

spectively grouped? Give a short account of the properties which justify such grouping.

8. Ascertain what acid and what base are present in the salt given you.

FORM IV.

PHYSICS.

1. A falling body passes two points 10 feet apart in $\frac{1}{2}$ second; it subsequently passes two other points 10 feet apart in $\frac{1}{3}$ second. Find the difference between the first and the last of these four points. ($g=32$).

2. (a) Explain *coefficient of friction*, and give a method of finding it.

(b) The base of an inclined plane is 4 feet and the height is 3 feet; a force of 8 pounds acting parallel to the plane will just prevent a 20-lb. weight from sliding down. Find the coefficient of friction between the weight and the plane.

3. How would you show that the height of the mercury in a barometer depends on the pressure of the air?

4. A spherical balloon, 10 metres in diameter, is filled with coal gas (specific gravity, relative to air, .496) at a pressure of 76 cms. of mercury. What is the weight of the balloon and its appendages if it will just not float in air?

5 Show that for strongest current it is best to arrange the cells of a battery so that the internal and external resistances are equal.

6. (a) Explain, with diagram, the relation between the polarity of an electro-magnet and the direction of the current.

(b) You want to use the current from a dynamo, which delivers electricity at 110 volts, to excite an electro-magnet; how would you construct your electro-magnet that there may be no unnecessary loss of energy. Give full reasons.

7. (a) Give a method of finding the velocity of sound in air. How does the velocity depend on the temperature?

(b) If the velocity in air at zero is 331 metres per second, what will it be at $20^{\circ}\text{C}.$?

8. (a) State the laws for transverse vibrations of strings.

(b) A vibrating string gives a note f when stretched by a weight of 16 lbs. What weight must be used to get the note a in the same octave? What weight for c of the octave next above?

9. (a) Give a simple optical method of measuring the angle of a prism.

(b) Give a practicable method for finding the index of refraction of either water or glass.

10. How would you proceed to find the radius of curvature of a concave mirror, not using a distant source of light? Prove formula used, and describe a suitable experimental arrangement.

FORM III.

PHYSICS.

1. Describe a two-fluid cell; explain how you would set it up; and show the utility of the two fluids. Also, give the chief uses of the cell you describe, with reasons therefor.

2. Explain the action of the electric bell; give a clear diagram and trace the current through the entire circuit.

3. Describe a simple galvanometer. In what different ways can you increase its sensibility? Give full reasons.

4. Explain, with diagram, the dynamo, giving as full details as possible of the armature.

5. What is an *interval*? Three tuning-forks have frequencies 512, 640, 768 respectively. Compare the intervals between the first and the