(MATHS) **POLYNOMIALS**

DPP – 03

CLASS –10th

TOPIC – RELATIONSHIP BETWEEN ZEROS & COEFF.

Q.1 Find the zeros of each of the following quadratic polynomials and verify the relationship between the zeros and their coefficients:

(i) $f(x) = x^2 - 2x - 8$

(ii) $g(s) = 4s^2 - 4s + 1$

(iii) $h(t)=t^2 - 15$

(iv) $f(x) = 6x^2 - 3 - 7x$

(v) $p(x) = x^2 + 2\sqrt{2}x - 6$

(vi) $q(x)=\sqrt{3}x^2 + 10x + 7\sqrt{3}$

(vii) $f(x) = x^2 - (\sqrt{3} + 1)x + \sqrt{3}$

(viii) $g(x)=a(x^2 + 1)-x(a^2+1)$

(ix) $h(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$

(x) $f(v) = v^2 + 4\sqrt{3}v - 15$

(xi) $p(y) = y^2 + (3\sqrt{5}/2)y - 5$

(xii) $q(y) = 7y^2 - (11/3)y - 2/3$

Q.2 For each of the following, find a quadratic polynomial whose sum and product respectively of the zeros are as given. Also, find the zeros of these polynomials by factorization.

(i) $-8/3$, $4/3$

(ii) $21/8$, $5/16$

(iii) $-2\sqrt{3}$, -9

(iv) $-3/2\sqrt{5}$, $-1/2$

Q.3 If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - 5x + 4$, find the value of $1/\alpha + 1/\beta - 2\alpha\beta$.

Q.4 If α and β are the zeros of the quadratic polynomial $p(y) = 5y^2 - 7y + 1$, find the value of $1/\alpha+1/\beta$.

Q.5 If α and β are the zeros of the quadratic polynomial $f(x)=x^2 - x - 4$, find the value of $1/\alpha+1/\beta-\alpha\beta$.

Q.6 If α and β are the zeroes of the quadratic polynomial $f(x) = x^2 + x - 2$, find the value of $1/\alpha - 1/\beta$.

Q.7 If one of the zero of the quadratic polynomial $f(x) = 4x^2 - 8kx - 9$ is negative of the other, then find the value of k.

Q.8 If the sum of the zeroes of the quadratic polynomial $f(t)=kt^2 + 2t + 3k$ is equal to their product, then find the value of k.

Q.9 If α and β are the zeros of the quadratic polynomial $p(x) = 4x^2 - 5x - 1$, find the value of $\alpha^2\beta+\alpha\beta^2$.

Q.10 If α and β are the zeros of the quadratic polynomial $f(t)=t^2- 4t + 3$, find the value of $\alpha^4\beta^3+\alpha^3\beta^4$.

DPP – 03

CLASS –10^{th}

TOPIC – RELATIONSHIP BETWEEN ZEROS & COEFF.

SOL.1 (i) $f(x) = x^2 - 2x - 8$

Given,

$f(x) = x^2 - 2x - 8$

To find the zeros, we put $f(x) = 0$

$\Rightarrow x^2 - 2x - 8 = 0$

$\Rightarrow x^2 - 4x + 2x - 8 = 0$

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

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

This gives us 2 zeros, for

$x = 4$ and $x = -2$

Hence, the zeros of the quadratic equation are 4 and -2.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$4 + (-2) = -(-2) / 1$

$2 = 2$

Product of roots = constant / coefficient of x^2

$4 \times (-2) = (-8) / 1$

$-8 = -8$

Therefore, the relationship between zeros and their coefficients is verified.

(ii) $g(s) = 4s^2 - 4s + 1$

Given,

$g(s) = 4s^2 - 4s + 1$

To find the zeros, we put $g(s) = 0$

$\Rightarrow 4s^2 - 4s + 1 = 0$

$\Rightarrow 4s^2 - 2s - 2s + 1 = 0$

$\Rightarrow 2s(2s - 1) - (2s - 1) = 0$

$\Rightarrow (2s - 1)(2s - 1) = 0$

This gives us 2 zeros, for

$s = 1/2$ and $s = 1/2$

Hence, the zeros of the quadratic equation are 1/2 and 1/2.

