MATHEMATICS MCQ BOOKLET

Grade 9 · Chapter 4 · Factorization and Algebraic Manipulation

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Independent MCQs on factorization identities, HCF and LCM of algebraic expressions, algebraic fractions, and square roots. Not copied from the book exercise. Total: 108 questions. Each item has four options, the correct letter, and a short explanation of why it is correct.

A. Important / Main Topics

1. Factorization of an algebraic expression means writing it as a:

(A) product of its factors
(B) sum of unrelated constants only
(C) ratio of two decimals only
(D) list of unrelated words

Correct Answer: A

Explanation: A polynomial is factorized when it is expressed as a product of polynomial factors.

2. The identity used to take out a common monomial factor is:

(A) $a^2 - b^2 = (a + b)(a - b)$ only
(B) $ka + kb + kc = k(a + b + c)$
(C) $a^3 + b^3$ only
(D) $\sin^2\theta + \cos^2\theta = 1$

Correct Answer: B

Explanation: Each term shares the factor k, so k factors out of the whole sum.

3. 6p + 9q + 3r factorizes as:

(A) 3p(2 + 3q + r)
(B) 6(p + q + r)
(C) 3(2p + 3q + r)
(D) 9(p + q + r)

Correct Answer: C

Explanation: The numerical HCF is 3, and 6p + 9q + 3r = 3(2p + 3q + r).

4. Grouping ac + ad + bc + bd yields:

(A) (a + c)(b + d)
(B) (a − b)(c − d)
(C) (ac)(bd)
(D) (a + b)(c + d)

Correct Answer: D

Explanation: Grouping ac + ad + bc + bd yields (a + b)(c + d).

5. xy + 4x + 3y + 12 factorizes as:

(A) (x + 3)(y + 4)
(B) (x + 3)(y + 12)
(C) (x + 4)(y + 3)
(D) (xy + 4)(3 + 12)

Correct Answer: A

Explanation: xy + 4x + 3y + 12 factorizes as (x + 3)(y + 4).

6. $a^2 + 2ab + b^2$ is identical to:

(A) $(a - b)^2$
(B) $(a + b)^2$
(C) $a^2 - b^2$

(D) (a + b)(a − b)

Correct Answer: B

Explanation: The perfect-square identity is $(a + b)^2 = a^2 + 2ab + b^2$.

7. $m^2 - 10m + 25$ equals:

(A) (m − 5)(m + 5)
(B) $(m + 5)^2$
(C) $(m - 5)^2$
(D) $m^2 - 25$

Correct Answer: C

Explanation: $m^2 - 10m + 25$ equals $(m - 5)^2$.

8. The difference of squares identity is:

(A) $a^2 + b^2 = (a + b)^2$
(B) $a^3 - b^3 = (a - b)^2$
(C) $2ab = (a + b)^2$
(D) $a^2 - b^2 = (a - b)(a + b)$

Correct Answer: D

Explanation: The difference of squares identity is $a^2 - b^2 = (a - b)(a + b)$.

9. $t^2 - 49$ factorizes as:

(A) (t − 7)(t + 7)
(B) $(t - 7)^2$
(C) $(t + 7)^2$
(D) t(t − 49)

Correct Answer: A

Explanation: $49 = 7^2$, so $t^2 - 49 = (t - 7)(t + 7)$.

10. $a^2 + 2ab + b^2 - c^2$ factorizes as:

(A) (a − b + c)(a − b − c)
(B) (a + b + c)(a + b − c)
(C) $(a + b)^2 - c$
(D) (a + c)(b − c)

Correct Answer: B

Explanation: It is the difference of squares $(a + b)^2 - c^2$.

11. $a^2 - 2ab + b^2 - c^2$ factorizes as:

(A) (a + b + c)(a + b − c)
(B) $(a - b)^2 + c^2$
(C) (a − b + c)(a − b − c)
(D) (a + c)(a − c)

Correct Answer: C

Explanation: It is $(a - b)^2 - c^2 = (a - b + c)(a - b - c)$.

12. $x^2 - 8x + 16 - 9y^2$ equals:

(A) (x − 4 − 3y) only as a single factor
(B) $(x + 4)^2 - 9y$
(C) (x − 4y)(x + 4y)
(D) (x − 4 − 3y)(x − 4 + 3y)

Correct Answer: D

Explanation: $(x - 4)^2 - (3y)^2$ is a difference of squares.

13. To factor $a^4 + a^2b^2 + b^4$ one first adds and subtracts:

(A) a^2b^2
(B) $2a^4$
(C) $4b^4$

(D) ab

Correct Answer: A

Explanation: To factor $a^4 + a^2b^2 + b^4$ one first adds and subtracts a^2b^2.

