MATHS

BOOKS - NAGEEN PRAKASHAN ENGLISH

POLYNOMIALS

Solved Examples

1. Which of the following are polynomials :

(i)

$3x^2 - 7x + 6 \quad (ii) x^2 - \sqrt{3}x + 4 \quad (iii) 3\sqrt{x} + 5 \quad (iv) 13 \quad (v) a +$

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2. Find the degree of each of the following polynomials :

$(i) 5x^2 - 2x + 1 \quad (ii) 1 - 5t + t^4 \quad (iii) 7 \quad (iv) x^4 - 3x^6 + 2$

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3. Write : (i) a binomial of degree 50, (ii) a monomial of degree 10, (iii) a trinomial of degree 5, (iv) a constant polynomial.

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4. Write the degree of following polynomials :

$(i) 4x + 7 \quad (ii) 4x^2 - 3x + 5 \quad (iii) 2x^2 - \frac{3}{2}x + 6$

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

$(i) 5x^3 + 3x^2 + 1 \quad (ii) 3x^2 + x \quad (iii) x + 1$

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6. Find the coefficient of x^2 in the polynomial :

$2x^3 - 3x^2 + 5x\left(1 - \frac{x}{2}\right) + 2x^2(x + 7) - 13$

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7. Find the value of each of the following :

$(i) p(x) = 3x + 7 \text{ at} x = 1$ $(ii) q(y) = y^3 - 3y^2 + \sqrt{3} \text{ at} y = 1$

(iii) $p(a) = a^4 + 6a^2 - 6a + 3$ at a=m

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8. Find a zero of the polynomial :

$(i) p(x) = 4x - 3$

$(ii) p(x) = 2x - 2$

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9. Check whether 2 and 0 are zeros of polynomial $x^3 - 4x$.

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10. Divide p(x) by g(x) and find the quotient q(x) and remainder r(x).

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

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11. If $p(x) = x^5 + 4x^4 - 3x^2 + 1$ and $g(x) = x^2 + 2$, then divide p(x) by g(x) and find quotient q(x) and remainder r(x).

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12. If g(x)=x+2 and $p(x) = x^3 + 3x^2 + 5x - 1$, then divide p(x) by g(x) and find the quotient q(x) and remainder r(x).

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13. Check whether x+2 is a factor polynomial $x^3 + 8x^2 + 9x - 6$?

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14. Find the remainder when the polynomial $p(x) = x^4 - 3x^2 + 5x + 1$ is divided by (x-2).

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15. Find the remainder when the polynomial $p(x) = x^3 - 3x^2 + 4x + 50$ is divided by (x+3).

A. -13

B. -14

C. -15

D. -16

Answer: D

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16. Find the remainder when the polynomial $4x^4 + 3x^2 - 5x + 1$ is divided by (2x-1).

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17. If the polynomial $ax^3 + 3x^2 - 3$ leaves the remainder 6 when divided by x-4, then find the value of a.

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18. Show that (x-3) is a factor of the polynomial $x^3 + x^2 - 17x + 15$.

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19. Check whether (2x-3) is a factor of the polynomial $2x^4 + 9x^2 - 11x - 30$?

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20. Find the value of 'k' if x+3, is a factor of the polynomial $x^4 - x^3 - 11x^2 - x + k.$

A. $k = -13$

B. $k = -12$

C. $k = -14$

D. $k = -15$

Answer: B

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21. Factorise $x^3 - 7x + 6.$

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22. $x^3 + 6x^2 + 11x + 6$

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23. Factorise : $x^5 + y^5$

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24. Find the values of a and b so that $2x^3 + ax^2 + bx - 14$ has (x-1) and (x+2) are its factors.

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25. What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$.

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26. If $f(x) = x^4 - 2x^3 + 3x^2 - ax + b$ is a polynomial such that when it is divided by $x - 1$ and $x + 1$, the remainders are respectively 5 and 19. Determine the remainder when $f(x)$ is divided by $(x - 2)$.

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27. If $x^2 + 2x - 5$ is a factor of $x^4 - 2x^3 + px^2 + qx - 35$, then find the value of $p^2 - q$.

