PROBLEM XII.

To find the side x of a square x^2, equivalent to any irregular polygon.

Divide the polygon into triangles by drawing diagonals; let these triangular parts be calculated separately, and represented respectively by P, Q, R, S......... ; then

$$x = \sqrt{P + Q + R + S...} \quad \text{N. S.}$$
$$= \sqrt{y^2 + y'^2 + y''^2 + y'''^2} \quad \text{(See Prob. XI.)}$$
$$= \sqrt{z^2 + y'' + y'''^2}$$
$$= \sqrt{z'^2 + y'''^2} \quad \text{G. S.}$$

PROBLEM XIII.

To find the side x of a square x^2, equivalent to a given circle.

$$x = \sqrt{\pi\ R^2} \quad \text{N. S.}$$

$$= \sqrt{3\ R \times R} \quad \text{G. S.}$$

N.B.—If a very exact graphical construction is required, the line R should be taken 3.14 times, instead of 3 times.

PROBLEM XIV.

To find the side x of a square x^2, which is a mean proportional between any two given polygons P and R.

$$x = \sqrt[4]{P \times R}$$

transforming the two polygons P and R into equivalent squares, y^2, z^2 then

$$x = \sqrt[4]{y^2, \times z^2} = \sqrt{y\ z} \quad \text{N. and G. S.}$$

PROBLEM XV.

To construct a triangle $\frac{c\ x}{2}$ on a given base c, equivalent to a given square a^2.

$$\text{Altitude } x = \frac{2\ a^2}{c} \quad \text{N. S.}$$

$$= \frac{2\ a \times a}{c} \quad \text{G. S.}$$