MATHEMATICS MCQ BOOKLET

Grade 9 · Chapter 1 · Real Numbers

FBISE / National Book Foundation Model Textbook companion

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Independent MCQs on the history of numbers, rationals and irrationals, the number line, properties of reals, radicals, and laws of exponents. 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. A number is an abstract idea used for counting or measuring, while a numeral is the:

(A) written symbol that represents that idea
(B) price of the object counted
(C) always a fraction only
(D) same as a geometric point

Correct Answer: A

Explanation: The idea is the number; the written mark such as 7 or VII is the numeral.

2. The earliest counting numbers used by shepherds and traders are called:

(A) complex numbers
(B) natural numbers
(C) imaginary units
(D) transcendental constants only

Correct Answer: B

Explanation: Natural numbers began as counting numbers for discrete objects.

3. Babylonians used a sexagesimal system, meaning their place-value base was:

(A) 2
(B) 10
(C) 60
(D) 12

Correct Answer: C

Explanation: Babylonians used a sexagesimal system, meaning their place-value base was 60.

4. Babylonians indicated nothingness in a place by a:

(A) digit 0 like Hindu-Arabic
(B) letter M
(C) negative sign
(D) space between digits, which could be ambiguous

Correct Answer: D

Explanation: A blank gap stood for an empty place, so readings were sometimes unclear.

5. Roman numerals used seven symbols and, like the Babylonian system, originally lacked a:

(A) symbol for nothingness (zero)
(B) symbol for five
(C) symbol for ten
(D) symbol for one thousand

Correct Answer: A

Explanation: Roman numerals used seven symbols and, like the Babylonian system, originally lacked a symbol for nothingness (zero).

6. The modern digits 0 through 9 are called the:

(A) Attic numerals
(B) Hindu-Arabic digits

(C) Mayan bar-and-dot only
(D) cuneiform wedges

Correct Answer: B

Explanation: Today's decimal digits come from the Hindu-Arabic tradition.

7. Brahmagupta is credited with writing a symbol for nothingness in about:

(A) 30 000 BC
(B) 500 BC
(C) 628 AD
(D) 1202 AD

Correct Answer: C

Explanation: His 7th-century work treated zero as a genuine numeral, not just a gap.

8. Al-Khwarizmi called the digit zero sifr; through Italian usage this became the word:

(A) infinity
(B) ratio
(C) mantissa
(D) zero

Correct Answer: D

Explanation: Sifr → zefero → zero is the European path of the name.

9. Fibonacci's 1202 book helped Europe adopt the 0–9 system mainly for:

(A) practical arithmetic such as accounts and currency
(B) poetry metre
(C) naming constellations
(D) drawing maps only

Correct Answer: A

Explanation: Merchants needed a place-value system for profit, loss, and conversion.

10. The word rational in rational number comes from:

(A) radius of a circle
(B) ratio, because such numbers are quotients a/b
(C) a Roman emperor
(D) the word radical

Correct Answer: B

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

11. Hippasus linked √2 to the hypotenuse of a right isosceles triangle of side 1, showing √2 is:

(A) an integer
(B) a terminating decimal 1.4 exactly
(C) irrational, not writable as a/b in lowest terms
(D) equal to 22/7

Correct Answer: C

Explanation: No integers a and b give a/b = √2, so the length is irrational.

12. The set of real numbers R is the union:

(A) N □ {0} only
(B) Z □ P only
(C) imaginary numbers □ zero
(D) Q □ Q'

Correct Answer: D

Explanation: Every real is rational or irrational; those two classes together make R.

13. Q ∩ Q' equals:

(A) the empty set
(B) R

(C) N
(D) {0}

Correct Answer: A

Explanation: No number is both a ratio of integers and not a ratio of integers.

14. Because Q □ Q' = R and Q ∩ Q' is empty, Q and Q' are called:

(A) equal sets
(B) exhaustive (and disjoint) subsets of R
(C) complex conjugates
(D) open intervals only

Correct Answer: B

Explanation: They partition the reals: nothing is left out and nothing sits in both.

