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(Department of Education).

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1935.

PASS.

APPLIED MATHEMATICS.

FRIDAY, 21*st 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.

1. The following table gives the velocity, v, of a motor-car at intervals of 2 seconds:

v ft. per sec. ..	9	15	16	18	25	31	34	34
t secs.	2	4	6	8	10	12	14	16

Plot the velocity-time graph and find the acceleration of the car at the end of 10 seconds and the distance travelled in the 16 seconds.

2. A man is walking due West at a rate of 5 miles per hour and another is cycling in a direction 30° West of North. At what rate is the second man cycling if he is always due North of the first? Find graphically or by calculation the velocity of the second relative to the first.

3. The acceleration of a tram-car when starting is 2 ft. per second per second, and when stopping the retardation is 3 ft. per second per second. If the maximum speed is 20 ft. per second find the time taken by the car and the distance travelled (i) in reaching its maximum speed, starting from rest; (ii) in slowing down from its maximum speed to rest.

Find also the shortest time taken between two stops 1,200 ft. apart.

4. A stone is thrown from a point 3 ft. above the ground, with a velocity of 60 ft. per second inclined at 60° to the horizontal. Find, neglecting air resistance, the velocity of the stone after 2 seconds and the horizontal distance from the point of projection to the point at which it strikes the ground, assuming the ground to be level.

5. Two weights of 3 lb. and 5 lb. respectively, are fastened to the ends of a light inextensible cord passing over a light, frictionless pulley, supported by a hook. Find the acceleration of the system and the pull on the hook.

6. A body weighing 10 cwt. is kept in equilibrium on a smooth plane inclined at 15° to the horizontal, by a rope which is inclined at 20° to the plane. Find graphically and by calculation the pull in the rope and the pressure on the plane.

7. A telegraph wire passes round the top of a pole 30 ft. high, the two portions of the wire being horizontal and inclined at 40° to each other and the tension in each being 100 lbs. The pole is kept in a vertical position by means of a cable attached, symmetrically with respect to the two parts of the wire, to a point on the pole 12 ft. from the ground and to a point on the ground 9 ft. from the foot of the pole. Find (i) the resultant of the tensions in the two parts of the wire (ii) the tension in the cable.

8. AB and AC are the two legs of a step-ladder freely hinged at A, each 6 ft. long. The angle BAC is 60°. The weights of the legs are respectively 20 lb., and 40 lb., and may be supposed to act at their mid-points, D. and E, which are connected by a light cord. The ladder is standing on smooth ground and a man is standing on a rung at F, 4 ft. from C. Determine (i) the pressures on the ground at B and C; (ii) the tension in the cord.

9. A cylindrical can, without a lid, which is made throughout of uniform thin metal, is 10 in. high, and the radius of the base is 4 in. Find the distance of the centre of gravity from the base.

10. A railway truck weighing 3 tons, moving at 6 miles per hour, overtakes a truck weighing 2 tons moving at 4 miles per hour, and they move on together a distance of 120 ft. after the collision before coming to rest. Find (i) the common velocity immediately after the collision; (ii) the total retarding force, assumed uniform, required to bring the trucks to rest.