

AN ROINN OIDEACHAIS

(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1945.

APPLIED MATHEMATICS.—PASS.

THURSDAY, 21st 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.

1. A point starting from rest moves with uniform acceleration for 6 seconds and acquires a velocity of 10 ft. per sec. It moves with this velocity for 4 seconds and then becomes uniformly retarded, coming to rest 17 seconds from the start. Show from the velocity time graph, or otherwise, that (i) the total distance traversed is 105 feet; (ii) the acceleration is $1\frac{2}{3}$ ft./sec.²; (iii) the retardation is $1\frac{1}{3}$ ft./sec.².

2. A weight of 100 lb. hangs by means of two strings of lengths 4' and 5' from two points 6 feet apart at the same horizontal level. Find by construction (or calculation) the tensions in the strings.

3. A uniform rod $ABCD$, $AB=BC=CD=4$ ft., weighing 12 lb. rests on two supports at A and C and has a 7 lb. weight suspended at B and an 8 lb. weight at D . Find the reactions at A and C .

4. A rectangular plate $ABCD$ ($10'' \times 8''$) has a square piece ($4'' \times 4''$) cut from the corner at C . Find the distance of the $c-g.$ from each of the sides AB , AD .

5. How are velocities compounded?

A boat can be rowed at 5 miles per hour in still water. A river with parallel banks flows at the rate of 3 miles per hour. Find the direction in which the boat must be rowed, relative to the water, so as to cross the river in a direction perpendicular to the banks.

6. Neglecting friction, find in lb. wt. what constant force would produce a velocity of 20 miles per hour in a 5 ton waggon in 20 seconds; find also what constant force would bring it to rest in 10 yards.

7. A tennis ball when moving horizontally just clears the net which is 3 ft. high and strikes the ground 16 ft. from the net. Neglecting air resistance, find (i) the velocity of the ball when passing over the net, (ii) the distance from the net when the ball is one foot from the ground.

8. A body of mass 3 lb. starting from rest slides down a smooth plane inclined at 20° to the horizontal. One second later a second body of equal mass is projected down the plane with an initial velocity of 16 feet per second. It overtakes the first body and coalesces with it. Find (i) the time which elapses from the start of the first body until it is struck by the second, (ii) the velocity with which both move just after the collision. [$g=32$.]