15. Which number is rational?

(A) √11
(B) √23
(C) 9/11
(D) −√7

Correct Answer: C

Explanation: 9/11 is an integer over a non-zero integer, so it lies in Q.

16. Which number is irrational?

(A) −5
(B) 0
(C) 7
(D) √11

Correct Answer: D

Explanation: 11 is not a perfect square, so √11 cannot be written as a/b.

17. Every integer belongs to:

(A) Q, because n = n/1
(B) Q' only
(C) only N
(D) only the empty set

Correct Answer: A

Explanation: Writing n as n/1 shows every integer is rational.

18. Whole numbers W are:

(A) {…, −2, −1}
(B) {0, 1, 2, 3, …}
(C) {1, 2, 3, …} excluding 0
(D) all irrationals

Correct Answer: B

Explanation: Whole numbers W are {0, 1, 2, 3, …}.

19. Natural numbers N, in this course's classification chart, are:

(A) {0, 1, 2, …}
(B) all negatives
(C) {1, 2, 3, …}
(D) Q'

Correct Answer: C

Explanation: Here N begins at 1; 0 is a whole number but not natural.

20. On a number line the origin is the point corresponding to:

(A) 1
(B) −1

(C) √2
(D) 0

Correct Answer: D

Explanation: Zero is the reference point from which positive and negative directions are measured.

21. Positive integers lie to the:

(A) right of 0
(B) left of 0
(C) same point as −1
(D) origin only

Correct Answer: A

Explanation: Positive integers lie to the right of 0.

22. The distance between consecutive integers on the standard real line is called the:

(A) mantissa
(B) unit length
(C) index of a radical
(D) characteristic

Correct Answer: B

Explanation: That spacing is the unit used to locate other reals.

23. 7/8 as a decimal is 0.875, which is a:

(A) non-terminating non-recurring decimal
(B) purely imaginary value
(C) terminating decimal
(D) Roman numeral

Correct Answer: C

Explanation: The division ends after three digits, so the decimal terminates.

24. 1/3 as a decimal is 0.333…, which is a:

(A) terminating decimal
(B) non-recurring irrational expansion
(C) finite binary only
(D) non-terminating recurring decimal

Correct Answer: D

Explanation: 1/3 as a decimal is 0.333…, which is a non-terminating recurring decimal.

25. √2 ≈ 1.414213… is:

(A) non-terminating and non-recurring
(B) terminating
(C) recurring with period 2
(D) exactly 7/5

Correct Answer: A

Explanation: Irrationals have infinite decimals that never settle into a repeating block.

26. A fraction in lowest terms has a terminating decimal if and only if the denominator's prime factors are among:

(A) 3 and 7 only
(B) 2 and/or 5 only
(C) 11 only
(D) all primes

Correct Answer: B

Explanation: After cancelling, only factors 2 and 5 can be cleared by powers of 10.

27. Which expansion is terminating?

(A) 2/3

(B) 5/6
(C) 3/8
(D) 1/7

Correct Answer: C

Explanation: 3/8 = 0.375 because 8 = 2³, so only the prime 2 appears in the denominator.

28. Which expansion is recurring but not terminating?

(A) 1/4
(B) 1/5
(C) 1/2
(D) 5/6

Correct Answer: D

Explanation: 5/6 — this correctly answers the question.

29. For real a, b the closure law for addition says:

(A) a + b is always in R
(B) a + b may leave R
(C) a + b is always irrational
(D) a + b = 0 always

Correct Answer: A

Explanation: The sum of two reals is again a real number.

30. The commutative law for multiplication is:

(A) a(bc) = (ab)c
(B) ab = ba
(C) a + 0 = a
(D) a(1/a) = 1

Correct Answer: B

Explanation: The commutative law for multiplication is ab = ba.