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28. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be (x-a). Find k and a.

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29. When $x^5 - 5x^4 + 9x^3 - 6x^2 - 16x + 13$ is divided by $x^2 - 3x + a$, then quotient and remainders are $x^3 - 2x^2 + x + 1$ and -15x+11 respectively. Find the value of a.

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30. Factorise $x^3 + 2x^2 + x$.

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31. Factorise a(x-y)-b(x-y).

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32. $p^2x^2 + c^2x^2 - ac^2 - ap^2$

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33. Factorise $ax + ay + az + bx + by + bz$.

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34. Factorise $x^2 - \left(a + \frac{1}{a}\right)x + 1$.

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35. Factorise $a^2 - 9b^2$.

A. (a+3b)(a+3b)

B. (a+3b)(a-3b)

C. (a-3b)(a-3b)

D. (a+5b)(a-3b)

Answer: B

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36. Factorise $x^2 - (y - z)^2$.

A. $(x + y - z)(x + y + z)$

B. $(x + y - z)(x - y - z)$

C. $(x - y - z)(x - y + z)$

D. $(x + y - z)(x - y + z)$

Answer: D

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37. Factorise $x^2 - 6x - y^2 + 9$.

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38. Factorise $16x^4 - 81y^4$.

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39. Factorise :

$$x^2 + \frac{1}{x^2} - 3$$

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40. Factorise $x^2 + 9x + 20$.

A. $(x + 4)(x + 4)$

B. $(x + 5)(x + 4)$

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

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

Answer: B

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41. Factorise $x^2 - 21x + 108$.

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42. Factorise $x^2 + 5x - 24$.

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43. Factorise $(2x + 3y)^2 + 14(2x + 3y)(3x - y) - 32(3x - y)^2$.

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44. Factorise $4x^2 + 12x + 5$.

A. $(2x + 5)(2x - 1)$

B. $(2x + 5)(2x + 1)$

C. $(x + 5)(2x + 1)$

D. $(2x + 5)(x + 1)$

Answer: B

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45. Factorise $99x^2 - 202xy + 99y^2$.

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46. Factorise $18x^3 - 27x^2 - 35x$.

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47. Factorise $\sqrt{3}x^2 + 10x + 3\sqrt{3}$

A. $\left(x + 3\sqrt{3}\right)\left(\sqrt{3}x - 1\right)$

B. $\left(x - 3\sqrt{3}\right)\left(\sqrt{3}x - 1\right)$

C. $\left(x + 3\sqrt{3}\right)\left(\sqrt{3}x + 1\right)$

D. $\left(x-3\sqrt{3}\right)\left(\sqrt{3}x+1\right)$

Answer: C

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48. Factorise $x^2+6\sqrt{6}x+48$.

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49. Factorise : $\left(2x^2+5x\right)\left(2x^2+5x-19\right)+84$

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50. Factorise : x^4+3x^2-28

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51. Evaluate : $(i)(a+6b)^2 \quad (ii)(3x-4y)^2 \quad (iii)(2a-b+c)^2$

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52. Using identities find the values of the following :

$(a)102^2 \quad (b)48^2$

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53. Find the product using appropriate identities

(i) (x+5)(x+5) (ii) (x+4)(x-4) (iii) (x+5)(x+3) (iv) (x-5)(x+3)

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54. Factorise : $(i)36x^2+60xy+25y^2 (ii)\frac{49}{9}x^2-\frac{35}{6}xy+\frac{25}{16}y^2$

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55. Expand : (i) $(4a - 5b)^3$ $(ii)(a + 2b)^3$

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56. Evaluate : $15^3 + 10^3 - 25^3$

A. -11350

B. -11550

C. -11250

D. -11200

Answer: C

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57. Find the product $(2a - 3b - 2c)\left(4a^2 + 9b^2 + 4c^2 + 6ab - 6bc + 4ca\right).$

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58. Factorise : $(a)x^4 + 4x^2 + 16 \qquad (ii)x^4 + 4$

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59. Factorise : $(a)x^6 + y^6 \qquad (b)x^6 - y^6$

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60. Factorise : $27x^3 + 8y^3 + 8z^3 - 36xyz$

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61. Factorise : $(i)125a^3 + \frac{1}{8} \qquad (ii)8a^3 - 27b^3$

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62. If a+b+c=2, ab+bc+ca=-1 and abc=-2 , find the value of $a^3 + b^3 + c^3$.

