If $x^2+nax+a^2$ be the other factor, we have $(x^2+max+a^2)(x^2+nax+a^2)=x^4-ax^3+a^2x^2-a^3x$ *identically*.

9. $(1+x)^n=1+nx+\frac{n(n-1)}{\underline{|2}}x^2+\ldots\ldots+nx^{n-1}+x^n.$

$$\left\{1+\frac{1}{x}\right\}^n=1+\frac{n}{x}+\frac{n(n-1)}{\underline{|2}}\cdot\frac{1}{x^2}+\ldots\ldots+n\frac{1}{x^{n-1}}+\frac{1}{x^n}.$$

$$\therefore\ 1+n^2+\left\{\frac{n(n-1)}{\underline{|2}}\right\}^2+\ldots+n^2+1$$

$=$coefficient of x^0 in $(1+x)^n.\left\{1+\frac{1}{x}\right\}^n$

$=$coefficient of x^n in $(1+x)^{2n}$

$$=\frac{\underline{|2n}}{\underline{|n}\ \underline{|n}}.$$

10. See Todhunter's Larger Algebra, Art. 473, in this question $a=1$, $b=2$.

$$n^{\text{th}}\text{ term}=\frac{1}{(5n-2)(5n-3)}=\tfrac{1}{5}\left\{\frac{1}{5n-2}-\frac{1}{5n+3}\right\}$$

$$\overline{n-1}^{\text{th}}\text{ ''}=\frac{1}{(5n-7)(5n-2)}=\tfrac{1}{5}\left\{\frac{1}{5n-7}-\frac{1}{5n-2}\right\}$$

etc. = etc.

$$\frac{1}{8.13}=\frac{1}{5}\left\{\frac{1}{8}-\frac{1}{13}\right\}$$

$$\frac{1}{3.8}=\frac{1}{5}\left\{\frac{1}{8}-\frac{1}{3}\right\}$$

$$\therefore\ S_n=\frac{1}{15}-\frac{1}{5(5n+3)}$$

and sum to infinity $=\frac{1}{15}$.

11. We give the solution (1) reducing the determinant to the ordinary form; (2) retaining the determinant form.

1. $$\begin{vmatrix} bc, & -ac, & -ab \\ b^2-c^2, & a^2+2ac, & -a^2-2ab \\ c^2, & c^2, & (a+b)^2 \end{vmatrix}$$

$$=bc\left\{(a^2+2ac)(a+b)^2+c^2(a^2+2ab)\right\}$$
$$+(b^2-c^2)\left\{-abc^2+ac(a+b)^2\right\}$$
$$+c^2\left\{ac(a^2+2ab)+ab(a^2+2ac)\right\}.$$

Putting a, b, c, $a+b+c$, successively$=0$, in above, we find that $abc(a+b+c)$ is a factor,

2. Put $a=0$, determinant becomes

$$\begin{vmatrix} bc, & 0, & 0, \\ b^2-c^2, & 0, & 0 \\ c^2, & c^2, & b^2 \end{vmatrix}=\begin{vmatrix} bc, & 0 \\ b^2-c^2, & 0 \end{vmatrix}=0.$$

Similarly for b, etc. $\therefore$ abc is a factor.

Put $a+b+c=0$ or $-a=b+c$, and we have

$$\begin{vmatrix} bc, & c(b+c), & b(b+c) \\ b^2-c^2, & b^2-c^2, & b^2-c^2 \\ c^2, & c^2, & c^2 \end{vmatrix}=\begin{vmatrix} bc, & c^2, & b^2 \\ b^2+c^2, & 0, & 0 \\ c^2, & 0, & 0 \end{vmatrix}=0.$$

$\therefore$ $a+b+c$ is a factor.

THE most romantic of all numbers is the figure nine, because it can't be multiplied away or got rid of anyhow. Whatever you do it is sure to turn up again, as was the body of Eugene Aram's victim. One remarkable property of this figure (said to have been first discovered by Mr. Green, who died in 1794,) is that all through the multiplication table the product of nine comes to nine. Multiply by what you like, and it gives the same result. Begin with twice nine, 18; add the digits together, and 1 and 8 makes 9. Three times nine are 27; and 2 and 7 are nine. So it goes on, up to 11 times nine which gives 99. Very good; add the digits; 9 and 9 are 18, and 8 and 1 are 9. Going on to any extent it is impossible to get rid of the figure nine. Take a couple of instances at random. Three hundred and thirty-nine times nine are 3,051; add up the figures and they are nine. Five thousand and seventy-one times nine are 45,639; the sum of these digits is 27; 2 and 7 are 9.

THE following bundle of maxims for teachers appears in an American contemporary:—

Educate and Train, as well as instruct and teach.

Healthy Emulation is a spur to success.

Order and Method are indispensable.

Little and Well win in the end.

The Hearts of teacher and taught must be enlisted.

Clear Enunciation and Pronunciation are necessary.

Copious Illustration always pays.

Remember the Capacity of the class.

Employ the Eyes and Ears of all.

Teach the Expression of ideas.

Encourage Invention.

Summarize what has been taught.

THE following colloquy lately took place between a wise child and his tutor: "That star you see up there is bigger than this world." "No, it is'nt." "Yes, it is." "Then why does'nt it keep the rain off?"