SCHOOL WORK.

MATHEMATICS.

ARCHIBALD MACMURCHY, M.A., TORONTO, EDITOR.

NOTES.

BY M. GLASHAN.

See June-July, No. p. 244.

Q. 1. appeared some two years ago in a paper set to candidates for junior matriculation in Toronto University. On this account and from the fact that the problem is a particular case of a well-known elementary theorem an examiner might reasonably assume that the question would not be strange to pupils trained by mathematical masters. Any candidate who fully understood the meaning of an exponent might have solved the problem by simple division.

Q. 2 can be worked by multiplication and addition, or be made an exercise in factoring.

Q. 3 (*a*) and (*b*) are easy exercises in the theory of divisors and the principle of symmetry. The examinees are told that the factors are linear, therefore they know, or ought to know, that there are but five forms of factor they need try. The problems here given involve the three simplest types.

Q. 4 is an example of the form in which homogeneous simple equations usually present themselves in actual investigations. As the required result is given and only the proof of its accuracy required, a candidate whose strength lay in mathematics would supply the proof instantly thus:—

$$\therefore \frac{(2x-y)+(2y-z)+(2z-x)}{(2a+b)+(2b+c)+(2c+a)}=$$

$$\frac{12(2x-y)+13(2y-z)+17(2z-x)}{12(2a+b)+13(2b+c)+17(2c+a)},$$

$\therefore$ result required.

Q. 5 is an example of the most important use in algebra of the process for finding H. C. F.

Q. 6 affords an illustration of the application of the widely useful theorem:

"If $\frac{a}{b}=\frac{c}{d}$, $\therefore \frac{a}{b}=\frac{ma+nc}{mb+nd}$."

An examinee strong in mathematics would instantly notice that the first three numerators can be derived from each other by cyclic substitutions of $(x, y-z)$ and that therefore their sum is a numerical multiple of $x+y-z$, the fourth numerator; hence the sum of their denominators is the same multiple of 6, the fourth denominator. This gives the value of x at once, and the values of y and z follow easily. A "Third Class" examinee, looking at the paper, proposed the following instantaneous solution:

Each of the given fractions

$$=\frac{(x+y-z)+(4x+2y-3z)-(2x+3y-4z)}{6+(4x-1)-(x+5)}$$

$$=\frac{3x}{3x}=1, \therefore \text{etc.}$$

Q. 7 is an easy simultaneous quadratic.

Q. 8 is a very simple problem in elimination, one of the commonest operations in algebra.

Q. 9 is an ordinary problem. It was taken, slightly modified, from an algebra paper set to boys and girls in England, and might therefore be judged not too difficult for candidates for teachers' certificates valid for life in Ontario.

MODERN LANGUAGES.

Editors. H. I. STRANG, B.A., Goderich. W. H. FRASER, B.A., Toronto.

EXERCISES IN ENGLISH.

1. Point out all the phrases in the following extract, and show the grammatical value and relation of each:

Then he climbed to the tower of the church,
Up the wooden stairs, with stealthy tread,
To the belfry chamber overhead,
And startled the pigeons from their perch
On the sombre rafters, that round him made
Masses and moving shapes of shade;
Up the light ladder, slender and tall,
To the highest window in the wall,