14. $a^4 + a^2b^2 + b^4$ factorizes as:

(A) $(a^2 + b^2)^2$
(B) $(a^2 + ab + b^2)(a^2 - ab + b^2)$
(C) $(a^2 + b^2)(a^2 - b^2)$
(D) $(a + b)^4$

Correct Answer: B

Explanation: $a^4 + a^2b^2 + b^4$ factorizes as $(a^2 + ab + b^2)(a^2 - ab + b^2)$.

15. $x^4 + x^2 + 1$ factorizes as:

(A) $(x^2 + 1)^2$
(B) $(x^2 - 1)(x^2 + 1)$
(C) $(x^2 - x + 1)(x^2 + x + 1)$
(D) $(x + 1)^4$

Correct Answer: C

Explanation: $x^4 + x^2 + 1$ factorizes as $(x^2 - x + 1)(x^2 + x + 1)$.

16. The identity $a^4 + 4b^4$ equals:

(A) $(a^2 + 2b^2)^2$
(B) $(a^2 + 4b^2)(a^2 - 4b^2)$
(C) $(a + 2b)^4$
(D) $(a^2 + 2ab + 2b^2)(a^2 - 2ab + 2b^2)$

Correct Answer: D

Explanation: The identity $a^4 + 4b^4$ equals $(a^2 + 2ab + 2b^2)(a^2 - 2ab + 2b^2)$.

17. $x^4 + 4y^4$ factorizes as:

(A) $(x^2 + 2xy + 2y^2)(x^2 - 2xy + 2y^2)$
(B) $(x^2 + 2y^2)^2$
(C) $(x^2 + 4y^2)(x^2 - y^2)$
(D) $(x + y)^4$

Correct Answer: A

Explanation: This is $a^4 + 4b^4$ with $a = x$ and $b = y$.

18. For the trinomial $x^2 + px + q$ one splits the middle term using two numbers whose:

(A) quotient is p and difference is q
(B) product is q and sum is p
(C) product is p and sum is q
(D) sum is always 0

Correct Answer: B

Explanation: If those numbers are r and s, then $x^2 + (r + s)x + rs = (x + r)(x + s)$.

19. $n^2 + 8n + 15$ factorizes as:

(A) $(n + 15)(n + 1)$
(B) $(n - 3)(n - 5)$
(C) $(n + 3)(n + 5)$
(D) $(n + 8)(n + 15)$

Correct Answer: C

Explanation: $n^2 + 8n + 15$ factorizes as $(n + 3)(n + 5)$.

20. $w^2 - 11w + 24$ factorizes as:

(A) $(w - 24)(w - 1)$
(B) $(w + 3)(w + 8)$
(C) $(w - 11)(w + 24)$

(D) $(w - 3)(w - 8)$

Correct Answer: D

Explanation: Both factors are negative: $(-3)(-8) = 24$ and $-3 + (-8) = -11$.

21. $k^2 + 2k - 15$ factorizes as:

(A) $(k + 5)(k - 3)$
(B) $(k + 15)(k - 1)$
(C) $(k - 5)(k + 3)$
(D) $(k + 2)(k - 15)$

Correct Answer: A

Explanation: $k^2 + 2k - 15$ factorizes as $(k + 5)(k - 3)$.

22. $u^2 - 2u - 24$ factorizes as:

(A) $(u - 24)(u + 1)$
(B) $(u - 6)(u + 4)$
(C) $(u + 6)(u - 4)$
(D) $(u - 2)(u - 12)$

Correct Answer: B

Explanation: $u^2 - 2u - 24$ factorizes as $(u - 6)(u + 4)$.

23. For $ax^2 + bx + c$ one lists factor pairs of:

(A) $a + c$ only
(B) b^2 only
(C) the product ac, then splits bx
(D) $a - c$ only

Correct Answer: C

Explanation: The split pair must multiply to ac and add to b.

24. $2x^2 + 7x + 3$ factorizes as:

(A) $(2x + 3)(x + 1)$
(B) $(2x - 1)(x - 3)$
(C) $(x + 7)(2x + 3)$
(D) $(2x + 1)(x + 3)$

Correct Answer: D

Explanation: $2x^2 + 7x + 3$ factorizes as $(2x + 1)(x + 3)$.

