(2) 1. Performing the divisions represented by the fractions we have

$$\frac{1}{ax+m-1}+\frac{1}{ax+n-2}=\frac{1}{ax+m-2}+\frac{1}{ax+n-1};$$

adding the fractions on each side we find
$2ax+m+n-3$ is a factor of the equation, $\therefore\ x=3-m-n$.
It is easily seen that the coefficients of $x^2$ and $x$ vanish.

2. Cubing we have

$$1+\sqrt{x}+1-\sqrt{x}+3\sqrt[3]{1-x}\times 2=8. \quad \therefore\ x=0.$$

(3) Let $x=A$'s rate, $y$, $B$'s, $z$, $C$'s; then

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

$$\frac{3y}{4}-\frac{4z}{9}=\tfrac{1}{4};\ \text{and } x=5,\ y=3,\ z\ \ 4\tfrac{1}{2}.$$

(4) 1. The given quantity, if a perfect square, must be of the form $\sqrt{A}.\,x+\sqrt{B}.\,y+\sqrt{C}.\,z)^2$. Square and equate coefficients. Then $A=\frac{bc}{2a},\ B=\frac{ac}{2b},\ C=\frac{ab}{2c}$.

2. Solving for $x$ we get
$ac^2x^2+(b^4-c^4-a^4)\,x+a^2c^2=0$ $\therefore$ the vals. of $x$ are rational when $(b^4-c^4-a^4)^2-4ac^2\times a^2c^2$ is a perfect square; *i.e.*, when $b^4-c^4-a^4=\pm 2a^2c^2$, or $(a^2\pm c^2)^2=b^4$, or $a^2\pm c^2=\pm b^2$. Similarly the values of $y$ are rational when $b^2\pm c^2=\pm a^2$; and the only condition common to these two sets of conditions is that $a^2+b^2=c^2$, hence when this condition holds, the values of $x$ and $y$ are both rational.

(5) Let $x+a$ be the common factor; then
(1) $a^2+pa+q=0$.
(2) $a^2+ma+n=0$. $\therefore a(m-p)+n-q=0$, and $a=-\frac{n-q}{m-p}$

Substituting this value of $a$ in (2) we get

$$\left(\frac{n-q}{m-p}\right)^2-m\,.\,\frac{n-q}{m-p}+n=0;\ \text{or}$$

$$(n-q)^2+n(m-p)^2=m(m-p)\ (n-q).$$

(6) $(x^{2m}+x^{2n})^{\frac{1}{mn}}=\left\{x^{m+n}\left(x^{m-n}+x^{n-m}\right)\right\}^{\frac{1}{mn}}=x^{\frac{1}{n}+\frac{1}{m}}(x^{m-n}+x^{n-m})^{\frac{1}{mn}}.$

(7) 1. $\frac{a^{2n}}{b^{2n}}=\frac{c^{2n}}{d^{2n}}\ \therefore\ \frac{a^{2n}+b^{2n}}{b^{2n}}=\frac{c^{2n}+d^{2n}}{d^{2n}};$

Also $\frac{(a-b)^{2n}}{b^{2n}}=\frac{(c-d)^{2n}}{d^{2n}}:$

$$\therefore\frac{a^{2n}+b^{2n}}{(a-b)^{2n}}=\frac{c^{2n}+d^{2n}}{(c-d)^{2n}}\ \text{and}\ \frac{a^{2n}+b^{2n}}{c^{2n}+d^{2n}}=\left(\frac{a-b}{c-d}\right)^{2n}$$

$$\sqrt{\frac{a^{2n}+b^{2n}}{c^{2n}+d^{2n}}}=\left(\frac{a-b}{c-d}\right)^{n}.$$

2. Take *sum* of nums. $\div$ by *sum* of denoms. for *one* result; then *difference* of nums. $\div$ by *diff.* of denoms. for a second result. Then of these two results, sum of nums. $\div$ sum of denoms. gives

$$\frac{1}{n}(a^n+b^n+c^n+d^n).$$

(8) Expanding and retaining terms involving only first power of $x$, we get given expression

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

$$=(2+2x)\ (1+3x)^{-1}=\text{(by expanding)}$$

$$(2+2x)\ (1-3x)=2-4x.$$

$$(1+x)^n=1+nx+\frac{n(n-1)}{1\cdot 2}x^2+\frac{n(n-1)\ (n-2)}{1\cdot 2\cdot 3}x^3+\&c.$$

$$\left(1+\frac{1}{x}\right)^{-n}=1-\frac{n}{x}+\frac{n(n+1)}{1\cdot 2}\frac{1}{x^2}-\frac{n(n+1)\ (n+2)}{1\cdot 2\cdot 3}\frac{1}{x^3}+\&c.$$

