lishing House, Toronto. No book published in England during the past year has attracted more attention than No. 5 John Street. The author in common with so many of his countrymen is genuinely and deeply interested in the poorer classes. His book is a study of the jubilee year in London, and it is most stirring and unaffected in its manner of presentation.

S. R. Crockett's latest novel, Kit Kennedy, Country Boy, has been issued by William Briggs, Toronto. The story—the scene is again laid in Scotland—is in the author's well-known and highly popular style. The account of Kit leaving his old home on the farm is particularly well done.

ALGEBRA—FORM III.

PROF. DUPUIS, QUEEN'S UNIVERSITY, KINGSTON.

1. (a) Prove that $(p+q)\,m=mp+mq$, m being an integer.

It is doubtful if this should have been given, for being fundamental in the usage of algebraical symbols, it involves a definition of what is meant by the brackets, what by juxtaposition of symbols, etc.

In fact, this is the distributive law for multiplication in the usage of algebraical symbols, and in that sense it cannot be proved *per se*. It is a convention adopted to satisfy the demands of arithmetic, because *our* algebra originated in the endeavour to generalize and symbolize the well known operations of arithmetic which apply to numbers. And if algebra is to apply to arithmetic, it must follow the operative laws common to the latter science. So that the only way to prove what is here given is by fundamentally reasoning it out upon numbers, and then putting the result into the symbol-form of algebra.

(b) Find the coefficient of x^4 in the product of

$$1+\frac{x}{2}+\frac{x^3}{3}+\frac{x^3}{4}+\frac{x^4}{5}+\frac{x^5}{6}+\cdots \text{ by } 1-\frac{x}{3}+\frac{x^2}{5}-\frac{x^3}{7}+\frac{x^4}{9}-\frac{x^5}{11}+\cdots$$

Write these up to the term containing x^4 as follows:

$$1+\frac{x}{2}+\frac{x}{3}+\frac{x^3}{4}+\frac{x^4}{5}$$
$$\frac{x^4}{9}-\frac{x}{7}+\frac{x^2}{5}-\frac{x}{3}+1$$

and multiply each term by the one under it, we have

$$\frac{1}{9}-\frac{1}{14}+\frac{1}{15}-\frac{1}{12}+\frac{1}{5}=\frac{97}{420} \text{ as the coefficient of } x^4 \text{ in the product.}$$

2 Prove without expanding

(a) that $(x+y-2z)^3+(y+z-2x)^3+(z+x-2y)^3$
$=3(x+y-2z)(y+z-2x)(z+x-2y)$.

We may prove this without making an actual expansion of the expressions put down in brackets, but we cannot do so without making some expansion, or carrying an expansion in our heads. So that it appears to me to be of very little importance whether we make one expansion or the other.

The sum of the quantities in the brackets is zero.

$\therefore$ Take $a+b+c=0$ and cube. Then $0=\Sigma a^3+3\Sigma a^2b+6abc$.

But $\Sigma a^2b=ab(a+b)+bc(b+c)+ca(c+a)$; and because

$a+b+c=0$, $a+b=-c$, $b+c=-a$, $c+a=-b$

$\therefore \Sigma a^2b=-3abc$; and $3\Sigma a^2b=-9abc$

$\therefore 0=\Sigma a^3-3abc$; or $\Sigma a^3=3abc$.

and putting $a=x+y-2z$, $b=y+z-2x$, $c=z+x-2y$ we have the result.