Important Questions Class 9 Maths Chapter 2

Question 1: Calculate the value of $9x^2 + 4y^2$ if $xy = 6$ and $3x + 2y = 12$.

Answer 1: Consider the equation $3x + 2y = 12$

Now, square both sides:

$(3x + 2y)^2 = 12^2$

$\Rightarrow 9x^2 + 12xy + 4y^2 = 144$

$\Rightarrow 9x^2 + 4y^2 = 144 – 12xy$

From the questions, $xy = 6$

So,

$9x^2 + 4y^2 = 144 – 72$

Thus, the value of $9x^2 + 4y^2 = 72$

Question 2:Evaluate the following using suitable identity

$(102)^3$

Answer 2: We can write 102 as 100+2

Using identity, $(x+y)^3 = x^3 + y^3 + 3xy(x+y)$

$(100+2)^3 = (100)^3 + 2^3 + (3\times100\times2)(100+2)$

$= 1000000 + 8 + 600(100 + 2)$

$= 1000000 + 8 + 60000 + 1200$

$= 1061208$

Question 3:Without any actual division, prove that the following $2x^4$

$– 5x^3 + 2x^2 – x + 2$ is divisible by $x^2 – 3x + 2$.

[Hint: Factorise $x^2 – 3x + 2$]

Answer 3: x^2-3x+2

$x^2-2x-1x+2$

$x(x-2)-1(x-2)$

$(x-2)(x-1)$

Therefore,$(x-2)(x-1)$are the factors.

Considering $(x-2)$,

$x-2=0$

$x=2$

Then, $p(x)$ becomes,

$p(x)=2$

$p(x)=2x^4-5x^3+2x^2-x+2$

$p(2)=2(2)^4-5(2)^3+2(2)^2-2+2$

$=32-40+8$

$= -40+40=0$

Therefore, $(x-2)$ is a factor.

Considering $(x-1)$,

$x-1=0$

$x=1$

Then, $p(x)$ becomes,

$p(x)=1$

$p(x)=2x^4-5x^3+2x^2-x+2$

$p(1)=2(1)^4-5(1)^3+2(1)^2-1+2$

$=2-5+2-1+2$

$=6-6$

$=0$

Therefore, (x-1) is a factor.

Question 4: Using the Factor Theorem to determine whether g(x) is a factor of p(x) in the following case

(i) $p(x) = 2x^3+x^2–2x–1$, $g(x) = x+1$

Answer 4:$p(x) = 2x^3+x^2–2x–1$, $g(x) = x+1$

g(x) = 0

⇒ x+1 = 0

⇒ x = −1

∴Zero of g(x) is -1.

Now,

$p(−1) = 2(−1)^3+(−1)^2–2(−1)–1$

= −2+1+2−1

= 0

∴By the given factor theorem, g(x) is a factor of p(x).

Question 5: Obtain an example of a monomial and a binomial having degrees of 82 and 99, respectively.

Answer 5: An example of a monomial having a degree of 82 = x^{82}

An example of a binomial having a required degree of 99 = $x^{99} + 7$

Question 6: If the two *x* – 2 and *x* – ½ are the given factors of px^2

+ 5*x* + *r*, show that *p* = *r*.

Answer 6: Given, $f(x) = px^2+5x+r$ and factors are x-2, x – ½

g1(x) = 0,

x – 2 = 0

x = 2

Substituting x = 2 in place of the equation, we get

$f(x) = px^2+5x+r$

$f(2) = p(2)^2+5(2)+r=0$

$= 4p + 10 + r = 0$ … eq.(i)

$x – ½ = 0$

$x = ½$

Substituting x = ½ in place of the equation, we get,

$f(x) = px^2+5x+r$

$f(½) = p(½)^2 + 5(½) + r =0$

$= p/4 + 5/2 + r = 0$

$= p + 10 + 4r = 0$ … eq(ii)

On solving eq(i) and eq(ii),

We get,

$4p + r = – 10$ and $p + 4r = – 10$

the RHS of both equations are the same,

We get,

$4p + r = p + 4r$

$3p=3r$

$p = r$.

