

7. You are appointed master of a Village School, classified as follows:—1st reader, 20 pupils; 2nd, 35; 3rd, 25; 4th, 40; 5th, 30. How would you organize such a school with two assistant Teachers?

8. You are appointed a Public School Inspector: what points would you consider most important in your inspection of a Public School?

### SCHOOL LAW.

#### FIRST CLASS TEACHERS.

Examiner: JAMES HUGHES.

1. On what condition may non-resident children attend any school?

2. State the steps necessary to be taken in order to secure the establishment of township boards of trustees.

3. When and how may a by-law for the establishment of township boards be repealed, and section boards substituted?

4. How may third class certificates be renewed?

5. How may a vacancy be formed in a trustee board?

6. When is it necessary for the trustees of rural schools to consult the assessed freeholders and householders of their section?

7. (a) Who should enforce the compulsory clauses of the School Act? (b) What legal excuse may parents urge for not sending their children to school, and who should decide whether such excuses should be accepted or not?

8. What steps should be taken by a ratepayer to secure the transfer of his property from one school section to another?

### CHEMISTRY.

Examiner: J. A. McLELLAN, LL.D.

#### I.

##### SECOND CLASS TEACHERS AND INTERMEDIATE.

1. Give two methods of preparing Hydrogen. By what experiments would you show its most important properties?

2. How would you prepare Nitric Acid? Describe any experiments with Nitric Acid which you have seen.

3. State the different forms in which Carbon occurs in nature. Port Wine filtered through charcoal is deprived of its color; give the reasons of this. How is charcoal used as a disinfectant? Give the theory of its action.

4. How would you prepare Carbonic Acid from Chalk and Sulphuric Acid? Express the reaction by an equation. Bread is raised by the liberation of Carbonic Acid. Explain.

5. What is meant by combustion? Explain fully the substances formed when a candle is burned (1) in oxygen, (2) in a limited supply of air.

6. Write down the formulæ and molecular weights of water, ammonia, hydrochloric acid, sulphuric acid, ferrous sulphate, phosphoric acid.

7. (1) How many grams of oxygen are required to burn 24 grams of carbon and 32 grams of sulphur?

(2) How many lbs. of zinc are there in 350 lbs. of zinc sulphate?

8. Describe any two experiments which you have performed yourself, and the purpose for which you performed them.

9. How would you obtain chlorine from common salt? Give the equation respecting the reaction. Describe any experiments with chlorine you may have seen.

#### II.

##### FIRST CLASS TEACHERS.

1. Distinguish between atomic, equivalent, and molecular weights. Give the atomic and equivalent weights of mercury, zinc, chlorine, iodine, sulphur, iron, and copper. Write down the molecular weights of  $H_2S$ ,  $PCl_5$ ,  $AsH_3$ ,  $H_2SO_4$ .

2. Enumerate very briefly the various methods by which atomic weights may be determined; and indicate in the case of each of the following elements the method or methods which would be applicable—oxygen, chlorine, carbon, sulphur, lead, arsenic.

3. Half a pound of pure zinc is put into a vessel containing a small quantity of water;  $H_2SO_4$  is then added in quantity just sufficient to dissolve the zinc, and leave no free acid; name, describe briefly, and give the exact weight of all the resulting products, whether gaseous or solid, the superfluous water being evaporated.

4. Draw a diagram representing the structure of flame, and explain briefly. Of three lamps, one is burning in the ordinary way, another has the wick turned up so high as to give off a large amount of smoke, while the third is so much agitated by the wind as to be rendered almost non-luminous; describe accurately the chemical processes going on in each of these cases.

5. Certain hard waters become soft after boiling, while others retain their hardness: explain the reason, naming the substances present in each case, stating how the latter class may be rendered soft, and representing by equations the chemical changes that take place.

6. How would you prove that the burning of diamond in a jar of oxygen, and the consuming of particles of carbon in the lungs, are really the same processes and produce the same results?

7. The analysis of a compound leads to these numbers:—

Carbon .....	37.20
Hydrogen .....	7.90
Chlorine .....	54.95
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	100.05

Prove that the formula  $C_2H_5Cl$  represents correctly the composition of the body.

8. A piece of bright green wall paper supposed to contain arsenic is given you: describe fully all the experiments by which you could ascertain the presence of arsenic in the paper.

9. State fully how salt-cake (sodium sulphate) is prepared from common salt.

A ton of salt is converted into salt-cake, find the weight of sulphuric acid required, and the weights of the resulting products.

10. The formula of water was formerly written  $H O$ , and subsequently for some years  $H_2 O_2$  (assuming  $O=8$ ). Discuss both these formulæ, pointing out any inconsistencies you may detect in them. Give reasons for adopting the formula now in use.

### BOTANY AND PHYSIOLOGY.

#### SECOND CLASS TEACHERS.

Examiner: J. J. TILLEY.

1. Describe the different parts of a flower, and give the use of the stamens and pistils. What peculiarity in the structure of pend flowers, as the Fuchsia?

2. Explain the mode of life of biennial plants?

3. Describe the process of absorption, transpiration, and assimilation, as carried on in plants.

4. Describe two of the following: the human stomach, the skin, aorta, optic nerve.

5. Give the use of the epiglottis, mesenteric glands, pancreas, tendons, capillaries, synovia.

6. Write short notes on one of the following subjects: muscles, circulation, respiration.

### BOTANY, AGRICULTURE, AND DOMESTIC ECONOMY.

#### FIRST CLASS TEACHERS.

Examiner: J. M. BUCHAN, M.A.

1. Give an account of the various means by which cross-fertilization is secured.

2. Describe the composition and properties of protoplasm, and tell what part it plays in vegetable organisms.

3. Explain the structure of the sting of the nettle, showing how the irritation caused by it is produced.

4. State wherein gymnospermous plants differ from other phanerogams.

5. State the theories held as to the origin of species.

6. Sketch a vertical section of a flower of the Mallow Family.

7. Explain the terms *rhizome*, *plumule*, *cotyledon*, *achene*, *corymb*, and *calkin*.

8. Explain how you would feed cattle in order—

(i.) To fatten them. (ii.) To obtain the largest possible quantity of milk. (iii.) To obtain milk of the best possible quality. (iv.) To obtain the largest possible return in cheese.

9. State when it is advisable—

(i.) Not to plough deep. (ii.) To use the subsoil plough. (iii.) To drain.

10. Explain the value of lime as a manure, and state on what