Geometry

In this lesson, I'll cover basic geometry topics that are useful in competitions.

We'll cover the following

- Computational geometry
- Square
- Parallelogram
- Circle
- Distance between two points

Computational geometry

Computational geometry is the study of geometric input output problems like convex hull, line sweep, etc.

These topics are all covered in separate lessons. We are not jumping into computational geometry yet.

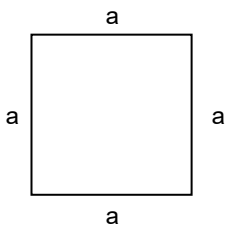
This is a refresher on high school geometry for *easy to easy-medium* geometry problems that don't require a computational geometry algorithm.

Square

All four sides of equal length - a

Perimeter: $4a$

Area: a^2

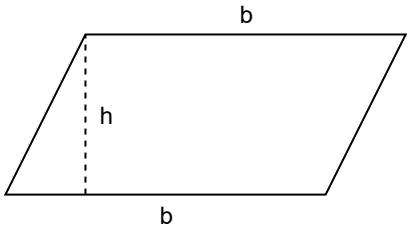


Parallelogram

Define by base - b and height - h. Opposite sides have the same length.

Perimeter: $2b + 2h$

Area: $b \times h$



Circle

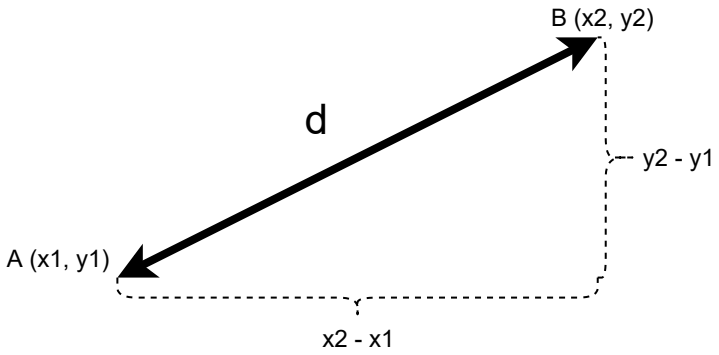
All points on a circle are equidistant from a single point called the center of the circle - c. Each point is at a distance r, which is called the radius of the circle.

Another parameter is diameter - d, which is the distance between two opposite points on a circle. $d = 2r$

Perimeter: $2\pi r$

Area: πr^2

Distance between two points



Using Pythagorean theorem, the distance, d, between A and B is

$d_e = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

This is also called the **Euclidean distance**.

Another way to describe distance is **Manhatten Distance**. This is the distance if you are only allowed to move parallel to the *x-axis* or *y-axis*. This is defined as

$$d_m = |x_2 - x_1| + |y_2 - y_1|$$

In the next lesson, we'll study the solution to the factorization problem.