Suppose a scholar during the winter six months has attended 110 days, that he recites lessons 5 times a day then he can obtain 5 × 110 or 550 credit marks, besides those for deportment. But suppose his actual number of credit marks per register is 480, and that he has received 15 misconduct marks, and 10 marks for lateness or irregularity, we make each misconduct mark cancel 3 good ones, so that his standing in the class would be stated thus,

480 — (15 × 3) × (110 — 25) = 520, and this pupil would obtain the first prize in his class if the number 520 was the highest reached by any one in the class, counted similarly.

To those whose bad marks cancel their good ones or nearly so, I give no prize, to all others prizes are awarded in the above way.

Little ones in the first classes are encouraged by a weekly distribution of cards, &c., according to their standing in the class, and with most cheering effect. I am aware that many features in the above may be deemed objectionable by teachers of ability and experience, but rather than trespass further on your valuable space, let me say to such, "Give the plan a fair trial for at least two distributions of prizes, and if you cannot make it work publish the fact for the benefit of others, but do not condemn until you have had experimental evidence on which to base your judgment."

C. S. T., Waterloo Township, C. W.

IV. Papers on Physical Science.

1. THE ACTION OF THE SUN.

Every mechanical action on the earth's surface, every manifestation of power, organic or inorganic, vital and physical, is produced by the sun. His warmth keeps the sea liquid and the atmosphere a gas, and all the storms which agitate both are blown by the mechanical force of the sun. He lifts the rivers and the glaciers up the mountains, and thus the cataract and the avalanche shoot with an energy derived immediately from him. Thunder and lightning are also his transmuted strength. Every fire that burns and every flame that glows dispenses light and heat which originally belonged to the sun. In these days, unhappily, the news of battle is familiar to us; but every shock and every charge is an application, or misapplication, of the mechanical force of the sun. He blows the trumpet, he urges the projectile, he bursts the bomb. And, remember, this is not poetry, but rigid, mechanical truth. He rears, as I have said, the whole vegetable world, and through it the animal; the lines of the field are his workmanship, the verdure of the meadows, and the cattle upon a thousand hills. He forms the muscle, he urges the blood, he builds the brain. His fleetness is in the lion's foot: he springs in the panther, he soars in the eagle, he slides in the snake. He builds the forest and hews it down, the power which raised the tree and which wields the axe, being one and the same. The clover sprouts and blossoms, and the scythe of the mower swings by the same force. The sun digs the ore from our mines; he rolls the iron, he rivets the plates, he boils the water, he draws the train. He not only grows the cotton, but he spins the fibre and weaves the web. There is not a hammer raised, a wheel turned, or a shuttle thrown, that is not raised and turned and thrown by the sun. His energy is poured forth into space, but our world is a halting-place where his energy is conditioned. Here the Proteus works his spells.—"*Heat considered as a Mode of Motion,*" *by Professor Tyndall.*

2. REVELATIONS OF THE MICROSCOPE.

Brush a little of the fuzz from the wing of a butterfly, and let it fall upon a piece of glass. It will be seen on the glass as a fine golden dust. Slide on the glass under a microscope, and each particle of the dust will reveal itself as a perfect symmetrical feather.

Give your arm a slight prick, so as to draw a small drop of blood, mix the blood with a drop of vinegar and water, and place it upon the glass slide under the microscope. You will discover that the red matter of the blood is formed of innumerable globules or disks; which, though so small as to be separately invisible to the naked eye, appear under the microscope each larger than the letter of this print.

Take a drop of water from a stagnant pool or ditch, or sluggish brook, dipping it from among the green vegetable matter on the surface. On holding the water to the light it will look a little milky; but on placing the smallest drop under the microscope, you will find it swarming with hundreds of strange animals that are swimming in it with the greatest vivacity. These animalcules exist in such multitudes that any effort to conceive of their numbers bewilders the imagination.

