1. he LCM and HCF of the following pairs of integers and verify that
   LCM X HCF =product of integers
   (i) 26 and 91 (ii) 510 and 92 (iii) 336 and 54

Solution- 26) 91 (3   13 | 26 -- 91

78   2 --- 7

13) 26 (2

26

0

HCF= 13 LCM= 13 x2 x7 = 182

Ist number x 2nd number = HCF X LCM   26 X91= 13 X182= 2366

2. Find the LCM and HCF of the following integers by applying the prime factorization method
   (i) 12,15 and 21 (ii) 17,23 and 29 (iii) 8,9 and 25 (iv) 40,36 and 126
   (v) 84,90 and 126 (vi) 24,15 and 36

Solution –(I) 12=2X2 X 3   HCF=3

15=3X5   LCM=2X2X3X5X7=720

21=3 X7

3. Find the greatest number of 6-digit exactly divisible by 24,15 and 36

Solution- The greatest 6-digit number is 999999

To find the LCM of 15,24,36

2	15,24,36
2	15,12,18
3	15, 6, 9
	5, 2 , 3

LCM= 2 x2 x3x5x2x3=360

The greatest 6-digit number is 999999-360= 999720

4. A rectangular courtyard is 18m72cm long and 13m20cm broad . it is to be paved

With square tiles of same size .find the least possible numbers of such tiles

Solution- length=1872cm breadth= 1320cm

HCF of 1872 and 1320 is 24

No. of tiles $=\frac{area\ of\ courtyard}{area\ of\ one\ tile} = \frac{1872 \times 1320}{24}$ =4290

5. Find the least numbers that is divisible by all the numbers between 1 and 10

(both inclusive)

Solution- Find the LCM of 1,2,3,4,5,6,7,8,9,10

2	1,2,3,4,5,6,7,8,9,10
2	1,1,3,2,5,3,7,4,9,5
2	1,1,3,1,5,3,7,2,9,5
3	1,1,1,1,5,1,7,2,3,5
5	1,1,1,1,1,1,7,2,3,1

LCM=2x2x2x3x5x7x2x3=2520

This is the required number

6. What is the smallest number that when divided by 35,56 and 91 leaves

remainders 7 of in each case?.

Solution- The LCM of 35,56and 91

7	35 ,56, 91
	5 , 8 ,13

LCM= 7 x 5 x 8 x13 =3640

Hence required number is 3640+7=3647

7. In morning walk three persons step off together ,their steps measure 80cm

,85cm and 90cm respectively . what is the minimum distance each shoud walk so that he can cover the distance in complete steps ?

Solution- The LCM of 80,85and 90

2	80 ,85, 90
5	, 40,85 ,45
	5 , 17 ,9

LCM= 2x5x5x17x9=12240=122m40cm

8. Determine the number nearest to 110000 but greater than 100000 which is exactly divisible by 8,15 and 21

Solution- The LCM of 8,15and 21

3	8 ,15 ,21
	8 , 5 ,7

LCM= 3 x8 x 5 x7=840

now 110000÷840

Remainder= 800

The required no. is =110000-800=109200

9. find the smallest number which leaves remainders 8 and 12 when divided by 28 and 32 respectively

Solution- The LCM of 28 and 32

2	28 , 32
2	14, 16
	7 , 8

LCM= 2x2x7x8=224

But remainders are 8 and 12

So required number= 224-20=204

10. Find the smallest number which when increased by 17 is exactly divisible by

both 520 and 468

Solution- The LCM of 520 and 468

2	468 , 520
2	234, 260
13	117, 130
	9, 10

LCM= 2x2x13x9x10=4680

Required number = 4680-17=4663

11. A circular field has a circumference of 360km .Three cyclist starts together and can cycle 48,60 and 72km a day, round the field When will they meet again?

12. The LCM and HCF of two numbers are 180 and 6 respectively . If one of the numbers is 30, find the other number.

Solution- 1^{st} no. x 2^{nd} no.= LCMx HCF

30. x 2^{nd} no.= 180x 6

2^{nd} no.= $\frac{180\ x6}{30}$ = 36

13.The HCF of two numbers is 16 and their product is 3072 .Find their LCM

Solution- 1^{st} no. x 2^{nd} no.= LCMx HCF

3072 = LCM X 16

LCM= $\frac{3072}{16}$ =192

14. The HCF of two numbers is 145 and their LCM is 2175. If one of the

numbers is 725, find the other number.