25. $3x^2 + 11x - 4$ factorizes as:

(A) $(3x - 1)(x + 4)$
(B) $(3x + 1)(x - 4)$
(C) $(3x + 4)(x - 1)$
(D) $(x + 11)(3x - 4)$

Correct Answer: A

Explanation: $3x^2 + 11x - 4$ factorizes as $(3x - 1)(x + 4)$.

26. $6x^2 - x - 2$ factorizes as:

(A) $(6x - 2)(x + 1)$
(B) $(3x - 2)(2x + 1)$
(C) $(3x + 2)(2x - 1)$
(D) $(6x + 1)(x - 2)$

Correct Answer: B

Explanation: $6x^2 - x - 2$ factorizes as $(3x - 2)(2x + 1)$.

27. To factor $(ax^2 + bx + c)(ax^2 + bx + d) + k$ a useful substitution is:

(A) let $y = ax^2$ only
(B) let $y = c + d$
(C) let $y = ax^2 + bx$

(D) let y = k

Correct Answer: C

Explanation: To factor $(ax^2 + bx + c)(ax^2 + bx + d) + k$ a useful substitution is let $y = ax^2 + bx$.

28. $(y^2 + y - 2)(y^2 + y + 4) + 5$ is first rewritten by setting:

(A) $z = y^2$ only
(B) $z = -2 + 4$
(C) $z = 5y$
(D) $z = y^2 + y$

Correct Answer: D

Explanation: Both quadratics share $y^2 + y$, so that common piece is the substitution.

29. For $(x + a)(x + b)(x + c)(x + d) + k$ one pairs binomials so that:

(A) the sums of the paired constants are equal
(B) the products of constants are 0
(C) all four constants are equal
(D) k is ignored

Correct Answer: A

Explanation: Equal constant-sums give two quadratics with the same $x^2 + Sx$ middle part.

30. $(x + 1)(x + 6)(x + 2)(x + 5)$ is paired as $(x + 1)(x + 6)$ with $(x + 2)(x + 5)$ because:

(A) $1 \times 6 = 2 + 5$
(B) $1 + 6 = 2 + 5 = 7$
(C) $1 + 2 = 6 + 5$
(D) the pairing is random

Correct Answer: B

Explanation: Equal sums 7 and 7 produce a common $x^2 + 7x$ for substitution.

31. For $(x + a)(x + b)(x + c)(x + d) + kx^2$ one pairs binomials so that:

(A) the sums of constants are 0
(B) k equals x
(C) the products of the paired constants are equal
(D) all constants are 1

Correct Answer: C

Explanation: For $(x + a)(x + b)(x + c)(x + d) + kx^2$ one pairs binomials so that the products of the paired constants are equal.

32. $(x + 1)(x + 8)(x + 2)(x + 4)$ is a product-pairing because:

(A) $1 + 8 = 2 + 4$
(B) $1 \times 2 = 8 \times 4$
(C) $8 - 4 = 1 \times 2$
(D) $1 \times 8 = 2 \times 4 = 8$

Correct Answer: D

Explanation: The constant products 8 and 8 match, which is the Type-III (c) pairing rule.

33. $a^3 + 3a^2b + 3ab^2 + b^3$ is identical to:

(A) $(a + b)^3$
(B) $(a - b)^3$
(C) $a^3 + b^3$
(D) $(a + b)(a^2 + b^2)$

Correct Answer: A

Explanation: $a^3 + 3a^2b + 3ab^2 + b^3$ is identical to $(a + b)^3$.

34. $a^3 - 3a^2b + 3ab^2 - b^3$ is identical to:

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

(C) $a^3 - b^3$ only as two factors
(D) $(a - b)(a + b)$

Correct Answer: B

Explanation: $a^3 - 3a^2b + 3ab^2 - b^3$ is identical to $(a - b)^3$.

35. $8x^3 + 12x^2 + 6x + 1$ factorizes as:

(A) $(2x - 1)^3$
(B) $(8x + 1)^3$
(C) $(2x + 1)^3$
(D) $(2x + 1)(4x^2 + 1)$

Correct Answer: C

Explanation: $8x^3 + 12x^2 + 6x + 1$ factorizes as $(2x + 1)^3$.

36. $27p^3 - 27p^2 + 9p - 1$ factorizes as:

(A) $(3p + 1)^3$
(B) $(9p - 1)^3$
(C) $(3p - 1)(9p^2 + 1)$
(D) $(3p - 1)^3$

Correct Answer: D

Explanation: $27p^3 - 27p^2 + 9p - 1$ factorizes as $(3p - 1)^3$.

