AN ROINN OIDEACHAIS

(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1928.

SCIENCE (Syllabus A).

TUESDAY, 19th JUNE.—MORNING, 10 A.M. TO 12 NOON.

(Only *six* questions are to be attempted).

All questions are of equal value.

1. How would you determine :—

   (*a*) the volume of a rectangular block of wood ;

   (*b*) the volume of a stone about the size of a cricket ball ;

   (*c*) the volume of a small lead pendulum bob ;

   (*d*) the average volume of a number of small shot?

2. Describe and explain what happens when (*a*) a candle, (*b*) a piece of phosphorus, is burned in a bell jar over water. (The two experiments are to be regarded as quite distinct). State the names and properties of the constituents of ordinary atmospheric air and the proportions in which they occur.

3. Describe an experiment to determine the coefficient of expansion of a liquid. The volume of 10 kilograms of water at different temperatures is greater than 10 litres by the amounts shewn in the following table :—

At 0°C by 1·3 c.c.	At 12°C by 4·5 c.c.
,, 4°C ,, 0 c.c.	,, 16°C ,, 10 c.c.
,, 8°C ,, 1 c.c.	,, 20°C ,, 17·5 c.c.

Plot these values and comment on the resulting graph. From the graph determine the mean coefficient of expansion of water between 10°C and 20°C.

4. State clearly what is the " Triangle of Forces "? How would you test it experimentally?

A body rests on a smooth inclined plane and is supported by a string parallel to the plane. Make a sketch and a diagram shewing how the " Triangle of Forces " applies in this case.

5. What is the "Principle of Achimedes"? A cylinder of aluminium (sp. gr. 2·71) is 7·7 cm. high and has a diameter of 0·8 cm. What is its apparent weight when suspended in Methylated Spirit (sp. gr. 0·83); with what instrument could you quickly test the specific gravity of the Methylated Spirit?

6. Name three acids and three alkalies. Describe carefully how you would prepare neutral crystals of Sodium Sulphate from an acid and an alkali.

7. Explain the difference between melting and dissolving. Give an example of each to illustrate your answer. How would you find (*a*) the melting point, (*b*) the solubility, of a solid substance?

8. A uniform iron rod projects 20 feet from the surface of an iron sphere of 6 inches diameter. The weight of the sphere is 32 lbs. and that of the projecting rod 16 lbs. The whole arrangement is balanced on a narrow edge so that the rod is horizontal. How far is the narrow edge from the end of the rod? Give full reasons for your answer.

9. What is a barometer? Describe carefully how one can be made. What atmospheric pressure (in lbs. wt. per sq. in.) will cause the reading of a barometer to be 29·2 inches of mercury?

[Sp. gr. of mercury = 13·6., 1 cu. foot of water weighs 62·4 lbs.]

10. Describe the preparation of Sulphur Dioxide, stating carefully what occurs during the preparation. Give a tabular statement of the properties of Sulphur Dioxide and also of the common oxides of Hydrogen and Magnesium.