AN ROINN OIDEACHAIS

(Department of Education).

BRAINSE AN MHEÁN-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1926.

PASS

APPLIED MATHEMATICS.

WEDNESDAY, 23rd *JUNE*.—Afternoon, 4 to 6 p.m.

Five questions may be answered.

All questions carry equal marks.

Tables of Measures, Constants and Formulae and Logarithm Tables may be obtained from the Superintendent.

1. What do you understand by " speed," " velocity " ?

At a certain instant a body is moving north at 5 miles per hour : at a later instant it is found to be moving north-west at the same rate. Find graphically or otherwise the change of velocity in magnitude and direction.

2. Prove for a particle moving in a straight line with uniform acceleration f the formulae (i) $v = u + ft$; (ii) $s = ut + \frac{1}{2} ft^2$.

A body moving with uniform acceleration has at a certain instant a velocity of 15 miles per hour : in the following minute it moves through 10,370 feet : find the acceleration in feet per second per second.

3. A shot is fired horizontally from the top of a cliff with a velocity of 300 ft. per sec. and strikes the ground in 3 secs. What is the height of the cliff, and what is the velocity of the shot in magnitude and direction at the instant of striking the ground ?

4. What do you understand by " momentum," " conservation of momentum " ?

A body of mass 4 lbs. moving with a velocity of 7 ft. per sec. strikes a mass of 6 lbs. moving in the same direction at a speed of 2 feet per sec. If the masses then move on together, find their common velocity.

5. Prove that the moment of the resultant of two non-parallel forces about any point in their plane is the algebraic sum of the moments of the forces about that point.

Three forces act in one plane on an extended body and are in equilibrium. The lines of action of two of the forces meet in a point. Show that the line of action of the third force passes through that point.

6. State how to find in magnitude and direction the resultant of two unlike parallel forces.

ABCD is a square, named in order, of side 2 inches. Forces of 40, 30 and 20 act along AB, BC, CD respectively. Show correctly drawn to scale (i) the resultant of the parallel forces ; (ii) the magnitude of the resultant of the three forces ; (iii) the line of action of the resultant.

7. Two particles of masses of 10 and 13 grammes are connected by a light string passing over a smooth peg. Find (i) their common acceleration ; (ii) the tension of the string ; (iii) the velocity at the end of 3 seconds ; (iv.) the distance described in 3 seconds.

8. A motor car of mass 1,000 lbs. moving at 60 miles per hour has the brakes applied and is brought to rest after travelling ½ mile. What is the average retarding force produced by the brakes ?