31. The associative law for addition is:

(A) a + b = b + a
(B) a(b + c) = ab + ac
(C) a + (b + c) = (a + b) + c
(D) a + (−a) = 0

Correct Answer: C

Explanation: Grouping of three addends can be changed without changing the sum.

32. The additive identity for real numbers is:

(A) 1
(B) −1
(C) a
(D) 0

Correct Answer: D

Explanation: The additive identity for real numbers is 0.

33. The multiplicative identity for real numbers is:

(A) 1
(B) 0
(C) −a
(D) 1/a

Correct Answer: A

Explanation: The multiplicative identity for real numbers is 1.

34. The additive inverse of a is:

(A) 1/a

(B) −a
(C) a²
(D) 0 only when a = 1

Correct Answer: B

Explanation: a + (−a) = 0, so −a cancels a under addition.

35. The multiplicative inverse of a (a ≠ 0) is:

(A) −a
(B) a + 1
(C) 1/a
(D) 0

Correct Answer: C

Explanation: a · (1/a) = 1, so 1/a is the reciprocal.

36. Which real has no multiplicative inverse in R?

(A) 1
(B) −1
(C) 2
(D) 0

Correct Answer: D

Explanation: Division by zero is undefined, so 0 has no reciprocal in the reals.

37. Which number is equal to its own additive inverse?

(A) 0
(B) 1
(C) −1
(D) 2

Correct Answer: A

Explanation: 0 — this correctly answers the question.

38. The distributive law of multiplication over addition is:

(A) a + (b + c) = (a + b) + c
(B) a(b + c) = ab + ac
(C) ab = ba
(D) a + 0 = a

Correct Answer: B

Explanation: The distributive law of multiplication over addition is a(b + c) = ab + ac.

39. Evaluate 24(1/6 + 1/8) using the distributive law:

(A) 5
(B) 6
(C) 7
(D) 8

Correct Answer: C

Explanation: 24 · (1/6) + 24 · (1/8) = 4 + 3 = 7, so the correct choice is 7.

40. The same distributive idea over subtraction is:

(A) a(b − c) = ab + ac
(B) a(b − c) = a − bc
(C) a(b − c) = b − ac
(D) a(b − c) = ab − ac

Correct Answer: D

Explanation: Multiplication still distributes, and the minus sign is kept on the second product.

41. Trichotomy for real a and b says that exactly one of the following holds:

(A) a < b, a = b, or a > b

(B) a + b = 0 always
(C) ab = 1 always
(D) a and b are both irrational

Correct Answer: A

Explanation: Trichotomy for real a and b says that exactly one of the following holds a < b, a = b, or a > b.

42. The symbols < and > were introduced by Thomas Harriot around:

(A) 628 AD
(B) 1630
(C) 1202
(D) 1525

Correct Answer: B

Explanation: Those inequality signs date from about 1630 in Harriot's work.

43. The reflexive property of equality is:

(A) if a = b then b = a
(B) if a = b and b = c then a = c
(C) a = a
(D) if a = b then a + c = b + c

Correct Answer: C

Explanation: Every real is equal to itself, so the correct choice is a = a.

44. The symmetric property of equality is:

(A) a = a
(B) if a = b then ac = bc
(C) a < b or a > b only
(D) if a = b then b = a

Correct Answer: D

Explanation: Equality can be read in either direction.

45. The transitive property of equality is:

(A) if a = b and b = c then a = c
(B) a = a
(C) a + 0 = a
(D) ab = ba

Correct Answer: A

Explanation: The transitive property of equality is if a = b and b = c then a = c.

46. If a = b then a + c = b + c is the:

(A) multiplicative property of equality
(B) additive property of equality
(C) trichotomy law
(D) inverse law

Correct Answer: B

Explanation: If a = b then a + c = b + c is the additive property of equality.

47. If a = b and c ≠ 0, then ac = bc is the:

(A) cancellation for addition
(B) associative law
(C) multiplicative property of equality
(D) identity law

Correct Answer: C

Explanation: If a = b and c ≠ 0, then ac = bc is the multiplicative property of equality.