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63. If $a^2 + b^2 + c^2 = 154$ and $ab + bc + ca = -5$, find a+b+c.

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64. If $abx^2 = (a-b)^2(x+1)$, then find the value of $1 + \frac{4}{x} + \frac{4}{x^2}$ in terms of a and b.

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65. Find the square root of $(2x^2 - 7x - 15)(2x^2 - 24x + 70)(2x^2 - 11x - 21)$.

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66. Differentiate $\sin x^2 + \sin^2 x + \sin^2(x^2)$

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Problems From Ncert Exemplar

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

$(i) x = 0$ $(ii) x = -1$ $(iii) x = 2$

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

$(i) x + 1$ $(ii) x - \frac{1}{2}$ $(iii) x$ $(iv) x + \pi$ $(v) 5 + 2x$

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3. Find the remainder when $x^3 - ax^2 + 6x - a$is divided by $x - a$.

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4. Find the value of k, if x-1 is a factor of p(x) in each of the following cases :

(i) $p(x) = x^2 + x + k$ $(ii) p(x) = 2x^2 + kx + \sqrt{2}$

(iii) $p(x) = kx^2 - \sqrt{2}x + 1$ $(iv) p(x) = kx^2 - 3x + k$

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5. Factorise the following using appropriate identities :

$(i) 9x^2 + 6xy + y^2$ $(ii) 4y^2 - 4y + 1$ $(iii) x^2 - \frac{y^2}{100}$

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6. Give possible expressions for the length and breath of each of the following rectangles, in which their areas are given :

(i) area $= 25a^2 - 35a + 12$ (ii) area $= 35y^2 - 13y - 12$

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7. What are the possible expressions for the dimensions of the cuboids whose volumesare given below?(i) Volume: $3x^2 - 12x$ (ii) Volume: $12ky^2 + 8kx - 20k$

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8. Factorise the following :

$(i) 4x^2 + 20x + 25$ $(ii) 9y^2 - 66yz + 121z^2$ $(iii)\left(2x + \frac{1}{3}\right.$

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9. Factorize : $(x - 2y)^3 + (2y - 3z)^3 + (3z - x)^3$

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10. Find the value of :

$(i) x^3 + y^3 - 12xy + 64$, when x+y=-4

$(ii) x^3 - 8y^3 - 36xy - 216$, when x=2y+6

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11. Factorise the following

(i) $9x^2 + 4y^2 + 16z^2 + 12xy - 16yz - 24xz$

(ii) $25x^2 + 16y^2 + 4z^2 - 40xy + 16yz - 20xz$

(iii) $16x^2 + 4y^2 + 9z^2 - 16xy - 12yz + 24xz$

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12. Without actual division, prove that $2x^4 - 5x^3 + 2x^2 - x + 2$ is divisible by $x^2 - 3x + 2$.

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13. Simplify $(2x-5y)^3-(2x+5y)^3$.

A. $120x^2y-250y^3$

B. $120x^2y+250y^3$

C. $-120x^2y-250y^3$

D. can not determine its value

Answer: C

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14. Multiply $x^2+4y^2+z^2+2xy+xz-2yz$ by (-z+x-2y)

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15. If a, b, c are all non-zero and $a+b+c=0$, then $\frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}=?$

.

A. 1

B. 2

C. 3

D. 4

Answer: C

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16. Prove that $(a+b+c)^3 - a^3 - b^3 - c^3 = 3(a+b)(b+c)(c+a)$.

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17. If a+b+c=5 and ab+bc+ca=10, then prove that $a^3 + b^3 + c^3 - 3abc = -25$.

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18. The polynomial $p(x) = x^4 - 2x^3 - ax + 3a - 7$ when divided by x+1 leaves remainder 19. Also, find the remainder when p(x) is divided by x+2.

