

tion have no desire to press upon these old servitors the yoke of a new act of parliament, the necessities of a new time. We would not fling an old postman into the gutters when his hands could not carry the heavy bags of these plethoric times, nor send an old policeman adrift because he could not compete with the athletic and beautiful beings who do us the honor to lounge at the corners and grace the public promenades for certain hundreds of dollars a year. And certainly the teachers of the Province would be justly indignant if the men who had grown old in the good service were oppressed and hindered in their work for the little term that remains. Such an act would be an insult to the Craft, to our Service. The Council of Public Instruction has therefore wisely decided to allow all who hold licenses under the older system to continue their work by exchanging the older licenses for new ones, and by presenting at the same time certificates of moral worth and successful labor in their vocations. This is wise and kindly. It inflicts no injury upon education. It shows thoughtfulness in public officers. It will commend itself to teachers in general who would be grieved to see any harshness practiced on their co-laborers in any rank. The Council have also decided to allow teachers holding licenses from other British institutions for the training of teachers to exchange, on petition and on presentation of proper certificates as may be seen, their licenses for licenses of a similar class in this Province, provided that such application be made within one year. This is approaching to the liberal provisions of the other professions. The legal profession admits the degree of any British college as a certificate of scholarship, entitling a student to an allowance of one year in his studies, and a barrister of Great Britain may practice in Colonial courts merely on application and presentation of certain certificates. The medical profession also allows physicians to practice under the diplomas of recognized medical colleges. This part of the Minute might even be made more liberal in the interests of the profession of teachers who would thus become in some respects less a sect than they are. The Minute will doubtless be received with favor by all the teaching body. They do not fear that they will be injured by the men of the old school, nor of any influence of strangers. The Minute is intended to be a benefit to men of the profession, and the profession will receive it as such. The government in approving of it have been actuated by a judicious and wise liberality.—*Com.*

MATHEMATICAL SCALE.

For the JOURNAL OF EDUCATION, by A. M. CHISHOLM.

HOW to become acquainted with Chisholm's Mathematical Scale step by step.

Miscellaneous Problems that may be solved at one sitting on Chisholm's Mathematical Scale.

NOTE.—Set 100 on Index or F on the perpendicular of 80 on side A or top, (any other setting will give similar results according to data used).

TO MULTIPLY BY 8.

Assume 80 on side A as 8, then all or any quantity on Index or F multiplied by 8, will cut or be in contact with the perpendicular of the product on side A: Thus 8 times 9 = 72 on A, and every other number or quantity on F will cut the product on A. But 90 (on F) x 8 should be read 720 on A, or if 80 x 90 the figures read should be 7200.

NOTE.—If 100 on Index or F be placed on the perpendicular of any number or quantity, on A similar and correct products will be obtained.

TO MULTIPLY BY A VULGAR FRACTION.

The denominator of a vulgar fraction should be taken on F or Index, and if correctly brought in contact with any perpendicular of less value on side A, it will represent a vulgar fraction. In this position of F we find that 50 on it cuts 40 = a fraction of $\frac{40}{50}$ or $\frac{4}{5}$. Many others will now appear such as $\frac{60}{75}$, $\frac{64}{80}$ &c., &c., which are all evidently fractions of the same value; and any whole number taken on Index or F multiplied by any of these fractions will cut the perpendicular of the product on A: Thus 80 on F x $\frac{40}{50}$ or $\frac{4}{5}$ will give for product 64. But if the 80 thus

taken be assumed as 8 the product will read 6 and $\frac{4}{10}$ (but $\frac{4}{10} = \frac{2}{5}$) as the product of any quantity multiplied by a fraction either vulgar or decimal will always be less than the multiplicand. The product of any other number taken on F must now become obvious to the operator.

MULTIPLICATION BY DECIMAL FRACTIONS.

