AN ROINN OIDEACHAIS
(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1946.

APPLIED MATHEMATICS—PASS.

SATURDAY, 22nd JUNE.—AFTERNOON, 2 TO 4.

Not more than *six* questions may be answered. All questions are of equal value.

Mathematical Tables may be obtained from the Superintendent.

---

1. Two forces of 5 lb. weight and 4 lb. weight act along OA, OB, respectively, which enclose an angle of 30°. Show that the magnitude of their resultant is 8·7 lb. weight approximately, and that it is inclined to OA at an angle of 13° 18′ approximately. If the force of 5 lb. weight act along OA, but the force of 4 lb. weight along BO, show that the resultant is then 2·5 lb. weight approximately.

2. A 15 lb. weight is kept in equilibrium on a smooth inclined plane of inclination 29° to the horizontal by means of a force which makes an angle of 11° upwards with the greatest slope of the plane. Calculate the magnitude of the force and the pressure on the plane, to the nearest tenth of a pound weight in each case.

3. A steel bar AB balances at a point 10 inches from the end B when a 20 lb. weight is suspended from that end, and at a point 8 inches from B when a 40 lb. weight is suspended from B. Prove that the weight of the bar is 60 lb. and that the distance of the centre of gravity from B is $13\frac{1}{2}$ inches. If the total length of the bar is 24 inches and if it is supported horizontally at its two ends, find the pressure on each support.

4. A cylindrical can, without lid, is made of uniform thin metal. It is 12″ high and its diameter is 7″. Find the position of the centre of gravity.

5. A mass of 100 lb. initially at rest is acted on by a force of 8 lb. weight for 4 secs. Find the velocity acquired and the distance travelled in that time. If at the end of the 4 secs. it overtakes and coalesces with a mass of 50 lb. moving in the same direction with a velocity 2 ft. per sec., find the common velocity immediately after the collision.

6. Two bodies weighing 100 grams and 150 grams are attached to the ends of a light inextensible string passing over a smooth light pulley at the top of a smooth plane inclined at 30° to the horizon, the body of 100 grams weight moving on the plane and the other hanging vertically. Find the acceleration produced and the tension on the string in grams weight. ($g=981$ cm./sec.^{2}).

7. Raindrops are falling vertically at 100 feet per sec. Find the inclination to the vertical at which the drops appear to be falling to a passenger in a train which is running horizontally at 30 miles per hour.

8. Prove the formula for the range of a projectile on a horizontal plane.

The initial velocity of a projectile is 1500 ft. per sec. Calculate the two angles of projection which will give a range of 45,000 feet.