

AN ROINN OIDEACHAIS.

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AN BRAINSE GAIRM-OIDEACHAIS.

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CERTIFICATE EXAMINATIONS  
for  
DAY VOCATIONAL COURSES, 1950.

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**MECHANICS AND HEAT.**

*Tuesday, June 27th—2.30 to 4 p.m.*

- (i) Not more than *four* questions may be attempted.
  - (ii) Question 1 must be attempted by all candidates.
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1. Answer each of the following:—

- (a) For what purpose is a hydrometer used?
- (b) A gallon of water weighs 10 lb. A pint of oil weighs 1 lb. What is the specific gravity of the oil?
- (c) Define a calorie.
- (d) What is meant by latent heat?
- (e) What is a convection current?
- (f) What is meant by force?
- (g) Define the velocity ratio of a machine.
- (h) Calculate the weight of an object which, when hung 40 cms. from the fulcrum of a lever suspended at its centre of gravity, is balanced by a weight of 100 grams hung 48 cms. from the fulcrum on the other side.

2. Sketch, and describe how you would set up, a simple barometer.

What does a barometer measure? Give approximate figures for its readings on (a) a normally fine day; (b) a very wet day; (c) a very fine day.

3. State Archimedes Principle.

A 50 gram brass weight is attached to a small block of wood. The combination weighs 59 grams in air and 37 grams in water. The brass weight alone weighs 44 grams in water. Calculate (a) the specific gravity of brass; (b) the specific gravity of the wood.

4. State the Triangle of Forces.

A body of weight 40 lb. is at rest on a plank 12 feet long, inclined so that one end is 4 feet higher than the other. Show by a sketch the directions of the force of friction and the normal reaction of the plank. Find by drawing, or otherwise, the magnitudes of these forces.

5. Distinguish between work and power.

A load of 1 ton is raised steadily from a pit 1,250 feet deep in 3 minutes by an engine working at the rate of 40 H.P. Calculate (a) the work done on the load; (b) the work done by the engine; (c) the efficiency of the hoisting mechanism.

6. Define specific heat.

64 grams of brass tacks at a temperature of  $99^{\circ}$  C. are added to 50 grams of water at  $16^{\circ}$  C. contained in a calorimeter of water-equivalent 4 grams. The resulting temperature is  $24^{\circ}$  C. Find the specific heat of brass.

7. Explain clearly why:

- (a) a pint of cold water is heavier than a pint of hot water.
- (b) it is easier to carry a broom by holding it near the head.
- (c) steel feels colder than wood.
- (d) heaps of snow which have been swept off the roads sometimes take days to melt although the weather has become warmer.