37. The sum-of-cubes identity is:

(A) $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
(B) $a^3 + b^3 = (a + b)^3$
(C) $a^3 + b^3 = (a - b)(a^2 + ab + b^2)$
(D) $a^3 + b^3 = a^3b^3$

Correct Answer: A

Explanation: The linear factor is $a + b$ and the quadratic is $a^2 - ab + b^2$.

38. The difference-of-cubes identity is:

(A) $a^3 - b^3 = (a - b)^3$
(B) $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$
(C) $a^3 - b^3 = (a + b)(a^2 - ab + b^2)$
(D) $a^3 - b^3 = (a - b)^2$

Correct Answer: B

Explanation: The linear factor is $a - b$ and the quadratic is $a^2 + ab + b^2$.

39. $x^3 + 27$ factorizes as:

(A) $(x + 3)^3$
(B) $(x - 3)(x^2 + 3x + 9)$
(C) $(x + 3)(x^2 - 3x + 9)$
(D) $(x + 27)(x^2 + 1)$

Correct Answer: C

Explanation: $27 = 3^3$, so $x^3 + 27 = (x + 3)(x^2 - 3x + 9)$.

40. $8 - 27y^3$ factorizes as:

(A) $(2 - 3y)^3$
(B) $(2 + 3y)(4 - 6y + 9y^2)$
(C) $(8 - 3y)(1 + 9y^2)$
(D) $(2 - 3y)(4 + 6y + 9y^2)$

Correct Answer: D

Explanation: $8 - 27y^3$ factorizes as $(2 - 3y)(4 + 6y + 9y^2)$.

41. $x^3 - 64$ factorizes as:

(A) $(x - 4)(x^2 + 4x + 16)$
(B) $(x - 4)^3$

(C) $(x + 4)(x^2 - 4x + 16)$
(D) $(x - 8)(x^2 + 8)$

Correct Answer: A

Explanation: $64 = 4^3$, so $x^3 - 64 = (x - 4)(x^2 + 4x + 16)$.

42. $x^6 - y^6$ is most efficiently started as:

(A) $(x - y)^6$
(B) a difference of squares $(x^3)^2 - (y^3)^2$
(C) a sum of cubes only
(D) $(x^6)(y^6)$

Correct Answer: B

Explanation: $x^6 - y^6$ is most efficiently started as a difference of squares $(x^3)^2 - (y^3)^2$.

43. The HCF of two or more polynomials is the:

(A) lowest degree polynomial they divide
(B) product of the polynomials
(C) highest-degree polynomial that divides each of them exactly
(D) sum of their degrees

Correct Answer: C

Explanation: HCF takes every common factor to the least power that appears in all of them.

44. The LCM of two or more polynomials is the:

(A) highest-degree common factor
(B) difference of the polynomials
(C) HCF cubed
(D) lowest-degree polynomial exactly divisible by each given polynomial

Correct Answer: D

Explanation: LCM takes every factor to the highest power that appears in any of them.

45. For monomial HCF one takes the HCF of coefficients and, for each common variable, the:

(A) lowest power that appears in all monomials
(B) highest power
(C) sum of the powers
(D) product of the powers

Correct Answer: A

Explanation: For monomial HCF one takes the HCF of coefficients and, for each common variable, the lowest power that appears in all monomials.

46. HCF of $12a^2b$ and $18ab^3$ is:

(A) $36a^2b^3$
(B) $6ab$
(C) $2a^2b^3$
(D) $12ab$

Correct Answer: B

Explanation: HCF of 12 and 18 is 6; lowest powers are a^1 and b^1, so $6ab$.

47. LCM of $12a^2b$ and $18ab^3$ is:

(A) $6ab$
(B) $12a^2b$
(C) $36a^2b^3$
(D) $18ab^3$

Correct Answer: C

Explanation: LCM of 12 and 18 is 36; highest powers are a^2 and b^3, so $36a^2b^3$.

48. HCF of $8x^3y$ and $12xy^4$ is:

(A) $24x^3y^4$

(B) 8xy
(C) $12x^3y$
(D) 4xy

Correct Answer: D

Explanation: HCF of 8 and 12 is 4; lowest powers are x^1 and y^1, so 4xy.

49. LCM of $8x^3y$ and $12xy^4$ is:

(A) $24x^3y^4$
(B) 4xy
(C) $8x^3y$
(D) $12xy^4$

Correct Answer: A

Explanation: LCM of 8 and 12 is 24; highest powers are x^3 and y^4, so $24x^3y^4$.

50. In factored polynomials, HCF uses each common factor to the:

(A) highest power
(B) least power that is common
(C) sum of the powers
(D) power 0

Correct Answer: B

Explanation: In factored polynomials, HCF uses each common factor to the least power that is common.