Hence Proved.

Question 7: Identify constant, linear, quadratic, cubic and quartic polynomials from the following.

(i) – 7 + x

(ii) 6y

(iii) – ? ³

(iv) 1 – y – ? ³

(v) x – ? ³ + ?⁴

(vi) 1 + x + ?²

(vii) -6?²

(viii) -13

(ix) –p

Answer 7: (i) – 7 + x

The degree of – 7 + x is 1.

Hence, it is a linear polynomial.

(ii) 6y

The degree of 6y is 1.

Therefore, it is a linear polynomial.

(iii) – ? ³

We know that the degree of – ? ³ is 3.

Therefore, it is a cubic polynomial.

(iv) 1 – y – ? ³

We know that the degree of 1 – y – ? ³ is 3.

Therefore, it is a cubic polynomial.

(v) x – ? ³ + ?⁴

We know that the degree of x – ? ³ + ?⁴ is 4.

Therefore, it is a quartic polynomial.

(vi) 1 + x + ?²

We know that the degree of 1 + x + ?² is 2.

Therefore, it is a quadratic polynomial.

(vii) -6?²

We know that the degree of -6?² is 2.

Therefore, it is a quadratic polynomial.

(viii) -13

We know that -13 is a constant.

Therefore, it is a constant polynomial.

(ix) – p

We know that the degree of –p is 1.

Therefore, it is a linear polynomial.

Question 8: Observe the value of the polynomial $5x – 4x^2 + 3$ at $x = 2$ and $x = –1$.

Answer 8: Let the polynomial be $f(x) = 5x – 4x^2 + 3$

Now, for $x = 2$,

$f(2) = 5(2) – 4(2)^2 + 3$

=> $f(2) = 10 – 16 + 3 = –3$

Or, the value of the polynomial $5x – 4x^2 + 3$ at $x = 2$ is -3.

Similarly, for $x = –1$,

$f(–1) = 5(–1) – 4(–1)^2 + 3$

=> $f(–1) = –5 –4 + 3 = -6$

The value of the polynomial $5x – 4x^2 + 3$ at $x = -1$ is -6.

Question 9:Expanding each of the following, using all the suitable identities:

(i) $(x+2y+4z)^2$

(ii) $(2x−y+z)^2$

(iii) $(−2x+3y+2z)^2$

(iv) $(3a –7b–c)^2$

(v) $(–2x+5y–3z)^2$

Answer 9: (i) $(x+2y+4z)^2$

Using identity, $(x+y+z)^2 = x^2+^2+z^2+2xy+2yz+2zx$

Here, $x = x$

$y = 2y$

$z = 4z$

$(x+2y+4z)^2 = x^2+(2y)^2+(4z)^2+(2\times x\times 2y)+(2\times 2y\times 4z)+(2\times 4z\times x)$

$= x^2+4y^2+16z^2+4xy+16yz+8xz$

(ii) $(2x-y+z)^2$

Using identity, $(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

Here, $x = 2x$

$y = -y$

$z = z$

$(2x-y+z)^2 = (2x)^2+(-y)^2+z^2+(2\times 2x\times -y)+(2\times -y\times z)+(2\times z\times 2x)$

$= 4x^2+y^2+z^2–4xy–2yz+4xz$

(iii) $(-2x+3y+2z)^2$

Using identity, $(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

Here, $x = -2x$

$y = 3y$

$z = 2z$

$(-2x+3y+2z)^2 = (-2x)^2+(3y)^2+(2z)^2+(2\times -2x\times 3y)+(2\times 3y\times 2z)+(2\times 2z\times -2x)$

$= 4x^2+9y^2+4z^2–12xy+12yz–8xz$

(iv) $(3a –7b–c)^2$

Using identity $(x+y+z)^2= x^2+y^2+z^2+2xy+2yz+2zx$

Here, $x = 3a$

$y = -7b$

$z = -c$

$(3a - 7b - c)^2 = (3a)^2 + (-7b)^2 + (-c)^2 + (2 \times 3a \times -7b) + (2 \times -7b \times -c) + (2 \times -c \times 3a)$

