MATHEMATICS MCQ BOOKLET

Grade 10 · Chapter 5 · Algebraic Fractions

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Independent MCQs on rational expressions, factorization, simplifying fractions, operations on algebraic fractions, and rational equations. 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. An algebraic expression connects variables and constants using:

(A) arithmetic operations +, −, ×, ÷
(B) only addition
(C) only equality signs
(D) Roman numerals only

Correct Answer: A

Explanation: Algebraic expressions combine symbols with the four basic operations.

2. A polynomial has exponents that are:

(A) any real numbers including fractions
(B) non-negative integers on every variable
(C) always negative
(D) always irrational

Correct Answer: B

Explanation: A polynomial has exponents that are non-negative integers on every variable.

3. Which is a polynomial?

(A) x□³ + 1
(B) √y + 1/y
(C) x² + 3x − 1
(D) 2y^(1/2)

Correct Answer: C

Explanation: X² + 3x − 1 — this correctly answers the question.

4. Which is NOT a polynomial?

(A) x² − 4
(B) 3x + 5
(C) −7
(D) 1/x

Correct Answer: D

Explanation: 1/x = x□¹ has a negative exponent, so it is not a polynomial.

5. A rational expression has the form:

(A) P(x)/Q(x) with Q(x) ≠ 0
(B) √P(x) only
(C) P(x) + Q(x) always
(D) P(x) = 0 only

Correct Answer: A

Explanation: A rational expression is a ratio of polynomials with non-zero denominator.

6. Which is a rational expression?

(A) √(x + 1)
(B) (2x − 1)/(x² + 3)
(C) x^(1/2) + 1

(D) √[3]{y⁴}

Correct Answer: B

Explanation: (2x − 1)/(x² + 3) is a quotient of polynomials.

7. The constant 5 regarded as a rational expression equals:

(A) 5/0
(B) 1/5 only
(C) 5/1
(D) 0/5 undefined always

Correct Answer: C

Explanation: Every integer n can be written as n/1, a rational expression.

8. To reduce (x² + x)/(x³ + x) one first:

(A) add exponents only
(B) multiply top and bottom by x always
(C) ignore the domain
(D) factor numerator and denominator, then cancel common factors

Correct Answer: D

Explanation: To reduce (x² + x)/(x³ + x) one first factor numerator and denominator, then cancel common factors.

9. (x² + x)/(x³ + x) in lowest terms is:

(A) (x + 1)/(x² + 1)
(B) (x + 1)/x
(C) x/(x + 1)
(D) 1/(x + 1)

Correct Answer: A

Explanation: Cancel the common factor x from numerator and denominator.

10. The degree of $6x^2yz + 12xy^6z^6 + 9z^4$ is:

(A) 4
(B) 13
(C) 6
(D) 2

Correct Answer: B

Explanation: The degree of $6x^2yz + 12xy^6z^6 + 9z^4$ is 13.

11. A monomial has:

(A) exactly two terms
(B) at least three terms
(C) exactly one term
(D) no variables

Correct Answer: C

Explanation: Mono means one; a monomial is a single-term polynomial.

12. A binomial has:

(A) exactly one term
(B) exactly three terms
(C) no constants
(D) exactly two terms

Correct Answer: D

Explanation: Bi means two terms, such as x + 3, so the correct choice is exactly two terms.

13. A trinomial has:

(A) exactly three terms
(B) exactly two terms
(C) exactly one term

(D) degree 3 only

Correct Answer: A

Explanation: Tri means three terms, such as $x^2 + 2x + 1$.

14. Factor $x^2 - 49$:

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

Correct Answer: B

Explanation: Factor $x^2 - 49$ $(x - 7)(x + 7)$.

15. Factor $x^2 - x - 20$:

(A) $(x - 4)(x + 5)$
(B) $(x - 20)(x + 1)$
(C) $(x - 5)(x + 4)$
(D) $(x - 2)(x + 10)$

Correct Answer: C

Explanation: Factor $x^2 - x - 20$ $(x - 5)(x + 4)$.

16. Factor $2x^2 + 7x + 3$:

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

Correct Answer: D

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

17. Factor $x^3 - y^3$:

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

Correct Answer: A

Explanation: Factor $x^3 - y^3$ $(x - y)(x^2 + xy + y^2)$.

