pearing to praise or speak well of him." Sarcasm is bitter expression of scorn or contempt.

What part of this letter is chiefly ironical, and what sarcastic?

4. "If a compliment should escape me." Is "considerable," in line 14, complimentary? What compliment *does* escape him?

5. Explain "emoluments of a place," "sale of a borough," "purchase of a corporation," and "balloting at the India House."

6. Justify, historically, the use of the epithet "illustrious" in line 25.

7. Change the grammatical construction of the sentence beginning "Whenever an important," line 58.

8. Distinguish between the different applications of "nice," "peer," "place," "minister," and "measures."

9. Describe, in your own words, the character of the Duke of Bedford as portrayed in this letter.

10. Critisise the writing of personal attacks over an assumed name.

Mathematical Department.

HOW TO TEACH NOTATION AND NUMERATION.

BY W. SCOTT, B.A.

In order to teach notation and numeration properly, the teacher requires a *numeral-frame*. One with ten balls on a wire is preferable to any other. If his school is not supplied with one he should provide himself with a number of marbles, peas, or pebbles.

The class being ready for the lesson, and all the balls on one side of the frame, the teacher begins the lesson by asking a pupil to put *one* ball over to the other side of it. Another pupil is then asked to put over another ball. The pupils are then required to state how many *one ball* and *one ball* make. Another ball is then put over, and now they are asked how many balls do *two balls* and *one ball* make, &c. This should be continued till the pupils can count readily and intelligently any small number of objects.

When the class has reached this stage it should be introduced to *notation*. The teacher asks a pupil to put one ball over, and then he writes on the blackboard the figure 1. Another pupil counts out two balls, and the teacher puts on the board the figure 2, &c. The nine significant figures should be taught in this manner.

To teach the notation of numbers between 10 and 99, inclusive, the teacher should use *two* wires of the frame, and rule two upright columns on the board. He asks a pupil to count *ten* balls on the first wire, and he then puts them back and puts out *one* on the second wire. He tells his pupils that this one ball on the second wire is to represent the ten on the first. He also tells them that the figure representing the number of balls on the second wire is to be put in the second column. The one representing the number of balls on the second wire is then put in the second column, and the class is informed that the other column must be filled by the figure representing the number of balls on the first wire. If his instruction has been understood, he will have no difficulty in drawing from the class that he must make use of a new figure, one to represent no balls. He makes this figure and thus has the number that represents 10 balls on the board. The teacher then puts one ball on each wire, and the class will be able to tell him that they represent eleven balls. Some pupil is then required to write down the figures representing 11 in their proper columns; then he puts out one ball on the second wire and two on the first, and, as before, ascertains what these represent and how to write the figures denoting this number on the board.

When the class reaches twenty the teacher puts *two* balls on the second wire and none on the first, and the class will be able to tell him that they represent two groups of ten balls each, or twenty balls. The two is put into its proper column and the first one filled up as before, &c.

This exercise should be continued until the class can tell at a glance the number to be written down from seeing the number of balls on the two wires.

When the class can readily write down and read any number of two figures it is then introduced to numbers consisting of three figures. A third wire is used and another column ruled on the board. Ten balls are counted out on the second wire, and as the teacher puts them back he puts over one on the third wire and explains that this one is to represent the ten balls on the second wire. The class should now be able to tell him that this *one* ball stands for *ten groups of ten balls* each, or one hundred balls. The number 1 is now entered in the third column on the board, and the other two columns are filled as before by figures representing the number of balls on the second and first wires. The pupils should be thoroughly drilled in reading at a glance the number of balls to be represented from seeing the number of balls on each of the three wires, and at the same time they should be required to write this number down. This lesson should be repeated and re-repeated until the pupils can write down and read any number of three figures without hesitation.

It is now time to begin to teach the names of the three places. The teacher should first explain what *unity* is. He does this by putting out say four balls on the *first* wire and the class will be able to tell him that these are four *ones*. He then gives them the new word for one, UNIT. He should drill the meaning of it into the class by many examples and then proceed to the second wire: as the class already knows that each ball on this wire represents a group of ten, 8 balls will represent 8 tens. He should proceed in a similar manner with the hundreds.

As soon as the class can write down and read any number of three figures all that remains to be taught is the order of the periods, for in writing down or reading any number, however large, *one has never to write down or read more than three figures at once.*

In reading or writing down a large number there are three steps to be taken.

(1.) Show the pupils the mode of dividing it into *periods* or groups of *three* figures, counting always from the *right* hand. This separation into groups may be effected by a comma, an upright line, or a hyphen.

(2.) Accustom the pupils to read the figures in these periods *exactly as if written by themselves*: thus 871,408,072 should be read three hundred and seventy-one, four hundred and eight, seventy-two.

(8.) When the pupils can do this well, teach them the names by which the periods are distinguished from one another. In doing this the number with the names of the periods should be put thus: millions, thousands, units.

| 271 | 408 | 072 |

The pupils should now be required to read the figures in each period as before, but now they must add the name of the period.

The number will now read three hundred and seventy-one *millions*, four hundred and eight *thousands*, and seventy-two *units*.

After some time they should be required to drop the word units, it being generally omitted. A pupil taught in this manner will be able to read or write down any number. He will have a clear perception of the use of the zero, and will have no difficulty in understanding the difference between the *simple* and the *local* value of a figure.