$= 9a^2 + 49b^2 + c^2 - 42ab + 14bc - 6ca$

(v) $(-2x+5y-3z)^2$

Using identity, $(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

Here, $x = -2x$

$y = 5y$

$z = -3z$

$(-2x+5y-3z)^2 = (-2x)^2 + (5y)^2 + (-3z)^2 + (2 \times -2x \times 5y) + (2 \times 5y \times -3z) + (2 \times -3z \times -2x)$

$= 4x^2 + 25y^2 + 9z^2 - 20xy - 30yz + 12zx$

Question 10: If the polynomials $az^3 + 4z^2 + 3z - 4$ and $z^3 - 4z +$ leave the same remainder when divided by $z - 3$, find the value of a.

Answer 10: Zero of the polynomial,

$g1(z) = 0$

$z-3 = 0$

$z = 3$

Hence, zero of $g(z) = -2a$

Let $p(z) = az^3+4z^2+3z-4$

Now, substituting the given value of $z = 3$ in $p(z)$, we get,

$p(3) = a(3)^3 + 4(3)^2 + 3(3) - 4$

$\Rightarrow p(3) = 27a+36+9-4$

$\Rightarrow p(3) = 27a+41$

Let $h(z) = z^3-4z+a$

Now, by substituting the value of z = 3 in h(z), we get,

$h(3) = (3)^3-4(3)+a$

$\Rightarrow h(3) = 27-12+a$

$\Rightarrow h(3) = 15+a$

As per the question,

The two polynomials, p(z) and h(z), leave the same remainder when divided by z-3

So, h(3)=p(3)

$\Rightarrow 15+a = 27a+41$

$\Rightarrow 15-41 = 27a - a$

$\Rightarrow -26 = 26a$

$\Rightarrow a = -1$

Question 11: Compute the perimeter of a rectangle whose area is $25x^2 - 35x + 12$.

Answer 11: Area of rectangle = $25x^2 - 35x + 12$

We know the area of a rectangle = length × breadth

So, by factoring $25x^2 - 35x + 12$, the length and breadth can be obtained.

$25x^2 - 35x + 12 = 25x^2 - 15x - 20x + 12$

$\Rightarrow 25x^2 - 35x + 12 = 5x(5x - 3) - 4(5x - 3)$

$\Rightarrow 25x^2 - 35x + 12 = (5x - 3)(5x - 4)$

Thus, the length and breadth of a rectangle are (5x – 3)(5x – 4).

So, the perimeter = 2(length + breadth)

Therefore, the perimeter of the given rectangle = 2[(5x – 3)+(5x – 4)]

= 2(5x – 3 + 5x – 4)

= 2(10x – 7)

$= 20x – 14$

Hence, the perimeter of the rectangle = $20x – 14$

Question 12: $2x^2+y^2+^2–2\sqrt{2}xy+4\sqrt{2}yz–8xz$

Answer 12: Using identity, $(x +y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

We can say that, $x^2+^2+^2+2xy+2yz+2zx = (x+y+z)^2$

$2x^2+y^2+8z^2–2\sqrt{2}xy+4\sqrt{2}yz–8xz$

$= (-\sqrt{2}x)^2+(y)^2+(2\sqrt{2}z)^2+(2\times-\sqrt{2}x\times y)+(2\times y\times 2\sqrt{2}z)+(2\times 2\sqrt{2}\times-\sqrt{2}x)$

$= (-\sqrt{2}x+y+2\sqrt{2}z)^2$

$= (-\sqrt{2}x+y+2\sqrt{2}z)(-\sqrt{2}x+y+2\sqrt{2}z)$

Question 13: If ? + 2? is a factor of ? ⁵ – 4?²?³ + 2? + 2? + 3, find a.