Solution- 1^{st} no. x 2^{nd} no.= LCMx HCF

725 X 2^{nd} no. = 2175 X 145

2^{nd} no.= $\frac{2175 \times 145}{725}$ = 435

15. Can two numbers have 16 as their HCF and 380 as their LCM? Give reason

Solution- No, because 380 is not divisible by 16

POLYNOMIALS

EXERCISE-2.1

Q1- (i)

x^2-2x-8

$X^2+(-4+2)x-8$

$(X^2-4x)+(2x-8)$

$X(x-4)+2(x-4)=0$

$(x-4)(x+2)=0$

$X=4,-2$

Sum= 4+(-2)=2

Product=4 x-2= -8

$$\text{sum}=\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}=\frac{-(-2)}{1}=2$$

$$\text{product}=\frac{constant\ term}{co-efficient\ of\ x^2}=\frac{-8}{1}=-8$$

(v) $\sqrt{3}x^2+10x+7\sqrt{3}$

$\sqrt{3}x^2+(7+3)x+7\sqrt{3}$

$(\sqrt{3}x^2+7x)+(3x+7\sqrt{3})=0$

$\sqrt{3}x(x+\frac{7}{\sqrt{3}})+3(x+\frac{7\sqrt{3}}{3}\ x\ \frac{\sqrt{3}}{\sqrt{3}})=0$

$X=-\ -\frac{7}{\sqrt{3}}\quad x=\frac{-3}{\sqrt{3}}$

$\text{Sum}=\frac{-7-3}{\sqrt{3}}=\frac{-10}{\sqrt{3}}$

$\text{Product}=-\ -\frac{7}{\sqrt{3}}\times\frac{-3}{\sqrt{3}}=\frac{21}{3}=7$

$$\text{sum}=\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}=\frac{-(10)}{\sqrt{3}}=\frac{-10}{\sqrt{3}}$$

$$\text{product}=\frac{constant\ term}{co-efficient\ of\ x^2}=\frac{7\sqrt{3}}{\sqrt{3}}=7$$

(vi) $x^2-(\sqrt{3}+1)x+\sqrt{3}$

$(X^2-\sqrt{3}x)-(x+\sqrt{3})$

$x(x-\sqrt{3})-1(x-\sqrt{3})$

$(x-\sqrt{3})(x-1)=0$

$x=\sqrt{3},1$

Sum=$\sqrt{3}+1$

Product=$\sqrt{3}\text{x}1=\sqrt{3}$

sum=$\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}=\frac{-\{-(\sqrt{3}+1)\}}{1}=\sqrt{3}+1$

product=$\frac{constant\ term}{co-efficient\ of\ x^2}=\frac{\sqrt{3}}{1}=\sqrt{3}$

(vii) $a(x^2+1)-x(a^2+1)$

ax^2+a-xa^2-x

$ax^2-(a^2+1)x+a$

$(ax^2-xa^2)-(x+a)$

$ax(x-a)-1(x-a)=0$

$(x-a)(ax-1)=0$

$X=a,\frac{1}{a}$

Sum=$\frac{a^2+1}{a}$

Product= a x $\frac{1}{a}=1$

sum=$\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}=\frac{-\{-(a^2+1)\}}{a}$

$=\frac{a^2+1}{a}$

product=$\frac{constant\ term}{co-efficient\ of\ x^2}=\frac{a}{a}=1$

Part no. (ii) (iii) and (iv) are similar

Q2- if α and β are the zeros of quadratic polynomials ax^2+bx+c then evaluate

(i) $\alpha-\beta$ (iii) $\frac{1}{\alpha}-\frac{1}{\beta}-2\alpha\beta$ (iv) $\alpha^2\beta+\alpha\beta^2$ (v) $\alpha^4+\beta^4$ (vi) $\frac{1}{a\alpha+b}+\frac{1}{a\beta+b}$

(ii) $\frac{1}{\alpha}-\frac{1}{\beta}$ (vii) $\frac{\beta}{a\alpha+b}+\frac{\alpha}{a\beta+b}$