48. If a + c = b + c, then a = b is cancellation with respect to:

(A) multiplication only

(B) radicals only
(C) exponents only
(D) addition

Correct Answer: D

Explanation: The same addend can be removed from both sides.

49. If $a < b$ and $c > 0$, then:

(A) $ac < bc$
(B) $ac > bc$
(C) $ac = bc$ always
(D) the inequality cannot be multiplied

Correct Answer: A

Explanation: If $a < b$ and $c > 0$, then $ac < bc$.

50. If $a < b$ and $c < 0$, then:

(A) $ac < bc$
(B) $ac > bc$
(C) $ac = a + c$
(D) signs stay the same always

Correct Answer: B

Explanation: If $a < b$ and $c < 0$, then $ac > bc$.

51. If $2 < 5$, then $1/2$ compared with $1/5$ is:

(A) $1/2 < 1/5$
(B) $1/2 = 1/5$
(C) $1/2 > 1/5$
(D) undefined

Correct Answer: C

Explanation: If $2 < 5$, then $1/2$ compared with $1/5$ is $1/2 > 1/5$.

52. Graphing $x \leq 3$ on a number line uses a:

(A) hollow circle at 3 and a ray to the left
(B) filled circle at 3 and a ray to the right
(C) hollow circles at -3 and 3 only
(D) filled circle at 3 and a ray to the left

Correct Answer: D

Explanation: Filled means 3 is included; leftward covers all smaller reals.

53. Graphing $-2 < x < 4$ uses:

(A) hollow circles at -2 and 4 with the open segment between
(B) filled circles at -2 and 4
(C) only a filled circle at 0
(D) arrows covering all reals

Correct Answer: A

Explanation: Graphing $-2 < x < 4$ uses hollow circles at -2 and 4 with the open segment between.

54. A square root of 36 is a number m with $m^2 = 36$. Two such reals are:

(A) 6 and 0
(B) 6 and -6
(C) 18 and 2
(D) 36 and 1

Correct Answer: B

Explanation: Both 6^2 and $(-6)^2$ equal 36; they are additive inverses.

55. The principal square root $\sqrt{49}$ is:

(A) -7

(B) ±7 written together as one value
(C) 7
(D) 1/7

Correct Answer: C

Explanation: The principal square root √49 is 7.

56. In √[5]{40}, the index is 5 and the radicand is:

(A) 5
(B) √
(C) 8
(D) 40

Correct Answer: D

Explanation: The index sits in the crook of the radical; the radicand is the expression underneath.

57. If the index is omitted on a radical, it is understood to be:

(A) 2
(B) 3
(C) 0
(D) 10

Correct Answer: A

Explanation: √b means the principal square root, index 2.

58. There is no real number x with $x^2 = -9$ because:

(A) −9 is not an integer
(B) squares of reals are never negative
(C) 9 is prime
(D) radicals cannot have index 2

Correct Answer: B

Explanation: Any real square is ≥ 0, so √(−9) is not real.

59. If $a^n = b$ with n > 1, then a = b^{1/n} equals:

(A) b^n
(B) n^b
(C) √[n]{b}
(D) 1/b

Correct Answer: C

Explanation: The exponential form b^{1/n} is the same as the radical √[n]{b}.

60. The product rule for like-index radicals is:

(A) √[n]{a} · √[m]{b} = √[n]{ab} even if n ≠ m
(B) √[n]{a} + √[n]{b} = √[n]{a+b}
(C) √[n]{a} · √[n]{b} = √[n]{a+b}
(D) √[n]{a} · √[n]{b} = √[n]{ab}

Correct Answer: D

Explanation: Multiply radicands only when the indices match.

61. √3 · √12 equals:

(A) √36 = 6
(B) √15
(C) 15
(D) 9

Correct Answer: A

Explanation: √3 · √12 equals √36 = 6.

