AN ROINN OIDEACHAIS

AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS
for
DAY VOCATIONAL COURSES, 1956.

MECHANICS AND HEAT.

Thursday, 14th June—2.30 *to* 4 *p.m.*

(i) Not more than *four* questions may be attempted.

(ii) Question 1 must be attempted by all candidates.

1. Answer each of the following :—

(*a*) Distinguish between mass and weight.

(*b*) State the Principle of the Spiral Spring.

(*c*) Name three different types of energy.

(*d*) How much work is done in raising a load of 24 lb. through a vertical height of 20 inches ?

(*e*) Define velocity ratio of a machine.

(*f*) What are the " fixed points " of a thermometer ?

(*g*) For what purpose is a thermostat used ?

(*h*) What quantity of heat will raise the temperature of 3 lb. of water from 10°C. to 40°C. ?

2. Sketch and describe how you would set up a simple barometer. Explain the effect of (*a*) tilting the tube to one side ; (*b*) introducing a bubble of air above the mercury in the tube ; (*c*) using a tube of larger bore.

3. State *Archimedes' Principle.*

When a piece of iron was tied to a cork the combination weighed 43 grams in air and 13 grams in water. The piece of iron alone weighed 39 grams in air and 34 grams in water. Calculate the specific gravity of (*a*) iron, (*b*) cork.

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4. State the *Parallelogram of Forces* and describe how you would verify it experimentally.

Two forces of 64 lb. and 48 lb. respectively act with an angle of 120° between their lines of action. Find the magnitude and direction of their resultant.

5. What is meant by the *moment of a force* ?

A uniform, straight bar, AB, of weight 15 lb. and length 8 feet, is supported at a point 40 inches from end A and carries a load of 20 lb. at end B. What load placed at end A will balance the bar horizontally ?

6. When 6 grams of dry steam at 100°C. were passed into 145 grams of water at 12°C., contained in a calorimeter of water-equivalent 5 grams, the resulting temperature was 36°C. Calculate the latent heat of steam.

In such an experiment what precautions are taken to reduce loss of heat from the calorimeter by (*a*) conduction, (*b*) radiation.

7. Explain clearly why :—

(*a*) a compound bar of brass and iron bends in the form of an arc when heated ;

(*b*) water has its maximum density at 4°C. ;

(*c*) a thermos flask keeps hot liquid hot, or cold liquid cold, for a long time ;

(*d*) the handle of a chisel feels warmer than the blade ;

(*e*) the windows of a crowded bus mist over in cold weather.