1887.

SCIENCE AND ART DEPARTMENT OF THE COMMITTEE OF COUNCIL ON EDUCATION, SOUTH KENSINGTON.

SECOND GRADE EXAMINATION IN ART.

On 3rd May, 1887.

GEOMETRY.

General Instructions.

If the rules are not attended to, the paper will be cancelled.

The problems may be worked in pencil or in ink, but in either case the construction lines used in working the problem must be distinctly shown. Lines may be drawn parallel or perpendicular to other lines by means of T or set squares.

One sheet of paper *only* will be allowed to each candidate.

Not more than six problems may be attempted, and of these one, and one only, must be selected from Nos. 10, 11, and 12.

The number of marks assigned to each problem is stated in brackets.

Each solution must have the number of the problem plainly marked.

The examination in this subject lasts for one hour.

1. Within an equilateral triangle of $2\frac{1}{2}$ inches side, place three equal semicircles having their diameters adjacent and their arcs each touching *one* side of the triangle. (14.)

2. Describe a circle of $\frac{3}{4}$ inch radius, and mark a point, A, on the paper at a distance of $1\frac{1}{4}$ inch from the centre of the circle; from point A draw a line to touch the circle. (12.)

3. Construct a rectangle having a diagonal of 3 inches and two opposite sides each of 1 inch. (12.)

4. Describe two circles having their centres $1\frac{1}{2}$ inch apart, and with radii of $\frac{1}{2}$ inch and $\frac{3}{4}$ inch respectively, describe a third circle to enclose and touch the other two.
N.B.—The three centres must not be in the same right line. (14.)

5. Upon a base of 2 feet, construct an irregular pentagon having its four remaining sides 1 foot 6 inches, 1 foot, 9 inches, and 6 inches respectively. The longest and shortest sides are to be adjacent, and form with each other an angle of 90°, and the length of one diagonal is to be 2 feet. *This problem is to be worked to a scale of* 1 *inch to* 1 *foot.* (16.)

6. Within a circle of 1 inch radius inscribe a triangle with angles of 45°, 60°, and 75°. (14.)

7. Construct an isosceles triangle, having a base of 2 inches and the angle opposite the base 50°. (10.)

8. Describe a circle of $1\frac{1}{2}$ inch radius, and within it place seven equal circles, each of which shall be in contact with two others and also with the large circle. (16.)

9. Within a square of $2\frac{1}{2}$ inches side inscribe an isosceles triangle having an altitude of 3 inches. (12.)

10. A sphere of $1\frac{1}{2}$ inch radius stands upon the horizontal plane. A plane which is perpendicular to the vertical plane and inclined at 30° to the horizontal plane, cuts the vertical axis of the sphere at a point $\frac{1}{2}$ inch above its centre. Draw a plan of the sphere, and show upon it the section made by the plane. (20.)

11. A right pyramid has a square base of 2 inches side, and its altitude is $2\frac{1}{2}$ inches. This solid stands upon the horizontal plane, and two sides of its base are inclined to the intersection line at 30°. Draw the elevation of the pyramid, and show the section made by a plane parallel to the vertical plane which cuts the pyramid through its nearest oblique edge at a point half way between the base and the apex of the solid. (24.)

12. A right cylinder having an axis of 2 inches and a base of $1\frac{1}{2}$ inch diameter, has its axis parallel to the vertical plane, and inclined at 45° to the horizontal plane. The cylinder is cut by a horizontal plane which passes through its centre. Draw the plan of the cylinder and also that of the section formed by the plane. (30.)