Now, for verification

Sum of zeros = – coefficient of s / coefficient of s^2

$1/2 + 1/2 = -(-4)/4$

$1 = 1$

Product of roots = constant / coefficient of s^2

$1/2 \times 1/2 = 1/4$

$1/4 = 1/4$

Therefore, the relationship between zeros and their coefficients is verified.

(iii) $h(t)=t^2 - 15$

Given,

$h(t) = t^2 - 15 = t^2 + (0)t - 15$

To find the zeros, we put $h(t) = 0$

$\Rightarrow t^2 - 15 = 0$

$\Rightarrow (t + \sqrt{15})(t - \sqrt{15}) = 0$

This gives us 2 zeros, for

$t = \sqrt{15}$ and $t = -\sqrt{15}$

Hence, the zeros of the quadratic equation are $\sqrt{15}$ and $-\sqrt{15}$.

Now, for verification

Sum of zeros = – coefficient of t / coefficient of t^2

$\sqrt{15} + (-\sqrt{15}) = -(0)/1$

$0 = 0$

Product of roots = constant / coefficient of t^2

$\sqrt{15} \times (-\sqrt{15}) = -15/1$

$-15 = -15$

Therefore, the relationship between zeros and their coefficients is verified.

(iv) $f(x) = 6x^2 - 3 - 7x$

Given,

$f(x) = 6x^2 - 3 - 7x$

To find the zeros, we put $f(x) = 0$

$\Rightarrow 6x^2 - 3 - 7x = 0$

$\Rightarrow 6x^2 - 9x + 2x - 3 = 0$

$\Rightarrow 3x(2x - 3) + 1(2x - 3) = 0$

$\Rightarrow (2x - 3)(3x + 1) = 0$

This gives us 2 zeros, for

$x = 3/2$ and $x = -1/3$

Hence, the zeros of the quadratic equation are 3/2 and -1/3.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

3/2 + (-1/3) = – (-7) / 6

7/6 = 7/6

Product of roots = constant / coefficient of x^2

3/2 x (-1/3) = (-3) / 6

-1/2 = -1/2

Therefore, the relationship between zeros and their coefficients is verified.

(v) $p(x) = x^2 + 2\sqrt{2}x – 6$

Given,

$p(x) = x^2 + 2\sqrt{2}x – 6$

To find the zeros, we put p(x) = 0

$\Rightarrow x^2 + 2\sqrt{2}x – 6 = 0$

$\Rightarrow x^2 + 3\sqrt{2}x – \sqrt{2}x – 6 = 0$

$\Rightarrow x(x + 3\sqrt{2}) – \sqrt{2} (x + 3\sqrt{2}) = 0$

$\Rightarrow (x – \sqrt{2})(x + 3\sqrt{2}) = 0$

This gives us 2 zeros, for

$x = \sqrt{2}$ and $x = -3\sqrt{2}$

Hence, the zeros of the quadratic equation are $\sqrt{2}$ and $-3\sqrt{2}$.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$\sqrt{2} + (-3\sqrt{2}) = – (2\sqrt{2})/1$

$-2\sqrt{2} = -2\sqrt{2}$

Product of roots = constant / coefficient of x^2

$\sqrt{2}$ x $(-3\sqrt{2}) = (-6) / 2\sqrt{2}$

-3 x 2 = -6/1

-6 = -6

Therefore, the relationship between zeros and their coefficients is verified.