18. Factor $2x^2 - 11x - 21$:

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

Correct Answer: B

Explanation: Factor $2x^2 - 11x - 21$ $(2x + 3)(x - 7)$.

19. Factor $x^2 - 49$ in the denominator $x^2 - 49$:

(A) $(x - 7)^2$
(B) $x - 49$
(C) $(x - 7)(x + 7)$
(D) cannot be factored

Correct Answer: C

Explanation: It is a difference of squares, so the correct choice is $(x - 7)(x + 7)$.

20. Simplify $(x^2 - 9)/(x^2 + 2x) \cdot x/(x + 3)$:

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

(D) (x − 3)/(x + 2)

Correct Answer: D

Explanation: Simplify (x² − 9)/(x² + 2x) · x/(x + 3) (x − 3)/(x + 2).

21. Simplify (x² − x − 20) · 3/(x³ + 4x²):

(A) 3(x − 5)/x²
(B) 3(x + 4)/x
(C) 3(x − 5)(x + 4)/x²
(D) 3/x

Correct Answer: A

Explanation: Simplify (x² − x − 20) · 3/(x³ + 4x²) 3(x − 5)/x².

22. Multiply a/b by c/d gives:

(A) ad/bc
(B) ac/bd
(C) (a + c)/(b + d)
(D) ab/cd

Correct Answer: B

Explanation: Multiply a/b by c/d gives ac/bd.

23. Divide a/b by c/d equals:

(A) ac/bd
(B) bc/ad
(C) ad/bc
(D) (a − c)/(b − d)

Correct Answer: C

Explanation: Divide a/b by c/d equals ad/bc.

24. (2x² − 11x − 21)/(x² − 49) ÷ (2x + 3)/(x + 7) simplifies to:

(A) (x − 7)/(x + 7)
(B) (2x + 3)/(x − 7)
(C) x + 7
(D) 1

Correct Answer: D

Explanation: (2x² − 11x − 21)/(x² − 49) ÷ (2x + 3)/(x + 7) simplifies to 1.

25. Add x/2 and x/5:

(A) 7x/10
(B) x/7
(C) 3x/10
(D) x/10

Correct Answer: A

Explanation: Add x/2 and x/5 7x/10.

26. Add (x − 2)/2 and (x + 10)/9:

(A) (2x + 8)/11
(B) (11x + 16)/18
(C) (x + 8)/18
(D) 11x/18

Correct Answer: B

Explanation: Add (x − 2)/2 and (x + 10)/9 (11x + 16)/18.

27. Add 3x/(x + 5) and 10/(5x + 25):

(A) 3x/(x + 5) only
(B) 13x/(x + 5)
(C) (3x² + 17x + 10)/[5(x + 5)²]

(D) 1

Correct Answer: C

Explanation: Add 3x/(x + 5) and 10/(5x + 25) $(3x^2 + 17x + 10)/[5(x + 5)^2]$.

28. Subtract 7 from (23 − x)/5:

(A) (x − 12)/5
(B) (16 − x)/5
(C) (x − 35)/5
(D) (23 − x − 35)/5 = (−x − 12)/5

Correct Answer: D

Explanation: 7 = 35/5, so (23 − x − 35)/5 = (−x − 12)/5.

29. Simplify x/2 + x/3 − x/4 + x/5:

(A) 47x/60
(B) 77x/60
(C) 13x/60
(D) x/60

Correct Answer: A

Explanation: Simplify x/2 + x/3 − x/4 + x/5 47x/60.

30. Simplify 2/(x + 1) + x/(x − 1) − (x + 2)/(x − 1):

(A) $2x/(x^2 - 1)$
(B) 2/(x + 1) − 2/(x − 1)
(C) 0
(D) $4/(x^2 - 1)$

Correct Answer: B

Explanation: Simplify 2/(x + 1) + x/(x − 1) − (x + 2)/(x − 1) 2/(x + 1) − 2/(x − 1).

31. Simplify $(x^2 - 25)/5 - x/4 \div 3x/20$:

(A) (x − 5)/5
(B) x/3
(C) $(x^2 - 25)/5 - 5/3$
(D) 1

Correct Answer: C

Explanation: $x/4 \div 3x/20 = (x/4)(20/3x) = 5/3$, so the correct choice is $(x^2 - 25)/5 - 5/3$.

