

# AN ROINN OIDEACHAIS

(Department of Education).

---

INTERMEDIATE CERTIFICATE EXAMINATION, 1947.

---

## SCIENCE (Syllabus E).

WEDNESDAY, 18th JUNE.—MORNING, 10 TO 12.

[Not more than *six* questions to be attempted. Illustrate your answers wherever possible. All questions carry equal marks.]

---

1. What do you understand by (a) centre of gravity, (b) fulcrum, (c) law of the lever?

Show clearly, with the aid of diagrams, how the law of the lever is applied in the case of a person (i) raising a stone with a crowbar, (ii) using a scissors, (iii) rowing. The position of the fulcrum and the directions of the forces must be shown on the diagrams. Refer briefly to the relative magnitudes of the forces in each case.

2. What do you understand by density? How is it related to volume?

Explain how it may be deduced from everyday observations that (a) the density of ice is less than the density of water, (b) the density of paraffin oil is less than the density of water, (c) the density of hot air is less than the density of cold air.

It is not permitted to load a ship to sink below certain lines marked on its side. Explain the necessity for these lines.

3. Show, by means of a diagram, the shape of the path traced out by the earth on its journey round the sun, and state the time of year in the northern hemisphere when the earth is (a) nearest, (b) farthest from the sun.

Explain, with diagrams, (a) how the seasons occur, (b) why they do not occur at the same time in all places on the earth, and (c) why their duration is not the same in the torrid and temperate zones.

4. Explain how shadows are formed.

Draw diagrams to show the changes in appearance during a sunny day of the shadow of a gate, composed of vertical and horizontal bars, which is standing vertically on a line running east to west, and explain these changes.

Describe how the shadows of a vertical pole could be used to find (a) the altitude of the sun, (b) the time of noon-day.

5. Describe fully, with the aid of a diagram, a Fahrenheit thermometer. What does it measure and how does it work?

Three similar thermometers are placed side by side in the sun. The bulb of one of them is blackened and the bulb of another is covered with a piece of damp cloth. Would you expect the three thermometers to show the same reading? Give reasons for your answer.

6. What is meant by an optical image and what is the difference between a real and virtual image?

Mention everyday appliances in which a convex lens is used to form (a) a real magnified image, (b) a real diminished image, (c) a virtual magnified image. Draw a diagram in each case to show the paths of the rays of light which cause the image to be formed.

7. Describe and explain two different methods of producing a musical note. Illustrate your answer by referring to common musical instruments.

In the case of the instruments mentioned, explain briefly how notes of different pitches are produced.

What enables a person to distinguish between notes of the same pitch produced by different instruments?

8. Using an electric battery and a piece of wire, describe how a large nail AB may be magnetised so that there may be (a) a north pole, (b) a south pole at A.

Mention any appliance in which use is made of an electromagnet and explain the function of the magnet.

9. Describe how a metal sphere may be charged with (a) positive electricity, (b) negative electricity. How may it be shown that the sphere is actually charged with electricity?

In what way do charged particles behave when brought close to one another and how may their behaviour be demonstrated by experiment?

Explain why it is considered dangerous (i) to shelter under a tree, (ii) to put up an umbrella, during a thunderstorm.

10. Describe fully with the aid of a diagram how a bar magnet may be used to induce a current of electricity in a coil of wire lying on a table with its axis vertical so that the current flows (a) in a clockwise direction, (b) anticlockwise direction.

How may the factors which determine the strength of an induced current be demonstrated in the laboratory?

Explain briefly how the principle of the induced current is used in the working of a dynamo.