Answer 13: According to the question,

Let $p(x) = x^5 – 4a^2x^3 + 2x + 2a + 3$ and $g(x) = x + 2a$

$g(x) = 0$

$\Longrightarrow x + 2a = 0$

$\Longrightarrow x = – 2a$

Hence, zero of $g(x) = – 2a$

As per the factor theorem,

If g(x) is a factor of p(x), then $p(– 2a) = 0$

So, substituting the value of x in p(x), we get,

$p (– 2a) = (– 2a)^5 – 4a^2(– 2a)^3 + 2(– 2a) + 2a + 3 = 0$

$\Longrightarrow – 32a^5 + 32a^5 – 2a + 3 = 0$

$\Longrightarrow – 2a = – 3$

$\Longrightarrow a = 3/2$

Question 14: Find the value of $x^3+ y^3 + z^3 – 3xyz$ if $x^2 + y^2 + z^2 = 83$ and $x + y + z = 1$

Answer 14: Consider the equation $x + y + z = 15$

From algebraic identities, we know that $(a + b + c)^2 = a^2 + b^2 + c^2 + 2(ab + bc + ca)$

So,

$(x + y + z)^2 = x^2 + y^2 + z^2 + 2(xy + yz + xz)$

From the question, $x^2 + y^2 + z^2= 83$ and $x + y + z = 15$

So,

$152 = 83 + 2(xy + yz + xz)$

$=> 225 – 83 = 2(xy + yz + xz)$

Or, $xy + yz + xz = 142/2 = 71$

Using algebraic identity $a^3 + b^3 + c^3 – 3abc = (a + b + c)(a^2 + b^2 + c^2 – ab – bc – ca)$,

$x^3 + y^3 + z^3 – 3xyz = (x + y + z)(x^2 + y^2 + z^2 – (xy + yz + xz))$

Now,

$x + y + z = 15$, $x^2 + y^2 + z^2 = 83$ and $xy + yz + xz = 71$

So, $x^3 + y^3 + z^3 – 3xyz = 15(83 – 71)$

$=> x^3 + y^3 + z^3 – 3xyz = 15 \times 12$

Or, $x^3 + y^3 + z^3 – 3xyz = 180$

Question 15:Verify that:

(i) $x^3+y^3 = (x+y)(x^2–xy+y^2)$

(ii) $x^3–y^3 = (x–y)(x^2+xy+y^2)$

Answer 15:(i) $x^3+y^3 = (x+y)(x^2–xy+y^2)$

We know that $(x+y)^3= x^3+y^3+3xy(x+y)$

$\Rightarrow x^3+y^3 = (x+y)^3–3xy(x+y)$

$\Rightarrow x^3+y^3 = (x+y)[(x+y)^2–3xy]$

Taking (x+y) common $\Rightarrow x^3+y^3 = (x+y)[(x^2+y^2+2xy)–3xy]$

$\Rightarrow x^3+y^3 = (x+y)(x^2+y^2-xy)$

(ii) $x^3-y^3 = (x-y)(x^2+xy+y^2)$

We know that $(x-y)^3 = x^3-y^3-3xy(x-y)$

$\Rightarrow x^3-y^3 = (x-y)^3+3xy(x-y)$

$\Rightarrow x^3-y^3 = (x-y)[(x-y)^2+3xy]$

Taking (x+y) common $\Rightarrow x^3-y^3 = (x-y)[(x^2+y^2-2xy)+3xy]$

$\Rightarrow x^3+y^3 = (x-y)(x^2+y^2+xy)$

Question 16: For what value of m is ?³ – 2??² + 16 divisible by x + 2?

Answer 16: According to the question,

Let $p(x) = x^3 - 2mx^2 + 16$, and $g(x) = x + 2$

$g(x) = 0$

$\Longrightarrow x + 2 = 0$

$\Longrightarrow x = -2$

Hence, zero of $g(x) = -2$

As per the factor theorem,

if p(x) is divisible by g(x), then the remainder of p(−2) should be zero.