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Exercise 2 A

1. Which of the following are polynomials ?

$(i)x^2 - 3x + 1 \quad (ii)x^2 + 5x + 2 \quad (iii)x - \frac{1}{y} \quad (iv)x^7 + 8 \quad (v)x^3$

$(vi)\sqrt{2}x^2 + x - 1 \quad (vii)(3x - 1)(x + 5) \quad (viii)\left(x - \frac{3}{x}\right)(x + 2) \quad (i$

$(x)x + \frac{1}{\sqrt{x}} + 2$

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2. Separate monomial, binomial and trinomial from the following :

$(i)2x - 3 \quad (ii)3x^2 \quad (iii)5x^2 - 8x + 1 \quad (iv)(2x + 3)^2 \quad (v) - 5x +$

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3. Find the degree of each of the following polynomials :

$(i)3x^4 - x^2 + 8$ $(ii)y^2 - 5y + 7$ $(iii)3x + 4$ $(iv)3$

$(v)x - 2x^2 + 5x^7$ $(vi)2y^2 - 5y^6 + 1$ $(vii)x^3 - 1$ $(viii)3x + 5x^5$

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4. Write the coefficients of :

$(i)x^2$ $\text{in}3x^3 - 5x^2 - 5x + 6$ $(ii)x^3$ $\text{in}7x^4 + 5x^3 + 3x + 7$ $(iii)x^2$ i

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5. Give an example of :

(i) monomial of degree 19 (ii) binomial of degree 16 (iii) trinomial of degree 5

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6. Classify the following as linear quadratic and cubic polynomial :

$(i)x^3+x^2+3 \quad (ii)x^2+5 \quad (iii)x^3-x \quad (iv)3x \quad (v)x+3$

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7. Give an example of a polynomial which is neither monomial, nor binomial nor trinomial and nor any multinomial.

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8. If the degree of a polynomial AB is 15 and the degree of polynomial A is 5, then find the degree of polynomial B.

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Exercise 2 B

1. If $p(x) = x^3 + 2x^2 + x$ find :

(i) p(0) (ii)p(2)

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2. If $p(y) = y^3 + y^2 + y + 1$ find :

(i) y(1) (ii) y(-1)

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3. If $p(x) = 4x^2 - 3x + 6$ find :

(i) p(4) (ii) p(-5)

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4. Find the zero of the polynomial :

$(i)p(x) = x - 3 \quad (ii)q(x) = 3x - 4 \quad (iii)p(x) = 4x - 7 \quad (iv)q(x)$

$(v) p(x) = 4x \qquad (vi) p(x) = \frac{3}{2}x - 1$

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5. Verify that

(i) 3 is a zero of the polynomial x-5.

(ii) -2 is a zero of the polynomial x+2.

$(iii) \frac{7}{3}$ is a zero of the polynomial 3x-7.

(iv) 2 and 3 are zeros of the polynomial (x-2)(x-3).

$(v) \frac{13}{2}$ and -3 are zeros of the polynomial $2x^2 - 7x - 39$.

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Exercise 2 C

1. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^4 + 1, \qquad g(x) = x - 1$

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2. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

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

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3. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^4 + 4x^2 + 2, \qquad g(x) = x^2 + 1$

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4. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^3 - 7x^2 - 6x + 1, \qquad g(x) = x - 3$

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5. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^4 + 6x^3 - 4x^2 + 2x + 1, \qquad g(x) = x^2 + 3x - 1$

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6. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = 3x^3 - 4x^2 + 2x + 5, \qquad g(x) = x + 3$

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7. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^3 + 6x^2 - 1, \qquad g(x) = x^2 + 2$

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8. Divide p(x) by g(x) in each of the following questions and find the quotient q(x) and remainder r(x) :

$p(x) = x^6 - 1, \qquad g(x) = x^2 + 1$

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9. In each of the following cases (Q.9-12), find whether g(x) is a factor of p(x) :

$p(x) = x^2 - 5x + 6, \qquad g(x) = x - 2$

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10. In each of the following cases (Q.9-12), find whether g(x) is a factor of p(x) :

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

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11. In each of the following cases (Q.9-12), find whether g(x) is a factor of p(x) :

