WORKSHEET 2

CHAPTER 2 – POLYNOMIALS

1. Find the zero(es) of each of the following polynomials:
   (*i*) $p(x) = 2x$ (*ii*) $p(y) = 3 - 6y$ (*iii*) $p(a) = (a - 2)^2 - (a + 2)^2$
2. If 1 and –1 are zeroes of the polynomial $p(x) = ax^3 + x^2 - 2x + b$, find the values of a and b.
3. If $p(x) = 3 - 4x + x^2$, find the value of $p\left(\frac{1}{2}\right) + p(2) - p(-1)$.
4. Find the remainder when $5x^3 - x^2 + 6x - 2$ is divided by $1 - 5x$. **[CBSE SP 2010]**
5. If the polynomials $3x^3 + ax^2 + 3x + 5$ and $4x^3 + x^2 - 2x + a$ leave the same remainder when divided by $(x - 2)$ then find the value of a. Also find the remainder in each case. **[CBSE SP 2010]**
6. The polynomials $p(x) = x^4 - 2x^3 + 3x^2 - bx + a$ when divided by $x + 1$ and $x - 1$ leaves the remainders 19 and 5 respectively. Find the values of a and b.
7. Let R_1 and R_2 be the remainders when polynomials $f(x) = 4x^3 + 3x^2 - 12ax - 5$ and $g(x) = 2x^3 + ax^2 - 6x + 2$ are divided by $(x - 1)$ and $(x + 2)$ respectively. If $3R_1 + R_2 + 28 = 0$, find the value of a. **[CBSE SP 2011]**
8. Find the value of k if $(x - 3)$ is a factor of $k^2x^2 - kx - 2$.
9. If $(x + 2)$ and $(x - 2)$ are factors of the polynomial $p(x) = ax^4 + 2x^3 - 3x^2 + bx - 4$, then find the values of a and b.
10. What must be subtracted from $p(x) = 4x^3 + 16x^2 - x + 5$ to obtain a polynomial which is exactly divisible by $x + 5$? **[CBSE 2010]**
11. Without actual division show that $p(x) = 2x^4 - 6x^3 + 3x^2 + 3x - 2$ is exactly divisible by $x^2 - 3x + 2$.
12. Using identities find the product of each of the following:
    (*i*) $(x + 3)(x + 3)$ (*ii*) $(2 + 5x)(2 - 5x)$
    (*iii*) $(x - 9)(x - 2)$ (*iv*) $(x - 1)(x + 1)(x^2 + 1)(x^4 + 1)(x^8 + 1)$
13. Evaluate each of the following using identity:
    (*i*) $(102)^2$ (*ii*) $(0.97)^2$
14. Find the following products:
    (*i*) $(2a - b + 3c)(4a^2 + b^2 + 9c^2 + 2ab + 3bc - 6ca)$
    (*ii*) $\left(\frac{a}{2} + 2\right)\left(\frac{a^2}{4} - ab + 4b\right)$
15. Expand the following:
    (*i*) $(a - 2b - 3c)^2$ (*ii*) $\left(4 - \frac{1}{3}\right)^3$
16. Factorise:
    (*i*) $(x^2 + 4x)^2 + 4x^2 - 2x^2y + 16x - 8xy$ **[CBSE SP 2010]**
    (*ii*) $x^2 + 5x + \frac{25}{4}$ **[CBSE SP 2010]**
    (*iii*) $x^2 + y^2 + 2(xy + xz + yz)$ **[CBSE SP 2011]**
    (*iv*) $4a^2 - 4b^2 + 4a + 1$ **[CBSE SP 2010]**
    (*v*) $3x^3y - 243xy^3$
    (*vi*) $x^2 + 19x - 150$ **[CBSE SP 2011]**

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(*vii*) $x^2 + 6\sqrt{6}x + 48$ **[CBSE SP 2011]** (*viii*) $(2a + 3b)^3 - (2a - 3b)^3$ **[CBSE SP 2010]**

(*ix*) $8a^3 + 27b^3 + 64c^3 - 72abc$ (*x*) $(x - a)^3 + (x - b)^3 + (x - c)^3$ where $x = \frac{a+b+c}{3}$

17. (*i*) If $x^2 + \frac{1}{x^2} = 14$, find $x^3 + \frac{1}{x^3}$.

(*ii*) If $a + b + c = 1$, $ab + bc + ca = -1$ and $abc = -1$, find the value of $a^3 + b^3 + c^3$.

(*iii*) If $a + b = 8$ and $ab = 6$, find the value of $a^3 + b^3$.

(*iv*) If $x = 2y + 6$, find the value of $x^3 - 8y^3 - 36xy - 216$.

(*v*) If $x + y = 12$ and $xy = 27$, evaluate $x^3 + y^3$.

(*vi*) If $x + y + z = 5$ and $xy + yz + zx = 10$, evaluate $x^3 + y^3 + x^3 - 3xyz$.

18. Without actually calculating cubes, find the value of $5^3 - 16^3 + 11^3$.

19. Using factor theorem, factorise the polynomial $a^3 - 2a^2 - 5a + 6$.

20. Prove that $(a + b)^3 + (b + c)^3 + (c + a)^3 - 3(a + b)(b + c)(c + a) = 2(a^3 + b^3 + c^3 - 3abc)$.

ANSWERS

WORKSHEET 2

1. (*i*) 0 (*ii*) $\frac{1}{2}$ (*iii*) $a = 0$ **2.** $a = 2, b = -1$ **3.** $-\frac{31}{4}$ **4.** remainder $= -\frac{4}{5}$ **5.** $a = -1$; remainder $= 31$

6. $a = 8, b = 5$ **7.** $a = 1$ **8.** $k = \frac{2}{3}, k = -\frac{1}{3}$ **9.** $a = 1, b = -8$ **10.** -90

12. (*i*) $x^2 + 6x + 9$ (*ii*) $4 - 25x^2$ (*iii*) $x^2 - 11x + 18$ (*iv*) $x^{16} - 1$

13. (*i*) 10404 (*ii*) 0.9409 **14.** (*i*) $8a^3 - b^3 + 27c^3 + 18abc$ (*ii*) $\frac{a^3}{8} + 8b^3$

15. (*i*) $a^2 + 4b^2 + 9c^2 - 4ab + 12bc - 6ac$ (*ii*) $64 - \frac{16}{a} + \frac{4}{3a^2} - \frac{1}{27a^3}$

16. (*i*) $x(x + 4)(x^2 + 4x - 2y + 4)$ (*ii*) $\left(x + \frac{5}{2}\right)\left(x + \frac{5}{2}\right)$

(*iii*) $(x + y)(x + y + 2z)$ (*iv*) $(2a + 2b + 1)(2a - 2b + 1)$

(*v*) $3xy(x + 9y)(x - 9y)$ (*vi*) $(x + 25)(x - 6)$

(*vii*) $(x + 2\sqrt{6})(x + 4\sqrt{6})$ (*viii*) $18b(4a^2 + 3b^2)$

(*ix*) $(2a + 3b + 4c)(4a^2 + 9b^2 + 16c^2 - 6ab - 12bc - 8ca)$

(*x*) $3(x - a)(x - b)(x - c)$

17. (*i*) 52 (*ii*) 1 (*iii*) 368 (*iv*) 0 (*v*) 756 (*vi*) –25

18. –2640

19. $(a - 1)(a - 3)(a + 2)$