Thus, substituting the value of x in p(x), we obtain,

$p(-2) = 0$

$\Longrightarrow (-2)^3 - 2m(-2)^2 + 16 = 0$

$\Longrightarrow 0 - 8 - 8m + 16 = 0$

$\Longrightarrow 8m = 8$

$\Longrightarrow m = 1$

Question 17:If $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$, find the value of $a^3 + b^3 + c^3 - 3abc$.

Answer 17: We know that,

$a^3 + b^3 + c^3 – 3abc = (a + b + c)(a^2 + b^2 + c^2 – ab – bc – ca)$ ….(i)

$(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$ ….(ii)

Given, $a + b + c = 15$ and $a^2 + b^2 + c^2 = 83$

From (ii), we have

$152 = 83 + 2(ab + bc + ca)$

$\Rightarrow 225 – 83 = 2(ab + bc + ca)$

$\Rightarrow 142/2 = ab + bc + ca$

$\Rightarrow ab + bc + ca = 71$

Now, (i) can be written as

$a^3 + b^3 + c^3 – 3abc = (a + b + c)[(a^2 + b^2 + c^2) – (ab + bc + ca)]$

$a^3 + b^3+ c^3 – 3abc = 15 \times [83 – 71] = 15 \times 12 = 180$.

Question 18: Factorise: $27x^3+y^3+z^3–9xyz$

Answer 18: The expression$27x^3+y^3+z^3–9xyz$ can be written as $(3x)^3+y^3+z^3–3(3x)(y)(z)$

$27x^3+y^3+z^3–9xyz = (3x)^3+y^3+z^3–3(3x)(y)(z)$

We know that $x^3+y^3+^3–3xyz = (x+y+z)(x^2+y^2+z^2–xy –yz–zx)$

$27x^3+y^3+z^3–9xyz = (3x)^3+y^3+z^3–3(3x)(y)(z)$

$= (3x+y+z)[(3x)^2+y^2+z^2–3xy–yz–3xz]$

$= (3x+y+z)(9x^2+y^2+^2–3xy–yz–3xz)$

Question 19: If $(x – 1/x) = 4$, then evaluate $(x^2 + 1/x^2)$ and $(x^4 + 1/x^4)$.

Answer 19: Given, $(x – 1/x) = 4$

Squaring both sides, we get,

$(x – 1/x)^2 = 16$

$\Rightarrow x^2 – 2.x.1/x + 1/x^2 = 16$

$\Rightarrow x^2 – 2 + 1/x^2 = 16$

$\Rightarrow x^2 + 1/x^2 = 16 + 2 = 18$

$\therefore (x^2 + 1/x^2) = 18$ ….(i)

Again, squaring both sides of (i), we get

$(x^2 + 1/x^2)^2 = 324$

$\Rightarrow x^4 + 2.x^2.1/x^2 + 1/x^4 = 324$

$\Rightarrow x^4 + 2 + 1/x^4 = 324$

$\Rightarrow x^4 + 1/x^4 = 324 – 2 = 322$

$\therefore (x^4 + 1/x^4) = 322$.

Question 20: Factorise

$64m^3–343n^3$

Answer 20: The expression $64m^3–343n^3$ can be written as $(4m)^3–(7n)^3$

$64m^3–343n^3 =(4m)^3–(7n)^3$

We know that $x^3–y^3 = (x–y)(x^2+xy+y^2)$

$64m^3–343n^3 = (4m)^3–(7n)^3$

$= (4m-7n)[(4m)^2+(4m)(7n)+(7n)^2]$

$= (4m-7n)(16m^2+28mn+49n^2)$

Question 21: Find out the values of a and b so that ($2x^3 + ax^2 + x + b$) has (x + 2) and (2x – 1) as factors.

Answer 21: Let $p(x) = 2x^3 + ax^2 + x + b$. Then, p(–2) = and p(½) = 0.

$p(2) = 2(2)^3 + a(2)^2 + 2 + b = 0$

$\Rightarrow –16 + 4a – 2 + b = 0 \Rightarrow 4a + b = 18$ ….(i)

$p(½) = 2(½)^3 + a(½)^2 + (½) + b = 0$

$\Rightarrow a + 4b = –3$ ….(ii)

On solving (i) and (ii), we get a = 5 and b = –2.

