AN ROINN OIDEACHAIS
(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1941.

PASS.

PHYSICS.

SATURDAY, 21st JUNE.—Afternoon, 1.30 to 3.30 p.m.

Candidates must answer one question at least out of each Section, and not more than *six* questions in all.

All questions are of equal value.

Section I.

1. Find a formula for the focal length of a concave mirror in terms of u and v, where u is the distance of the object, and v is the distance of the image from the mirror.

An object is moved from a great distance along the axis of a concave mirror. Draw diagrams showing the positions and relative sizes of the images, as the object moves towards the mirror.

2. Explain by diagrams how a convex lens forms real and virtual images.

Describe how the focal length of a convex lens may be found by a parallax method.

3. Explain clearly how you would determine by experiment the index of refraction of water. A ray of light is incident at 45° to the surface of water. Find the angle that the refracted ray makes with the normal. [The index of refraction of water is 1·33.]

4. Explain the construction of the compound microscope, and show by a diagram how a magnified image is obtained.

Section II.

5. State Newton's laws of motion.

A body is projected vertically upwards from the ground with an initial velocity of 120 feet per second. Find :

(i) the height to which it rises,

(ii) the time that elapses before it strikes the ground again.

6. Define " Horse power."

A train is drawn up an incline of 1 in 400 at the rate of 40 miles per hour by an engine working at 600 H.P. The mass of the train, including its engine, is 200 tons. Apart from the resistance due to gravity find in pounds weight per ton the resistance due to other causes.

7. Describe a method by which the acceleration due to gravity may be determined experimentally. What precautions should be taken to ensure a reasonably accurate result ?

8. Explain the term " component velocity."

If the component velocities of a body in two directions are known show how these velocities may be compounded.

A river, a half a mile in width, flows with a speed of one mile per hour. What is the least time taken by a man to cross the river, if he can row with a speed of two miles per hour in still water.

Section III.

9. Find a formula for the intensity due to a bar magnet at a point along the production of its axis.

Calculate the field due to a short bar magnet, of moment 1000, at a point that is 40 cms. distant from the centre of the magnet, and which lies on the production of the axis.

10. What is meant by (a) declination, (b) magnetic dip ? Indicate approximately how the dip changes as you proceed directly from the equator to the poles.

11. Describe an experiment to show the distribution of electric charge over the surface of a pear-shaped conductor.

Mention the results you would expect to obtain.

Explain how a lightning conductor works.

12. Describe the tangent galvanometer or the potentiometer.

Explain how any one of them may be used to compare the electro-motive-force of two cells.