(vi) $q(x)=\sqrt{3}x^2 + 10x + 7\sqrt{3}$

Given,

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

To find the zeros, we put q(x) = 0

$\Rightarrow \sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$

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

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

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

This gives us 2 zeros, for

$x = -\sqrt{3}$ and $x = -7/\sqrt{3}$

Hence, the zeros of the quadratic equation are $-\sqrt{3}$ and $-7/\sqrt{3}$.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$-\sqrt{3} + (-7/\sqrt{3}) = -(10)/\sqrt{3}$

$(-3-7)/\sqrt{3} = -10/\sqrt{3}$

$-10/\sqrt{3} = -10/\sqrt{3}$

Product of roots = constant / coefficient of x^2

$(-\sqrt{3}) \times (-7/\sqrt{3}) = (7\sqrt{3})/\sqrt{3}$

$7 = 7$

Therefore, the relationship between zeros and their coefficients is verified.

(vii) $f(x) = x^2 - (\sqrt{3} + 1)x + \sqrt{3}$

Given,

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

To find the zeros, we put $f(x) = 0$

$\Rightarrow x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$

$\Rightarrow x^2 - \sqrt{3}x - x + \sqrt{3} = 0$

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

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

This gives us 2 zeros, for

$x = \sqrt{3}$ and $x = 1$

Hence, the zeros of the quadratic equation are $\sqrt{3}$ and 1.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$\sqrt{3} + 1 = -(-(\sqrt{3} + 1))/1$

$\sqrt{3} + 1 = \sqrt{3} + 1$

Product of roots = constant / coefficient of x^2

$1 \times \sqrt{3} = \sqrt{3}/1$

$\sqrt{3} = \sqrt{3}$

Therefore, the relationship between zeros and their coefficients is verified.

(viii) $g(x)=a(x^2+1)-x(a^2+1)$

Given,

$g(x) = a(x^2+1)-x(a^2+1)$

To find the zeros, we put $g(x) = 0$

$\Rightarrow a(x^2+1)-x(a^2+1) = 0$

$\Rightarrow ax^2 + a - a^2x - x = 0$

$\Rightarrow ax^2 - a^2x - x + a = 0$

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

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

This gives us 2 zeros, for

$x = a$ and $x = 1/a$

Hence, the zeros of the quadratic equation are a and 1/a.

Now, for verification

Sum of zeros = – coefficient of x / coefficient of x^2

$a + 1/a = -(-(a^2 + 1)) / a$

$(a^2 + 1)/a = (a^2 + 1)/a$

Product of roots = constant / coefficient of x^2

$a \times 1/a = a / a$

$1 = 1$

Therefore, the relationship between zeros and their coefficients is verified.

(ix) $h(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$

Given,

$h(s) = 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2}$

To find the zeros, we put $h(s) = 0$

$\Rightarrow 2s^2 - (1 + 2\sqrt{2})s + \sqrt{2} = 0$

$\Rightarrow 2s^2 - 2\sqrt{2}s - s + \sqrt{2} = 0$

$\Rightarrow 2s(s - \sqrt{2}) -1(s - \sqrt{2}) = 0$

$\Rightarrow (2s - 1)(s - \sqrt{2}) = 0$

This gives us 2 zeros, for

$x = \sqrt{2}$ and $x = 1/2$

Hence, the zeros of the quadratic equation are $\sqrt{3}$ and 1.

Now, for verification

Sum of zeros = – coefficient of s / coefficient of s^2

$\sqrt{2} + 1/2 = -(-(1 + 2\sqrt{2})) / 2$

$(2\sqrt{2} + 1)/2 = (2\sqrt{2} +1)/2$

Product of roots = constant / coefficient of s^2

$1/2 \times \sqrt{2} = \sqrt{2} / 2$

$\sqrt{2} / 2 = \sqrt{2} / 2$

Therefore, the relationship between zeros and their coefficients is verified.