Solution- the zeros of quadratic polynomial is

$\alpha=\frac{-b+\sqrt{b^2-4ac}}{2a}$ $\beta=\frac{-b-\sqrt{b^2-4ac}}{2a}$

$\alpha-\beta=\frac{-b+\sqrt{b^2-4ac}}{2a}-\frac{-b-\sqrt{b^2-4ac}}{2a}$

$=\frac{(-b+\sqrt{b^2-4ac})-(-b-\sqrt{b^2-4ac})}{2a}$

$=\frac{-b+\sqrt{b^2-4ac}+b+\sqrt{b^2-4ac}}{2a}=\frac{2\sqrt{b^2-4ac}}{2a}$

$=\frac{\sqrt{b^2-4ac}}{a}$

$(ii)\ \frac{\alpha-\beta}{\alpha\beta}$

$\alpha-\beta=\frac{\sqrt{b^2-4ac}}{a}$

$\alpha\beta=\frac{-b+\sqrt{b^2-4ac}}{} \times \frac{-b+\sqrt{b^2-4ac}}{}$

2a 2a

$$\frac{(-b)^2 - (\sqrt{b^2-4ac})^2}{4a^2}$$

$$\frac{b^2 - b^2 - 4ac}{4a\,a} = \frac{c}{a}$$

$$\frac{\alpha-\beta}{\alpha\beta} = \frac{\sqrt{b^2-4ac}}{a} \quad \frac{c}{a}$$

$$\frac{\sqrt{b^2-4ac}}{a} \quad \frac{a}{c}$$

(iii) $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta \quad \frac{\alpha+\beta}{\alpha\beta} - 2\alpha\beta = \frac{(-b)/a}{c/a} - 2\frac{c}{a} = -\left\{\frac{b}{c} + \frac{2c}{a}\right\}$

(iv) $\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha+\beta) = \frac{c}{a} \times \frac{-b}{a} = \frac{-bc}{a^2}$

(v) $\alpha^4 + \beta^4$ Solve on page no.229 example 8 RDSAHARMA

(vi) $\frac{1}{a\alpha+b} + \frac{1}{a\beta+b} = \frac{a\beta+b+a\alpha+b}{(a\alpha+b)(a\beta+b)} = \frac{a(\alpha+\beta)+2b}{a^2(\alpha\beta)+ab(\alpha+\beta)+b^2}$

$$= \frac{a\left(\frac{-b}{a}\right)+2b}{a^2\left(\frac{c}{a}\right)+ab\left(\frac{-b}{a}\right)+b^2} = \frac{b}{ac} \quad \left\{\alpha+\beta = \frac{-b}{a}, \alpha\beta = \frac{c}{a}\right\}$$

(vii) $\frac{\beta}{a\alpha+b}+\frac{\alpha}{a\beta+b}=\frac{\beta(a\beta+b)+\alpha(a\alpha+b)}{(a\alpha+b)(a\beta+b)}=\frac{\beta(a\beta+b)+\alpha(a\alpha+b)}{(a\alpha+b)(a\beta+b)}$

$=\frac{a(\alpha^2+\beta^2)+b(\alpha+\beta)}{a^2(\alpha\beta)+ab(\alpha+\beta)+b^2}$

$=(\alpha^2+\beta^2)=(\alpha+\beta)^2-2\alpha\beta$

$=\frac{a(\alpha+\beta)^2-2\alpha\beta+b(\alpha+\beta)}{a^2(\alpha\beta)+ab(\alpha+\beta)+b^2}=\frac{a(\frac{-b}{a})^2-2\frac{c}{a}+b(\frac{-b}{a})}{a^2\left(\frac{c}{a}\right)+ab\left(\frac{-b}{a}\right)+b^2}=\frac{-2}{a^2}$

Q3- $6x^2+x-2$ evaluate $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$

Solution- $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}=\frac{\alpha^2+\beta^2}{\alpha\beta}=\frac{(\alpha+\beta)^2-2\alpha\beta}{\alpha\beta}$

sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha+\beta=\frac{-1}{6}$ $\quad \alpha\beta=\frac{-2}{6}=\frac{-1}{3}$

$\frac{(\frac{-1}{6})^2-2(\frac{-1}{3})}{\frac{-1}{3}}=\frac{-25}{12}$

Q4- x^2-x-4, evaluate $\frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta$

Solution- sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha+\beta=\frac{-(-1)}{1}=1$ $\quad \alpha\beta=\frac{-4}{1}=-4$

$=\frac{1}{\alpha}+\frac{1}{\beta}-\alpha\beta$

$= \frac{\alpha+\beta}{\alpha\beta} - \alpha\beta = = \frac{1}{-4} - (-4) = \frac{15}{4}$