62. □8 · □27 equals:

(A) □35

(B) 6
(C) 216
(D) 3

Correct Answer: B

Explanation: □(8·27) = □216 = 6, since 6³ = 216, so the correct choice is 6.

63. The quotient rule √[n]{a}/√[n]{b} equals:

(A) √[n]{a − b}
(B) n√(a/b)
(C) √[n]{a/b}
(D) √[n]{ab}

Correct Answer: C

Explanation: Divide radicands when the indices are the same.

64. □3 · √2 cannot be combined by the product rule because:

(A) 3 and 2 are primes
(B) both are irrational
(C) 2 is even
(D) the indices 3 and 2 are different

Correct Answer: D

Explanation: The product rule needs a common index, so the correct choice is the indices 3 and 2 are different.

65. √[12]{9^6} reduces because 6 and 12 share a factor; it equals:

(A) 3
(B) 9
(C) 81
(D) 6

Correct Answer: A

Explanation: 9^{6/12} = 9^{1/2} = 3, so the correct choice is 3.

66. Write √[15]{t^{10}} with a smaller index (t > 0):

(A) √[5]{t}
(B) √[3]{t²}
(C) t^{15}
(D) √[10]{t}

Correct Answer: B

Explanation: t^{10/15} = t^{2/3} = √[3]{t²}, so the correct choice is √[3]{t²}.

67. In 5⁴, the base is 5 and the exponent 4 means:

(A) 5 + 4
(B) 4⁵
(C) 5 used as a factor four times
(D) 5/4

Correct Answer: C

Explanation: In 5⁴, the base is 5 and the exponent 4 means 5 used as a factor four times.

68. b^{1/n} is defined as:

(A) n^b
(B) b − n
(C) 1/(nb)
(D) √[n]{b}

Correct Answer: D

Explanation: A unit-fraction exponent is an nth root.

69. 27^{2/3} equals:

(A) 9

(B) 18
(C) 6
(D) 3

Correct Answer: A

Explanation: First □27 = 3, then 3² = 9, so the correct choice is 9.

70. 32^{3/5} equals:

(A) 6
(B) 8
(C) 4
(D) 2

Correct Answer: B

Explanation: Fifth root of 32 is 2, then 2³ = 8, so the correct choice is 8.

71. 125^{2/3} equals:

(A) 5
(B) 15
(C) 25
(D) 50

Correct Answer: C

Explanation: □125 = 5 and 5² = 25, so the correct choice is 25.

72. 9^{−3/2} equals:

(A) 27
(B) −27
(C) 3
(D) 1/27

Correct Answer: D

Explanation: 9^{3/2} = (√9)³ = 27, so the negative exponent gives the reciprocal 1/27.

73. (4/9)^{−1/2} equals:

(A) 3/2
(B) 2/3
(C) −3/2
(D) 8/27

Correct Answer: A

Explanation: (4/9)^{−1/2} equals 3/2.

74. The product rule of exponents is:

(A) a^m · a^n = a^{mn}
(B) a^m · a^n = a^{m+n}
(C) a^m · a^n = a^{m−n}
(D) a^m · a^n = (a + a)^{m+n}

Correct Answer: B

Explanation: Same base: add the exponents, so the correct choice is a^m · a^n = a^{m+n}.

75. The quotient rule of exponents is:

(A) a^m / a^n = a^{m+n}
(B) a^m / a^n = a^{mn}
(C) a^m / a^n = a^{m−n}
(D) a^m / a^n = n − m

Correct Answer: C

Explanation: Same base: subtract the exponents, so the correct choice is a^m / a^n = a^{m−n}.

76. (a^m)^n equals:

(A) a^{m+n}

(B) a^{m−n}
(C) na^m
(D) a^{mn}

Correct Answer: D

Explanation: (a^m)^n equals a^{mn}.

77. (ab)^n equals:

(A) a^n b^n
(B) a^n + b^n
(C) ab^n
(D) n(ab)

Correct Answer: A

Explanation: A power distributes over a product, so the correct choice is a^n b^n.

