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(Department of Education).

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(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1943.

APPLIED MATHEMATICS—Honours.

FRIDAY, 18th JUNE.—AFTERNOON 4 TO 6.

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

Mathematical Tables may be obtained from the Superintendent.

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1. Two ships A and B are 10 miles apart, A being due west of B and steaming due East at 12 miles per hour. B is steaming due North at 18 miles per hour. When will they be nearest one another and what will be their distance apart at that time ?

2. A particle slides down a smooth inclined plane 12 feet long in 4 seconds : find its acceleration and the inclination of the plane to the horizontal.

How far from the bottom should a second particle be started on the plane one second after the first had started from the top so that the two particles will reach the bottom together ?

3. On a rectangular sheet of iron, 12 inches by 9 inches, marks are made on two adjacent edges at a distance of 3 inches from one corner. These marks are joined by a straight line and the sheet folded down along this line. Find the centre of gravity of the sheet so folded.

4. Describe any method by which the acceleration due to gravity may be determined experimentally. Mention the causes of error likely to affect the result.

5. An object of 18 lb. wt. is placed upon a sheet of glass resting on a horizontal table and a string attached to the object passes horizontally over a pulley at the end of the table. When a weight of 2 lb. is hung on the free end of the string, the object is drawn from rest through a distance of 6 feet in 3 seconds. Find the coefficient of friction between the object and the glass and also the tension in the string.

6. A uniform iron bar AB, 5 ft. long, weighs 10 lb., has a 5 lb. weight fixed to it at a point 1 ft. from A, and is supported by means of cords attached to its ends from a peg C. The cord CA is $3\frac{1}{2}$ ft. long and the cord CB is 4 ft. long. Find the inclination of the bar to the horizontal in the position of equilibrium and find the tensions in the cords.

7. The height of a lift from the ground t seconds after starting is h feet, given by the following table :—

t	1	2	3	4	5	6	7	8	9	10	11	12
h	1·6	4·5	8·5	14·4	22·7	33·3	44	54·8	63	69	72·5	74

Draw the distance-time graph for the lift. Find the greatest velocity of the lift.

Draw a rough velocity-time graph, and use it to give a short account of the variation in the acceleration throughout the journey.

8. An inverted cone, of angle 60°, has a smooth inside surface and rests with its axis vertical. A smooth particle moves in a horizontal circle on the inside of the cone with a uniform speed of 8 feet per second. Find the distance of the particle from the vertex of the cone.

9. A particle is moving in a straight line with Simple Harmonic Motion. When it is 5 ft. and 12 ft. from the centre of its path, its speeds are 24 ft./sec. and 10 ft./sec. respectively. Find the period and the amplitude of the motion. Find also the maximum speed and the maximum acceleration of the particle.