

AN ROINN OIDEACHAIS

AN BRAINSE GAIRM-OIDEACHAIS.

CERTIFICATE EXAMINATIONS

for

DAY VOCATIONAL COURSES, 1953.

MECHANICS AND HEAT.

Tuesday, June 23rd—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) Distinguish between centre of gravity and specific gravity.
- (b) What information is required to represent a force fully on paper by a straight line ?
- (c) When does a force do work ?
- (d) Explain force of friction.
- (e) What affects the time of swing of a simple pendulum ?
- (f) What temperatures on the Fahrenheit scale correspond to 0° C. and 100° C. ?
- (g) What is meant by the statement that the specific heat of copper is 0.095 ?
- (h) What quantity of heat will raise the temperature of 5 lb. of water from 50° F. to 150° F. ?

2. Sketch neatly (a) a simple barometer ; (b) a thermometer. Label the parts in each case.

Describe and explain how changes in atmospheric conditions affect the readings of these instruments.

[P.T.O.]

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

A uniform, straight bar, 6 ft. long, supported at its centre of gravity, balances horizontally when a ham is suspended from one end of the bar and a load of 15 lb. is suspended 6 ins. from the other end of the bar. Find the weight of the ham.

If the 15 lb. load be removed, the bar balances again when the fulcrum is moved to a point 16 ins. from the end at which the ham is suspended. Find the weight of the bar.

4. Explain the *Parallelogram of Forces* and show how the *Triangle of Forces* can be derived from it.

Three forces of 21 lb., 28 lb. and 35 lb. respectively, acting outwards from a point, are in equilibrium. Draw the triangle of forces and from this draw a diagram showing the three forces acting at the point. Measure the angles between the lines of action of the forces.

5. In a hoisting machine, of velocity ratio 10, an effort of 400 lb. raises a load of 3,000 lb. through a height of 22 ft. in $\frac{1}{4}$ minute. Calculate (a) the mechanical advantage; (b) the distance moved by the effort; (c) the work done by the effort; (d) the efficiency; (e) the H.P. developed by the effort.

6. Define *coefficient of linear expansion*.

An iron bar, 150 cms. long at 10° C., becomes 150.162 cms. long when heated to 100° C. Calculate (a) the coefficient of linear expansion of iron; (b) the temperature at which the bar would be 150.45 cms. long.

7. Explain clearly why :—

- (a) metal teapots often have wooden handles ;
- (b) ice floats on water though they are both the same material ;
- (c) a vessel of water heats more quickly if heated from below than if heated at the top ;
- (d) a person's hand soon feels very cold when some drops of petrol or methylated spirits are spilled on it ;
- (e) white clothes are often worn in hot, sunny weather.