78. (a/b)^{−n} equals:

(A) (a/b)^n
(B) (b/a)^n
(C) a^n / b^{−n}
(D) −(a/b)^n

Correct Answer: B

Explanation: A negative exponent inverts the fraction, then the positive power is applied.

79. $(3^2)^3$ equals:

(A) 3^5
(B) 18
(C) 729
(D) 9^3 only, which is not 729

Correct Answer: C

Explanation: $(3^2)^3 = 3^6 = 729$, so the correct choice is 729.

80. $\sqrt{5} \cdot \sqrt{20}$ equals:

(A) 5
(B) 25
(C) $\sqrt{15}$
(D) 10

Correct Answer: D

Explanation: $\sqrt{5} \cdot \sqrt{20}$ equals 10.

B. Less Important / Secondary Topics

81. Tally marks carved tens of thousands of years ago were an early way to:

(A) record counts before place-value numerals
(B) write fractions a/b
(C) define logarithms
(D) mark complex numbers

Correct Answer: A

Explanation: Tally marks carved tens of thousands of years ago were an early way to record counts before place-value numerals.

82. Sumerians in the Fertile Crescent (present-day Iraq) were among the first to:

(A) invent calculus
(B) use written symbols for numerals on clay
(C) define Dedekind cuts
(D) ban zero

Correct Answer: B

Explanation: Sumerians in the Fertile Crescent (present-day Iraq) were among the first to use written symbols for numerals on clay.

83. Mayan numerals used dots and bars and a shell-like placeholder in a system of base:

(A) 10
(B) 12
(C) 20
(D) 60

Correct Answer: C

Explanation: Mayan numerals used dots and bars and a shell-like placeholder in a system of base 20.

84. Egyptian hieroglyphs used a lotus-flower symbol for:

(A) 10
(B) 100
(C) 1 000 000
(D) 1000

Correct Answer: D

Explanation: Powers of ten each had a picture; the lotus stood for one thousand.

85. Richard Dedekind is associated with a precise definition of:

(A) real numbers
(B) natural numbers only
(C) Roman numerals
(D) tally bones

Correct Answer: A

Explanation: Richard Dedekind is associated with a precise definition of real numbers.

86. Non-integer rationals include numbers such as:

(A) −2, 0, 7
(B) 9/13 and −13/25
(C) √2 and π
(D) only primes

Correct Answer: B

Explanation: They are ratios that are not whole integers.

87. Integers Z split into negative integers and:

(A) only primes
(B) only irrationals
(C) whole numbers W
(D) only unit fractions

Correct Answer: C

Explanation: W = {0, 1, 2, …} sits inside Z together with the negatives.

88. The coordinate of a point on the number line is:

(A) always an integer
(B) the index of a radical
(C) always positive
(D) the real number associated with that point

Correct Answer: D

Explanation: Each point is labelled by exactly one real.

89. −π ≈ −3.14159… lies between:

(A) −3 and −4
(B) −2 and −3
(C) 3 and 4
(D) 0 and −1

Correct Answer: A

Explanation: $-\pi \approx -3.14159\ldots$ lies between -3 and -4.

90. Natural numbers are typically used in daily life for:

(A) exact circle area with π
(B) counting discrete objects
(C) signed temperatures below zero
(D) wave mechanics only

Correct Answer: B

Explanation: Stock-taking and head-counts are natural-number jobs.

91. Integers are the natural tool for recording:

(A) only probabilities between 0 and 1
(B) only repeating decimals
(C) temperature, gain/loss, or rise/fall
(D) only cube roots

Correct Answer: C

Explanation: Signed whole amounts capture direction as well as size.

92. Engineers meet irrationals such as π when they compute:

(A) only bank interest
(B) only counting sheep
(C) only ISBN codes
(D) circumferences and areas of circles

Correct Answer: D

Explanation: Circle formulae introduce π, which is irrational.