51. In factored polynomials, LCM uses each factor to the:

(A) least common power
(B) difference of powers
(C) highest power that appears in any of them
(D) power 1 always

Correct Answer: C

Explanation: LCM must be a multiple of every given polynomial.

52. HCF of $2x(x - 1)$ and $4x(x - 1)^2$ is:

(A) $4x(x - 1)^2$
(B) 2x
(C) $(x - 1)^2$
(D) $2x(x - 1)$

Correct Answer: D

Explanation: HCF of $2x(x - 1)$ and $4x(x - 1)^2$ is $2x(x - 1)$.

53. LCM of $2x(x - 1)$ and $4x(x - 1)^2$ is:

(A) $4x(x - 1)^2$
(B) $2x(x - 1)$
(C) $8x^2(x - 1)^3$
(D) $x - 1$

Correct Answer: A

Explanation: LCM of $2x(x - 1)$ and $4x(x - 1)^2$ is $4x(x - 1)^2$.

54. If two polynomials have no common factor other than a constant 1, their HCF is:

(A) their product
(B) 1 (up to a constant unit)
(C) 0
(D) their LCM

Correct Answer: B

Explanation: If two polynomials have no common factor other than a constant 1, their HCF is 1 (up to a constant unit).

55. If two polynomials are coprime, their LCM is:

(A) 1
(B) their difference
(C) their product (up to a constant)
(D) 0

Correct Answer: C

Explanation: If two polynomials are coprime, their LCM is their product (up to a constant).

56. For two polynomials P and Q the relation between HCF and LCM is:

(A) HCF + LCM = P + Q
(B) HCF − LCM = P − Q
(C) LCM = HCF always
(D) HCF × LCM = P × Q

Correct Answer: D

Explanation: For two polynomials P and Q the relation between HCF and LCM is HCF × LCM = P × Q.

57. If P × Q and the HCF of P and Q are known, then LCM equals:

(A) (P × Q) / HCF
(B) P + Q − HCF
(C) HCF / (P × Q)
(D) P − Q

Correct Answer: A

Explanation: If P × Q and the HCF of P and Q are known, then LCM equals (P × Q) / HCF.

58. If the product of two polynomials is $(x - 2)^2(x + 3)$ and their HCF is $(x - 2)$, their LCM is:

(A) $(x - 2)^3(x + 3)$
(B) $(x - 2)(x + 3)$
(C) $(x - 2)^2(x + 3)$
(D) $x - 2$

Correct Answer: B

Explanation: If the product of two polynomials is $(x - 2)^2(x + 3)$ and their HCF is $(x - 2)$, their LCM is $(x - 2)(x + 3)$.

59. Division method for HCF is used mainly when:

(A) the expressions are already monomials
(B) the LCM is 1
(C) factorization of the polynomials is difficult
(D) no variables appear

Correct Answer: C

Explanation: Division method for HCF is used mainly when factorization of the polynomials is difficult.

60. Algebraic fractions with the same denominator are called:

(A) unlike fractions
(B) improper radicals
(C) quadrantal angles
(D) like fractions

Correct Answer: D

Explanation: Like fractions share a denominator, so numerators add or subtract directly.

61. Algebraic fractions with different denominators are called:

(A) unlike fractions
(B) like fractions
(C) integers
(D) perfect cubes

Correct Answer: A

Explanation: Unlike fractions need an LCM of denominators before they can be added.

62. To divide one algebraic fraction by another, multiply the first by the:

(A) square of the second
(B) reciprocal of the second
(C) HCF of the second
(D) degree of the second

Correct Answer: B

Explanation: To divide one algebraic fraction by another, multiply the first by the reciprocal of the second.

63. The product of a non-zero algebraic fraction and its reciprocal is:

(A) 0
(B) the HCF
(C) 1
(D) the LCM

Correct Answer: C

Explanation: The product of a non-zero algebraic fraction and its reciprocal is 1.

64. $(x^2 - 9)/(x + 3)$ simplifies, for $x \neq -3$, to:

(A) $x + 3$
(B) $x^2 - 3$
(C) 9
(D) $x - 3$

Correct Answer: D

Explanation: $x^2 - 9 = (x - 3)(x + 3)$, so the $(x + 3)$ cancels.

65. $(4x^2 - 1)/(2x - 1)$ simplifies, for $2x \neq 1$, to:

(A) $2x + 1$
(B) $2x - 1$
(C) $4x$
(D) $x - 1$

Correct Answer: A

Explanation: $(4x^2 - 1)/(2x - 1)$ simplifies, for $2x \neq 1$, to $2x + 1$.