Hence, a = 5 and b = –2.

Question 22: Explain that p – 1 is a factor of $p^{10} – 1$ and $p^{11} – 1$.

Answer 22: According to the question,

Let h(p) = $?^{10} - 1$,and g(p) = ? – 1

zero of g(p) ⇒ g(p) = 0

p – 1 = 0

p = 1

Therefore, zero of g(x) = 1

We know that,

According to the factor theorem, if g(p) is a factor of h(p), then h(1) should be zero

So,

h(1) = $(1)^{10} - 1 = 1 - 1 = 0$

⟹ g (p) is a factor of h(p).

Here, we have h(p) = $?^{11} - 1$, g (p) = ? – 1

Putting g (p) = 0 ⟹ ? − 1 = 0 ⟹ ? = 1

As per the factor theorem, if g (p) is a factor of h(p),

Then h(1) = 0

⟹ $(1)^{11} – 1 = 0$

Hence, g(p) = ? – 1 is the factor of h(p) = $?^{10} – 1$

Question 23: Examine whether (7 + 3x) is a factor of (3×3 + 7x).

Answer 23: Let p(x) = 3×3 + 7x and g(x) = 7 + 3x. Now g(x) = 0 ⇒ x = –7/3.

By the remainder theorem, p(x) is divided by g(x), and then the remainder is p(–7/3).

Now, p(–7/3) = 3(–7/3)3 + 7(–7/3) = –490/9 ≠ 0.

∴ g(x) is not a factor of p(x).

Question 24:Prove that:

$x^3+y^3+z^3–3xyz = (1/2)\ (x+y+z)[(x–y)^2+(y–z)^2+(z–x)^2]$

Answer 24: We know that,

$x^3+y^3+z^3-3xyz = (x+y+z)(x^2+y^2+z^2–xy–yz–xz)$

$\Rightarrow x^3+y^3+z^3–3xyz = (1/2)(x+y+z)[2(x^2+y^2+z^2–xy–yz–xz)]$

$= (1/2)(x+y+z)(2×2+2y^2+^2–2xy–2yz–2xz)$

$= (1/2)(x+y+z)[(x^2+y^2-2xy)+(y^2+z^2–2yz)+(x^2+z^2–2xz)]$

$= (1/2)(x+y+z)[(x–y)^2+(y–z)^2+(z–x)^2]$

Question 25: Find out which of the following polynomials has x – 2 a factor:

(i) 3?² + 6?−24.

(ii) 4?² + ?−2.

Answer 25: (i) According to the question,

Let p(x) =3?² + 6?−24 and g(x) = x – 2

g(x) = x – 2

zero of g(x) ⇒ g(x) = 0

x – 2 = 0

x = 2

Hence, zero of g(x) = 2

Thus, substituting the value of x in p(x), we get,

$p(2) = 3(2)^2 + 6\ (2) – 24$

= 12 + 12 – 24

= 0

the remainder = zero,

We can derive that,

g(x) = x – 2 is factor of p(x) = 3?² + 6?−24

(ii) According to the question,

Let p(x) = 4?² + ?−2 and g(x) = x – 2

$g(x) = x - 2$

zero of g(x) ⇒ g(x) = 0

$x - 2 = 0$

$x = 2$

Hence, zero of g(x) = 2

Thus, substituting the value of x in p(x), we get,

$p(2) = 4(2)^2 + 2 - 2$

$= 16 \neq 0$

Since the remainder ≠ zero,

We can say that,

g(x) = x – 2 is not a factor of p(x) = 4?² + ?−2

Question 26: Factorise $x^2 + 1/x^2 + 2 - 2x - 2/x$.

Answer 26: $x^2 + 1/x^2 + 2 - 2x - 2/x = (x^2 + 1/x^2 + 2) - 2(x + 1/x)$

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

$= (x + 1/x)(x + 1/x - 2)$.

