AN ROINN OIDEACHAIS
(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS.
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1932.

PASS.

APPLIED MATHEMATICS.

WEDNESDAY, 8th 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. A lift ascends x feet from its lowest point in t seconds, given by the following table.

t	..	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
x	..	0.7	3.0	6.7	11.6	17.6	23.8	30.6	37.0	43.6	49.5	55.7	61.3	66.5	71	74.9	77.8	79.5	80.

Plot the distance—time graph. Explain how the graph shows that the speed is uniform during the greater part of the ascent. Verify that the initial and final motions of the lift are uniformly accelerated.

2. A boy in a large field sees a man 120 yards due E. walking northwards at the rate of 3 miles per hour on a path running N. and S. through the field. Find the direction in which the boy should run at the rate of 6 miles an hour to meet the man. If he ran in a N.E. direction, determine his least distance from the man.

3. A stone is let fall from the top of a tower 144 feet high, and at the same instant another stone is projected vertically upwards from the ground. Find its velocity of projection if they meet half-way. Show that their relative velocity remains unaltered during the motion. [$g = 32$ft./sec^2.]

4. A coach equipped with rubber tyres to run on rails travels between two stations two miles apart. It starts and continues to move with uniform acceleration for 650 yards when it has acquired a speed of 50 miles per hour. It continues to move with uniform speed to within 300 yards of the second station. The brakes are then applied bringing it to rest with uniform deceleration at the station. Find the time occupied on the journey.

5. A mass of 1,200 grams resting on a smooth horizontal table is connected by a light string passing over a smooth pulley at the edge of the table with a mass of 50 grams hanging vertically. Calculate the acceleration of the system.

6. Forces of 5, 10, and 10lb. act in the directions AB, BC and CA along the sides of an equilateral triangle ABC, in which the length of one side is 10in. Find the resultant of these forces by a graphical construction or otherwise.

7. A wire 36in. long is bent into the form of a regular hexagon A B C D E F. Find the distances from the centre of the hexagon to the centre of gravity (1) of three successsive sides AB, BC, and CD. (2) of four successive sides AB, BC, CD, and DE.

8. A rectangular lamina, ABCD, whose adjacent sides AB, BC are 8in. and 12in., respectively, rests on a smooth horizontal table. Equal and opposite parallel forces of 1lb. each in a horizontal plane are applied to the vertices A and C, each making an angle of 120°, externally, with the sides AD and CB, respectively. Show that the lamina can be maintained in equilibrium in this position by the application of another pair of parallel forces normal to the first acting at the vertices B and D and find their magnitude.

9. A rod AB 50cm. long and weighing 100 grams is hinged at A and maintained in equilibrium by a string attached to the end B of the rod and to a point C 100cm. vertically above A so that the angle BAC is 60°. Find the tension in the string and the magnitude of reaction at A.

10. A truck weighing 4 tons runs at the rate of 5·5 miles per hour into a truck at rest, weighing 6 tons. They move on together against a retarding force of 0·05 ton. How far will they move after collision?