lation, as goodly a number of excellent practical men as teachers, organizers, and administrators, in school matters, as, probably, any other country has, within a like period, produced. In educational literature, however, we have had to draw largely from older countries; but we are growing in this direction also, and ere long we may expect to see the works of several of our educationists occupy the position of recognized standards.

Mr. Hughes, inspector of public schools in Toronto, and formerly editor of the SCHOOL JOURNAL, is acquiring an international reputation as an educator. A short time ago, his works on teaching were adopted in Iowa and other States as books of reference for teachers, and in two or three of the States they have been reprinted. He has just returned from New York, where he has been lecturing on educational work, under the auspices of one of the institutes of that city.

The following items from current English papers will give our readers a glimpse of the working of the clauses in the New Code relating to Compulsory Attendance and to Payment by Results:—

At the Wandsworth Police Court, last week, Mr. Sheil was engaged for some time in hearing a number of summonses which had been taken out by the two superintendents for the Lambeth division of the School Board for London and the officer appointed for the School Board at Barnes. In one case, Mr. Williams, the superintendent, said it was a peculiar one, as the child, who was only nine years of age, was beyond the control of the parents. He wished the magistrate to send the boy to an industrial school. Mr. Sheil said he did not like to relieve the parents, so that their children might be maintained by other people. Mr. Williams stated that the parents had been fined fifteen or sixteen times. Mr. Sheil thought a child nine years old could not be beyond the control of the parents. He inflicted a penalty of 5*s.* In the case of a boy, eleven years of age, it was stated that he had not been to school for six months. Mr. Sheil said a strong man like the father ought to be able to make the boy go to school. The father replied that the boy would not go. If he thrashed him he would not return home. Captain Pasley said the defendant had been fined 5*s.* repeatedly. Mr. Sheil said he would fine him 5*s.* again. One defendant said his boy had bad feet, and could not wear shoes. Mr. Sheil said the defendant could send the boy to school without boots. He fined him 2*s.* 6*d.* In some of the cases the parents pleaded illness of the children as an excuse. One mother stated that the children were suffering from measles. Mr. Sheil said he could not convict a woman whose children were suffering from measles. He adjourned the summons for inquiry. In another case it was stated that the mother was in her confinement. Mr. Sheil said he could not punish the husband while his wife was ill. If he fined him, and he did not pay, his goods would be taken for the money. The summons was adjourned.

The grants to Infants' Schools will consist of a *fixed* grant of 9*s.* per scholar on the average attendance; a *merit* grant of 2*s.*, 4*s.*, or 6*s.*, according as the school is reported to be fair, good, or excellent; a grant of 1*s.* for needlework, and a grant of 6*d.* for singing by ear, or 1*s.* for singing by note. In awarding the merit grant, allowance will be made for special circumstances, and regard will be had to the provision for (1) suitable instruction in the elementary subjects; (2) simple lessons on objects, and on the phenomena of nature and of common life; and (3) appropriate and varied occupations. No merit grant at all is made unless the Report on the instruction in the elementary subjects is satisfactory.

Mathematical Department.

MATHEMATICAL TRIPOS.—CAMBRIDGE, ENGLAND.

1. Convert $\frac{1}{19}, \frac{2}{19}, \ldots\ldots \frac{18}{19}$ into circulating decimals, explaining any methods for deriving one case from another and for shortening the work.

2. *Resolve into its component factors*

(*a*) $(a^3+b^3+c^3)xyz+(b^2c+c^2a+a^2b)(y^2z+z^2x+x^2y)$
$+(bc^2+ca^2+ab^2)(yz^2+zx^2+xy^2)+(x^3+y^3+z^3)abc+3abcxyz.$

(*b*) Show also that if $x+y+z+w=0$, then
$wx(w+x)^2+yz(w-x)^2+wy(w+y)^2+zx(w-y)^2+wz(w+z)^2$
$+xy(w-z)^2+4xyzw=0.$

