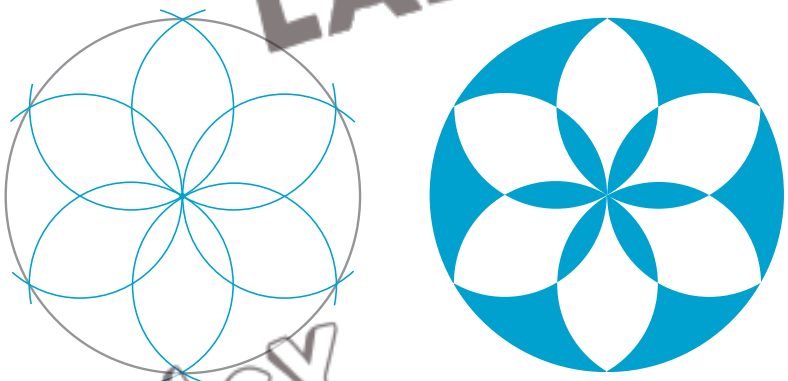
LABBEASY

Math Art with Compasses and a Ruler

Instructions for drawing geometric forms using compasses and a ruler



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PRINT SETTINGS

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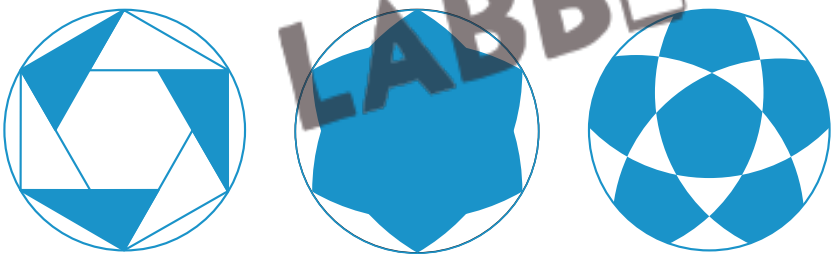
INTRODUCTION

Drawing forms with compasses & a ruler

Math also has a relationship to the graphic arts and design. Although it's hard to imagine today, the greatest thinkers of antiquity such as Pythagoras, Plato, Aristoteles and Euclid didn't do much with numbers but rather worked with compasses and a ruler. What's more, rulers back then had no markings – you could only draw a straight line and not measure distance.

Until the mid 1980s, all architects and engineers still had to use compasses and rulers to draft their drawings and plans. With the advent of computer software, however – with which you could work faster and more effectively – classical technical drawing disappeared. The centuries-old technique of drawing with compasses and rulers, with whose help even the pyramids were constructed, is on the wane. Yet such hand-drawn constructions are more than drawings on paper. Technical drawing is great for training the brain: Sketching out exact geometrical forms on the one hand supports visual-perceptual abilities and on the other hand aids the processing of the content, which in our case means solving mathematical problems.



The examples we've given here aren't so much based on a strictly logical scientific system but rather have a focus on manually-constructed geometry. Starting out with the use of compasses and a ruler, here it's all about form, color, and design. Working graphically makes geometry graspable and allows school kids to approach math with an artistic eye.

In these materials, we warm up by explaining the most important, basic geometric techniques such as 'halving a line', 'copying an angle', etc. After this, we explain step-by-step how to construct a triangle, a square, a pentagon, a hexagon, and an octagon with compasses and a ruler. Alongside this there are between six and nine different circle-pattern designs for each polygon, which you can copy and color as you like, letting your creativity run wild.

Micha Labbé

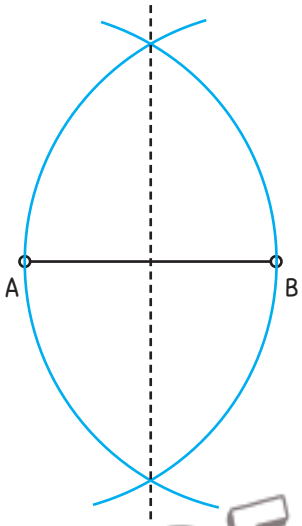
TIPS & TRICKS

1. Use a sharp pencil and a good pair of compasses.
2. Before you begin, check that your compasses are steady and the arms are properly fixed in place.
3. Place some kind of mat beneath your paper so that the point of the compasses doesn't scratch the table.
4. Larger designs are usually easier and the results more accurate.
5. Use pens or pencils that don't smudge
6. Wait until the final design is completely dry before you erase any guidelines.

