

AN ROINN OIDEACHAIS

(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1928.

PASS

APPLIED MATHEMATICS.

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

Five questions may be answered.

Mathematical Tables may be obtained from the Superintendent.

1. Prove that, if three forces acting on a particle are in equilibrium, each is proportional to the sine of the angle between the other two.

Two forces of 2 and 3 lbs. weight inclined at an angle of 30 degrees to each other act at a point: find the magnitude and the line of action of the resultant.

[44 marks].

2. A thin uniform rod of mass 4 lbs. is 5 feet in length and masses of 2 and 3 lbs. are fixed one to each of its extremities: find the position of the centre of gravity of the whole system.

[44 marks].

3. Distinguish between a *scalar* and a *vector* quantity. Give examples.

Show that displacements can be added by the "parallelogram law" and hence deduce that velocities and forces causing motion can also be added by this law.

[44 marks].

4. A body is projected with a velocity of 100 ft. per second directly up a smooth plane inclined at an angle of 50 degrees to the horizontal. Find the greatest height reached and the time that will elapse before the body returns to its original position.

[48 marks].

5. A mass of 10 lbs. is moving in a straight line under the action of a constant force applied in the direction of motion. During the fifth and seventh seconds of its motion the mass moves 108, 140 feet respectively: find its initial velocity and the magnitude of the force.

[48 marks].

6. Two equal masses are connected by a weightless string passing over a smooth peg. On adding a rider of $\frac{1}{4}$ lb. to one side it is found that the tension of the string is to the original value as 9 : 8. Find the masses:

[48 marks].

7. How far must a weight of 10 cwt. fall freely to drive a pile weighing 640 lbs. 6 inches into the ground against an average resistance of 5 tons weight, assuming that the weight moves with the pile?

[48 marks].

8. In a triangle ABC a straight line drawn parallel to the base BC meets the sides in D, E. If $DE = 10$ inches, $BC = 16$ inches, and the distance between DE and BC is equal to $5\frac{1}{2}$ inches, find the distances from BC of the centres of gravity of the triangle ADE and the trapezium DECB.

[48 marks].