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HIGHEST COMMON FACTOR BY THE VEDIC MATHEMATICS

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ABSTRACT : Thispaper shows to calculate Highest common factors by Modern method and Vedic method lopna sthapanabhayam sutra sankalan - vyavakalabhyam process and the Adyamadya rule. It can also be applied in polynomial expressions.

INTRODUCTION –

Finding Highest common factor of numbers and Algebraic expressions is fundamental process in Mathematics with much application. Highest common factor is also known as greatest common factor. There are two methods which are used to find HCF in Modern Mathematics. The first is by means of factorization and the second is by process of continuous division. The Vedic method provides a third method which is applicable to all cases.

LOPNA-STHAPANABHYAM SUTRA - It means 'By Alternate elimination and retention or alternate destruction' of the highest and the lowest powers.

HCF BY MODERN METHODS

Take an example

Example 1: Find the H.C.F. of $x^2 + 5x + 4$ and $x^2 + 7x + 6$.

1. Factorization method:

$x^2 + 5x + 4 = (x + 4)(x + 1)$

$x^2 + 7x + 6 = (x + 6)(x + 1)$

H.C.F. is $(x + 1)$.

2. Continuous division process.

$x^2+ 5x + 4) x^2+ 7x + 6 (1$

$x^2 + 5x + 4$

$2x + 2) x^2+ 5x + 4 (1/2x$

$x^2 + x$

$4x + 4) 2x + 2 (½$

$2x + 2$

0

Thus 4x + 4 i.e., (x + 1) is H.C.F.

HIGHEST COMMON FACTOR BY VEDIC METHODS

Lopana - Sthapana process i.e. elimination and retention or alternate destruction of the highest and the lowest powers is as below:

Subtract $\begin{cases} x^2 + 5x + 4 \\ x^2 + 7x + 6 \\ \hline -2) -2 x - 2 \\ \hline x + 1 \end{cases}$

i.e.,, (x + 1) is the H.C.F.

Example 2: Find H.C.F. of $2x^2$ - x - 3 and $2x^2$ + x - 6

Subtract $\begin{cases} 2x^2 - x - 3 \\ 2x^2 + x - 6 \\ \hline -1) -2 x + 3 \\ \hline 2x + 3 \end{cases}$ is the H .C.F

Example 3: x^3 - 7x - 6 and x^3 +$8x^2$ + 17x + 10.

Now by Lopana - Sthapana and Sankalana - Vyavakalanabhyam

Subtract $\begin{cases} x^3 - 7x - 6 \\ x^3 + 8x^2 + 17x + 10 \\ \hline -8) -8x^2 -24x - 16 \\ \hline x^2 + 3x + 2 \end{cases}$

Example 4: x^3 + $6x^2$ + 5x — 12 and x^3 +$8x^2$ + 19x + 12.

Add $\begin{cases} x^3 + 6x^2 + 5x - 12 \\ x^3 + 8x^2 19x + 12 \\ \hline 2x^3+14x^2+24x \\ \hline 2x(x^2 + 7x +12) \end{cases}$

(or)

Subtract $x^3 + 6x^2 + 6x - 12$

$x^3 + 8x^2 + 19x + 12$

$-2x^2 - 14x - 24$

$-2x(x^2 + 7x + 12)$

So $x^2 + 7x + 12$ is highest common factor

Now Algebraic Proof:

Let P and Q be two expressions and H is their H.C.F. Let A and

B the Quotients after their division by H.C.F.

i.e., $\frac{P}{H} = A$ and $\frac{Q}{H} = B$ which gives $P = A.H$ and $Q = B.H$

$P + Q = AH + BH$ and $P - Q = AH - BH$

$= (A + B).H$ $= (A - B).H$

Thus we can write $P \pm Q = (A \pm B).H$

Similarly $MP = M.AH$ and $NQ = N.BH$ gives $MP \pm NQ = H (MA \pm NB)$

This states that the H.C.F. of P and Q is also the H.C.F. of $P \pm Q$ or $MA \pm NB$.

i.e. we have to select M and N in such a way that highest powers and lowest powers (or Independent terms) are removed and H.C.F appears as we have seen in the examples.

CONCLUSION

Althogh Modern methods 1st is Factorisation method and 2nd is process of continuous division are more intellectual but harder to work as high power of algebraic into further factors is greater waste of time , energy and less dependable. The Vedic method is free from all these defects and is not only intellectual but also simple, easy and reliable .

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