(x) $f(v) = v^2 + 4\sqrt{3}v - 15$

Given,

$f(v) = v^2 + 4\sqrt{3}v - 15$

To find the zeros, we put $f(v) = 0$

$\Rightarrow v^2 + 4\sqrt{3}v - 15 = 0$

$\Rightarrow v^2 + 5\sqrt{3}v - \sqrt{3}v - 15 = 0$

$\Rightarrow v(v + 5\sqrt{3}) - \sqrt{3} (v + 5\sqrt{3}) = 0$

$\Rightarrow (v - \sqrt{3})(v + 5\sqrt{3}) = 0$

This gives us 2 zeros, for

$v = \sqrt{3}$ and $v = -5\sqrt{3}$

Hence, the zeros of the quadratic equation are $\sqrt{3}$ and $-5\sqrt{3}$.

Now, for verification

Sum of zeros = – coefficient of v / coefficient of v^2

$\sqrt{3} + (-5\sqrt{3}) = - (4\sqrt{3}) / 1$

$-4\sqrt{3} = -4\sqrt{3}$

Product of roots = constant / coefficient of v^2

$\sqrt{3} \times (-5\sqrt{3}) = (-15) / 1$

$-5 \times 3 = -15$

$-15 = -15$

Therefore, the relationship between zeros and their coefficients is verified.

(xi) $p(y) = y^2 + (3\sqrt{5}/2)y - 5$

Given,

$p(y) = y2 + (3\sqrt{5}/2)y - 5$

To find the zeros, we put $f(v) = 0$

$\Rightarrow y^2 + (3\sqrt{5}/2)y - 5 = 0$

$\Rightarrow y^2 - \sqrt{5}/2\ y + 2\sqrt{5}y - 5 = 0$

$\Rightarrow y(y - \sqrt{5}/2) + 2\sqrt{5} (y - \sqrt{5}/2) = 0$

$\Rightarrow (y + 2\sqrt{5})(y - \sqrt{5}/2) = 0$

This gives us 2 zeros, for

$y = \sqrt{5}/2$ and $y = -2\sqrt{5}$

Hence, the zeros of the quadratic equation are $\sqrt{5}/2$ and $-2\sqrt{5}$.

Now, for verification

Sum of zeros = – coefficient of y / coefficient of y^2

$\sqrt{5}/2 + (-2\sqrt{5}) = -(3\sqrt{5}/2) / 1$

$-3\sqrt{5}/2 = -3\sqrt{5}/2$

Product of roots = constant / coefficient of y^2

$\sqrt{5}/2 \times (-2\sqrt{5}) = (-5) / 1$

$-(\sqrt{5})^2 = -5$

$-5 = -5$

Therefore, the relationship between zeros and their coefficients is verified.

(xii) $q(y) = 7y^2 - (11/3)y - 2/3$

Given,

$q(y) = 7y^2 - (11/3)y - 2/3$

To find the zeros, we put $q(y) = 0$

$\Rightarrow 7y^2 - (11/3)y - 2/3 = 0$

$\Rightarrow (21y^2 - 11y - 2)/3 = 0$

$\Rightarrow 21y^2 - 11y - 2 = 0$

$\Rightarrow 21y^2 - 14y + 3y - 2 = 0$

$\Rightarrow 7y(3y - 2) - 1(3y + 2) = 0$

$\Rightarrow (3y - 2)(7y + 1) = 0$

This gives us 2 zeros, for

$y = 2/3$ and $y = -1/7$

Hence, the zeros of the quadratic equation are 2/3 and -1/7.

Now, for verification

Sum of zeros = – coefficient of y / coefficient of y^2

$2/3 + (-1/7) = -(-11/3) / 7$

$-11/21 = -11/21$

Product of roots = constant / coefficient of y^2

$2/3 \times (-1/7) = (-2/3) / 7$

$-2/21 = -2/21$

Therefore, the relationship between zeros and their coefficients is verified.

