 2 minutes and 42 seconds would work out to $60 + 60 + 42 = 162$ seconds.

2. Create a full page graph that plots distance from heat source on the horizontal axis and time required on the vertical axis.
3. Create a line of best fit as per your teachers instructions.

Part II - Different Metals:

1. Trace the device used on a full piece of paper. Identify and label all of the metals used (periodic table may help).
2. Perform the experiment as instructed and write the time required (in seconds) for each metal directly on your sketch. Again, be sure you have calculated the seconds correctly.
3. Look up the thermal conductivity for each metal used (please use https://www.engineersedge.com/properties_of_metals.htm). Use this value in a table that has the following columns:

Metal	Thermal Conductivity	Time Required
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4. Create a full page graph that plots thermal conductivity on the horizontal axis and time on the vertical axis. Create a point for each metal and label each point directly on the graph as to the type of metal. Try to draw a line of best fit.

decided by the experiment (time) - usually the data that is recorded

Questions:

experimenter has control over this (distance)

1. What is the difference between an independent variable and a dependent variable on a graph? What is the rule for the location of each variable on the graph paper? What is the rule for the order of the variables in the title of the graph? dependent vs independent
2. For the graph that you have created in the first part of this experiment, comment on the shape of the line that you have drawn. Does this make sense? Explain. Comment on what may have gone wrong in this experiment and what additional factors could be considered.
3. What does thermal conductivity mean? If you have a large value for thermal conductivity, does this mean it will take more or less time for the heat to travel through the metal?
4. For the graph that you have created in the second part of this experiment, comment on the orientation of the points that you have plotted. Does this make sense (or not). Explain!
5. Suppose you had a device similar to the one that you have used in the second part of this experiment but made from gold, lead, platinum, silver and tin. What order would you expect the paper clips to drop off? Support your answer with appropriate thermal conductivity values.

2. greater distance more time - the particle motion takes time to spread down the rod plus more