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(Department of Education).

BRAINSE AN MHEAN-OIDEACHAIS

(Secondary Education Branch).

LEAVING CERTIFICATE EXAMINATION, 1952.

APPLIED MATHEMATICS—PASS.

THURSDAY, 19th JUNE.—MORNING, 10 TO 12.

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

Mathematical Tables may be obtained from the Superintendent.

1. Find the resultant of two forces, of 3 and 5 lb. wt. respectively, whose lines of action are at right angles to each other.

A weight of 5 lb. is suspended by a light string from a fixed point and is then drawn aside by a horizontal force of 3 lb. wt. Find the tension in the string and the angle which the string makes with the vertical.

2. A tapering beam AB of length 10 feet rests horizontally on two supports C and D, where $AC=3$ feet and $DB=2$ feet. A vertical force of 55 lb. wt. applied at A will just lift the beam off the support C, and a vertical force of 80 lb. wt. applied at B will just raise the beam off the support D. Find the weight of the beam and the distance of its centre of gravity from one end.

3. A block weighing 20 lb. is resting on a horizontal plane and can just be moved by a horizontal force of 12 lb. wt. Find the coefficient of friction between the block and the plane.

What force will just move the block when applied in an upwards direction making an angle of 45° with the plane?

4. A car is travelling at 15 m.p.h. On passing a point A it is uniformly accelerated at the rate of one foot per sec.² for a distance of 160 yards. It is then uniformly retarded so that 26 seconds after passing A its speed is 10 m.p.h. Find the uniform retardation and find how much farther the car would travel with this retardation before coming to rest.

5. A stone is dropped from the top of a vertical cliff and strikes the water at the foot of the cliff 3 seconds later. Find the height of the cliff.

If the stone were thrown vertically upwards from a point which is 170 feet above the water with a velocity of 28 feet per second, how long would it take to reach the water, and with what velocity would it strike the water?

6. Two scale pans, each of mass 1 lb., are connected by means of a light inextensible string which passes over a smooth pulley. A mass of 10 lb. is placed in one pan and a mass of 8 lb. in the other, and the system is released. Find the acceleration of the masses and the tension in the string.

7. A uniform rod weighing 6 lb. is supported by two strings which are attached to the ends of the rod and to a fixed peg. The rod is 5 feet long and the strings are 3 feet and 4 feet long, respectively. Find, graphically or otherwise, the tension in each of the strings.

8. A motorist is travelling due north at 40 m.p.h. and the wind is blowing with a velocity of 20 m.p.h. from a direction 30° north of east. Find, graphically or otherwise, the velocity of the wind relative to the man, in magnitude and direction.

9. A cylindrical vessel of diameter one foot is filled to a depth of 7 inches with a liquid of specific gravity 0.8. Find the total thrust on the base of the vessel.

If an object of specific gravity 2.5 and weighing 2 lb. is suspended by a vertical string so that it is totally immersed in the liquid, find the total thrust on the base of the vessel and the tension in the string.

[One cubic foot of water weighs $62\frac{1}{2}$ lb.]