

to the foot. Details of design on cover at pleasure. [20]

Geometry.—Time, 15 minutes.

(a) Upon a horizontal line 2 inches long, construct a square.

(b) Bisect one of its angles.

(c) Upon its upper side construct an isosceles triangle having a vertical angle of 30 degrees.

(d) Upon the right hand side of the square, construct a triangle similar and equal to half the square; and in this triangle inscribe a circle. [20]

Perspective.—Time, 30 minutes.

Height 6 feet, distance 16 feet, scale $\frac{1}{4}$ inch = 1 foot.

(a) Place in perspective a block 6 feet square, 2 feet thick, lying on one of its square faces, having two of its edges perpendicular to the picture plane, and its nearer left hand corner 2 feet to the left, and 2 feet back from the picture plane. [40]

(b) Place centrally upon this block, a cylinder 4 feet in diameter, 4 feet high, having its axis vertical. [40]

(c) Make the top of the cylinder the base of a cone 4 feet high. [5]

Design.—Time, 30 minutes.

(a) Draw a regular pentagon confined in a circle 3 inches in diameter. Join by straight lines its alternate corners, thus forming a five pointed star; finish this star, showing it as formed by an interwoven band $\frac{1}{8}$ inch wide. [10]

(b) Draw two horizontal lines, each 4 inches long and 2 inches apart. Divide the space between them into contiguous equilateral triangles, as the basis of a design for a border suitable for a wall paper. [25]

CHEMISTRY.

Examiner—John Seath, B.A.

NOTE.—The candidate is requested to arrange, as far as practicable, the different parts of his answers to Nos. 1, 2, 4, 5, 6, and 7, under the following heads: (1) EXPERIMENT, (2) OBSERVATION, and (3) INFERENCE. Answers to be as concisely worded as possible.

1. How would you demonstrate with KClO_3 the difference between physical change and chemical change? [6]

2. With some water containing CO_2 in solution, is shaken up a mixture of pure sand and NaCl .

(1) How would you separate these four substances? [10]

(2) How would you prove that you had separated them? [10]

3. An organic body which is known to contain only C, O, and H, gives on analysis 27.58 per cent. of O and 10.35 per cent. of H. Its vapour density is 58, that of H being unity. What is its molecular formula? [12]

4. You are given HCl and NH_3 (each in the form of a gas), litmus paper, and turmeric paper, and pure distilled water. How would you demonstrate the nature and properties of an acid, an alkali and a salt? [10]

5. A liquid is known to contain H_2SO_4 , HI , HCl , KHO , or NH_4HO . Give a simple mode of determining which it is. [10]

6. How would you demonstrate

(1) The resemblances and differences between H and Cl; [10]

(2) The effects of heat upon a mixture of 4 vols. of H, one vol. of O, one of Cl, and one of N? [12]

7. The water of a well is supposed to be contaminated by sewage. Describe the means you would take to determine the question. [12]

8. (1) A glass rod moistened with strong H_2SO_4 is held very near a mixture of powdered KClO_3 and dry loaf sugar, *but so as not to touch it*.

(2) A glass rod moistened with strong H_2SO_4 is brought into contact with the same mixture.

Describe and explain what happens in each case, and state the general conclusion you would base on these and similar experiments. [8]

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