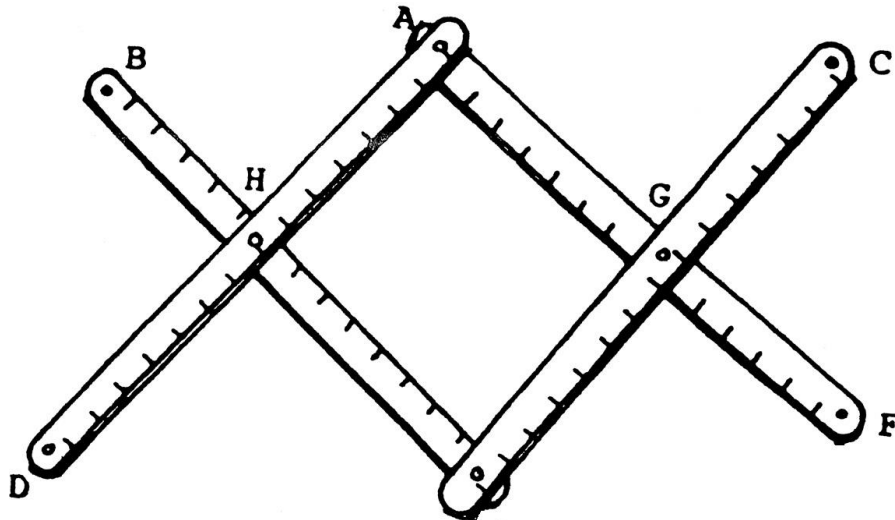


A pantograph can be used to copy figures the same size, enlarged in size, or reduced in size. It is made up of 4 strips joined as illustrated below.



To use the pantograph, fasten D to a drawing board with a push pin or suction cup. Attach a pencil at F. When point E is moved over a curve to be copied, the pencil at F will automatically draw a curve similar and similarly placed to the first but enlarged or reduced according to the setting.

Make a pantograph. Use two pieces of plywood, plastic, or cardboard 18" long and two 12" long and connect them using screws, eyelets, and/or staples. Cut strips AF and AD of equal length. Drill a series of holes equally spaced on each of these strips. Attach the strips at A. In a similar manner, make strips EC and EB of equal length. Drill a series of holes equally spaced on each of these strips. Attach the strips at E. Attachments at H and G depend upon the proportions desired.

Use the pantograph to enlarge a cartoon or map to 3 times its original size. Use it again to reduce the size of a cartoon or map to half the original. Notice how the attachment at H and G determine the proportions desired. Analyze the properties of similar triangles that are used in this device.

Display the enlarged and reduced drawings you made. Write a report explaining in detail the geometric principles involved in the way a pantograph works.