$p(x) = 3x^3 + 5x^2 - 7x - 1, \qquad g(x) = x - 1$

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12. In each of the following cases (Q.9-12), find whether g(x) is a factor of p(x) :

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

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13. Using remainder theorem, find the remainder when :

$(i) x^3 + 5x^2 - 3$ is divided by $(x - 1)$ $(ii) x^4 - 3x^2 + 2$ is divided by (x-2)

$(iii) 2x^3 + 3x^2 - 5x + 2$ is divided by $(x + 3)$ $(iv) x^3 + 2x^2 - x + 1$ is divided by (x+2)

$(v)x^3 + 3x^2 - 5x + 4$ is divided by $(2x - 1)$ $(vi)3x^3 + 6x^2 - 15x + 2$ is divided by (3x-1)

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14. Show that :

(i) x-5, is factor of $x^2 - 11x + 30$ $(ii)(x + 2,$ is a factor of $x^2 + 3x + 2$

(iii) x-3, is a factor of $2x^3 + 7x^2 - 24x - 45$ $(iv)3x - 2,$ is a factor of $3x^3 + x^2 - 20x + 12$

(v) x-1, is a factor of $x^3 - 10x^2 + 23x - 14$ $(vi)x - 2,$ is a factor of $x^3 - 3x^2 - x + 6$

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15. Polynomials $ax^3 + 3x^2 - 3$ and$2x^3 - 5x + a$ when divided by (x-4) leave the same remainder. Find the value of a.

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16. Find the value of 'k' if :

(i) x+5, is a factor of $2x^3 + kx^2 - 11x - 30$ $(ii) 2x - 1$, is a factor of $2x^3 - 7x^2 + 11x - 7 + k$

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17. Using factor theorem, factorize the polynomial $x^3 - 6x^2 + 11x - 6$.

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18. if $x^2 + 2x + 3$,is the factor of $x^4 + 3px^2 + 2q$then find $p + q$

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19. What should be subtracted from $p(x) = 6x^4 + 7x^3 + 26x^2 - 25x + 25$ so that the resulting polynomial is exactly divisible by $g(x) = 3x^2 - x + 4$.

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20. When a polynomial f(x) is divisible by x-3 and x+6, the respective remainders are 7 and 22. What is the remainder when f(x) is divided by (x-3)(x+6) ?

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21. Evaluate : $\frac{(0.35)^3+(0.41)^3-(0.76)^3}{9(0.35)(0.41)(0.76)}$

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22. Evaluate : $\left(x^{1/3}+y^{1/3}\right)\left(x^{2/3}-x^{1/3}y^{1/3}+y^{2/3}\right)$, when $x=4\frac{5}{7}$ and $y=5\frac{2}{7}$.

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23. Evaluate : $x^3 + 3x - 13, \quad \text{if} x = \sqrt[3]{7 + 5\sqrt{2}} - \dfrac{1}{\sqrt[3]{7 + 5\sqrt{2}}}$

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24. Find the greatest value of x, which satisfies the system of equations :

$x^3 + y^3 = 35, x^2y + xy^2 = 30.$

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Exercise 2 D

1. Factorise the following polynomials :

$(i)x^3 + x^2 \quad (ii)a^3bc + ab^3c - abc^3 \quad (iii)ab(x + y) + bx(x + y)$

$(iv)32(x + y)^2 + 2(x + y) \quad (v)x(x - y) - z(y - x) \quad (vi)(1 - x) - (x$

$(vii)7(x + y)^3 + 14(x + y)^2 + 28(x + y)$

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2. Factorise the following expressions :

$(i)ax - ay + bx - by$ $(ii)x^2 - x - ax + a$ $(iii)x^4 + x^3 + x^2 + x$

$(iv)16(a+b)^2 - 4a - 4b$ $(v)x^2 + \frac{1}{x^2} + 2 - 3x - \frac{3}{x}$ $(vi)x^2 - \left(\frac{a}{b} +$

$(vii)x^2 + \left(a - \frac{1}{a}\right)x - 1$ $(viii)ab\left(x^2 + y^2 + xy\left(a^2 + b^2\right)\right.$ $(ix)(ax +$

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3. Factorise the following :

