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(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS  
(Secondary Education Branch).

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INTERMEDIATE CERTIFICATE EXAMINATION, 1932.

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SCIENCE (Syllabus A).

FRIDAY, 3rd JUNE.—AFTERNOON, 4 TO 6 P.M.

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[Not more than *six* questions to be attempted. All questions carry equal marks. Illustrate your answers wherever possible.]

1. Sketch and describe a micrometer screw gauge and explain its use as a measuring instrument.

The weight of a thin flat sheet of aluminium (density 2.71 grams per c.c.) is 11.59 grams. Find the volume of the sheet. If the area of the flat face of the sheet is 32.7 units and its thickness is 1.31 units, state in what units these measurements have been made.

2. What is meant by the "Coefficient of Expansion of a gas"? Describe an experiment by which you could determine this quantity.

The volume of a gas at atmospheric pressure is 528 c.c. when the temperature is 15° C. and is 610 c.c. when the temperature is 60° C. What is its coefficient of expansion?

3. Describe an experiment by which phosphorus can be burned in an enclosed volume of air. State what happens and what you learn from it. What is carbon? What happens to it when it is burned in air?

4. State the principle known as the "Triangle of Forces." You are given a stone and a piece of metal, whose weights are about 80 and 60 grams respectively, and 100 gram weight. Explain in detail how you would by means of the Triangle of Forces find what the weights are.

5. How would you find the volume of liquid that would fill a bottle to a given mark? How would you transfer 25 c.c. of water from one vessel to another?

A certain weight of water fills a cylindrical bottle to a depth of 9.7 cm., the same weight of turpentine fills the same bottle to a depth of 11.1 cm. What is the specific gravity of the turpentine? Explain your calculations.

6. What can be observed to take place in water while it is being heated in a glass vessel from ordinary temperature till it boils? What conclusions can be drawn from these observations? Some water was boiled in a flask, which was corked when the water was boiling and then allowed to cool. It was found that :—

(a) weight of corked flask after experiment = 217.22 gm.

(b) weight of flask, water and cork, weighed  
after the cork has been taken out of the  
flask = 217.762 gm.

(c) Volume of water left in flask = 74 c.c.

(d) Total capacity of flask = 493 c.c.

From these results calculate the weight of a litre of air.

7. State briefly how you could make some Nitric Acid. State how you could make some Caustic Soda from a piece of Sodium. How would you make a neutral salt from these substances? What would you call it?

8. What is a lever? Show, using a diagram, how you would find the weight of a straight walking stick, if the only weight you had available for the purpose was a 1 lb. weight. If the weight of the stick was 12 ounces, put figures in your diagram that would agree with the facts.

9. Show by means of a sketch, how you would suspend a simple pendulum. Describe how you would proceed to measure its length. The following table gives results of experiment :—

length of pendulum	2.5	5.8	12.0	20.7	28.5	39.0 cm.
time of swing	.165	.245	.35	.46	.54	.635 secs.

Plot a graph of these quantities and make what deductions you can.

10. Define " Latent Heat."

Describe (with sketch) an experiment, from the results of which the latent heat of steam could be calculated, and state what measurements should be taken during the course of the experiment.

On what general principle is the calculation of the result based?

11. What is meant, in Chemistry, by the equivalent of an element? Explain, giving a sketch of the apparatus, how you have found the equivalent of any element which displaces hydrogen from an acid.

12. How is work measured in " Mechanics " ? It is found that it takes a force of 13 ounces weight to pull a body of 3.5 pounds weight along a horizontal table. What is the coefficient of friction between their surfaces? How much work is done when the body is pulled along a distance of 4 feet?