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(Department of Education).

BRAINNSE AN MHEAN—OIDEACHAIS.
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1934.

LOWER COURSE.

SCIENCE (Syllabus A).

FRIDAY, 15th 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 the Principle of Archimedes.

A piece of salt weighs 12.09 grams in air and 5.26 grams in a saturated solution of salt. A piece of metal weighs 85.14 grams in air, 74.18 grams in water and 71.84 grams in the solution. Find the specific gravities of metal, salt and salt solution.

2. What is the chemical explanation of burning? Some magnesium is set alight in a bell jar of air, standing in a trough containing dilute acid. What change would you find (*a*) in the magnesium; (*b*) in the air; (*c*) in the acid, after the burning was over? Explain your answers.

3. Describe fully the changes that would take place if a lump of ice at a temperature of 15° F. were gradually heated until the temperature rose to 220° F.

What do you understand by the Latent Heat of Fusion?
Convert 40° C. to the Fahrenheit scale.

4. Define (*a*) weight; (*b*) centre of gravity of a body. If a circular disc 10 feet in diameter have cut out of it a circular piece whose diameter is one of the radii of the disc and whose circumference passes through the centre of the disc, where is the C. of G. of the remainder of the disc?

5. Given the following table, concerning a given volume of gas:—

Pressures in cm. of mercury	64.77,	70.44,	76,	81.56,	87.12
Temperatures in °C.	-40,	-20,	0,	20,	40.

Draw a graph of these quantities and find the law connecting them. Determine from the graph the temperature at which the pressure on the gas would be zero, if the law held at that temperature.

6. Describe with sketches two methods of preparing carbon dioxide. What is its effect on (a) litmus solution; (b) lime water; (c) a burning taper; (d) ammonia gas?

7. What do you understand by standard temperature and pressure?

512 c.c. of dry carbon dioxide at 12° C. and 764 mm. pressure weight 1.091 grams. Calculate the weight of a litre of carbon dioxide at S.T.P.

8. What is meant by the moment of a force about a point? How is its magnitude calculated?

In a pair of nutcrackers a force equal to 8 lbs. is applied at a distance of $5\frac{1}{2}$ inches from the hinge. If the nut is $\frac{5}{8}$ inch from the hinge, what is the force which crushes it?

9. State the law connecting the period of swing of a pendulum and its length.

Given that the length of pendulum which beats seconds is 99.5 cm., find the length of one whose time of swing is 1.5 seconds.

10. What is meant by the equivalent of an element? If 12 grams of calcium acting on water yield 6,720 c.c. of hydrogen, what is the equivalent of calcium?

[11.2 litres of hydrogen weigh 1 gram.]

11. What do you understand by Specific Heat? A lump of copper weighing 75 grams is heated in a bunsen for some time. It is then dropped into a copper calorimeter weighing 45 grams and containing 100 grams of water at 11° C. The temperature of the mixture is steady at 51° C. The specific heat of the copper is 0.1. Find the temperature of the bunsen.

12. How is work measured in mechanics? Distinguish between work done on a body and work done by a body. Why does a man tire more climbing up steps than coming down steps? Does a pillar supporting a roof do work? A horse pulls a load a distance of a mile; how much work does he do if the resistance of the road is equal to a force of 80 lbs?