AN ROINN OIDEACHAIS

(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1927.

SCIENCE (Syllabus A).

WEDNESDAY, 22nd JUNE.—MORNING, 10 A.M. TO 12 NOON

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

1. You are given an irregularly shaped piece of sheet iron. How would you measure (*a*) the area of one of its faces ; (*b*) its thickness ? Having obtained these results, what else would you have to do to find the specific gravity of iron ? If the area to one face is 52·72 sq. cm., the thickness ·235 cm. and the specific gravity 7·85, what is the weight of the piece ?

2. What are the laws of floating bodies ? A body, consisting of a cylinder (diameter 5 cm., height 1 cm.) surmounted by a cone the same height and diameter of base, floats in methylated spirit (sp. gr. = ·83) so that the conical portion only is above the surface. What is the density of the material of the body ? What is its weight ? (The volume of the cone is one third that of the cylinder).

3. State carefully how you would suspend a pendulum, measure its length and find the time of swing. Describe an experiment to find the relation between the length of a pendulum and its time of swing. Plot the following experimental results :—

Length of Pendulum in cm.	97	70·5	41·5	16	5
Time of one swing in seconds.	·995	·84	·64	·40	·23

and make what deductions you can from the resulting graph.

4. Describe a method of finding the co-efficient of expansion by heat of Air. In a room 20 ft. long, 15 ft. wide and 10 ft. high a Fahrenheit thermometer reads 65° and the barometer 29·3 inches. What would be the volume of this quantity of air at normal temperature and pressure ?

5. Describe carefully how you would conduct and record an experiment to find the specific heat of a metal which is given you in small pieces. The specific heat of aluminium is ·212. 21 grams of aluminium at 90°C. are put into a Copper calorimeter (weight = 30 grams) containing 35 grams of water at 15°C. To what temperature will the water rise? How should a thermometer be graduated to measure such a change of temperature?

6. How may the solubility in water of a solid substance be determined? How would you separate a mixture of two soluble salts whose solubilities differ considerably?

7. Describe the changes that occur in limestone when it is heated in a limekiln; and also the composition and properties of the solid and gaseous products of these changes.

8. Describe the preparation of Chlorine gas, and mention any precautions that should be taken. Contrast the properties of this gas with those of Oxygen and of Sulphur dioxide.

9. What is the "Triangle of Forces." Describe an experiment for demonstrating the Principle. In a simple jib crane, the vertical post is 9 feet high, the jib is 17 feet long and the tie rope is 11 feet long. Find graphically the forces in the jib and the tie rope when a weight of 3 tons is suspended from the jib.

10. What do you understand by "work" as applied to machines? How is it measured? Give three numerical examples to illustrate your answer. Explain why it is harder work riding an unoiled bicycle than an oiled one.