BASIC GEOMETRIC CONSTRUCTIONS

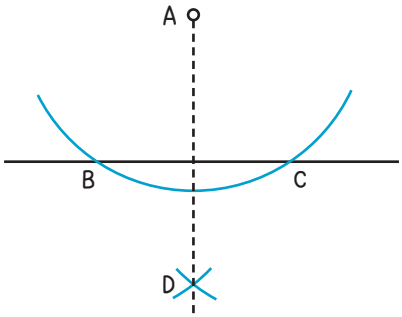
COPYING A LINE

1. Set the compasses so that the tip of one arm is directly on point A and the tip of the pen or pencil is on point B.
2. Draw a line with a ruler and mark the starting point, C.
3. Place the tip of the compasses on point C and with the other arm trace a curve that crosses directly through the line.



HALVING A LINE

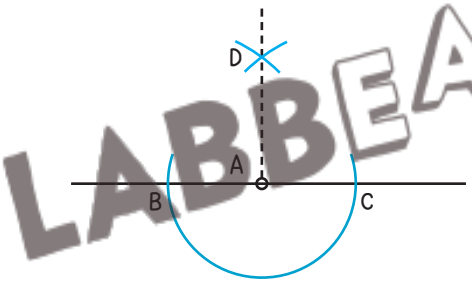
1. Set the compasses so that the tip of one arm is directly on point A and the tip of the pen or pencil is on point B.
2. Use the compasses to trace a semicircle.
3. Do the same with the tip of the compasses on point B.
4. Join the intersecting points of the two semicircles with a ruler in order to halve the line.



CONSTRUCTING A PERPENDICULAR THROUGH A LINE TO AN EXTERNAL POINT

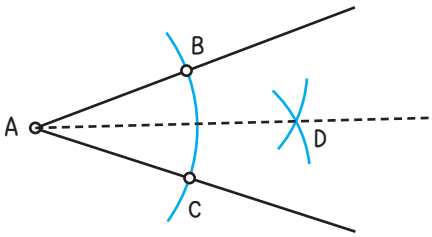
1. Set the compasses so that the tip of one arm is directly on point A and the other arm exceeds the horizontal line.
2. Trace a semicircle with the compasses to create the points of intersection B and C.
3. From both point B and point C and using the same radius, trace the segment of a circle downward to create intersection point D.
4. Join points A and D to create the perpendicular line.

CONSTRUCTING A PERPENDICULAR THROUGH A POINT ON THE HORIZONTAL



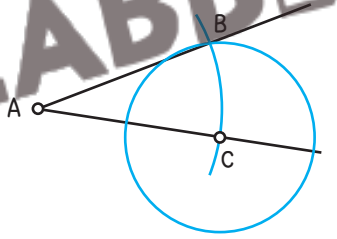
1. Trace a curve with the compasses from point A that intersects the horizontal line to create intersection points B and C.
2. Set the compasses a bit wider. From both point B and point C trace a curve upwards to create intersection point D.
3. Join points A and D to create the perpendicular line.

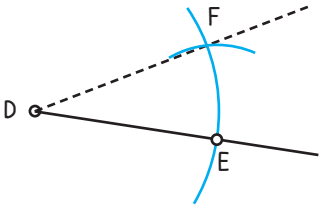
HALVING AN ANGLE



1. From point A trace a circle with the compasses that intersects both arms of the angle, giving you intersection points B and C.
2. Using the same radius, trace a curve from both point B and point C to the right. Point D is where these curves intersect.
3. Joining points A and D will give you the halved angle.

COPYING AN ANGLE





1. Mark point D and from this point draw an axis.
2. From point A, trace part of a circle with the compasses that intersects both arms of the angle. Using the same radius, trace part of a circle from point D that intersects the axis, giving you point E.
3. Set your compasses to the distance between points C and B. Using this radius, trace a curve upwards from point E, giving you intersection point F.
4. Join points D and F to reproduce the angle.