

AN ROINN OIDEACHAIS
(Department of Education).
BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1937.

FULL COURSE.
SCIENCE (Syllabus A)

FRIDAY, 18th JUNE.—AFTERNOON, 4 TO 6 P.M.

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

1. State Archimedes' Principle.

How would you verify it experimentally ?

A solid weighs 19.8 grm. in air, 17.9 grm. in water, and 18.2 grm. in turpentine. Calculate the specific gravity of turpentine.

2. Describe, with sketch, how you would suspend a simple pendulum, and how you would determine its time of swing.

How would you measure the length of the pendulum ?

How is the time of swing affected by—

- (a) the length of the pendulum ;
- (b) the mass of the bob ;
- (c) the angle through which the pendulum swings ?

3. The following table was obtained by experiments on circular discs cut from a sheet of metal.

Weight of disc in grams.	1.8	6.2	9.2	17.1	24.8	40.7
Diameter in cms.	1.1	2.0	2.45	3.3	4.0	5.1

Show these results in the form of a graph and deduce the relation between the weight of a disc and its diameter.

4. What do you understand by "standard temperature and pressure" ?

State the laws connecting the volume of a given mass of dry gas with (a) its pressure, (b) its temperature.

Name the discoverer of each law.

A certain mass of gas occupies 500 c.c. at 800 mm. pressure and 15°C. Determine its volume at standard temperature and pressure.

5. Explain the terms :—

- (a) real expansion of a liquid ;
 (b) apparent expansion of a liquid.

How would you determine experimentally the coefficient of apparent expansion of a liquid ? Calculate the coefficient of expansion of mercury-in-glass from the following figures :—

Mass of glass bottle = 30.20 gm.

Mass of glass bottle filled with mercury at 15°C. = 430.20 gm.

Mass of glass bottle filled with mercury at 100°C. = 424.97 gm.

6. Define " Latent Heat of Fusion."

A copper calorimeter (specific heat 0.1) weighs 50 gm. It contains 65 gm. of water at 35°C. 10 gm. of dry ice at 0°C. are introduced. The final temperature is 20.6°C. Determine the Latent Heat of Fusion of ice.

How would you perform the above experiment ?

What precautions are necessary to secure an accurate result ?

7. What do you understand by the term " solubility of a salt " ? Describe fully how you would determine the solubility of nitre at 50°C. How is the result calculated ?

8. Define " chemical equivalent of an element." Draw a sketch of the apparatus you would use to determine the chemical equivalent of zinc.

How would you carry out the experiment ?

How is the result calculated ?

9. What happens when :—

- (a) limestone is strongly heated,
 (b) steam is passed over heated iron,
 (c) air is passed over heated copper,
 (d) nitre is heated with concentrated sulphuric acid ?

Name the products in each case. Sketch the apparatus you would use to collect the product in (d).

10. State the " Principle of Moments."

A uniform metre stick is supported at its ends from two vertical spring balances. A mass of 60 gm. hangs from the 30 cm. mark and a mass of 120 gm. hangs from the 70 cm. mark. If the mass of the stick is 90 gm, determine the reading of each spring balance.

11. State :—

- (a) the Triangle of Forces ;
 (b) the Parallelogram of Forces.

Describe in detail how you would verify (a) experimentally.

12. What do you understand by the term " work " in mechanics ? How is work measured ?

A mass of 20 lb. is pulled through a distance of 10 feet along a horizontal plane. If the coefficient of friction is 0.2, determine the work done.

If the plane is inclined at 30° to the horizontal, how much extra work would be done in pulling the same mass 10 feet up along the plane ?