

# AN ROINN OIDEACHAIS

(Department of Education).

## BRAINSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1948.

### APPLIED MATHEMATICS—PASS.

THURSDAY, 24th 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 train is brought to rest from a speed of 35 miles per hour and the speeds corresponding to various times are given in the following table:—

Time (in secs.) ...	0	6	12	18	24	30	42	54	60
Speed (in m.p.h.) ...	35	34.5	34	32	30	25	16.5	7	0

Draw the speed-time graph and explain how the distance travelled during the whole interval of 1 minute could be obtained from the graph.

2. A uniform wire 10 inches long is bent in the form of an isosceles triangle of base 2 inches. Find the distance of the centre of gravity from the base.

3. The ends of a cord 20 inches long are fastened to two supports at the same height above the ground and 18 inches apart. A weight of 2 lb. is suspended from the centre of the cord. Find the force the cord exerts on each support supposing it does not stretch. Would this force be greater or less if the cord stretched? Give reason.

4. Explain the terms "component velocity", "resultant velocity", and show how velocities may be compounded.

A river  $\frac{1}{4}$  mile wide flows with a speed of 1 mile per hour. Find the time required for a man, who can row with a speed of 2 miles per hour in still water, to cross the river at right angles to the bank. What is the least time in which he can cross the river if he does not mind where he lands?



5. Assuming that the earth rotates about its axis once in 24 hours, find its angular velocity (*a*) in degrees per second, (*b*) in radians per hour. Find also (i) the linear speed in miles per hour of a point at the equator which describes a circle of diameter 8,000 miles, and (ii) the corresponding linear speed of a point at latitude  $53^\circ$ .

6. A stone is thrown vertically upwards with a velocity of 96 feet per second. Find (*a*) how long it takes to reach its greatest height, (*b*) the greatest height reached, and (*c*) after what times the stone is 140 ft. above its initial position (the point of projection).

7. A uniform rod is 4 feet long and weighs 2 lb. The rod is supported by two strings of lengths 2 and 3 feet which are attached to the ends of the rod and to a peg. Find, graphically or otherwise, the tension of each string.

8. Define *work*, *power*.

If the maximum power a man weighing 160 lb. can develop is  $\frac{1}{8}$  h.p., find the greatest speed at which he can ride a bicycle weighing 30 lb. up an incline of 1 in 24.

9. A solid cylinder, of specific gravity 7.2, 10 cm. high and of diameter 4 cm., is suspended in a vertical position by means of a string in a liquid of specific gravity 0.8 so that the top of the cylinder is 3 cm. below the surface of the liquid. Find (i) the total thrust of the liquid on the bottom of the cylinder, and (ii) the tension in the string.

