AN ROINN OIDEACHAIS
(Department of Education).

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

LEAVING CERTIFICATE EXAMINATION, 1930.

PASS.

APPLIED MATHEMATICS.

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

Not more than *five* questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Rain-drops are falling vertically at 100 feet per second. Find the inclination to the vertical at which the drops appear to be falling to a passenger in a train which is running at the rate of 30 miles per hour. Draw a diagram showing the apparent inclination of the drops as seen from the train.   [55 marks.]

2. The relation between distance and time for an electric tramcar starting from rest is given in the following table:—

Time in seconds	0	10	20	30	40	50	60	70
Distance in feet	0	36	160	395	660	880	1,040	1,160

Plot the distance-time graph and determine from it the speed at intervals of 10 seconds for the first 60 seconds. Plot your results as a graph.   [60 marks.]

3. Three telegraph posts A, B, C stand by the side of the road, the distances A, B and B, C being each 60 yards. A car which is uniformly accelerated is observed to take 8 seconds between A and B and 7 seconds between B and C. Find the value of the acceleration and the speed in miles per hour at A and C.   [60 marks.]

4. Explain the meaning of the term centre of gravity.

A uniform wire is bent into the shape of a rectangle A, B, C, D, whose adjacent sides BC and CD are 4 and 8 inches respectively. If the side CD is removed, find the centre of gravity of the remaining three sides.   [55 marks.]

5. Forces of 4, 6, 4 and 6 lbs. act along the sides AB, BC, CD and DA of a square whose side is 12 inches in length.

Find the magnitude and direction of the resultant of the forces acting along the sides AB, BC and CD. State what forces you would add to the system to produce equilibrium.   [60 marks.]

6. A stick, AB, one metre long is hinged to a horizontal table at A. The end B is held above the table by the pull of a string fixed to a point C on the table so that AC=100 cms. and the angle BAC is 120°. Neglecting the weight of the stick find the tension in the string when a weight of 500 grams is attached to B.
[60 marks.]

7. A bead slides on a taut wire inclined at angle of 30° to the horizontal. If the frictional resistance to motion is R and the mass is M write down the equation for its acceleration. If R is one-sixteenth of the weight of the bead find the time taken to slide down 14 feet.   [55 marks.]

8. A bullet of mass 1 oz. is fired horizontally into a block of mass 20 lb. suspended as a ballistic pendulum whose centre of gravity is 8 ft. below the point of suspension. The bullet becomes embedded in the block and the latter is displaced through a horizontal distance of 6 inches. It is found from this observation that the velocity of the block immediately after impact was 12 inches per second. How was this velocity calculated? Find the velocity of the bullet immediately before it struck the block.
[60 marks.]