93. Rene Descartes popularised modern exponential notation but often wrote xx instead of:

(A) x^2
(B) x^3
(C) $\sqrt{x}$
(D) x^0

Correct Answer: A

Explanation: He used a repeated letter for the square.

94. The radical sign itself was first used around:

(A) 628 AD
(B) 1525 AD
(C) 1202
(D) 1630

Correct Answer: B

Explanation: The radical sign itself was first used around 1525 AD.

95. Imaginary numbers are introduced so that one can discuss:

(A) only whole-number exponents
(B) terminating decimals
(C) square roots of negative numbers
(D) Roman numerals

Correct Answer: C

Explanation: Imaginary numbers are introduced so that one can discuss square roots of negative numbers.

96. In $3 \cdot 3 \cdot 3 \cdot 3 = 3^4$ the factored form is the left product and the exponential form is:

(A) 3 + 4
(B) 4^3
(C) 12
(D) 3^4

Correct Answer: D

Explanation: In $3 \cdot 3 \cdot 3 \cdot 3 = 3^4$ the factored form is the left product and the exponential form is 3^4.

97. An exponent of 2 is read as a square; an exponent of 3 is read as a:

(A) cube
(B) root
(C) mantissa
(D) characteristic

Correct Answer: A

Explanation: Those two nicknames are standard, so the correct choice is cube.

98. When the exponent is a natural number, the base may be:

(A) only positive integers
(B) any real number
(C) only 10
(D) never negative

Correct Answer: B

Explanation: Repeated multiplication is defined for every real base.

99. $\sqrt{(2a)} \cdot \sqrt{(8a)}$ for $a > 0$ equals:

(A) $\sqrt{10}$ a
(B) $2a^2$
(C) $\sqrt{(16a^2)} = 4a$
(D) 16a

Correct Answer: C

Explanation: $\sqrt{(16a^2)} = 4a$ when a is positive, so the correct choice is $\sqrt{(16a^2)} = 4a$.

100. 4^{5/2} equals:

(A) 8
(B) 16
(C) 64
(D) 32

Correct Answer: D

Explanation: $\sqrt{4} = 2$ and $2^5 = 32$, so the correct choice is 32.

101. 25^{3/2} equals:

(A) 125
(B) 15
(C) 75
(D) 625

Correct Answer: A

Explanation: $\sqrt{25} = 5$ and $5^3 = 125$, so the correct choice is 125.

102. $2^5 \cdot 2^{-2}$ equals:

(A) 2^7 = 128
(B) $2^3 = 8$
(C) 2^{10}
(D) 1/4

Correct Answer: B

Explanation: Add exponents: $5 + (-2) = 3$, so 8, so the correct choice is $2^3 = 8$.

103. 5^0 equals:

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

Correct Answer: C

Explanation: Any non-zero real to the power 0 is 1, so the correct choice is 1.

104. (−8)^{1/3} equals:

(A) 2
(B) 8
(C) not a real number
(D) −2

Correct Answer: D

Explanation: The real cube root of −8 is −2 because $(-2)^3 = -8$.

105. 22/7 is:

(A) rational, hence not equal to π
(B) equal to π
(C) irrational
(D) not a real number

Correct Answer: A

Explanation: 22/7 is a ratio of integers; π is irrational, so they differ.

106. 0.272727… (27 repeating) is:

(A) irrational
(B) rational, equal to 27/99 = 3/11
(C) not a real
(D) a terminating decimal 0.27

Correct Answer: B

Explanation: 0.272727… (27 repeating) is rational, equal to 27/99 = 3/11.

107. Commutative property fails for:

(A) addition of reals
(B) multiplication of reals
(C) subtraction of reals
(D) addition and multiplication both

Correct Answer: C

Explanation: a − b is not generally b − a, so the correct choice is subtraction of reals.

108. If a · b = a and a ≠ 0, then b equals:

(A) 0
(B) a
(C) 1/a
(D) 1

Correct Answer: D

Explanation: Factor a(b − 1) = 0 with a ≠ 0 forces b = 1, the multiplicative identity.