$(i)9a^2 - b^2$ $(ii)81x^3 - x$ $(iii)x^3 - 49xy^2$ $(iv)a^2 - (b-c)^2$

$(v)(x-y)^3 - x + y$ $(vi)x^2y^2 + 1 - x^2 - y^2$ $(vii)25(a+b)^2 - 49(a -$

$(ix)x^8 - 256$ $(x)x^8 - 81y^8$

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4. Factorise the following :

$(i)x^2 + 7x + 12$ $(ii)x^2 + 18x + 45$ $(iii)x^2 - 7x + 12$ $(iv)x^2 - 25$

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5. Factorise the following : (i) $2x^2 + 9x + 9$ (ii) $2x^2 + 9x - 5$

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Exercise 2 E

1. Use direct method to evaluate the following product :

$(i)(x + 8)(x + 3)$ $(ii)(x - 8)(x + 2)$ $(iii)(x - 3)(x - 5)$

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2. Use direct method to evaluate :

$(i)(x + y)(x - y)$ $(ii)(4 + x)(4 - x)$ $(iii)(2x - 1)(2x + 1)$ (iv)

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

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3. Evaluate without multiplying directly :

$(i) 33 \times 27 \quad (ii) 103 \times 97 \quad (iii) 9.8 \times 10.2.$

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4. Expand :

$(i)(3a - 5b)^2 \quad (ii)\left(a + \frac{1}{a}\right)^2 \quad (iii)\left(2x - \frac{1}{2x}\right)^2.$

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5. Expand :

$(i)(a + b - c)^2 \quad (ii)(a - 2b - 5c)^2 \quad (iii)(3a - 2b - 5c)^2 \quad (iv)\left(2x +$

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6. Evaluate using formula :

$(i)(188)^2 \quad (ii)(9.4)^2 \quad (iii)(10.9)^2$

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7. (i) If $a^2 + b^2 + c^2 = 20$ and $a + b + c = 0$, find $ab + bc + ac$.

(ii) If $a^2 + b^2 + c^2 = 250$ and $ab + bc + ca = 3$, find $a + b + c$.

(iii) If a+b+c=11 and ab+bc+ca=25, then find the value of $a^3 + b^3 + c^3 - 3$ abc.

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8. Expand :

$(i)(2x + 3y)^3 \quad (ii)(5y - 3x)^3 \quad (iii)(2a + 3b)^3.$

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9. Evaluate $(2x - 3y + 5)^3$.

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10. If a+2b=5, then show that $a^3 + 8b^3 + 30ab = 125$.

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11. If $2x - 3y = 10$ and $xy = 16$, find the value of $8x^3 - 27y^3$.

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12. Evaluate :

$(i)(98)^3 \quad (ii)(598)^3 \quad (iii)(1003)^3$

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13. Factorise :

$4a^2 + 9b^2 + 16c^2 + 12ab - 24bc - 16ca$

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14. Verify : (i) $x^3 + y^3 = (x + y)\left(x^2 - xy + y^2\right)$ (ii) $x^3 - y^3 = (x - y)\left(x^2 + xy + y^2\right)$

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15. Factorise :

$(i)9a^3 - 27b^3 \quad (ii)a^3 - 343 \quad (iii)a^3 - \frac{27}{a^3} \quad (iv)1 + 8a^3 \quad (v)(a + b$

.

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16. Find the product :

$(i)(x+3)\left(x^2-3x+9\right)$ $(ii)(7+5b)\left(49-35b+25b^2\right)$

$(iii)\left(5a+\frac{1}{2}\right)\left(25a^2-\frac{5a}{2}+\frac{1}{4}\right)$.

