scribed at length by Aristotle. This comet may be the third return, but of that I am not at all certain. From the nature of the case the period is the most uncertain element. A very small change of position in any of the observations would change the ellipse into a parabola, and give an infinite period. I am, however, satisfied that these elements fit the observations remarkably well, and can be used immediately for finding the small outstanding differences and correcting the period. The distance from the sun's centre accordingly at perihelion was about 718,000 miles, and the distance from the surface about 278,000 miles, allowing 440,000 miles for the sun's radius. Although, therefore, the distance was very small the comet could not have been within the sun's atmosphere. The aphelion distance is just as uncertain as the time; but according to the figures it is between eighty and ninety times as great as the diameter of the earth's orbit.

UNIVERSITY WORK.

MATHEMATICS.

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

SOLUTIONS TO CAMBRIDGE QUESTIONS, JUNE, 1882,

By A. J. Ames, B.A., Mathematical Master, Collegiate Institute, St. Thomas. (See November number of MONTHLY.)

2. Expression factors into

$$\left\{(ax+by+cz)+(ay+bz+cx)+(az+bx+cy)\right\}$$
$$\left\{(\quad ''\quad)^2+\ldots+\ldots-(ay+bz+cx)(az+bx+cy)-\ldots-\right\}$$

(1) First factor $=(a+b+c)(x+y+z)$;

(2) Second factor $=(a^2+b^2+c^2-bc-ca-ab)(x^2+y^2+z^2-yz-zx-xy)$;

$\therefore$ (1).(2) $=(a^3+b^3+c^3-3abc)(x^3+y^3+z^3-3xyz)$.

3. $S_m=a^m+(ar)^m+(ar^2)^m+\ldots=\dfrac{a^m}{1-r^m}$,

$$\therefore\left(\frac{1}{s_1}+\frac{1}{s_3}+\ldots\right)^2-\left(\frac{1}{s_2}+\frac{1}{s_4}+\ldots\right)^2$$

$$=\left(\frac{1-r}{a}+\frac{1-r^3}{a^3}+\frac{1-r^5}{a^5}+\ldots\right)^2-\left(\frac{1-r^2}{a^2}+\frac{1-r^4}{a^4}+\ldots\right)^2$$

$$=\frac{(1-r)^2(a+r)^2a^4}{a^2(a^2-1)^2(a^2-r^2)^2}-\frac{(1-r^2)^2a^4}{(a^2-r^2)(a^2-1)^2}$$

$$=\frac{a^2}{a^2-1}\,\frac{(1-r)^2}{a^2-r^2}.$$

4. $$\frac{50x^2+75x-1250}{5x+8}-\frac{40x^2-592x}{4x^2-7}+1=0$$

i.e., $$10x-1-\frac{1248}{5x+8}-10x+\frac{522x}{4x^2-7}+1=0.$$

or $$-\frac{1248}{5x+8}+\frac{522x}{4x^2-7}=0,$$

an ordinary quadratic.

$9^x-8.3^x+3=0.$

$\therefore\ 3^{2x}-8.3^x+3=0,$

$(3^x)^2-8.3^x+4^2=-3+16=13,$

$3^x-4=\pm\sqrt{13}$, or $3^x=4\pm\sqrt{13}$,

$x=\log_3(4\pm\sqrt{13})$.

7. (1) $\left(\dfrac{2n-4}{n}\right)90°$.

(2) Angle subtended at the centre of the inscribed circle by arc between touching points of consecutive sides of polygon $=\dfrac{m}{n}.360°$. This angle and angle of polygon $=180°$;

$\therefore$ angle of polygon $=180°\left(\dfrac{n-2m}{n}\right)$.