Multiplying these results, we see that $1-n^2+\frac{n^2(n^2-1)}{2^2}-$ &c., is the coefficient of $x^0$ in the expansion of

$(1+x)^n\times\left(1+\frac{1}{x}\right)^{-n}$ *i.e.*, of $(1+x)^n\times\frac{x^n}{(1+x)^n}$ *i.e.*, of $x^n$, and therefore $=0$.

10. Amount of \$$a$ for $n$ years $=a(1+r)^n$. And amount of annuity $\frac{a}{m}$ at end of $n$ years $=\frac{a}{m}\left\{\frac{(1+r)^n-1}{(1+r)-1}\right\}$ $\therefore\ (1+r)^n=\frac{(1+r)^n-1}{mr}$, and $(1+r)^n\ (1-mr)=1$.

(11) 1. Multiplying the equations together *crosswise* and transposing we get

$$34x^2-261xy+44y^2=0,\ \text{or}\ (2x-5y)\ (17x-88y)=0;$$

$$\therefore\ 2x=5y,\ \text{and}\ 17x=88y.$$

Each of these taken in turn with the given equations will give the values of $x$ and $y$.

2. The equation reduces to

$$\frac{10}{x^2-10x+16}=x^2-10x+19,\ \text{or}$$

$10=(x^2-10x)^2+35(x^2-10x)+304$, a quadrate in $x^2-10x$.

3. Dividing through by $x^{\frac{1}{p}}$ there results

$$a^2\ b^2\ x^{\frac{p-q}{pq}}\ \ 4a^{\frac{3}{2}}b^{\frac{3}{2}}x^{\frac{p-q}{2pq}}=(a-b)^2\ ;\ \text{or}$$

$$\left(abx^{\frac{p-q}{2pq}}\right)^2-4a^{\frac{3}{2}}b^{\frac{3}{2}}x^{\frac{p-q}{2pq}}=(a-b)^2,\ \text{whence}$$

$$abx^{\frac{p-q}{2pq}}=\left(a^{\frac{1}{2}}+b^{\frac{1}{2}}\right)^2\ \text{or}-\left(a^{\frac{1}{2}}-b^{\frac{1}{2}}\right)^2\ ;\ \text{and finally}$$

$$x=\left(\frac{1}{b^{\frac{1}{2}}}\pm\frac{1}{a^{\frac{1}{2}}}\right)^{\frac{4pq}{p-q}}.$$

## Notes and News.

### ONTARIO.

The meeting of the Provincial Teachers' Association, which took place this year about the middle of August, was a most successful one. The programme announced beforehand was, with a few exceptions, adhered to, and the proceedings were of the most interesting character throughout. In the absence of the President, Rev. Dr. Caven, his address was read by the Secretary, A. McMurchy, M.A. The paper was of a highly practical character, and dealt in an able and useful manner with the difficult subject of "Discipline in Schools." Under the head of "Teachers and their Mission," the same subject was subsequently treated by Rev. Dr. Fyfe in an equally able and suggestive address. The cordial thanks of the Association were voted to both gentlemen for their addresses. One of the liveliest discussions which took place during the meeting of the Convention was that on township school boards. The subject was ably introduced by Mr. J. H. Smith, P. S. inspector for Wentworth. Mr. Smith took strong ground in favour of township boards, and replied to the objections ordinarily urged against them. Those who subsequently addressed the Convention on the subject nearly all favoured the township system, while they deprecated any attempt to make it compulsory. A resolution, embodying very accurately the general opinion as manifested by the discussion, was carried unanimously. The subject of uniform promotion examinations in Public Schools was introduced by Mr. J. M. Moran, of Stratford, who, after explaining in a very lucid manner the advantages resulting from the adoption of the system in counties, suggested that a Provincial scheme might profitably be set on foot. On this latter point there was evidently some difference of opinion amongst the members of the Convention, but there appeared to be none as to the desirability of having county promotion examinations, and a resolution expressive of this view was carried without dissent. Incidentally in the course of the discussion several speakers put in strong pleas for written examinations as a good means of disciplining pupils. A pleasant incident occurred during the session set apart for the reception of delegates. Mr. Munro, who appeared as the representative of the