32. Divide $x^4 - 10x^2 + 9$ by $x^2 - 2x - 3$:

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

Correct Answer: D

Explanation: Divide $x^4 - 10x^2 + 9$ by $x^2 - 2x - 3$ $x^2 + 2x - 3$.

33. Divide $x^3 - 3x^2y + 3xy^2 - y^3$ by x − y:

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

Correct Answer: A

Explanation: The dividend is $(x - y)^3$, so quotient is $(x - y)^2 = x^2 - 2xy + y^2$.

34. Simplify $(4x^2 - 16)/(5x) \div (2x + 4)/15$:

(A) 12/x
(B) 6(x − 2)/x
(C) 4(x − 2)/x

(D) 6/x

Correct Answer: B

Explanation: Simplify (4x² − 16)/(5x) ÷ (2x + 4)/15 6(x − 2)/x.

35. Simplify (x² + 5x)/(x − 3) ÷ (x² − 25)/(x − 3):

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

Correct Answer: C

Explanation: Simplify (x² + 5x)/(x − 3) ÷ (x² − 25)/(x − 3) x/(x − 5).

36. For a rational expression, values making the denominator zero are:

(A) always solutions
(B) ignored in all steps
(C) added to the numerator
(D) excluded from the domain

Correct Answer: D

Explanation: Division by zero is undefined, so those x-values are excluded.

37. Solve 12/(x² − 16) − 24/(x − 4) = 3:

(A) x = −2 after checking domain
(B) x = 4
(C) x = 0
(D) no solution

Correct Answer: A

Explanation: Solve 12/(x² − 16) − 24/(x − 4) = 3 x = −2 after checking domain.

38. Solve y/(2y − 6) − 3/(y² − 6y + 9) = (y − 2)/(3y − 9):

(A) y = 3 always
(B) requires y ≠ 3 and clearing denominators
(C) y = 0 only
(D) all real y

Correct Answer: B

Explanation: Denominators factor with (y − 3); y = 3 must be excluded before solving.

39. When checking a rational-equation solution one must verify:

(A) only the numerator
(B) x = 0 always
(C) no denominator becomes zero
(D) only positive x

Correct Answer: C

Explanation: Extraneous values can appear if they zero a denominator.

40. Simplify x/(x + 2) − (5x + 3)/(x − 2) + 1/2:

(A) x only
(B) cancel all terms to 0
(C) cannot be simplified
(D) combine over LCD (x + 2)(x − 2)

Correct Answer: D

Explanation: Simplify x/(x + 2) − (5x + 3)/(x − 2) + 1/2 combine over LCD (x + 2)(x − 2).

41. Simplify [x/(x² − y²)] · [(x² + 2xy + y²)/(x + y)] ÷ 3x/(x − y):

(A) 1/[3(x + y)] after cancellation
(B) x − y
(C) 3x

(D) x + y

Correct Answer: A

Explanation: Simplify [x/(x² − y²)] · [(x² + 2xy + y²)/(x + y)] ÷ 3x/(x − y) 1/[3(x + y)] after cancellation.

42. The set 7, 24, 25 forms a right triangle because:

(A) 7 + 24 = 25
(B) $7^2 + 24^2 = 25^2$
(C) $7^2 = 24^2 + 25^2$
(D) 25 − 24 = 1 only

Correct Answer: B

Explanation: The set 7, 24, 25 forms a right triangle because $7^2 + 24^2 = 25^2$.

43. The set 3, 4, 5 forms a right triangle because:

(A) 3 + 4 = 6
(B) $5^2 = 3 + 4$
(C) $3^2 + 4^2 = 5^2$
(D) 3·4 = 5

Correct Answer: C

Explanation: 9 + 16 = 25 shows a right triangle, so the correct choice is $3^2 + 4^2 = 5^2$.

44. The set 12, 35, 36 does NOT form a right triangle because:

(A) 12 + 35 = 36
(B) 36 is prime
(C) 35 is even
(D) $12^2 + 35^2 \neq 36^2$

Correct Answer: D

Explanation: 144 + 1225 = 1369 ≠ 1296, so the correct choice is $12^2 + 35^2 \neq 36^2$.

