MATHEMATICS MCQ BOOKLET

# Grade 10 · Chapter 6 · Functions and Graphs

FBISE / National Book Foundation Model Textbook companion

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*Independent MCQs on functions, domain and range, types of mappings, inverses and composites, and graphs of common functions. 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 function maps each input to:**

(A) exactly one output
(B) many outputs always
(C) no output
(D) only the input itself

**Correct Answer: A**

*Explanation: A function maps each input to exactly one output.*

**2. The set of allowed inputs of a function is its:**

(A) range
(B) domain
(C) origin
(D) gradient

**Correct Answer: B**

*Explanation: The set of allowed inputs of a function is its domain.*

**3. The set of outputs produced by a function is its:**

(A) domain
(B) x-intercept
(C) range
(D) asymptote

**Correct Answer: C**

*Explanation: The set of outputs produced by a function is its range.*

**4. If f(x) = x² − ½x + 3, then f(2) equals:**

(A) 5
(B) 4½
(C) 7
(D) 6

**Correct Answer: D**

*Explanation: 4 − 1 + 3 = 6, so the correct choice is 6.*

**5. If f(x) = x² − ½x + 3, then f(−1) equals:**

(A) 3½
(B) 2½
(C) 4
(D) 5

**Correct Answer: A**

*Explanation: 1 + ½ + 3 = 3.5, so the correct choice is 3½.*

**6. If f(x) = x² − ½x + 3, then f(2/3) equals:**

(A) 3
(B) 28/9
(C) 2⅔

(D) 3⅓

**Correct Answer: B**

*Explanation: If f(x) = x² − ½x + 3, then f(2/3) equals 28/9.*

**7. If f(x) = x² − ½x + 3, then f(t + 1) equals:**

(A) t² + 3 only
(B) t + 4
(C) (t + 1)² − ½(t + 1) + 3
(D) 2t + 3

**Correct Answer: C**

*Explanation: Replace x by t + 1 throughout the rule, so the correct choice is (t + 1)² − ½(t + 1) + 3.*

**8. For V(t) = 9500 − 860t, V(5) equals:**

(A) 9500 dollars
(B) 4300 dollars
(C) 860 dollars
(D) 5200 dollars

**Correct Answer: D**

*Explanation: For V(t) = 9500 − 860t, V(5) equals 5200 dollars.*

**9. If V(t) = 9500 − 860t and V(t) = 6920, then t equals:**

(A) 3 years
(B) 5 years
(C) 8 years
(D) 10 years

**Correct Answer: A**

*Explanation: 860t = 2580, so t = 3, so the correct choice is 3 years.*

**10. A relation is a function only if:**

(A) every pair is repeated
(B) each first component maps to exactly one second component
(C) domain equals range always
(D) outputs repeat freely

**Correct Answer: B**

*Explanation: A relation is a function only if each first component maps to exactly one second component.*

**11. From A = {2, 4, 6, 8} to B = {1, 3, 5}, R = {(2,3), (6,5), (8,3), (4,1)} is a function because:**

(A) 6 maps twice
(B) 8 is missing
(C) each element of A appears once as a first coordinate
(D) B has three elements

**Correct Answer: C**

*Explanation: From A = {2, 4, 6, 8} to B = {1, 3, 5}, R = {(2,3), (6,5), (8,3), (4,1)} is a function because each element of A appears once as a first coordinate.*

**12. R = {(2,3), (6,1), (8,3), (6,5)} is NOT a function because:**

(A) 2 maps to 3
(B) 8 maps to 3
(C) 4 is absent
(D) 6 is paired with both 1 and 5

**Correct Answer: D**

*Explanation: R = {(2,3), (6,1), (8,3), (6,5)} is NOT a function because 6 is paired with both 1 and 5.*

**13. A function f: A → B is one-to-one (injective) when:**

(A) different inputs give different outputs
(B) every b in B is hit

(C) f(x) = x always
(D) domain is empty

**Correct Answer: A**

*Explanation: A function f: A → B is one-to-one (injective) when different inputs give different outputs.*

