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INTERMEDIATE CERTIFICATE EXAMINATION, 1931.

SCIENCE (Syllabus A).

FRIDAY, 12*th 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. How would you use it to find the volume of a solid ? A body weighs 78·5 grm. in air, and 70·2 grm. when immersed in methylated spirit (sp. gr. 0·83). Find the volume of the body.

2. Describe how to set up a simple barometer, and explain its working. What will happen if (*a*) the tube be moved from a vertical to a sloping position, (*b*) the vessel containing the mercury and lower part of the tube be immersed in a deep vessel of water, (*c*) the whole instrument be taken up to the top of a high mountain. Give reasons for your statement in each case.

3. How would you find :—

(*a*) the internal cross-sectional area of a narrow piece of glass tubing ;

(*b*) whether a given cylinder will float on water. (You are not allowed to wet the cylinder.)

Give full answers in each case.

4. Explain the meaning of the terms :—(*a*) Element, (*b*) compound, (*c*) mixture, (*d*) physical change, (*e*) chemical change. Give an example in each case.

5. Describe the preparation and properties of hydrogen. Sketch and explain the apparatus you would use to burn dry hydrogen.

6. Quantities of the following substances are left exposed to the air, and weighed from time to time : iron filings, caustic potash, and calcium chloride. State whether you would expect any change in weight, and if so, account fully for such change.

7. Define "Coefficient of Linear Expansion." How would you find experimentally the coefficient of linear expansion of a metal rod. Calculate the length of a copper rod at 85° C., if the length at 0° C. is 500 cm.

(Coefficient of linear expansion of copper is ·000017.)

8. Define "specific heat." 110 grm. of a metal at 70° C. are immersed in 255 grm. of water at 12° C., contained in a copper calorimeter weighing 50 grams. The temperature rises to 18° C. Find the specific heat of the metal, assuming what you consider a suitable value for the water equivalent of the calorimeter.

9. Describe fully how you would find the solubility of a given salt at 65° C. Explain how you would calculate the result.

10. What is understood by (*a*) Triangle of Forces, (*b*) Parallelogram of Forces ? How would you test (*a*) or (*b*) experimentally ?

11. Define "Principle of Moments." Make a sketch of a uniform metre stick suspended from its centre of gravity (50 cm. mark). Weights of 50, 75, 80 and 100 grm. are suspended from the 10, 20, 60, 84·5 cm. marks respectively. Is the lever in equilibrium ? Why ?

12. How would you set up an apparatus to measure the extensions produced in a spiral spring by the suspension from it of weights ?

The following results were obtained experimentally :—

Weight suspended..	5	10	15	20	30	40	50	60	grm.
Extension produced ..	·2	1·4	2·6	3·8	6·1	8·5	10·9	13·2	cm.

Plot a graph of these results, and state what you can deduce from it.