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INTERMEDIATE CERTIFICATE EXAMINATION, 1943.

SCIENCE (Syllabus A)

WEDNESDAY, 16th JUNE.—Morning, 10 to 12.

[Not more than *six* questions to be attempted, of which *three* must be taken from Section I, and *three* from Section II. Illustrate your answers wherever possible. All questions are of equal value.]

Section I.

1. Describe fully how it may be shown experimentally that there is a definite relationship between the diameter of a circle and its circumference.

What is the relationship ?

2. What do you understand by specific gravity (relative density) ? Describe fully how you would use a density bottle to determine the specific gravity of sand.

3. How is the volume of a mass of gas related to the pressure acting on it if the temperature remains constant ?

   (*a*) Describe in detail an experiment in support of your answer,

   Or

   (*b*) Calculate the depth of a lake if the volume of a bubble of air on reaching the surface is three times as great as it was at the bottom.

   [Pressure of the atmosphere$=29''$ of mercury ;
   Sp. gr. of mercury$=13\cdot6$.]

4. Explain (*a*) conduction, (*b*) convection, and (*c*) radiation of heat. Give one everyday example to illustrate your answer in each case. How would you show that a dark surface (i) absorbs , (ii) radiates heat better than a bright one ?

5. In what units is quantity of heat measured ? What is meant by latent heat ?

3·92 grms. of steam will raise the temperature of 94·50 grms. of water from 10°C. to 35°C. The same weight of steam will change 20·72 grms. of ice into water at 35°C. Calculate (a) the latent heat of steam, (b) the latent heat of fusion of ice.

[Temperature of steam = 100°C. ;
Temperature of melting ice = 0°C.]

Section II.

6. How may oxygen be prepared and collected in the laboratory ? Sketch the apparatus used, and describe the properties of the gas. Name (a) a solid oxide, (b) a gaseous oxide, (c) a liquid oxide.

7. If you were given a piece of potassium and some nitric acid, describe in detail how you would prepare a pure sample of a salt.

Name the salt, describe its properties, and tell what happens when it is heated.

8. Describe in detail, with the aid of a diagram, how you would determine the equivalent weight of zinc by displacing hydrogen from an acid. A list of the necessary measurements should be written down and the method of making the calculation should be shown clearly.

9. A mass of 100 lbs. is attached by means of a string to a fixed point. The mass is pulled aside by a horizontal force so that the string makes an angle of 20° with the vertical. Find (a) the magnitude of the force, (b) the tension in the string, and (c) the work done on the mass if the string is 10 ft. in length.

10. What do you understand by (a) Force, (b) Resultant, (c) the Parallelogram of Forces ?

Two forces of 7 lbs. weight and 5 lbs. weight respectively act at a point so that their directions are at right angles. Calculate the magnitude and direction of their resultant. How may these forces be arranged so that their resultant may be (i) a maximum, (ii) a minimum ?