**14. A function is onto (surjective) when:**

(A) no output repeats
(B) every element of the codomain is an output
(C) domain has one point
(D) range is empty

**Correct Answer: B**

*Explanation: A function is onto (surjective) when every element of the codomain is an output.*

**15. A bijective function is:**

(A) neither injective nor surjective
(B) constant only
(C) both injective and surjective
(D) always quadratic

**Correct Answer: C**

*Explanation: Bijection means one-to-one correspondence.*

**16. The identity function is:**

(A) f(x) = 1
(B) f(x) = 0
(C) f(x) = −x
(D) f(x) = x

**Correct Answer: D**

*Explanation: Output equals input for every allowed x.*

**17. The graph of f(x) = x passes through:**

(A) (0, 0) with slope 1
(B) (1, 0) only
(C) (0, 1) only
(D) no origin

**Correct Answer: A**

*Explanation: The graph of f(x) = x passes through (0, 0) with slope 1.*

**18. The absolute value function f(x) = |x| has range:**

(A) all real y
(B) y ≥ 0
(C) y ≤ 0 only
(D) y = x only

**Correct Answer: B**

*Explanation: Distance from zero is never negative, so the correct choice is y ≥ 0.*

**19. For x ≥ 0, |x| equals:**

(A) −x
(B) 1/x
(C) x
(D) $x^2$

**Correct Answer: C**

*Explanation: Non-negative inputs stay unchanged, so the correct choice is x.*

**20. For x < 0, |x| equals:**

(A) x
(B) 0

(C) 1/x
(D) −x

**Correct Answer: D**

*Explanation: For x < 0, |x| equals −x.*

**21. The graph of y = |x| is:**

(A) V-shaped with vertex at (0, 0)
(B) a straight line through origin only in QI
(C) a parabola opening down
(D) a hyperbola

**Correct Answer: A**

*Explanation: The graph of y = |x| is V-shaped with vertex at (0, 0).*

**22. If P(x) = |2x − 100| and 120 units are sold, profit equals:**

(A) 100 rupees
(B) 140 rupees
(C) 240 rupees
(D) 20 rupees

**Correct Answer: B**

*Explanation: |240 − 100| = 140, so the correct choice is 140 rupees.*

**23. A constant function has the form:**

(A) f(x) = x
(B) f(x) = 1/x
(C) f(x) = c for every x
(D) f(x) = $x^2$

**Correct Answer: C**

*Explanation: Output stays fixed regardless of input, so the correct choice is f(x) = c for every x.*

**24. The graph of a constant function y = c is:**

(A) a vertical line
(B) a parabola
(C) a V-shape
(D) a horizontal line

**Correct Answer: D**

*Explanation: All points share the same y-value c, so the correct choice is a horizontal line.*

**25. A linear function has the form:**

(A) f(x) = mx + c
(B) f(x) = $x^2$
(C) f(x) = 1/x
(D) f(x) = |x|

**Correct Answer: A**

*Explanation: Degree-one polynomial graphs as a straight line.*

**26. The gradient (slope) of y = 2x − 1 is:**

(A) −1
(B) 2
(C) 1
(D) −2

**Correct Answer: B**

*Explanation: Coefficient of x in y = mx + c is the slope.*

**27. The y-intercept of y = 2x − 1 is:**

(A) 2
(B) 0

(C) −1
(D) 1

**Correct Answer: C**

*Explanation: Set x = 0 to get y = −1, so the correct choice is −1.*

**28. If f(x) = 2x − 1, then f⁻¹(x) equals:**

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

**Correct Answer: D**

*Explanation: Solve y = 2x − 1 for x: x = (y + 1)/2, so the correct choice is (1 + x)/2.*

