AN ROINN OIDEACHAIS

(Department of Education).

INTERMEDIATE CERTIFICATE EXAMINATION, 1948.

SCIENCE (Syllabus A).

WEDNESDAY, 23rd JUNE.—MORNING, 10 TO 12.

[Not more than *six* questions are to be attempted, of which *three* must be taken from Section I, and *three* from Section II. Illustrate your answers wherever possible. All questions are of equal value.]

SECTION I.

1. Describe an experiment to test the law of flotation in the case of any liquid.

A wooden cube of side 2 cms. weighs 6·82 grams. Find its density. If it floats vertically in water, find its depth immersed.

2. Draw a diagram of a common water-pump and explain how it works.

If the pressure of the atmosphere be 29½ inches of mercury and if the specific gravity of mercury be 13·6, find the height of the water barometer. Explain why a common pump cannot draw water from a depth which exceeds the height of the water barometer.

3. Given an ungraduated thermometer, describe fully how you would graduate it (*a*) in degrees Centigrade, (*b*) in degrees Fahrenheit.

The following table shows the readings on a Centigrade thermometer which correspond to certain readings on a Fahrenheit thermometer :—

Centigrade	—45°	—20°	—10°	5°
Fahrenheit	—49°	— 4°	14°	41°

Draw a graph from these figures, and show how you would find *from the graph* (*a*) the reading on the Centigrade thermometer which corresponds to 0° on the Fahrenheit thermometer, (*b*) the temperature at which both thermometers will show the same reading.

4. What do you understand by latent heat? Illustrate your answer by two everyday examples.

Describe fully how you would measure the latent heat of fusion of ice.

5. Define: (*a*) heat capacity, (*b*) specific heat, (*c*) water equivalent of a calorimeter.

A piece of iron weighing 25·50 grms. is heated to 100°C. and dropped into 78·80 grms. of water in an *iron* calorimeter weighing 40·50 grms. The temperature of the calorimeter and its contents is raised from 15°C. to 18°C. Calculate (*a*) the heat capacity of the piece of iron, (*b*) its specific heat, (*c*) the water equivalent of the calorimeter.

Section II.

6. Define: (*a*) element, (*b*) compound, (*c*) mixture, (*d*) physical change, (*e*) chemical change, (*f*) catalyst, and give one example of each.

7. Describe with the aid of diagrams how you would examine the action of (*a*) sodium on water, and (*b*) magnesium *or* iron on steam. Name the products formed in each case and give an account of their chief properties.

What may be deduced from the results of these experiments with regard to the composition of water?

8. Describe and explain what may be observed when

(*a*) iron filings are left in a damp gas jar inverted over water,

(*b*) a stick of caustic soda is left exposed to the air,

(*c*) a crystal of washing soda is left exposed to the air,

(*d*) red oxide of mercury is heated in a hard-glass test tube,

(*e*) dry hydrogen is passed over heated copper oxide,

(*f*) burning sulphur is plunged into a jar of oxygen which contains a few drops of blue litmus solution.

9. Write down the theorem known as the Parallelogram of Forces and describe an experiment to test it.

A garden roller weighing 109 lbs. is being pulled along a horizontal path at a uniform speed by a force of 40 lbs. wt. which is inclined at 30° to the horizontal. Find (*a*) the horizontal force acting on the roller, (*b*) the reaction of the ground on the roller.

10. Distinguish between mass and weight, and explain centre of gravity.

Describe how you would find the centre of gravity of an irregularly shaped piece of cardboard.

A piece of cardboard hangs vertically from a pin inserted near its edge so that it is free to turn about the pin. Explain, as fully as you can, what would be observed if the cardboard were displaced from its position of rest and then released.