POLYNOMIALS

1.Introduction:

In Class IX, you have studied polynomials in one variable and their degrees. Recall that if p(x) is a polynomial in x, the highest power of x in p(x) is called the degree of the polynomial p(x).

2.Notes:

- Polynomials of degrees 1, 2 and 3 are called linear, quadratic and cubic polynomials respectively.
- A quadratic polynomial in x with real coefficients is of the form ax2 + bx + c, where a, b, c are real numbers with a ≠ 0.
- The zeroes of a polynomial p(x) are precisely the x-coordinates of the points, where the graph of y = p(x) intersects the x -axis.
- A quadratic polynomial can have at most 2 zeroes and a cubic polynomial can have at most 3 zeroes.

3.Example Sums:

*Find the zeroes of the quadratic polynomial x2 + 7x + 10, and verify the relationship between the zeroes and the coefficients.

Solution : We have x2 + 7x + 10 = (x + 2)(x + 5) So, the value of x2 + 7x + 10 is zero when x + 2 = 0 or x + 5 = 0, i.e., when x = – 2 or x = –5. Therefore, the zeroes of x2 + 7x + 10 are – 2 and – 5. Now, sum of zeroes = 2 (7) – (Coefficient of) – 2 (–5) – (7) , 1 Coefficient of x x − += = = product of zeroes = 2 10 Constant term (2) (5) 10 1 Coefficient of x − ×− = = = ·

*Divide $2x2 + 3x + 1$ by $x + 2$.

Solution : Note that we stop the division process when either the remainder is zero or its degree is less than the degree of the divisor. So, here the quotient is $2x – 1$ and the remainder is 3. Also, $(2x – 1)(x + 2) + 3 = 2x2 + 3x – 2 + 3 = 2x2 + 3x + 1$ i.e., $2x2 + 3x + 1 = (x + 2)(2x – 1) + 3$ Therefore, Dividend = Divisor × Quotient + Remainder Let us now extend this process to divide a polynomial by a quadratic polynomial.

4.Practice Sums:

*Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients. (i) $x2 – 2x – 8$ (ii) $4s2 – 4s + 1$ (iii) $6x2 – 3 – 7x$.

* Divide $3x2 – x3 – 3x + 5$ by $x – 1 – x2$, and verify the division algorithm.