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(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS
(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1942.

APPLIED MATHEMATICS.—PASS.

THURSDAY, 18th JUNE.—AFTERNOON, 4 TO 6.

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

Mathematical Tables may be obtained from the Superintendent.

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1. Two forces of 4 lb. wt. and 5 lb. wt. are inclined at angles of 25° and 75° respectively to the horizontal. Find the horizontal and vertical components of the resultant and find its magnitude and direction.

2. Establish the formula $s = ut + \frac{1}{2}ft^2$ for motion in a straight line with uniform acceleration.

A particle moving in a straight line with uniform acceleration travels 2 feet during the first second and 3 feet during the next second : find its initial velocity.

3. Relative to a train travelling at 40 miles per hour in a North-East direction an aeroplane is moving due North at 200 miles per hour. Find the velocity, in magnitude and direction, of the aeroplane relative to the ground.

4. A toboggan slides down a smooth incline of 1 in 10. Find the velocity of the toboggan after it has travelled 100 feet from rest and find also the time that will elapse before it has covered another 100 feet.

5. A circular table of radius 2 feet and weight 50 lb. is supported by three legs placed symmetrically 3 inches from the edge of the table. Find the greatest weight that can be placed on the edge of the table without upsetting it. Show that a greater weight can be supported in some positions on the edge than on others.

6. A string passing over a smooth pulley supports two scale pans attached to its ends, the mass of each pan being 3 ounces. Masses of 6 and 10 ounces respectively are placed in the pans and motion ensues. Find the acceleration of the system and the tension in the string during motion.

7. A bomb is dropped from an aeroplane when it is travelling at 150 miles per hour in a horizontal direction at a height of 2,000 feet. Find (a) the velocity with which the bomb will strike the ground, (b) the time taken by the bomb to fall, (c) the horizontal distance of the place of impact from the place where the bomb was let fall.

8. A uniform bar 1 foot long and weighing 1 lb. is suspended in a vertical plane by means of two strings 6 inches and 10 inches long respectively attached to the ends of the bar and tied to a peg. Find, graphically or otherwise, the tension in the strings in the position of equilibrium and the inclination of the bar to the horizontal.