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(Department of Education).

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(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1931.

PASS.

APPLIED MATHEMATICS.

WEDNESDAY, 17th JUNE.—AFTERNOON, 4 TO 6 P.M.

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

Mathematical Tables may be obtained from the Superintendent.

1. The relation between time and distance for a particle is given in the following table :—

Time in seconds	0	·1	·2	·3	·4	·5	·6	·7	·8	·9	1·0
Distance in cm.	80	79	74	65	55	40	25	15	6	1	0

Find its average speed for the whole interval and also its speed at 0·45 second. Determine approximately the times at which the speed of the particle is equal to its average speed over the whole interval.

2. A motor-car travelling at a speed of 30 miles an hour on a road running E.W. crosses a road running N.S. just when a second motorcar travelling on the N.S. road at a speed of 45 miles an hour is 220 yards from the intersection of the two roads. What is the relative speed of the two cars ? Obtain by a graphical construction the least distance between them.

3. Establish an expression for the distance travelled in t seconds by a particle whose initial velocity is u ft. per second and which is subject to a uniform acceleration of a ft. per second per second.

4. A train running between two stations A and B starts and continues to move with a uniform acceleration of 4 ft. per sec. per sec. for 11 seconds ; it then moves with uniform speed for 2 minutes and comes to rest at B with uniform retardation in $16\frac{1}{2}$ seconds. What is the distance between A and B ?

5. Given that the acceleration of a body varies as the force applied, show that a poundal is approximately equal to the weight of half an ounce. Why is this unit of force introduced into dynamics ?

6. A motor-car of weight 15 cwt. has its speed reduced from 45 miles per hour to 20 miles per hour in a distance of 39 yards. Find the magnitude of the uniform force in lbs. weight which should be applied to produce this retardation.

7. If ABC be a uniform triangular lamina and D and E be the middle points of the sides AB and AC, prove that the centre of gravity of the lamina lies at the intersection of BE and CD. Find the centre of gravity of the trapezium BCED.

8. Determine the magnitude and position of the resultant of two forces 37 lb. and 53 lb. which make an angle of 120° with each other, either from a graphical construction or by calculation.

9. Derive the formula for the acceleration of the masses in Attwood's machine. Point out in what respect the conditions in an actual experiment differ from those assumed in the derivation of the formula.

10. A tennis ball served horizontally from a height of 8 feet parallel to the side lines, strikes the ground 60 feet away. What was its time of flight, its initial *speed*, its final *velocity* ? [g=32ft./sec^2.]