arithmetic for third class it was so miserably small that we concluded we would not be just to ourselves to consider it; anecdotes were almost a blank. The deduction we drew from this state of the matter was that teachers loved arithmetic rather than jokes, and that it is no joke to teach school now-a-days The days of the worthy schoolmaster of Auburn have passed away.

After several delays in our efforts to obtain the services of persons to act as judges of the merits of the fourth class papers, we were fortunate in securing two who, from their position and attainments, are eminently qualified for such a task. We refer to W. H. Ballard, Esq., M.A., City Inspector of Schools, Hamilton, and W. J. Robertson, Esq., B.A., LL.B., Mathematical master, St. Catharines Collegiate Institute, both of whom are gold medalists in mathematics. We knew that the opinion of these gentlemen in such a matter as that placed before them, could not be questioned by the competitors, and we have every confidence that full justice has been done.

There were forty papers of questions suited to fourth class sent in and submitted to the committee. The decision of the judges is:

(1) That the first prize of $75 be awarded to "Quarto," and

(2) That as there were four papers of equal merit to warrant second place, the 2nd, 3rd, and 4th prizes, amounting to $75, be equally distributed among the four who sent them.

We acknowledge that this judgment upset our original plan of distribution, but as we believe the committee would not advise this course without having very strong grounds, we consented, and hope it will cause no dissatisfaction among the competitors. The four were, "Try Again," "Pharaoh," "Snye," and "R. G. N." The prize-winners indicated by these soubriquets are:

"Quarto"—Mr. John Elliott, Caledonia.

"Try Again"—Mr. Richard Peever, Pembroke.

"Pharaoh"—Mr. John N. Lannin, Tilsonburg.

"Snye"—Mr. Thomas Kirkconnell, Vankleek Hill.

"R. G. N."—Mr. Robert G. Nesbitt, Woodville.

We congratulate the winners, and feel confident that the publication of their names in connection with the affair will be a testimonial to their ability in the eyes of their fellow-teachers and the public.

We are pleased to have these "glad tidings" to announce in this Christmas number of the CANADA SCHOOL JOURNAL.

Special.

ELEMENTARY CHEMISTRY.

CHAPTER III.—*Continued.*

By Fermentation.

Exp. 15.—Dissolve a little sugar in eight or ten times its weight of warm (not hot) water in a flask, the delivery-tube of which passes into lime-water. Add to the flask a little dried yeast, previously rubbed down with water; fermentation will begin in the course of an hour or so, and carbon dioxide will pass over into the bottle, and turn the lime-water milky.

Under the action of the yeast, cane sugar, $C_{12}H_{22}O_{11}$, becomes grape sugar, $C_6H_{12}O_6$, and the grape sugar is then changed into alcohol and carbon dioxide; thus:—

$$\underset{\text{Grape sugar.}}{C_6H_{12}O_6} = \underset{\text{Alcohol.}}{2C_2H_6O} + \underset{\text{Carbon dioxide.}}{2CO_2}$$

By Germination.

Exp. 16.—Moisten some seeds, put them under a tumbler containing common air, and set them in a moderately warm place; signs of vegetation will soon begin. After the seeds have sprouted, examine the air for carbon dioxide in the usual way. It will be found that a portion of the oxygen has disappeared, and a corresponding volume of carbon dioxide has been produced. The presence of oxygen is as favorable to germination as that of large quantities of carbon dioxide is unfavorable; hence the process is hastened by the introduction into the soil of slaked lime, in order to absorb the carbon dioxide as fast as it is produced by the sprouting seeds.

By Decay of Animal or Vegetable Substances.

Exp. 17.—Place some dead leaves in an air-tight bottle; the air will soon cease to have the power of supporting combustion, its oxygen having combined with the carbon of the leaves to form carbon dioxide.

SUMMARY AND ADDITIONAL FACTS.

History.—Carbon dioxide was known as early as the sixteenth century. It was examined by Black in 1757, and called by him fixed air, because it was fixed in the carbonates. In 1775, Lavoisier determined its exact nature, and named it carbonic acid.

Sources.—We have seen that carbon dioxide is a product of respiration in man and animals, that it is a product of combustion, and a product of fermentation. It is a small but constant constituent of the atmosphere; it is likewise invariably contained in the soil, being one of the chief products of decay of all organic substances. From the soil it is taken up by rain and spring water, and it is to this substance that spring water, to a great extent, owes its fresh and pleasant taste. It is evolved from the craters of active volcanoes, from fissures in the earth, and is contained in immense quantities in the carbonates.

Properties.—Carbon dioxide is a colorless gas, possessing a slightly pungent smell and acid taste. It supports neither combustion nor respiration. When pure, carbon dioxide cannot be breathed. When so far diluted as to admit of being received into the lungs, it acts as a narcotic poison, causing drowsiness and insensibility. It is not, however, poisonous in the strict sense of the term. On the contrary, it is always present in the blood in large quantities, and is constantly secreted from the lungs and from other parts of the body. If the atmosphere contains more than a small percentage of this gas, it arrests this secretion, and fatal results necessarily follow. No rule can be laid down as to the precise quantity of carbon dioxide that may be present in the air without injury to respiration. According to Dr. Parks, an eminent authority on this subject, air is unhealthy when the carbon dioxide in it exceeds ·06 per cent., or 6 volumes in 10,000.

Carbon dioxide accumulates in old wells, cellars, etc., being either exhaled from the earth or produced by the decay of