Q5-p(x)= $4x^2-5x-1$ evaluate $\alpha^2\beta + \alpha\beta^2$

Solution - $\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha + \beta)$

sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha + \beta = \frac{-(-5)}{4}$ $\alpha\beta = \frac{-1}{4}$

$= \alpha\beta(\alpha + \beta) = \frac{5}{4}(\frac{-1}{4}) = \frac{-5}{16}$

Q6-f(x)=x^2+x-2 evaluate $\frac{1}{\alpha} - \frac{1}{\beta}$

Solution- $\frac{1}{\alpha} - \frac{1}{\beta} = \frac{\alpha-\beta}{\alpha\beta}$

Sum = $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha + \beta = \frac{-1}{1}$=-1, $\alpha\beta = \frac{-2}{1}$ =-2

$\alpha - \beta = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta}$

$= \sqrt{(-1)^2 - 4 X - 2}$

$= \sqrt{9} = 3$

$= \frac{\alpha-\beta}{\alpha\beta} = \frac{3}{-2}$

Q7-x^2-5x+4 evaluate , $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$

Solution- sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$=\frac{\alpha+\beta}{\alpha\beta}-2\alpha\beta$

$\alpha+\beta=\frac{-(-5)}{1}=5 \quad \alpha\beta=\frac{4}{1}=4$

$=\frac{5}{4}-2(4)=\frac{-27}{4}$

Q8-f(t)=t^2-4t+3 evaluate $\alpha^4\beta^3+\alpha^3\beta^4$

Solution - sum= $\frac{-(co-efficient\ of\ t)}{co-efficient\ of\ t^2}$, product= $\frac{constant\ term}{co-efficient\ of\ t^2}$

$\alpha+\beta=\frac{-(-4)}{1}=4 \quad \alpha\beta=\frac{3}{1}=3$

$=\alpha^4\beta^3+\alpha^3\beta^4 == \alpha^3\beta^3(\alpha+\beta) =(\alpha\beta)^3(\alpha+\beta)$

$=(4)^3(3)=192$

Q9- p(y)=5y^2-7y+1 evaluate, $\frac{1}{\alpha}+\frac{1}{\beta}$

Solution - sum= $\frac{-(co-efficient\ of\ y)}{co-efficient\ of\ y^2}$, product= $\frac{constant\ term}{co-efficient\ of\ y^2}$

$\alpha+\beta=\frac{-(-7)}{5}=\frac{7}{5} \quad \alpha\beta=\frac{1}{5}$

$\frac{\alpha+\beta}{\alpha\beta}= \frac{\frac{7}{5}}{\frac{1}{5}}=7$

Q10-p(s) 3s^2-6s+4 evaluate , $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}+2\left\{\frac{1}{\alpha}+\frac{1}{\beta}\right\}+3\alpha\beta$

Solution - sum= $\frac{-(co-efficient\ of\ s)}{co-efficient\ of\ s^2}$, product= $\frac{constant\ term}{co-efficient\ of\ s^2}$

$\alpha + \beta = \frac{-(-6)}{3} = 2 \quad \alpha\beta = \frac{4}{3}$

$= \frac{\alpha^2+\beta^2}{\alpha\beta} + 2\left\{\frac{\alpha+\beta}{\alpha\beta}\right\} + 3\alpha\beta$

$= \frac{(\alpha+\beta)^2-2\alpha\beta}{\alpha\beta} + 2\left\{\frac{\alpha+\beta}{\alpha\beta}\right\} + 3\alpha\beta \qquad = \frac{(2)^2-2x\frac{4}{3}}{\frac{4}{3}} + 2\left\{\frac{2}{\frac{4}{3}}\right\} + 3x\frac{4}{3} = 8$

Q11- x^2-px+q prove that $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2} = \frac{p^4}{q^2} - \frac{4p^2}{q} + 2$

Solution - sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha + \beta = \frac{-(-p)}{1} = p \quad \alpha\beta = \frac{q}{1} = q$

$\alpha^2 + \beta^2 = (\alpha+\beta)^2 - 2\alpha\beta = (p)^2 - 2q = p^2 - 2q$

$\alpha^2\beta^2 = q^2$

$= \frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2} = \frac{\alpha^4+\beta^4}{\alpha^2\beta^2} = \frac{(\alpha^2+\beta^2)^2 - 2\alpha^2\beta^2}{\alpha^2\beta^2} = \frac{(p^2-2q)^2 - 2q^2}{q^2}$

