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(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

INTERMEDIATE CERTIFICATE EXAMINATION, 1939.

LOWER COURSE.

SCIENCE (Syllabus A).

FRIDAY, 16th 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. Define :—

(*a*) force ;

(*b*) moment of a force.

What is a lever ?

Give examples of instruments in which use is made of the principle of the lever.

2. State the Principle of Archimedes.

What do you understand by density ?

A solid weighs 28·06 gm. in air, 16·56 gm. in water, and 18·06 gm. in another liquid.

Calculate (*a*) the volume of the solid ;

(*b*) the specific gravity of the liquid.

3. State (*a*) Boyle's Law ;

(*b*) Charles' Law.

A certain mass of gas occupies 380 c.c. at 740 mm. pressure and 12° C.

Determine its volume at standard temperature and pressure.

4. Distinguish between real and apparent expansion of a liquid.

Calculate the coefficient of apparent expansion of turpentine from the following figures :—

Weight of bottle .. .. =19·40 gm.

,, of bottle filled with turpentine at 13° C.=62·67 gm.

,, of bottle filled with turpentine at 100° C.=59·40 gm.

5. Define :—

(*a*) calorie ;

(*b*) latent heat of steam.

Sketch the apparatus by means of which the latent heat of vaporisation of water is determined.

State briefly how the apparatus is used.

6. Distinguish between heat and temperature.

Give an account of the construction and graduation of a Centigrade mercury thermometer.

Convert 98·4° F. to the Centigrade scale.

7. What is the composition of ordinary air ?

Describe with sketches any experiments you have seen performed to show the composition of the atmosphere.

8. Describe in detail what happens when :—

(*a*) mercuric oxide is strongly heated ;

(*b*) dilute sulphuric acid is poured on zinc ;

(*c*) nitre is heated with concentrated sulphuric acid ;

(*d*) potassium is put on water ;

(*e*) water is put on quicklime.

9. How is oxygen prepared in the laboratory ?

Sketch the apparatus used.

What products are formed when the following elements burn freely in oxygen :—(*a*) carbon, (*b*) magnesium, (*c*) sulphur ?

Give the properties of the products formed in each case.

10. Define :—

(*a*) weight ;

(*b*) couple ;

(*c*) unstable equilibrium ;

(*d*) "The Parallelogram of Forces" ;

(*e*) "The Triangle of Forces."

11. State the laws of friction.

A body weighing 20 lb. rests on a rough horizontal table, the coefficient of friction being ·45.

What is the least horizontal force which will cause the body to move along the table ?

12. What do you understand by the "mechanical advantage" of a machine ?

Sketch a system of pulleys for which the mechanical advantage is 3.