MATHS

BOOKS - NAND LAL PUBLICATION

POLYNOMIALS

Exercise 2 1

1. Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:- $4x^2 - 3x + 7$

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2. Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:- $y^2 + \sqrt{2}$

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3. Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:- $3\sqrt{t} + t\sqrt{2}$

4. Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:- $y + \dfrac{2}{y}$

5. Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer:- $x^{10} + y^3 + t^{50}$

6. Write the coefficients of x^2 in each of the following: $2 + x^2 + x$

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7. Write the coefficients of x^2 in each of the following: $2 - x^2 + x^3$

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8. Write the coefficients of x^2 in each of the following: $\dfrac{\pi}{2}x^2 + x$

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9. Write the coefficients of x^2 in each of the following: $\sqrt{2x} - 1$

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10. Give one example each of a binomial of degree 35, and of a monomial of degree 100.

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11. Write the degree of each of the following polynomials: $5x^3 + 4x^2 + 7x$

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12. Write the degree of each of the following polynomials: $4 - y^2$

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13. Write the degree of each of the following polynomials: $5t - \sqrt{7}$

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14. Write the degree of each of the following polynomials: 3

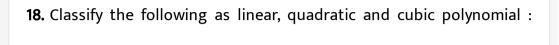**15.** Classify the following as linear, quadratic and cubic polynomials:

$x^2 + x$

16. Classify the following as linear, quadratic and cubic polynomial :

$x - x^3$.

17. Classify the following as linear, quadratic and cubic polynomial :

$y + y^2 + 4$.

18. Classify the following as linear, quadratic and cubic polynomial :

$1 + x$.

19. Classify the following as linear, quadratic and cubic polynomial : $3t$.

20. Classify the following as linear, quadratic and cubic polynomial : r^2.

21. Classify the following as linear, quadratic and cubic polynomial : $7x^3$

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Exercise 2 2

1. Find the value of the polynomial $5x - 4x^2 + 3$ at $x = 0$.

2. Find the value of the polynomial $5x - 4x^2 + 3$ at $x = -1$.

3. Find the value of the polynomial $5x - 4x^2 + 3$ at $x = 2$.

4. Find $p(0), p(1)$ and $p(2)$ for the following polynomial :

$p(y) = y^2 - y + 1.$

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5. Find p(0), p(1) and p(2) for each of the following polynomials:

$p(t) = 2 + t + 2t^2 - 1^3$

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6. Find $p(0), p(1)$ and $p(2)$ for the following polynomial : $p(x) = x^3.$

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7. Find $p(0), p(1)$ and $p(2)$ for the following polynomial :

$p(x) = (x - 1)(x + 1).$

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8. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = 3x + 1, x = -\dfrac{1}{3}$.

9. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = 5x - \pi, x = \dfrac{4}{5}$.

10. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = x^2 - 1, x = 1, -1$.

11. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = (x + 1)(x - 2), x = -1, 2$.

12. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = x^2, x = 0$.
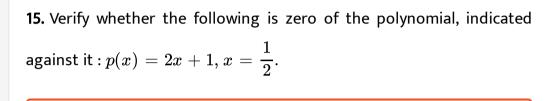
13. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = lx + m, x = -\dfrac{m}{l}$.

14. Verify whether the following are zeroes of the polynomial, indicated against them,

$$p(x) = 3x^2 - 1, x = \frac{1}{\sqrt{3}}, \frac{2}{\sqrt{3}}$$

15. Verify whether the following is zero of the polynomial, indicated against it : $p(x) = 2x + 1, x = \frac{1}{2}$.

16. Find the zero of the polynomial in each of the following cases:

$$p(x) = x + 5$$

17. Find the zero of the polynomial in each of the following cases:

$$p(x) = 5x - 5$$

18. Find the zero of the polynomial in each of the following cases:

$p(x) = 3x + 5$

19. Find the zero of the polynomial in the following : $p(x) = 3x$ is real

number.

20. Find the zero of the polynomial in the following : $p(x) = 3x$ is real

number.

21. Find the zero of the polynomial in the following : $p(x) = ax, a \neq 0$ is real number.

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22. Find the zero of the polynomial in the following : $p(x) = cx + d, c \neq 0, c, d$ is real number.

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Exercise 2 3

1. On dividing $x^3 + 3x^2 + 3x + 1$ by $x + 1$ we get remainder :

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2. On dividing $x^3 + 3x^2 + 3x + 1$ by $x - \dfrac{1}{2}$ we get remainder :

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3. On dividing $x^3 + 3x^2 + 3x + 1$ by x we get remainder :

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4. Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divided by : $x + \pi$.

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5. On dividing $x^3 + 3x^2 + 3x + 1$ by $5 + 2x$ we get remainder :

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6. On dividing $x^3 - ax^2 + 6x - a$ by $x - a$ we get remainder :

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7. Check whether 7 + 3x is a factor of $3x^3 + 7x$

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Exercise 2 4

1. Determine which of the following polynomials has (x + 1) a factor:

$x^3 + x^2 + x + 1$

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2. Determine which of the following polynomials has (x + 1) a factor:

$$x^4 + x^3 + x^2 + x + 1$$

3. Determine which of the following polynomials has (x + 1) a factor:

$$x^4 + 3x^3 + 3x^2 + x + 1$$

4. Determine which of the following polynomials has (x + 1) a factor:

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

5. Use the Factor Theorem to determine whether g(x) is a factor of p(x) in each of the following cases:

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

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6. Use the Factor Theorem to determine whether g(x) is a factor of p(x) in each of the following cases:

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

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7. Use the Factor Theorem to determine whether g(x) is a factor of p(x) in each of the following cases:

$$p(x) = x^3 - 4x^2 + x + 6, g(x) = x - 3$$

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8. Find the value of k, if $x - 1$ is a factor of $p(x)$ of the following case :

$p(x) = x^2 + x + k$.