SOL.2 (i) -8/3 , 4/3

A quadratic polynomial formed for the given sum and product of zeros is given by:

f(x) = x^2 + -(sum of zeros) x + (product of roots)

Here, the sum of zeros is = -8/3 and product of zero= 4/3

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (-8/3)x + (4/3)$

⇒ $x^2 + 8/3x + (4/3)$

So, to find the zeros, we put f(x) = 0

⇒ $x^2 + 8/3x + (4/3) = 0$

⇒ $3x^2 + 8x + 4 = 0$

⇒ $3x^2 + 6x + 2x + 4 = 0$

⇒ $3x(x + 2) + 2(x + 2) = 0$

⇒ $(x + 2)(3x + 2) = 0$

⇒ (x + 2) = 0 and, or (3x + 2) = 0

Therefore, the two zeros are -2 and -2/3.

(ii) 21/8, 5/16

A quadratic polynomial formed for the given sum and product of zeros is given by:

f(x) = x^2 + -(sum of zeros) x + (product of roots)

Here, the sum of zeros is = 21/8 and product of zero = 5/16

Thus,

The required polynomial f(x) is,

⇒ $x^2 - (21/8)x + (5/16)$

⇒ $x^2 - 21/8x + 5/16$

So, to find the zeros, we put f(x) = 0

⇒ $x^2 - 21/8x + 5/16 = 0$

⇒ $16x^2 - 42x + 5 = 0$

⇒ $16x^2 - 40x - 2x + 5 = 0$

⇒ $8x(2x - 5) - 1(2x - 5) = 0$

⇒ $(2x - 5)(8x - 1) = 0$

⇒ (2x – 5) = 0 and, or (8x – 1) = 0

Therefore, the two zeros are 5/2 and 1/8.

(iii) -2$\sqrt{3}$, -9

A quadratic polynomial formed for the given sum and product of zeros is given by:

$f(x) = x^2 + -(\text{sum of zeros})\ x + (\text{product of roots})$

Here, the sum of zeros is = $-2\sqrt{3}$ and product of zero = -9

Thus,

The required polynomial f(x) is,

$\Rightarrow x^2 - (-2\sqrt{3})x + (-9)$

$\Rightarrow x^2 + 2\sqrt{3}x - 9$

So, to find the zeros we put f(x) = 0

$\Rightarrow x^2 + 2\sqrt{3}x - 9 = 0$

$\Rightarrow x^2 + 3\sqrt{3}x - \sqrt{3}x - 9 = 0$

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

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

$\Rightarrow (x + 3\sqrt{3}) = 0$ and, or $(x - \sqrt{3}) = 0$

Therefore, the two zeros are $-3\sqrt{3}$ and $\sqrt{3}$.

(iv) $-3/2\sqrt{5}$, $-1/2$

A quadratic polynomial formed for the given sum and product of zeros is given by:

$f(x) = x^2 + -(\text{sum of zeros})\ x + (\text{product of roots})$

Here, the sum of zeros is = $-3/2\sqrt{5}$ and product of zero = $-1/2$

Thus,

The required polynomial f(x) is,

$\Rightarrow x^2 - (-3/2\sqrt{5})x + (-1/2)$

$\Rightarrow x^2 + 3/2\sqrt{5}x - 1/2$

So, to find the zeros, we put f(x) = 0

$\Rightarrow x^2 + 3/2\sqrt{5}x - 1/2 = 0$

$\Rightarrow 2\sqrt{5}x^2 + 3x - \sqrt{5} = 0$

$\Rightarrow 2\sqrt{5}x^2 + 5x - 2x - \sqrt{5} = 0$

$\Rightarrow \sqrt{5}x(2x + \sqrt{5}) - 1(2x + \sqrt{5}) = 0$

$\Rightarrow (2x + \sqrt{5})\ (\sqrt{5}x - 1) = 0$

$\Rightarrow (2x + \sqrt{5}) = 0$ and, or $(\sqrt{5}x - 1) = 0$

Therefore, the two zeros are $-\sqrt{5}/2$ and $1/\sqrt{5}$.