Question 27: Factorise

$8a^3+b^3+12a^2b+6ab^2$

Answer 27: The expression, $8a^3+b^3+12a^2b+6ab^2$ can be written as $(2a)^3+b^3+3(2a)^2b+3(2a)(b)^2$

$8a^3+b^3+12a^2b+6ab^2 = (2a)^3+b^3+3(2a)^2b+3(2a)(b)^2$

$= (2a+b)^3$

= (2a+b)(2a+b)(2a+b)

Here, the identity, $(x + y)^3 = x^3 + y^3 + 3xy(x+y)$ is used.

Question 28: By Remainder Theorem, find out the remainder when p(x) is divided by g(x), where

(i) p(?) = ?³ – 2?² – 4? – 1, g(?) = ? + 1

(ii) p(?) = ?³ – 3?² + 4? + 50, g(?) = ? – 3

(iii) p(?) = 4?³ – 12?² + 14? – 3, g(?) = 2? – 1

(iv) p(?) = ?³ – 6?² + 2? – 4, g(?) = 1 – 3/2 ?

Answer 28: (i) Given p(x) = ?³ – 2?² – 4? – 1 and g(x) = x + 1

Here zero of g(x) = – 1

By applying the remainder theorem

P(x) divided by g(x) = p(– 1)

$P(-1) = (-1)^3 - 2(-1)^2 - 4(-1) - 1 = 0$

Therefore, the remainder = 0

(ii) given p(?) = ?³ – 3?² + 4? + 50, g(?) = ? – 3

Here zero of g(x) = 3

By applying the remainder theorem p(x) divided by g(x) = p(3)

$p(3) = 3^3 - 3 \times (3)^2 + 4 \times 3 + 50 = 62$

Therefore, the remainder = 62

(iii) $p(x) = 4x^3 - 12x^2 + 14x - 3$, $g(x) = 2x - 1$

Here zero of g(x) = ½

By applying the remainder theorem p(x) divided by g(x) = p (½)

$P(\frac{1}{2}) = 4(\frac{1}{2})^3 - 12(\frac{1}{2})^2 + 14(\frac{1}{2}) - 3$

$= 4/8 - 12/4 + 14/2 - 3$

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

$= 3/2$

Hence, the remainder = 3/2

(iv) p(?) = ?³ – 6?² + 2? – 4, g(?) = 1 – 3/2 ?

so, zero of g(x) = 2/3

By applying the remainder theorem p(x) divided by g(x) = p(2/3)

$p(2/3) = (2/3)^3 - 6(2/3)^2 + 2(2/3) - 4$

$= - 136/27$

Therefore, the remainder = – 136/27

Question 29:Factorise $x^2 - 1 - 2a - a^2$.

Answer 29: $x^2 - 1 - 2a - a^2 = x^2 - (1 + 2a + a^2)$

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

$= [x - (1 - a)][x + 1 + a]$

$= (x - 1 - a)(x + 1 + a)$

$\therefore x^2 - 1 - 2a - a^2 = (x - 1 - a)(x + 1 + a)$.

Question 30:Evaluate the following using suitable identity

$(998)^3$

Answer 30: We can write 99 as 1000–2

Using identity, $(x-y)^3 = x^3 - y^3 - 3xy(x-y)$

$(998)^3 = (1000-2)^3$

$= (1000)^3 - 2^3 - (3\times1000\times2)(1000-2)$

$= 1000000000 - 8 - 6000(1000 - 2)$

$= 1000000000 - 8 - 6000000 + 12000$

$= 994011992$

Question 31: Find the zeroes of the polynomial:

p(?)= (? –2)² −(? + 2)²

Answer 31: p(x) = (? –2)² −(? + 2)²

We know that,

Zero of the polynomial p(x) = 0

Hence, we get,

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

Expanding using the identity, $a^2 - b^2 = (a - b)(a + b)$

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

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

$\Rightarrow -8x = 0$

Therefore, the zero of the polynomial = 0