AN ROINN OIDEACHAIS

(Department of Education.)

BRAINNSE AN MHEADHON-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1943.

APPLIED MATHEMATICS.—PASS.

FRIDAY, 18*th 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. Two forces of 5 lb. wt. and 7 lb. wt. acting at a point are inclined at an angle of 28° : find the magnitude and direction of the resultant.

Explain why three forces of 5, 7, 13 lb. wt. respectively, acting at a point, cannot be in equilibrium whatever their directions may be.

2. What is the *moment* of a force about a point ?

A straight uniform rod is 3 feet long. When a load of 10 lb. is placed at one end the rod balances about a point 3 inches from that end : find the weight of the rod.

3. 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.

4. A square of uniform cardboard has each side 5 inches long. From one corner a square of side 1 inch is cut away : find the distance of the centre of gravity of the remainder from the opposite corner.

[A graphical solution will be accepted.]

5. The tide is flowing from the South-West at 7 miles an hour. In what direction should a ship, which is capable of a speed of 15 miles an hour in still water, set its course so as to maintain a true southerly direction ?

6. A stone dropped from the top of a vertical cliff is found to strike the sea after an interval of 3 seconds : what is the height of the cliff ?

If the stone had been projected horizontally seawards with a velocity of 50 miles per hour, how far from the base of the cliff would it strike the sea ?

7. A bus weighing 5 tons carries 60 passengers whose average weight is 10 stone. What is the momentum of the bus when travelling at the rate of 20 miles per hour.

What constant force, in pounds weight, must be applied to stop the bus (*a*) in 20 seconds, (*b*) in 10 yards ?

8. Two bodies of 2 and 5 lb. wt. respectively are suspended by a string passing over a smooth light pulley. Find the velocity of either body after it has moved through $1\frac{1}{2}$ feet and find also the tension of the string during the motion.

9. A train travels from one station to another in 8 minutes. The rates of travelling (in miles per hour) at the end of each minute are 8, 20, 29, 32, 32, 27, 16, 0 respectively. Draw a speed-time graph to show the speed of the train at any moment, and from the graph determine approximately the distance between the two stations.