$\frac{(p^4+4q^2-4p^2q) - 2q^2}{q^2} = \frac{p^4}{q^2} - \frac{4p^2}{q} + 2$

Q12-

Q13-if the sum of zeros of quadratic polynomials is $f(t)=kt^2+2t+3k$ Is equal totheir product,find the value of k

Solution - sum= $\frac{-(co-efficient\ of\ t)}{co-efficient\ of\ t^2}$, product= $\frac{constant\ term}{co-efficient\ of\ t^2}$

$\alpha + \beta = \frac{-(2)}{k} = \frac{-2}{k} \quad \alpha\beta = \frac{3k}{k} = 3$

According to statement

$\alpha + \beta = \alpha\beta$

$\frac{-2}{k} = 3$, $k = \frac{-2}{3}$

Q14-

Q15-if α *and* β are zeros of quadratic polynomial $f(x)=x^2-1$, find a quadratic polynomial whose zeros are $\frac{2\alpha}{\beta}$ *and* $\frac{2\beta}{\alpha}$

Solution - sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha + \beta = \frac{-(0)}{1} = 0 \quad \alpha\beta = \frac{-1}{1} = -1$

sum $= \frac{2\alpha}{\beta} + \frac{2\beta}{\alpha} = \frac{2\alpha^2+2\beta^2}{\alpha\beta} = \frac{2(\alpha^2+\beta^2)}{\alpha\beta} = \frac{2\{(\alpha+\beta)^2-2\alpha\beta\}}{\alpha\beta} = \frac{2\{(0)^2-2\,X-1\}}{-1} = -4$

product$= \frac{2\alpha}{\beta} X \frac{2\beta}{\alpha} = 4$

Required polynomial is $f(x)=k(x^2-sx+p)$

$= k(x^2-(-4)x+4)$

$= k(x^2+4x+4)$

Q16- if α *and* β are zeros of quadratic polynomial $f(x)=x^2-3x-2$, find a quadratic polynomial whose zeros are $\frac{1}{2\alpha+\beta}$, $\frac{1}{2\beta+\alpha}$

Solution - sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha + \beta = \frac{-(-3)}{1} = 3 \quad \alpha\beta = \frac{-2}{1} = -2$

sum $= \frac{1}{2\alpha+\beta} + \frac{1}{2\beta+\alpha} = \frac{2\beta+\alpha+2\alpha+\beta}{(2\alpha+\beta)(2\beta+\alpha)} = \frac{3\alpha+3\beta}{(4\alpha\beta+2\beta^2+2\alpha^2+\alpha\beta)} = \frac{3(\alpha+\beta)}{(5\alpha\beta+2(\alpha^2+\beta^2)}$

$\frac{3(\alpha+\beta)}{\{(5\alpha\beta+2(\alpha+\beta)^2-2\alpha\beta)\}}=\frac{3(3)}{\{(5X-2+2\{(3)^2-2X-2)\}\}}=\frac{9}{16}$

Product= $\frac{1}{2\alpha+\beta}X\frac{1}{2\beta+\alpha}=\frac{1}{(2\alpha+\beta)(2\beta+\alpha)}=\frac{1}{(4\alpha\beta+2\beta^2+2\alpha^2+\alpha\beta)}=\frac{3(\alpha+\beta)}{(5\alpha\beta+2(\alpha^2+\beta^2)}$

$=\frac{1}{\{(5\alpha\beta+2(\alpha+\beta)^2-2\alpha\beta)\}}=\frac{1}{\{(5X-2+2\{(3)^2-2X-2)\}\}}=\frac{1}{16}$

Required polynomial is f(x)=k(x^2 - $\frac{9}{16}$x+$\frac{1}{16}$)

Q17-- if α and β are zeros of quadratic polynomial such that $\alpha+\beta=24$ and $\alpha-\beta=8$ find a quadratic polynomial whose zeros are α $and\beta$

Solution – $\alpha+\beta=24$

$\alpha-\beta=8$

$2\alpha=32$, $\alpha=\frac{32}{2}$=16, $\beta=24-16=8$, $\alpha\beta=16X8=128$

Required polynomial is f(x)=k(x^2-sx+p)

= k(x^2-24x+128)

Q18- if α and β are zeros of quadratic polynomial f(x)=x^2-p(x+1)-c then show that