66. $(2a/3) \times (9/(4a))$ simplifies, for $a \neq 0$, to:

(A) $6a/12$
(B) $3/2$
(C) $8a^2/27$
(D) $2/3$

Correct Answer: B

Explanation: $(2a/3) \times (9/(4a))$ simplifies, for $a \neq 0$, to $3/2$.

67. $(6x^2/y) \div (2x/y)$ simplifies, for $x \neq 0$ and $y \neq 0$, to:

(A) $3x/y^2$
(B) $12x^3/y^2$
(C) $3x$
(D) $y/(3x)$

Correct Answer: C

Explanation: $(6x^2/y) \div (2x/y)$ simplifies, for $x \neq 0$ and $y \neq 0$, to $3x$.

68. $3/(x - 1) + 2/(x - 1)$ equals:

(A) $5 / 2(x - 1)$
(B) $6/(x - 1)^2$
(C) 1
(D) $5/(x - 1)$

Correct Answer: D

Explanation: $3/(x - 1) + 2/(x - 1)$ equals $5/(x - 1)$.

69. $7/(t + 2) - 3/(t + 2)$ equals:

(A) 4/(t + 2)
(B) 4 / 2(t + 2)
(C) 10/(t + 2)
(D) −4/(t + 2)

Correct Answer: A

Explanation: 7/(t + 2) − 3/(t + 2) equals 4/(t + 2).

70. 1/x + 1/y, with xy ≠ 0, equals:

(A) 1/(x + y)
(B) (x + y)/(xy)
(C) xy/(x + y)
(D) 2/(xy)

Correct Answer: B

Explanation: LCM of denominators is xy, so (y + x)/(xy).

71. Reduce $10x^2y / 15xy^2$, for xy ≠ 0, to:

(A) 2x / 3y
(B) 2xy / 3
(C) 10x / 15y
(D) 3y / 2x

Correct Answer: C

Explanation: Cancel 5xy: 10/15 = 2/3 and one x and one y remain as 2x / 3y.

72. A square root of a perfect-square algebraic expression is written with:

(A) only the positive sign
(B) only zero
(C) only the HCF
(D) a ± sign in general

Correct Answer: D

Explanation: If $A^2 = B$ then $A = \pm B$ when working over the reals in this chapter.

73. $\sqrt{(16x^4y^6)}$ equals:

(A) $\pm 4x^2y^3$
(B) $4x^2y^3$ only, never negative
(C) $8x^2y^3$
(D) $\pm 16xy$

Correct Answer: A

Explanation: $\sqrt{(16x^4y^6)}$ equals $\pm 4x^2y^3$.

74. $\sqrt{(x^2 + 6x + 9)}$ equals:

(A) x + 3 only
(B) ±(x + 3)
(C) x − 3
(D) ±(x + 9)

Correct Answer: B

Explanation: $\sqrt{(x^2 + 6x + 9)}$ equals ±(x + 3).

75. $\sqrt{(4x^2 − 12xy + 9y^2)}$ equals:

(A) 2x + 3y
(B) ±(2x + 3y)
(C) ±(2x − 3y)
(D) 4x − 9y

Correct Answer: C

Explanation: $\sqrt{(4x^2 − 12xy + 9y^2)}$ equals ±(2x − 3y).

76. $\sqrt{((5a − 2b)^4)}$ equals:

(A) ±(5a − 2b)
(B) (5a − 2b)⁴
(C) 25a² − 4b²
(D) ±(5a − 2b)²

Correct Answer: D

Explanation: √((5a − 2b)⁴) equals ±(5a − 2b)².

77. In the division method for a square root, the first term of the root is the square root of the:

(A) leading (highest-degree) term
(B) constant term only
(C) middle term only
(D) HCF of coefficients

Correct Answer: A

Explanation: Arrange descending powers, then take √ of the first term as the start of the root.

78. After placing the first root term R, the next divisor begins by:

(A) halving R
(B) doubling the current root
(C) cubing R
(D) erasing R

Correct Answer: B

Explanation: The process mirrors numerical long division for square roots: double the root so far.

79. HCF of (x − 3)(x + 1) and (x − 3)(x + 5) is:

(A) (x + 1)(x + 5)
(B) (x − 3)²
(C) x − 3
(D) x + 1

Correct Answer: C

Explanation: The only common linear factor is x − 3.