SOL.3 From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = -5 and c = 4

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-5)/1 = 5$

Product of the roots = $\alpha\beta = c/a = 4/1 = 4$

To find, $1/\alpha + 1/\beta - 2\alpha\beta$

$\Rightarrow [(\alpha + \beta)/ \alpha\beta] - 2\alpha\beta$

$\Rightarrow (5)/ 4 - 2(4) = 5/4 - 8 = -27/ 4$

SOL.4 From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a =5, b = -7 and c = 1

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-7)/5 = 7/5$

Product of the roots = $\alpha\beta = c/a = 1/5$

To find, $1/\alpha + 1/\beta$

$\Rightarrow (\alpha + \beta)/ \alpha\beta$

$\Rightarrow (7/5)/ (1/5) = 7$

SOL.5 From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = -1 and c = – 4

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-1)/1 = 1$

Product of the roots = $\alpha\beta = c/a = -4/1 = -4$

To find, $1/\alpha + 1/\beta - \alpha\beta$

$\Rightarrow [(\alpha + \beta)/ \alpha\beta] - \alpha\beta$

$\Rightarrow [(1)/ (-4)] - (-4) = -1/4 + 4 = 15/ 4$

SOL.6 From the question, it's given that:

α and β are the roots of the quadratic polynomial f(x) where a = 1, b = 1 and c = – 2

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(1)/1 = -1$

Product of the roots = $\alpha\beta = c/a = -2/1 = -2$

To find, $1/\alpha - 1/\beta$

$\Rightarrow [(\beta - \alpha)/ \alpha\beta]$

$$\frac{\beta-\alpha}{\alpha\ \beta} = \frac{\beta-\alpha}{\alpha\ \beta} \times \frac{\alpha-\beta}{\alpha\ \beta} = \frac{\sqrt{\alpha+\beta^{\ 2}-4\alpha\ \beta}}{\alpha\ \beta} = \frac{\sqrt{1+8}}{2} = \frac{\sqrt{9}}{2} = \frac{3}{2} \Rightarrow$$

SOL.7 From the question, it's given that:

The quadratic polynomial f(x) where a = 4, b = -8k and c = – 9

And, for roots to be negative of each other, let the roots be α and $-\alpha$.

So, we can find

Sum of the roots = $\alpha - \alpha = -b/a = -(-8k)/1 = 8k = 0$ [$\because \alpha - \alpha = 0$]

$\Rightarrow k = 0$

SOL.8 Given,

The quadratic polynomial $f(t)=kt^2 + 2t + 3k$, where a = k, b = 2 and c = 3k.

And,

Sum of the roots = Product of the roots

$\Rightarrow (-b/a) = (c/a)$

$\Rightarrow (-2/k) = (3k/k)$

$\Rightarrow (-2/k) = 3$

$\therefore k = -2/3$

SOL.9 From the question, it's given that:

α and β are the roots of the quadratic polynomial p(x) where a = 4, b = -5 and c = -1

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-5)/4 = 5/4$

Product of the roots = $\alpha\beta = c/a = -1/4$

To find, $\alpha^2\beta+\alpha\beta^2$

$\Rightarrow \alpha\beta(\alpha+\beta)$

$\Rightarrow (-1/4)(5/4) = -5/16$

SOL.10 From the question, it's given that:

α and β are the roots of the quadratic polynomial f(t) where a = 1, b = -4 and c = 3

So, we can find

Sum of the roots = $\alpha+\beta = -b/a = -(-4)/1 = 4$

Product of the roots = $\alpha\beta = c/a = 3/1 = 3$

To find, $\alpha^4\beta^3+\alpha^3\beta^4$

$\Rightarrow \alpha^3\beta^3(\alpha+\beta)$

$\Rightarrow (\alpha\beta)^3(\alpha+\beta)$

$\Rightarrow (3)^3(4) = 27 \times 4 = 108$