$A_1 = \frac{c(c^n - 1)}{c-1}$; $A_2 = \frac{c.c^2.(c^n-1)(c^{n}-1)}{(c-1)(c^2-1)}\ldots$;
and $A_m =$

$$\frac{c.c^2.c^3 \ldots c^m(c^n-1)(c^{n-1}-1)\ldots(c^{n-m+1}-1)}{(c-1)(c^2-1)\ldots(c^m-1)}$$

or $A_m =$

$$c^{\frac{m(m+1)}{2}} \cdot \frac{(c^{n+1}-1)(c^{n-1}-1)\ldots(c^{n-m+1}-1)}{(c-1)(c^2-1)\ldots(c^m-1)}$$

16. Since of $a, b, c, \ldots p$ are even and q odd: ∴ of $(-1)^a, (-1)^b, (-1)^c \ldots p$ results will be $+1$, and q results -1. The p positive results taken 3 at a time will give $\frac{p(p-1)(p-2)}{\lfloor 3}$; and q negative results $-\frac{(q)(q-1)(q-2)}{\lfloor 3}$.

Take 2, + results with 1, − result, and the whole product will be $-\frac{pq(p-1)}{\lfloor 2}$; also 2, − results, with 1, + result, will give $\frac{pq(q-1)}{\lfloor 2}$; ∴ total sum $\frac{p(p-1)(p-2)}{\lfloor 3}$ $+ \frac{q(q-1)(q-2)}{\lfloor 3} + \frac{pq(p-1)}{\lfloor 2} - \frac{pq(q-1)}{\lfloor 2}$
$= \frac{1}{6}\{(q-p)^3 - 3(q^2-p^2) + 2(q-p).\}$

17. $(1+x)^n = 1 + A_1x + A_2x^2 + A_3x^3$ &c.

$(1+x)^{-n} = 1 + B_1x + B_2x^2 + B_3x^3$ &c.

∴ $(1+x)^0 = 1 = 1 + (A_1+B_1)x + (A_2 + A_1B_1 + B^2)x^2 + (A_3 + A_2B_1 + A_1B_2 + B_3)x^3 +$ &c., equating coefficients : $A_3 + A_2B_1 + A_1B_2 + B_3 = 0$.

The following letter has come into our hands :—

I have been working out the questions in "Percentage," in Smith's and McMurchy's Advanced Arithmetic, and I find that I cannot solve the 35th.

If you will send me the Solution of it, you will confer a very great favour.

Answer, by Math. Editor, *C. E. M*:—

By the question we see that a difference of \$18 on every qr. makes a difference of 15% on Rent.

\$18 on every qr. = $\frac{3}{20}$ (Whole Rent).

£$\frac{18}{20}$ on every qr. = $\frac{3}{20}$ (£96 + 56*s.* on every qr.)

£$\frac{18}{20}$ on every qr. = $\frac{3}{20}$ (£96 + £$\frac{56}{20}$ on every qr.)

($\frac{18}{20} - \frac{3}{20} \times \frac{56}{20}$) £ on every qr. = $\frac{3}{20}$ × £96.

$\frac{192}{400}$ £ on every qr. = $\frac{3}{20}$ × £96.

No. of qrs. = $\frac{3}{20} \times \frac{96}{1} \times \frac{400}{192}$10 = 30.

PROBLEMS.

I.—The longer side of a parallelogram is double of the shorter. Prove that the straight lines bisecting the four angles will inclose a rectangle, whose diagonal is equal to the shorter side of the original parallelogram.

II.—ABC is a triangle right-angled at C, and D such a point that AD is one-third of AB; prove that the square on CD is equal to the square on AD and one-third the square on AC.

III.—If the side BC of the triangle ABC be bisected at D, prove that the angle A will be acute or obtuse according as AD is greater or less than DB or DC.

IV.—(a). If $(x + y + z = 1 + \{2(1-x)(1-y)(1-z)\}^{\frac{1}{2}}$, prove that $x^2 + y^2 + z^2 + 2xyz = 1$.

(b). If $a + b + c = 2s$, and $a^2 + b^2 + c^2 = 2S^2$, prove that, $(S^2 - a^2)(S^2 - b^2) + (S_2 - c^2)(S_2 - a^2) + (S_2 - b^2)(S^2 - c^2) = 4s(s-a)(s-b)(s-c)$.

If $x = y + \frac{1}{z}$ and $y = z + \frac{1}{x}$, show that $z = x - \frac{2}{y}$.

V.—Shew that if $ax^4 + bx^3 + cx^2 + dx + e$ be a perfect square, then will $\frac{a}{e} = \frac{b^2}{d^2}$ and $c = \frac{b^2}{4a} + \frac{2ad}{b}$.

VI.—Find the sum of the Arithmetic series in which the middle term and number of terms each equals $2p + 1$, p being any integer.

VII.—Find all the positive solutions less than 2π of the equation Sin 3θ = Cos 2θ.