80. LCM of (x − 3)(x + 1) and (x − 3)(x + 5) is:

(A) x − 3
(B) (x + 1)(x + 5)
(C) (x − 3)²
(D) (x − 3)(x + 1)(x + 5)

Correct Answer: D

Explanation: LCM of (x − 3)(x + 1) and (x − 3)(x + 5) is (x − 3)(x + 1)(x + 5).

B. Less Important / Secondary Topics

81. Multiplying factors back together is the inverse process of:

(A) factorization
(B) differentiation
(C) taking bearings
(D) converting radians

Correct Answer: A

Explanation: Multiplying factors back together is the inverse process of factorization.

82. 15x²y = (5x)(3xy) illustrates that 5x and 3xy are:

(A) roots of a quadratic
(B) factors of 15x²y
(C) HCF and LCM
(D) unlike fractions

Correct Answer: B

Explanation: $15x^2y = (5x)(3xy)$ illustrates that $5x$ and $3xy$ are factors of $15x^2y$.

83. When the last term of $x^2 + px + q$ is positive and the middle term is negative, the split numbers are usually:

(A) both positive
(B) one zero
(C) both negative
(D) complex

Correct Answer: C

Explanation: When the last term of $x^2 + px + q$ is positive and the middle term is negative, the split numbers are usually both negative.

84. When the last term of $x^2 + px + q$ is negative, the split numbers have:

(A) the same sign
(B) equal absolute values always
(C) product 0
(D) opposite signs

Correct Answer: D

Explanation: A negative product means one positive factor and one negative factor.

85. $x^8 + x^4 + 1$ can be treated like $a^4 + a^2 + 1$ by setting:

(A) $a = x^2$
(B) $a = x$
(C) $a = x^8$
(D) $a = 1/x$

Correct Answer: A

Explanation: Then $a^4 + a^2 + 1 = (a^2 - a + 1)(a^2 + a + 1)$ with $a = x^2$.

86. A polynomial that divides another polynomial exactly is called a:

(A) remainder
(B) factor
(C) bearing
(D) radian

Correct Answer: B

Explanation: That is the algebraic meaning of factor used for HCF.

87. If both given polynomials are multiplied by the same non-zero constant k, the HCF:

(A) is always multiplied by k^2
(B) becomes 0
(C) picks up the factor k only if k is common in the intended coefficient convention
(D) becomes the LCM

Correct Answer: C

Explanation: If both given polynomials are multiplied by the same non-zero constant k, the HCF picks up the factor k only if k is common in the intended coefficient convention.

88. HCF of $7x^2$ and $5y^2$, with distinct variables, is:

(A) $35x^2y^2$
(B) $7x^2$
(C) $5y^2$
(D) 1

Correct Answer: D

Explanation: No common variable and coefficients 7 and 5 are coprime, so HCF is 1.

89. The reciprocal of $(x + 2)/(x - 5)$, for $x \neq 5$ and $x \neq -2$, is:

(A) $(x - 5)/(x + 2)$
(B) $(x + 2)/(x - 5)$

(C) −(x + 2)/(x − 5)
(D) 1

Correct Answer: A

Explanation: The reciprocal of (x + 2)/(x − 5), for x ≠ 5 and x ≠ −2, is (x − 5)/(x + 2).

90. Adding unlike algebraic fractions requires the:

(A) HCF of numerators only
(B) LCM of the denominators
(C) square roots of denominators
(D) degree of the numerators

Correct Answer: B

Explanation: As with arithmetic fractions, a common denominator is the LCM.

91. $(r^2 - s^2)/r \div (r - s)/s$, for $r \neq s$ and $rs \neq 0$, simplifies to:

(A) s/r
(B) r/s
(C) s(r + s)/r
(D) (r − s)/s

Correct Answer: C

Explanation: $(r^2 - s^2)/r \div (r - s)/s$, for $r \neq s$ and $rs \neq 0$, simplifies to $s(r + s)/r$.

92. A quick check after factorization is to:

(A) delete the middle term
(B) replace x by 0 only
(C) take HCF of the factors
(D) expand the factors and recover the original polynomial

Correct Answer: D

Explanation: Multiplication is the inverse check.

93. $x^2 + 4xy + 4y^2 - z^2$ is the difference of squares:

(A) $(x + 2y)^2 - z^2$
(B) $(x + 2y)^2 + z^2$
(C) $x^2 - (2y - z)^2$
(D) $(x + z)^2 - 4y^2$

Correct Answer: A

Explanation: $x^2 + 4xy + 4y^2 - z^2$ is the difference of squares $(x + 2y)^2 - z^2$.

