or $5x^4+28x^3+42x^2+28x+5=0$,

or $5(x^2+1)^2+28x(x^2+1)+32x^2=0$,

or $\{5(x^2+1)+8x\}\ \{x^2+1+4x)\}=0$,

or $x^2+4x+1=0$, and $5x^2+8x+5=0$,

$\therefore\ x=-2\pm\sqrt{3}$ or $-\frac{4\pm3\sqrt{-1}}{5}$.

(iv.) From third equation $x+z=\frac{8}{y}$ substitute in first equation and $y+\frac{8}{y}=6$;

$\therefore\ y=4$ or 2, whence x and z.

10. There are three members such that the sum of the first and second added to their product is 194, the sum of the first and third added to their product is 207, and the sum of the second and third added to their product is 239. Find the numbers.

10. We have $x+y+xy=194$.

$x+z+xz=207$.

$y+z+yz=239$.

Substitute in second equation the values of x and z in terms of y; when simplifying we have $y^2+2y=224$, whence $y=14$ or -16, and the numbers are 12, 14 and 15.

11. Find the sum of n terms of an Arithmetical Progression.

The sum of n terms of an A. P. is $an+bn^2$, find the m^{th} term.

11. We have $s_n=an+bn^2$,

$s_{n-1}=a(n-1)+b(n-1)^2$,

$\therefore$ nth term $=a+b(2n-1)=s_n-s_{n-1}$.

and mth term $=a+b(2m-1)$.

12. Prove the Binominal Theorem for a positive integral exponent.

Show that in the expansion of $(1+x)^n$ the coefficients equally distant from the beginning and end are equal, where the exponent is a positive integer.

Expand $(\frac{1}{2}x-\frac{1}{3}y)^6$, and $(a^2-x^2)^{-\frac{1}{2}}$ to five terms.

At the request of a subscriber we give the following:—

1. Prove that $(s-a)^3+(s-b)^3+(s-c)^3+3abc=s^3$ where $2s=a+b+c$.

Expand and add, and we have: $3s^3-6s^3+3s(a^2+b^2+c^2)-a^3-b^3-c^3$; by substituting the value of s and simplifying, the result is s^3.

Now $(s-a)^3=\frac{1}{8}(b+c-a)^3$;

$\therefore\ (s-a)^3+(s-b)^3+(s-c)^3+3abc$

$=\frac{1}{8}(b^3+3b^2c-3b^2a-6abc+3a^2b+c^3-3ac^2+3a^2c-a^3)+$ (anal. $-$.) + (anal. $-$) $+\frac{1}{8}(4abc)$

$=\frac{1}{8}\{a^3+3a^2b+3a^2c+3ab^2+6abc+3ac^2+b^3+3b^2c+3bc^2+c^3\}$

$=\frac{1}{8}(a+b+c)^3=s^3$.

2. Factor $8(a+b+c)^3-(a+b)^3-(b+c)^3-(c+a)^3$

putting $(a+b)=\alpha$ $(b+c)=\beta$ $(c+a)=\gamma$

exp. $=(\alpha+\beta+\gamma)^3-(\alpha^3-\beta^3-\gamma^3$

$=3(\alpha+\beta)(\beta+\gamma)(\gamma+\alpha)$

$=3(a+2b+c)(b+2c+a)(c+2a+b)$.

3. Shew that

$$\frac{a^2\left(\frac{1}{c^2}-\frac{1}{b^2}\right)+b^2\left(\frac{1}{a^2}-\frac{1}{c^2}\right)+c^2\left(\frac{1}{b^2}-\frac{1}{a^2}\right)}{\frac{1}{bc}\left(\frac{1}{c}-\frac{1}{b}\right)+\frac{1}{ca}\left(\frac{1}{a}-\frac{1}{c}\right)+\frac{1}{ab}\left(\frac{1}{b}-\frac{1}{a}\right)}$$

$=(a+b)(b+c)(c+a)$

$=\frac{a^2b^2(a^2-b^2)-c^2(a^4-b^4)+c^4(a^2-b^2)}{-c(a^2-b^2)+ab(a-b)+c^2(a-b)}$

$=\frac{a^2b^2-c^2(a^2+b^2)+c^4}{ab+c^2-c(a+b)}\cdot(a+b)$

$=\frac{(a^2-c^2)(b^2-c^2)}{(a-c)(b-c)}(a+b)$

$=(a+b)(b+c)(c+a)$.

PROBLEMS IN ARITHMETIC.

By A. M. B., BLYTH.

1. If it cost \$84 to carpet a room 36 ft. long and 21 ft. wide, what will it cost to carpet a room 33 ft. long and 27 ft. wide?

Ans. \$99.00.

2. A clerk receiving a salary of \$950 per annum, pays \$275 a year for board, and \$180 for clothing, and \$150 for other expenses; what per cent. of his salary is left?

Ans. $36\frac{8}{19}$ per cent.

3. What will it cost to dig a cellar 40 ft. long, 21 ft. 6 in. wide, and 4 ft. deep, at \$1.75 a cubic yard? *Ans.* \$22.96.

4. 2 pk. 3 qt. $1\frac{1}{2}$ pt. is what decimal part of 20 bu.? *Ans.* .030625.

5. What are the proceeds of the following note, discounted at bank, and when will it