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17. Factorise :

$(i)a^3+27b^3+8c^3-18abc$ $(ii)2\sqrt{2}a^3+8b^3-27c^3+18\sqrt{2}abc$

$(iii)x^3+y^3-12xy+64$ $(iv)125-8x^3-27y^3=90xy.$

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18. Find the product :

$(i)(a+2b+4c)\left(a^2+4b^2+16c^2-2ab-8bc-4ca\right)$

$(ii)(3x-5y-4)\left(9x^2+25y^2+15xy+12x-20y+16\right)$

$(iii)(2-3b-7c)\left(4+9b^2+49c^2+6b-21bc+14c\right)$

$(iv)\left(\sqrt{2}a+2\sqrt{2}b+c\right)\left(2a^2+8b^2+c^2-4ab-2\sqrt{2}bc-\sqrt{2}ac\right)$

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19. Factorise :

$(i)(x-y)^3+(y-z)^3+(z-x)^3$

$(ii)(x-2y)^3+(2y-4z)^3+(4z-x)^3$

$(iv)\left(3\sqrt{2}a-5\sqrt{3}b\right)^3+\left(5\sqrt{3}b-7\sqrt{5}c\right)^3+\left(7\sqrt{5}c-3\sqrt{2}a\right)^3.$

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20. Without actually calculating the cube find the value of the following :

$(i)(-9)^3+(4)^3+(5)^3 \quad (ii)(-18)^3+(9)^3+(9)^3 \quad (iii)(16)^3+(1)^3$

$(iv)(8)^3+(3)^3+(-11)^3.$

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21. 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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22. If $x + y + z = 0$show that $x^3 + y^3 + z^3 = 3xyz$.

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Revision Exercise Very Short Answer Questions

1. Evaluate $\left(\frac{5x}{3} - \frac{y}{2}\right)^2$.

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2. Evaluate without calculating 52^2.

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3. Using properties find (x+3)(x-4).

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4. Evaluate $(a+2b)^3$.

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5. Evaluate $(14)^3+(-8)^3+(-6)^3$.

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

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7. Factorise $a^3-(b-c)^3$.

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8. if a +b+c=9 and ab+bc+ca=26,find $a^2 + b^2 + c^2$.

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9. Simplify : $a^6 - b^6$

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10. Factorise :

$(a + b)^3 - a - b$

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Revision Exercise Short Answer Questions

1. Evaluate $\left(\frac{2}{3}x - \frac{3}{4}y + \frac{4}{5}z\right)^2$.

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2. Evaluate :

$(i)\left(\frac{a}{2b}+\frac{2b}{a}\right)^2-\left(\frac{a}{2b}-\frac{2b}{a}\right)^2-4$

$(ii)(4a+3b)^2-(4a-3b)^2+48ab$

A. 3

B. 2

C. 1

D. 0

Answer: D

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3. If a+b+c=p and ab+bc+ac=q, find $a^2+b^2+c^2$.

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4. Expand : $(2x - 3y + 5)^3$

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5. If $a + b + c = 0$ then prove that $a^3 + b^3 + c^3 = 3abc$

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6. If $a + \frac{1}{a} = p$ and $a \neq 0$, then show that: $a^3 + \frac{1}{a^3} = p(p^2 - 3)$

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7. If $x^3 + y^3 + z^3 = 3xyz$ and x+y+z=0, find the value of $\frac{(x+y)^2}{xy} = \frac{(y+z)^2}{yz} + \frac{(z+x)^2}{zx}$

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8. If $3x - \frac{4}{x} = 4$, find $27x^3 - \frac{64}{x^3}$

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9. Evaluate $0.54 \times 0.54 \times 0.46 \times 0.46$ using identities.

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10. Simplify $(4a + 2b)^3 + (4a - 2b)^3$.

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11. Find the product $(7a - 5b)\left(49a^2 + 35ab + 25b^2\right)$.

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12. If a+b=7 and ab=12 find the value of $a^2 - ab + b^2$.

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13. If x=4 and y=1, find the value of $\left(\frac{x}{2}-\frac{y}{3}\right)\left(\frac{x^2}{4}+\frac{xy}{6}+\frac{y^2}{9}\right)$.

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14. Simplify $\frac{\left(a^2-b^2\right)^3+\left(b^2-c^2\right)^3+\left(c^2-a^2\right)^3}{(a-b)^3+(b-c)^3+(c-a)^3}$

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15. If a+b+c=9 and ab+bc+ca=35, find the value of $a^3+b^3+c^3-3abc$.

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16. Factorize: $3\sqrt{3}a^3-b^3-5\sqrt{5}c^3-3\sqrt{15}abc$

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