The most invisible universe of created beings is the most wonderful of all the revelations of the microscope. During the whole of a man's existence on the earth, while he has been fighting, taming and studying the lower animals which were visible to his sight, he has been surrounded by these other multitudes of the earth's inhabitants without any suspicion of their existence! In endless variety of form and structure they are bustling through their active lives—pursuing their prey—defending their persons—waging their wars—prosecuting their amours—multiplying their species—and ending their careers; countless hosts at each tick of the clock passing out of existence, and making way for new hosts that are following in endless succession. What other field of creation may yet, by some inconceivable methods, be revealed to our knowledge?

3. WHAT COAL WAS.

Some incline to the opinion of a marine orgin for the plants of which coal is formed, thus bringing them into natural contact with the fishes, and probably marine shells often found in the shales. Others insist on a terrestrial vegitation, and a third party on that of lagoons, or sea swamps, and bogs. The last few years have given important arguments to those who believe in a forest, perhaps very near to the level of the lake or sea. We know that among these giant stems of sigillaria the busy hum of flying insects and the merry chirp of the cricket were heard, that scorpions curled their ominous tails, that land shells crept slimily along, and that many kinds of reptiles either pursued their prey along the ground or climbed the trees whose hollow trunks have formed the caskets to preserve their remains. Here, then, is a goodly population to vivify the scene which only a few years ago was held to be almost wanting in all but vegetable life; and when we consider the accidents which have, amid the great decomposition of organic matter, preserved to us these remains, generally enclosed in ironstone nodules, we must feel confident that coming years will have many an additional fact to disclose.—*Prof. Warrington Smyth's Address at the British Association.*

4. THE DEPTH OF SPACE.

In 1837, Professor Bessel, of Germany, commenced a series of astronomical measures for getting the exact distance of the fixed stars, a thing that had never been done. The instrument which he used in connection with a powerful telescope, in his experiments, was a heliometer (sun-measurer). After three years' hard labour he was so fortunate as to obtain a parallax, but so minute that he could hardly trust his reputation upon it. But after repeated trials and working out of the result, he was fully satisfied that he could give the true distance to 61 Cygni. But who can comprehend this immense distance? We can only convey an idea to the mind of this distance, by the fact that light, which travels 12,000,000 of miles a minute requires not less than ten years to reach us! Just let any one try to take in the idea. One hour would give 720,000,000 of miles; one year then—8760 hours—this gives 6,307,200,000,000, and this multiplied by ten, gives 63,072,000,000,000.

This, according to Bessel, is the distance of the nearest fixed star to the sun! All astronomers confirm the correctness of Professor Bessel's calculations. But this distance, great as it is, is nothing to be compared to the distance of the Milky Way. Sir Wm. Herschell says that the stars or suns that compose the Milky Way are so very remote that it requires light, going at the rate of 12,000,000 of miles in a minute, 120,000 years to reach the earth. And he says there are stars, or rather nebulæ, five hundred times more remote! Now make your calculations: 120,000 years reduced to minutes, and then multiply that sum by 12,000,000, and the product by 500. What an overwhelming idea! The mind sinks under such a thonght; we can't realize it; it is too vast even for comprehension. David says, Psalm ciii. 19: "The Lord hath prepared his throne in the heavens, and his kingdom (or government) ruleth over all."—*Exe.*

V. Papers on Canadian Scientific Subjects.

1. McGILL COLLEGE OBSERVATORY.

The writer the other day went to visit the Observatory of Dr. Smallwood, at McGill College. Most of the citizens are aware of the exterior shape of the little stone edifice with a revolving dome, capable of being opened to survey the heavens, situated on a rising slope, to the west of the College. Partial observations have been taken for some time. The *regular observations* have not yet begun; but Dr. Smallwood, whose zeal in the interest of this branch of science is so well known, is fast getting all things ready for that purpose.

The principal room is on the first floor, and contains a small library of books used for the different calculations, also Barometers, Thermometers, Anemometer, Globes, a Telegraph Apparatus in