45. If a = 3, b = 4, c = 1, then √(2ab + 4ac) + √(9b) + 2abc/3 equals:

(A) 20
(B) 11
(C) 44/3
(D) 38/3

Correct Answer: A

Explanation: √36 + √36 + 8 = 6 + 6 + 8 = 20, so the correct choice is 20.

46. René Descartes introduced letters for unknowns in about:

(A) 820 AD
(B) 1637
(C) 1202
(D) 628 AD

Correct Answer: B

Explanation: René Descartes introduced letters for unknowns in about 1637.

47. Al-Khwarizmi is called the Father of Algebra for his work in:

(A) 1637
(B) 1525
(C) 820 AD
(D) 628 AD

Correct Answer: C

Explanation: His Hisab al-Jabr wal-Muqabala dates from about 820 AD.

48. Overtime pay at Rs. 60 per hour for t hours is modeled by:

(A) 60 + t
(B) t/60
(C) 60/t

(D) 60t

Correct Answer: D

Explanation: Overtime pay at Rs. 60 per hour for t hours is modeled by 60t.

49. A rational expression in lowest terms has:

(A) no common factor between numerator and denominator except 1
(B) equal numerator and denominator
(C) degree zero always
(D) no variables

Correct Answer: A

Explanation: Fully cancelled common factors define lowest terms.

50. Factor $x^2 + 5x + 6$:

(A) $(x + 1)(x + 6)$
(B) $(x + 2)(x + 3)$
(C) $(x - 2)(x - 3)$
(D) $(x + 5)(x + 1)$

Correct Answer: B

Explanation: 2 and 3 multiply to 6 and add to 5, so the correct choice is $(x + 2)(x + 3)$.

51. Factor $x^2 - 7x + 12$:

(A) $(x + 3)(x + 4)$
(B) $(x - 2)(x - 6)$
(C) $(x - 3)(x - 4)$
(D) $(x - 1)(x - 12)$

Correct Answer: C

Explanation: -3 and -4 multiply to 12 and add to -7, so the correct choice is $(x - 3)(x - 4)$.

52. Simplify $(x^2 - 4)/(x - 2)$:

(A) $x - 2$
(B) $x + 2$ for all x including 2
(C) 1
(D) $x + 2$ for $x \neq 2$

Correct Answer: D

Explanation: $(x - 2)(x + 2)/(x - 2) = x + 2$ with $x \neq 2$.

53. Simplify $(x^3 - 8)/(x - 2)$:

(A) $x^2 + 2x + 4$ for $x \neq 2$
(B) $x^2 - 2x + 4$
(C) $x + 2$
(D) $x^2 + 4$

Correct Answer: A

Explanation: Difference of cubes gives $x^2 + 2x + 4$, so the correct choice is $x^2 + 2x + 4$ for $x \neq 2$.

54. Add $4/(x + 1)$ and $2/(x - 1)$:

(A) $6/(x^2 - 1)$
(B) $(6x - 2)/[(x + 1)(x - 1)]$
(C) $2/(x + 1)$
(D) $4x/(x^2 - 1)$

Correct Answer: B

Explanation: Add $4/(x + 1)$ and $2/(x - 1)$ $(6x - 2)/[(x + 1)(x - 1)]$.

55. Complex rational expressions are simplified using:

(A) only addition
(B) only squaring
(C) BODMAS and fraction rules

(D) Roman numerals

Correct Answer: C

Explanation: Order of operations applies as in arithmetic.

56. The expression $(2x + 4)/(x^2 + 5x + 6)$ factors as:

(A) $2/(x + 2)$

(B) $x + 2$

(C) $2x/(x + 3)$

(D) $2/(x + 3)$ after cancelling $x + 2$

Correct Answer: D

Explanation: The expression $(2x + 4)/(x^2 + 5x + 6)$ factors as $2/(x + 3)$ after cancelling $x + 2$.

57. Subtract the sum of $2x^3 - 3x + 4$ and $-3x^2 + 2x - 7$ from $4x^3 - 3x^2 + x - 6$ involves:

(A) combining like polynomials first

(B) only multiplication

(C) only division

(D) no grouping

Correct Answer: A

Explanation: Add the subtrahend polynomials, then subtract from the minuend.