94. The expression $(2x + 3)^3$ expands with middle terms:

(A) $12x^2 + 6x$ only
(B) $3(2x)^2(3) + 3(2x)(3)^2$
(C) only $8x^3 + 27$
(D) 6x + 9

Correct Answer: B

Explanation: $(a + b)^3$ needs the two cross terms $3a^2b$ and $3ab^2$ with $a = 2x$ and $b = 3$.

95. For square roots by factorization one first writes the expression as:

(A) a sum of unlike fractions
(B) a cubic only
(C) a product of squared factors when possible
(D) an LCM

Correct Answer: C

Explanation: For square roots by factorization one first writes the expression as a product of squared factors when possible.

96. If HCF(P, Q) = d, then d divides:

(A) only P

(B) only Q
(C) neither
(D) both P and Q

Correct Answer: D

Explanation: That is the definition of a common factor, and HCF is the greatest such.

97. LCM must be a multiple of each given polynomial, so each original polynomial:

(A) is larger than the LCM in degree always
(B) divides the LCM
(C) equals the HCF
(D) has degree 0

Correct Answer: A

Explanation: "Exactly divisible by each" means each given polynomial divides the LCM.

98. Canceling a common factor in a fraction is valid only where that factor is:

(A) zero
(B) non-zero
(C) equal to the LCM
(D) negative

Correct Answer: B

Explanation: Division by zero is excluded, so state the cancelled factor ≠ 0.

99. HCF of $2(x^2 - 4)$ and $(x - 2)(x + 2)$ is commonly taken as:

(A) $2(x - 2)(x + 2)$
(B) 2 only
(C) $(x - 2)(x + 2)$
(D) $x + 4$

Correct Answer: C

Explanation: The common polynomial factor is $x^2 - 4$; the extra 2 is not shared.

100. $(a + b + c)(a + b - c)$ is the factorization of:

(A) $a^2 - b^2 - c^2$
(B) $(a + b)^2 + c^2$
(C) $a^2 + b^2 + c^2$
(D) $a^2 + 2ab + b^2 - c^2$

Correct Answer: D

Explanation: It is the difference of squares $(a + b)^2 - c^2$.

101. The missing factor in $x^2 - 5x - 14 = (x - 7)(\ )$ is:

(A) $x + 2$
(B) $x - 2$
(C) $x + 7$
(D) $x - 14$

Correct Answer: A

Explanation: The missing factor in $x^2 - 5x - 14 = (x - 7)(\ )$ is $x + 2$.

102. $x^6 + y^6$ can be viewed as a sum of cubes of:

(A) x and y
(B) x^2 and y^2
(C) x^3 and y^3
(D) x^6 and 1

Correct Answer: B

Explanation: $x^6 + y^6$ can be viewed as a sum of cubes of x^2 and y^2.

103. When finding LCM of monomials, repeated factors are written as:

(A) sums

(B) square roots
(C) powers
(D) bearings

Correct Answer: C

Explanation: The highest remaining power of each prime/variable factor is kept.

104. 1/x − 1/y, for xy ≠ 0, equals:

(A) 1/(x − y)
(B) (x − y)/(xy)
(C) 0
(D) (y − x)/(xy)

Correct Answer: D

Explanation: 1/x − 1/y, for xy ≠ 0, equals (y − x)/(xy).

105. $\sqrt{(36x^6y^{16})}$ equals:

(A) $\pm 6x^3y^8$
(B) $6x^6y^{16}$
(C) $\pm 36x^3y^8$
(D) 6xy

Correct Answer: A

Explanation: $\sqrt{36} = 6$, half of each even exponent: x^3 and y^8, with a ± sign.

106. If product of HCF and LCM of two polynomials is $(x^3 - y^3)(x + y)$, then the product of the polynomials is:

(A) $x^4 - y^4$ only as a guess
(B) $(x^3 - y^3)(x + y)$
(C) x − y
(D) 1

Correct Answer: B

Explanation: If product of HCF and LCM of two polynomials is $(x^3 - y^3)(x + y)$, then the product of the polynomials is $(x^3 - y^3)(x + y)$.

107. A substitution variable used in Type-III factorization should be a letter:

(A) already used as a given variable
(B) always equal to k
(C) not already present in the expression
(D) always θ

Correct Answer: C

Explanation: A substitution variable used in Type-III factorization should be a letter not already present in the expression.

108. $(x - 1/x)^3$ expands to a form that matches Type-IV with a = x and b =:

(A) x
(B) −x
(C) 3x
(D) 1/x

Correct Answer: D

Explanation: $(a - b)^3$ with $b = 1/x$ produces $x^3 - 3x + 3/x - 1/x^3$ after simplification.