NOTE.—It may be remarked here that when the denominator of a vulgar fraction is brought in contact with the perpendicular of its numerator, as before directed, 100 on Index or F will always cut the perpendicular of a decimal of the same value: Thus when 50 on Index cuts 40 on side A, 100 on Index will cut the perpendicular of 8 or 80 on side A, which 8 or 80 is the decimal corresponding to $\frac{40}{50}$ or $\frac{4}{5}$; and so it will in all cases.—

Therefore multiplication by decimals is performed as in whole numbers: the different value in the product is indicated by the decimal point. Thus 9 on F multiplied by 8 will read 7. 2 on A, and 6 on F multiplied by 8 will produce 1. 8 on A, and 12 on F will in the same way produce 9.6 on A. It is presumed that this much will suffice for illustration in decimals.

DIVISION OF WHOLE NUMBERS.

Division being the reverse of multiplication, the dividend is to be taken on side A: its perpendicular traced to Index or F will cut the quotient thereon in whole numbers, and the remainder—if any—in decimal fractions, or the remainder may be reckoned from quotient on F, towards the perpendicular of the dividend on A.

EXAMPLE.

80 on A divided by 8 will cut 10 on F, or 800 on A divided by 8 will cut 100 for quotient on F, and also 90 on A will cut 11.25, or from 11 on F to perpendicular of 90 on A will be 2—the remainder in whole numbers.

100 on A divided by 8 will cut 12.5 on F, or from 12 on F to perpendicular of 100 on A will be 4—the remainder.

Division by a vulgar fraction is performed by placing the denominator on F in contact with the perpendicular of the numerator on A. Then the perpendicular of any dividend taken on A will cut the quotient on F.

EXAMPLE.

8 on A divided by $\frac{40}{50}$ or $\frac{4}{5}$ will cut 10 on F, or 80 on A will cut 100 on F, &c., &c.

NOTE.—Whenever F or Index is in a position for a vulgar fraction, it is also in a position for a decimal fraction of the same value, and its application is more convenient.

Division by decimals is performed as in whole numbers, except as to the placing of the decimal point in the quotient. To the learned there is no difficulty in the proper placing of the decimal point, but to the pupil it must be taught, whether using the "scale" or figures.

EXAMPLE.

(Index thus far still in the same position.)

1st. 8 on A—8 its perpendicular traced to Index will therefore cut 100 or 800 on A will quote 1000.

2nd. 7 on A will quote 875 on F, or 70 on A will quote 87.5 on F, or 700 on A will quote 8.75 on F, or 9 on A divided by 8 will quote 11.25 on F, or 10 on A will quote 12.5 on F &c., &c.

PROPORTION.

The juvenile pupil may not yet have observed that multiplication and division are proportions. The point has been disputed by eminent teachers till convinced of the fact that because one of the terms is a unit, it is suppressed as it makes no change in the terms. This we shall presently see.

NOTE.—The pupil must know that quantities on scales may be assumed to any extent. Thus 100 on F may be assumed as 1 or 10, or 100 or 1000 &c., and so also .01 on side A or B in like manner. Neither must it be forgotten that the position of F or Index has not been changed in all the foregoing operations, nor will it be changed until notice is given.

Case 1st. As 100 on F, assumed as 1 is to 80, assumed as 8 on side A, so is 9 on F to 72 on A, and so is 100 on F, assumed as 10 to 80 on A, and so is 110 on F assumed as 11 to 88 on A, and so is any quantity on F to a fourth proportional on A, and the same as multiplication by 8.

Again, as 8 on A is to 1 on F, so is 7 on A to 875—its fourth proportional—on F, and as 8 on A is to 10 on F, so is 7 on A to 87.5 on F, and as 80 on A is to 100 on F, so is 70 on A to 78.5 on F, and so is any number or quantity on A to a fourth proportional on F. And these are results obtained by multiplication by 8.

The foregoing may appear at first sight frivolous, but yet it is considered necessary as elementary training for the "scale."

Some teachers believe in a word and a blow, and the word is always a harsh word.