AN ROINN OIDEACHAIS

(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1941.

PASS.

APPLIED MATHEMATICS.

FRIDAY, 20th JUNE.—AFTERNOON, 4 TO 6 P.M.

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

Mathematical Tables may be obtained from the Superintendent.

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1. A force of 5 lbs. wt. makes an angle of 50° with a straight line OX. What are the components of the force along, and perpendicular to, OX ? If another force of 8 lbs. wt. acts along XO, find the direction and magnitude of the resultant of the two forces.

2. Prove that if three forces acting in one plane upon a rigid body keep it in equilibrium, they must either meet in a point or be parallel.

A uniform rod AB of 6 grammes weight is smoothly hinged at A to a fixed point. Find the magnitude of the horizontal force applied at B which will keep the rod in a position inclined at an angle of 30° to the vertical.

3. If a body moves in a straight line from rest with constant acceleration through a distance of 4·02 feet in the first half-second find how far it would move during the next half-second. What will its velocity be after moving 50 feet ?

4. A uniform piece of wire is bent into the form of an isosceles triangle ABC, where AB=AC=$6\frac{1}{2}$ cms., and BC=5 cms. Find the distance of the centre of gravity from BC.

5. A mass of 10 ounces draws up another of 8 ounces by means of a light inextensible string passing round a smooth fixed pulley. Find the tension in the string and the pressure on the pulley during the motion.

6. In a system of pulleys consisting of two blocks with four pulleys in each block, the rope which passes round all the pulleys is attached to the upper block which is fixed. The lower block with its pulleys weighs 4 lbs. What vertical force downwards must a man of 12 stone weight exert on the free end of the rope in order to raise a weight of 2 cwt. and what will be his pressure on the ground ?

7. The inclination of a smooth inclined plane is 1 in 100. At what velocity must a body be projected up the plane so that it may travel a distance of 200 feet in 10 seconds ? How far will it go during the next 10 seconds ?

8. Two equal and smooth inclined planes are placed back to back and a particle projected up one of them flies over the top and strikes the ground just at the foot of the other. Find the velocity of projection, if the inclination of each plane is 30° and their common altitude 6 feet.

9. An express train running at 60 miles per hour is 340 yards behind a goods train running at 15 miles per hour in the same direction on the same track when the goods train increases its speed uniformly at the rate of $1\frac{1}{2}$ ft./sec^2. Show that there will be a collision after 20 seconds.