58. Divide the product $(x - 2)(x + 3)(2x - 7)$ by a quadratic denominator requires:

(A) adding exponents only

(B) expanding or factoring both parts

(C) ignoring $(x - 2)$

(D) squaring each factor

Correct Answer: B

Explanation: Divide the product $(x - 2)(x + 3)(2x - 7)$ by a quadratic denominator requires expanding or factoring both parts.

59. If $P(x)/Q(x)$ is rational and $Q(a) = 0$, then $x = a$ is:

(A) always a solution

(B) always in the range

(C) not in the domain

(D) the y-intercept

Correct Answer: C

Explanation: Denominator zero excludes that input value.

60. The expression $3/(4x^2)$ is rational because:

(A) it contains a square root

(B) x has fractional exponent in numerator

(C) it equals 0

(D) it is a constant over a polynomial

Correct Answer: D

Explanation: $4x^2$ is a polynomial and 3 is a constant numerator.

61. Simplify $(m + 3)/(24m) - (m + 1)/(24m)$:

(A) $1/(12m)$

(B) $2/(24m)$

(C) $1/(24m)$

(D) $m/12$

Correct Answer: A

Explanation: Simplify $(m + 3)/(24m) - (m + 1)/(24m)$ $1/(12m)$.

62. For $(1 - p^2)/(1 + q) \cdot (1 - q^2)/(p + p^2)$, cancellation uses:

(A) adding numerators

(B) factor $1 - p^2 = (1 - p)(1 + p)$ and $1 - q^2 = (1 - q)(1 + q)$

(C) p = q
(D) no factoring

Correct Answer: B

Explanation: For $(1 - p^2)/(1 + q) \cdot (1 - q^2)/(p + p^2)$, cancellation uses factor $1 - p^2 = (1 - p)(1 + p)$ and $1 - q^2 = (1 - q)(1 + q)$.

63. Rational equations are solved by:

(A) squaring every term always
(B) ignoring denominators
(C) multiplying through by the LCD and checking restrictions
(D) graphing only

Correct Answer: C

Explanation: Clear fractions with the least common denominator, then solve and verify.

64. An irrational expression may contain:

(A) only integer powers
(B) only constants
(C) only one term always
(D) variable under a radical or fractional exponent not allowed in polynomials

Correct Answer: D

Explanation: An irrational expression may contain variable under a radical or fractional exponent not allowed in polynomials.

65. The numerator and denominator of a rational expression may both be multiplied by the same non-zero expression to:

(A) obtain an equivalent fraction
(B) change the value always
(C) make the denominator zero
(D) remove variables

Correct Answer: A

Explanation: The numerator and denominator of a rational expression may both be multiplied by the same non-zero expression to obtain an equivalent fraction.

66. When dividing polynomials, the result is:

(A) always 1
(B) quotient (and possibly remainder)
(C) always 0
(D) always the product

Correct Answer: B

Explanation: When dividing polynomials, the result is quotient (and possibly remainder).

67. Factor 6p + 9q + 3r:

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

Correct Answer: C

Explanation: HCF 3 factors out of all three terms, so the correct choice is 3(2p + 3q + r).

68. Group ac + ad + bc + bd as:

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

Correct Answer: D

Explanation: a(c + d) + b(c + d) = (a + b)(c + d), so the correct choice is (a + b)(c + d).

69. Group xy + 4x + 3y + 12 as:

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

Correct Answer: A

Explanation: x(y + 4) + 3(y + 4) = (x + 3)(y + 4), so the correct choice is (x + 3)(y + 4).

70. The identity $a^2 - b^2$ equals:

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

Correct Answer: B

Explanation: Difference of squares factors as (a − b)(a + b).

71. The identity $(a + b)^2$ equals:

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

Correct Answer: C

Explanation: Perfect square trinomial expansion, so the correct choice is $a^2 + 2ab + b^2$.

72. The identity $(a - b)^2$ equals:

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

Correct Answer: D

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

73. Factor $m^2 - 10m + 25$:

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

Correct Answer: A

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

74. Factor $t^2 - 49$:

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

Correct Answer: B

Explanation: $49 = 7^2$, so difference of squares applies.

75. For $ax^2 + bx + c$, split bx using numbers whose product is ac and sum is b when:

(A) a = 0
(B) c = 0 always
(C) $a \neq 1$ requires the ac method
(D) b = 0 only

Correct Answer: C

Explanation: When leading coefficient is not 1, factor pairs of ac split the middle term.