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9. Find the value of k, if $x - 1$ is a factor of $p(x)$ of the following case :

$p(x) = 2x^2 + kx + \sqrt{2}$.

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10. Find the value of k, if $x - 1$ is a factor of $p(x)$ of the following case

$: p(x) = kx^2 - \sqrt{2}x + 1$.

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11. Find the value of k, if $x - 1$ is a factor of $p(x)$ of the following case :

$p(x) = kx^2 - 3x + k$.

12. The factors of $12x^2 - 7x + 1$ are :

13. Factorise : $2x^2 + 7x + 3$.

14. The factors of $6x^2 + 5x - 6$ are :

15. Factorise : $3x^2 - x - 4$.

16. Factorise : $x^3 - 2x^2 - x + 2$.

17. Factorise : $x^3 - 3x^2 - 9x - 5$.

18. Factorise : $x^3 + 13x^2 + 32x + 20$.

19. Factorise : $2y^3 + y^2 - 2y - 1$.

1. Use the suitable identity to find the following product :

$(x + 4)(x + 10)$.

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2. Use the suitable identity to find the following product :

$(x + 8)(x - 10)$.

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3. Use the suitable identity to find the following product :

$(3x + 4)(3x - 5)$.

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4. Use the suitable identity to find the following product :

$$\left(y^2 + \frac{3}{2}\right)\left(y^2 - \frac{3}{2}\right).$$

5. Use the suitable identity to find the following product :

$$(3 - 2x)(3 + 2x).$$

6. Evaluate the following product without multiplying directly :

$$103 \times 107.$$

7. Evaluate the following product without multiplying directly : 95×96

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8. Evaluate the following product without multiplying directly : 104×96.

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9. Factorise the following using appropriate identities : $9x^2 + 6xy + y^2$.

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10. Factorise the following using appropriate identities : $4y^2 - 4y + 1$.

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11. Factorise the following using appropriate identities : $x^2 - \dfrac{y^2}{100}$.

12. Expand the following using suitable Identities : $(x + 2y + 4z)^2$.

13. Expand each of the following, using suitable identifies :

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

14. Expand the following using suitable Identities : $(- 2x + 3y + 2z)^2$

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15. Expand the following using suitable Identities : $(3a - 7b - c)^2$.

16. Expand the following using suitable Identities : $(-2x + 5y - 3z)^2$.

17. Expand each of the following, using suitable identifies :

$[a - b + 1]^2$

18. Factorise : $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$.

19. Factorise : $2x^2 + y^2 + 8z^2 - 2\sqrt{2}xy + 4\sqrt{2}yz - 8xz.$

20. Write the following cube in expanded : $(2x + 1)^3.$

21. Write the following cube in expanded : $(2a - 3b)^3.$

22. Write the following cubes in expanded form:

$[3x + 1]^3$

23. Write the following cube in expanded : $\left[x - \dfrac{2}{3}y\right]^3$.

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24. Evaluate the following using suitable identity : $(99)^3$.

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25. Evaluate the following using suitable identity : $(102)^3$.

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26. Evaluate the following using suitable identity : $(998)^3$.

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27. Factorise the following : $8a^3 + b^3 + 12a^2b + 6ab^2$.

28. Factorise each of the following: $8a^3 - b^3 - 12a^2b + 6ab^2$

29. Factorise the following : $27 - 125a^3 - 135a + 225a^2$.

30. Factorise the following : $64a^3 - 27b^3 - 144a^2b + 108ab^2$.

31. Factorise the following : $27p^3 - \dfrac{1}{216} - \dfrac{9}{2}p^2 + \dfrac{1}{4}p.$

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32. Verify : $x^3 + y^3 = (x + y)(x^2 - xy + y^2).$

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33. Verify : $x^3 - y^3 = (x - y)(x^2 + xy + y^2).$

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34. Factorise each of the following:

$27y^3 + 125x^3$

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35. Factorise the following : $64m^3 - 343n^3$.

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36. Factorise : $27x^3 + y^3 + z^3 - 9xyz$.

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37. Verify that

$$x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)\left[(x - y)^2 + (y - z)^2 + (z - x)^2\right]$$

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38. If $x + y + z = 0$, show that $x^3 + y^3 + z^3 = 3xyz$.

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39. Without actually calculating the cubes, find the value of each of the following: $(-12)^3 + (7)^3 + (5)^3$

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40. Without actually calculating the cubes, find the value of each of the following: $(28)^3 + (-15)^3 + (-13)^3$

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41. Give possible expressions for the length and breadth of each of the following rectangles, in which their areas are given: Area : $25a^2 - 35a + 12$

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42. Give possible expressions for the length and breadth of each of the following rectangles, in which their areas are given: Area : $35y^2 + 13y - 12$

43. What are the possible expressions for the dimensions of the cuboids whose volumes are given below? Volume : $3x^2 - 12x$

44. What are the possible expressions for the dimensions of the cuboids whose volumes are given below? Volume : $12ky^2 + 8ky - 20k$