$(\alpha+1)(\beta+1)=1-c$

Solution – x^2-px-p-c

= x^2-px-(p+c)

Sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha+\beta$ = $\frac{-(-p)}{1}$ =p , $\alpha\beta$=$\frac{-(p+c)}{1}$ = -(p+c)

$(\alpha+1)(\beta+1) = (\alpha\beta + (\alpha+\beta) + 1) = (-(p+c) + (p) + 1) = 1-c$

Q19- if α *and* β are zeros of quadratic polynomial $f(x)=x^2-2x+3$, find a quadratic polynomial whose zeros are (I) $\alpha+2, \beta+2$ (ii) $\frac{\alpha-1}{\alpha+1}, \frac{\beta-1}{\beta+1}$

Solution – Sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha+\beta = \frac{-(-2)}{1} = 2$, $\alpha\beta = \frac{3}{1} = 3$

(i) sum = $\alpha+2+\beta+2 = (\alpha+\beta)+4 = 2+4=6$

product = $(\alpha+2)(\beta+2) = \alpha\beta + 2(\alpha+\beta)+4 = 3+2(2)+4=11$

Required polynomial is $f(x)=k(x^2-sx+p)$

$=k(x^2-6x+11)$

(ii) $\frac{\alpha-1}{\alpha+1}, \frac{\beta-1}{\beta+1}$

Sum= $\frac{\alpha-1}{\alpha+1} + \frac{\beta-1}{\beta+1} = \frac{(\alpha-1)(\beta+1)+(\alpha+1)(\beta-1)}{(\alpha+1)(\beta+1)} = \frac{\alpha\beta-\beta+\not\alpha-\not1+\alpha\beta+\beta-\not\alpha-\not1}{(\alpha\beta+(\alpha+\beta)+1)}$

$= \frac{2\alpha\beta-2}{(\alpha\beta+(\alpha+\beta)+1)} = \frac{2X3-2}{(2+(3)+1)} = \frac{4}{6} = \frac{2}{3}$

Product = $\frac{\alpha-1}{\alpha+1}\ X\ \frac{\beta-1}{\beta+1} = \frac{(\alpha-1)(\beta-1)}{(\alpha+1)(\beta+1)} = \frac{(\alpha\beta-\beta-\alpha-1)}{(\alpha\beta+\beta+\alpha+1)} = \frac{(\alpha\beta-\{\beta+\alpha\}-1)}{(\alpha\beta+\{\beta+\alpha\}+1)} = \frac{(3-\{2\}+1)}{(3+\{2\}+1)}$

$\frac{2}{6} = \frac{1}{3}$

Required polynomial is $f(x)=k(x^2 - \frac{2}{3}x + \frac{1}{3})$

Q20- if α and β are zeros of quadratic polynomial f(x)=x^2+px+q, find a quadratic polynomial whose zeros are (I) $(\alpha+\beta)^2, (\alpha-\beta)^2$

Solution – Sum= $\frac{-(co-efficient\ of\ x)}{co-efficient\ of\ x^2}$, product= $\frac{constant\ term}{co-efficient\ of\ x^2}$

$\alpha+\beta = \frac{-(p)}{1}$ =-p , $\alpha\beta = \frac{q}{1}$ = q

sum = $(\alpha+\beta)^2 + (\alpha-\beta)^2 = (\alpha^2+\beta^2+2\alpha\beta + \alpha^2+\beta^2-2\alpha\beta) = 2(\alpha^2+\beta^2) = 2\{(\alpha+\beta)^2 - 2\alpha\beta\}$

= $2\{p^2-2q\}$

Product = $(\alpha+\beta)^2$ X $(\alpha-\beta)^2 = (\alpha^2+\beta^2+2\alpha\beta)(\alpha^2+\beta^2-2\alpha\beta)$

= $\{(\alpha+\beta)^2 - 2\alpha\beta + 2\alpha\beta)\}\{(\alpha+\beta)^2 - 2\alpha\beta - 2\alpha\beta)\}$

= $\{(\alpha+\beta)^2\}\{(\alpha+\beta)^2 - 4\alpha\beta)\}$

= $\{(-p)^2\}\{(-p)^2 - 4q)\}$

= $p^2\{p^2-4q\}$

= Required polynomial is f(x)=k(x^2-sx+p)

= k{x^2-2(p^2-2q) x+$p^2(p^2-4q)$}

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IF YOU WANT WHOLE SA-1 UNSOLVED EXERCISE OF SA-1

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