76. Factor $n^2 + 8n + 15$:

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

Correct Answer: D

Explanation: 3 and 5 multiply to 15 and add to 8, so the correct choice is (n + 3)(n + 5).

77. Factor $w^2 - 11w + 24$:

(A) (w − 3)(w − 8)
(B) (w − 24)(w − 1)
(C) (w + 3)(w + 8)
(D) (w − 11)(w + 24)

Correct Answer: A

Explanation: Factor $w^2 - 11w + 24$ (w − 3)(w − 8).

78. Factor $k^2 + 2k - 15$:

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

Correct Answer: B

Explanation: 5 and −3 multiply to −15 and add to 2, so the correct choice is (k + 5)(k − 3).

79. Factor $u^2 - 2u - 24$:

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

Correct Answer: C

Explanation: −6 and 4 multiply to −24 and add to −2, so the correct choice is (u − 6)(u + 4).

80. Factor $2x^2 + 7x + 3$ using ac = 6 split:

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

Correct Answer: D

Explanation: Factor $2x^2 + 7x + 3$ using ac = 6 split (2x + 1)(x + 3).

B. Less Important / Secondary Topics

81. Muhammad ibn Musa al-Khwarizmi wrote on algebra in Arabic as:

(A) Hisab al-Jabr wal-Muqabala
(B) Principia Mathematica
(C) Elements
(D) Liber Abaci only

Correct Answer: A

Explanation: That title gives us the word algebra from al-jabr.

82. X-rays were named for unknown radiation, linking to the letter:

(A) y for output
(B) x for unknown
(C) z for complex

(D) a for constant

Correct Answer: B

Explanation: Scientists called them unknown rays, echoing algebraic x.

83. A polynomial with respect to variables can be classified by:

(A) color only
(B) page number
(C) terms, degree, coefficients, and variables
(D) only constants

Correct Answer: C

Explanation: A polynomial with respect to variables can be classified by terms, degree, coefficients, and variables.

84. The expression $z - \sqrt{2}t$ is algebraic but:

(A) always rational
(B) always an integer
(C) degree zero
(D) not a polynomial because of the radical in $\sqrt{2}t$ if t is variable

Correct Answer: D

Explanation: The expression $z - \sqrt{2}t$ is algebraic but not a polynomial because of the radical in $\sqrt{2}t$ if t is variable.

85. Whole numbers as coefficients like 1/2, −π, 22/7 are:

(A) real coefficients allowed in polynomials
(B) not allowed ever
(C) only in denominators
(D) only irrational

Correct Answer: A

Explanation: Coefficients may be any real numbers; exponents on variables must be whole.

86. Memory Plus: rational expressions have variable exponents that are:

(A) always fractions
(B) integers in numerator and denominator polynomials
(C) always negative only
(D) always irrational

Correct Answer: B

Explanation: Memory Plus: rational expressions have variable exponents that are integers in numerator and denominator polynomials.

87. Reduction step 1 is:

(A) add numerators
(B) multiply by zero
(C) factor completely
(D) remove variables

Correct Answer: C

Explanation: Reduction step 1 is factor completely.

88. Reduction step 2 is:

(A) add denominators
(B) take square roots
(C) set x = 0
(D) divide by common factors

Correct Answer: D

Explanation: Reduction step 2 is divide by common factors.

89. Reduction step 3 is:

(A) rewrite the simplified fraction
(B) graph on number line

(C) ignore restrictions
(D) multiply by LCD only

Correct Answer: A

Explanation: Reduction step 3 is rewrite the simplified fraction.

90. When subtracting rational expressions, rewrite as:

(A) multiplication only
(B) addition of the opposite
(C) division always
(D) absolute value

Correct Answer: B

Explanation: When subtracting rational expressions, rewrite as addition of the opposite.

91. Nested fractions like 1 − x/(1 + x/(1 − x)) require:

(A) only addition
(B) ignoring inner fractions
(C) working from inner denominators outward
(D) squaring first

Correct Answer: C

Explanation: Complex fractions simplify stepwise from the innermost layer.