3. Solve the equations

(*a*) $\frac{3x-2}{5} - \frac{1}{6}\left(x-\frac{1}{6}\right) = \frac{2x}{51}$,

(*b*) $x^3+y^3=b^3$, $\ldots+a(x+y)=ab$,

(*c*) $x+y+z=x^2+y^2+z^2=\frac{1}{2}(x^3+y^3+z^3)=3$

4. Show how to insert any number of geometrical means between two given numbers.

An *A. P.*, a *G. P.* and an *H. P.* have a and b for their first two terms; show that the $(n+2)^{th}$ terms will be in *G. P.* if

$$\frac{b^{2n+2}-a^{2n+2}}{ba(b^{2n}-a^{2n})}=\frac{n+1}{n}.$$

5. Define a logarithm. Prove that the logarithm of the product or quotient of two quantities is the sum or difference of their logarithms.

If $x_3=\log_{x_1}x_2$, $x_4=\log_{x_2}x_3$, ..., $x_n=\log_{x_{n-2}}x_{n-1}$, $x_1=\log_{x_{n-1}}x_n$, $x_2=\log_{x_n}x_1$, then $x_1x_2\ldots\ldots\ldots x_n=1$.

6. Find the number of Permutations of n things taken r together.

There are n points in a plane, no three of which lie in a straight line. Find how many closed r-sided figures can be formed by joining the points by straight lines.

SOLUTIONS.

1. $\frac{1}{19}=0\cdot05263\frac{3}{19}$, $\therefore$ $\frac{3}{19}=\frac{1}{19}\times 3=\cdot15789\frac{9}{19}$
$\therefore$ $\frac{1}{19}=\cdot0526315789\frac{9}{19}$, and $\frac{9}{19}=\cdot4736842105\frac{5}{19}$
$\therefore$ $\frac{1}{19}=\cdot05263157894736842105\frac{5}{19}$. Now as there cannot be more than 18 figures in the circle, and as our remainders begin to recur there we see that the circulating point should be placed over the last 1.

2. (*a*)

$$\text{Expression} = \left|\begin{array}{l} (a^3+b^3+c^3)xyz \\ +(x^3+y^3+z^3)abc \\ + \quad 3abcxyz \\ +(a^2b+b^2c+c^2a)(x^2y+y^2z+z^2x) \\ +(a^2c+c^2b+b^2a)(x^2z+z^2y+y^2x) \end{array}\right.$$

$$= \left|\begin{array}{l} ax.ay.az+bx.by.bz+cx.cy.cz \\ +ax.bx.cx+ay.by.cy+az.bz.cz \\ +ax.by.cz+ax.by.cz+ax.by.cz \\ +ax.ay.bx+ay.az.by+az.ax.bz \\ +bx.by.cx+by.bz.cy+bz.bx.cz \\ +cx.cy.ax+cy.cz.ay+cz.cx.a \\ +ax.az.cz+az.ay.cz+ay.ax.cy \\ +cx.cz.bx+cz.ay.bz+cy.cx.by \\ +bx.bz.ax+bz.by.ax+by.bx.ay \end{array}\right|$$

$$= ax\left|\begin{array}{l} ay.az+bz.az+cx.az \\ +ay.bx+bz.bx+cx.bx \\ +ay.cy+bz.cy+cx.cy \end{array}\right|$$

$$+ by\left|\begin{array}{llllll} & '' & + & '' & + & '' \\ + & '' & + & '' & + & '' \\ + & '' & + & '' & + & '' \end{array}\right|$$

$$+ cz\left|\begin{array}{llllll} & '' & + & '' & + & '' \\ + & '' & + & '' & + & '' \\ + & '' & + & '' & + & '' \end{array}\right|$$

$$= (ax+by+cz)(ay+bz+cx)(az+bx+cy)$$

NOTE. This is a very fine example of symmetry, and the solution presented shows the advantage of attending carefully to it. The work may be exhibited in a still more simple form by writing

$$\left.\begin{array}{l} k,\ l,\ m \\ p,\ q,\ r \\ s,\ t,\ v \end{array}\right\} \text{ for } \left\{\begin{array}{l} ax,\ by,\ cz \\ ay,\ bz,\ cx \\ az,\ bx,\ cy \end{array}\right.$$

respectively, as our readers may verify for themselves.