92. Checking denominators after solving prevents:

(A) factoring
(B) adding fractions
(C) finding LCD
(D) extraneous roots

Correct Answer: D

Explanation: Values that zero a denominator must be rejected.

93. Right-triangle sets are tested using:

(A) $a^2 + b^2 = c^2$ with c the hypotenuse
(B) a + b = c always
(C) $a^2 = b^2$
(D) a/b = c

Correct Answer: A

Explanation: Pythagoras links legs and hypotenuse, so the correct choice is $a^2 + b^2 = c^2$ with c the hypotenuse.

94. The set 1.6, 6.3, 6.5 is a right triangle because:

(A) 1.6 + 6.3 = 6.5
(B) $1.6^2 + 6.3^2 = 6.5^2$
(C) 6.5 is largest only
(D) 6.3 is prime

Correct Answer: B

Explanation: $2.56 + 39.69 = 42.25 = 6.5^2$, so the correct choice is $1.6^2 + 6.3^2 = 6.5^2$.

95. Algebra is described as an extension of:

(A) geometry only
(B) calculus
(C) arithmetic
(D) statistics only

Correct Answer: C

Explanation: Algebra is described as an extension of arithmetic.

96. Grouping symbols in expressions include:

(A) only commas
(B) only absolute value

(C) only radicals
(D) parentheses, brackets, and braces

Correct Answer: D

Explanation: Grouping symbols in expressions include parentheses, brackets, and braces.

97. A zero polynomial is:

(A) Q(x) = 0, not allowed as denominator
(B) any constant
(C) x + 1
(D) always numerator only

Correct Answer: A

Explanation: Division by the zero polynomial is undefined.

98. Irrational expressions include:

(A) 3x + 1
(B) $\sqrt{(b^2 - 4ac)}$ with variable under root
(C) 5/7
(D) x^2

Correct Answer: B

Explanation: Irrational expressions include $\sqrt{(b^2 - 4ac)}$ with variable under root.

99. Historical note: Fibonacci helped spread Hindu-Arabic numerals for:

(A) poetry only
(B) astronomy only
(C) practical trade and accounts
(D) tally marks

Correct Answer: C

Explanation: Merchants needed efficient calculation, so the correct choice is practical trade and accounts.

100. When multiplying two rational expressions, factor:

(A) after adding only
(B) never
(C) only constants
(D) before multiplying to ease cancellation

Correct Answer: D

Explanation: Factoring first exposes terms that cancel across multiply.

101. Division of fractions uses:

(A) multiply by reciprocal
(B) add denominators
(C) subtract numerators
(D) cross-add only

Correct Answer: A

Explanation: $a/b \div c/d = a/b \cdot d/c$, so the correct choice is multiply by reciprocal.

102. Polynomial degree of 3x + 5 is:

(A) 3
(B) 1
(C) 5
(D) 0

Correct Answer: B

Explanation: Highest power of x is 1, so the correct choice is 1.

103. Polynomial degree of 7 is:

(A) 1
(B) 7

(C) 0
(D) undefined

Correct Answer: C

Explanation: A non-zero constant has degree 0, so the correct choice is 0.

104. The expression 0 is a polynomial of:

(A) degree 1
(B) degree −1
(C) not a polynomial
(D) degree not defined or treated as 0 constant

Correct Answer: D

Explanation: Zero polynomial is special; constants have degree 0.

105. Rational expressions appear in rates such as:

(A) distance/time with variable time
(B) only geometry
(C) only Roman numerals
(D) only tally marks

Correct Answer: A

Explanation: Quotients like d/t are rational when t is variable.

106. Simplifying (x + 1)/(x + 1) for x ≠ −1 gives:

(A) x + 1
(B) 1
(C) 0
(D) x

Correct Answer: B

Explanation: Equal non-zero factors cancel to 1, so the correct choice is 1.

107. Adding fractions x/a + y/b needs:

(A) adding numerators only without LCD
(B) multiplying x and y
(C) common denominator ab or LCD
(D) no denominator

Correct Answer: C

Explanation: Adding fractions x/a + y/b needs common denominator ab or LCD.

108. Long division of polynomials is analogous to:

(A) adding exponents
(B) graphing lines
(C) absolute value
(D) long division of integers

Correct Answer: D

Explanation: Long division of polynomials is analogous to long division of integers.