**29. If f(x) = ½x, then f²(x) = f(f(x)) equals:**

(A) ¼x
(B) ½x²
(C) x/4
(D) 2x

**Correct Answer: A**

*Explanation: f(f(x)) = ½(½x) = ¼x, so the correct choice is ¼x.*

**30. Composite notation fg(x) means:**

(A) f(x) + g(x)
(B) f(g(x))
(C) f(x)g(x) only
(D) g(f(x)) always

**Correct Answer: B**

*Explanation: Apply g first, then f to the result, so the correct choice is f(g(x)).*

**31. If f(x) = x + 1 and g(x) = x², then f(g(2)) equals:**

(A) 4
(B) 6
(C) 5
(D) 9

**Correct Answer: C**

*Explanation: g(2) = 4, then f(4) = 5, so the correct choice is 5.*

**32. If f(x) = x + 1 and g(x) = x², then g(f(2)) equals:**

(A) 5
(B) 4
(C) 6
(D) 9

**Correct Answer: D**

*Explanation: f(2) = 3, then g(3) = 9, so the correct choice is 9.*

**33. The square root function f(x) = √x requires:**

(A) x ≥ 0
(B) x > 0 only if zero excluded
(C) all real x
(D) x ≤ 0

**Correct Answer: A**

*Explanation: Principal square root is defined for non-negative x.*

**34. The domain of f(x) = √x is:**

(A) x > 0 only
(B) x ≥ 0

(C) all reals
(D) x ≤ 0

**Correct Answer: B**

*Explanation: Non-negative reals form the domain, so the correct choice is x ≥ 0.*

**35. The range of f(x) = √x is:**

(A) all reals
(B) y ≤ 0
(C) y ≥ 0
(D) y = x

**Correct Answer: C**

*Explanation: Principal root outputs are non-negative.*

**36. The reciprocal function f(x) = 1/x is undefined at:**

(A) x = 1
(B) x = −1
(C) x = 2
(D) x = 0

**Correct Answer: D**

*Explanation: Division by zero is undefined, so the correct choice is x = 0.*

**37. The graph of y = 1/x has asymptotes:**

(A) x = 0 and y = 0
(B) x = 1 and y = 1
(C) no asymptotes
(D) only y = x

**Correct Answer: A**

*Explanation: The graph of y = 1/x has asymptotes x = 0 and y = 0.*

**38. For y = 1/x, as x increases the value:**

(A) increases without bound always
(B) decreases toward 0
(C) stays constant
(D) equals x

**Correct Answer: B**

*Explanation: For y = 1/x, as x increases the value decreases toward 0.*

**39. The reciprocal of zero is:**

(A) 0
(B) 1
(C) undefined
(D) ∞ as a real number

**Correct Answer: C**

*Explanation: The reciprocal of zero is undefined.*

**40. Which is an exponential function?**

(A) $x^2$ only
(B) √x only
(C) 1/x only
(D) 2^x

**Correct Answer: D**

*Explanation: Variable in the exponent defines an exponential function.*

**41. Functions (1/3)^x, e^x, and 2^x are all:**

(A) exponential
(B) linear

(C) constant
(D) identity

**Correct Answer: A**

*Explanation: Each has the variable in the exponent, so the correct choice is exponential.*

**42. If y = x/(x − 2), the function is undefined when:**

(A) x = 0
(B) x = 2
(C) x = −2
(D) x = 1

**Correct Answer: B**

*Explanation: Denominator x − 2 equals zero at x = 2, so the correct choice is x = 2.*

**43. If f(x) = 2/3 $x^2$ − 5, then f(−3) equals:**

(A) −1
(B) 0
(C) 1
(D) 3

**Correct Answer: C**

*Explanation: 2/3 × 9 − 5 = 6 − 5 = 1, so the correct choice is 1.*

**44. The domain of g = {(1, 0), (2, 2), (3, 4)} is:**

(A) {0, 2, 4}
(B) {0, 1, 2, 3, 4}
(C) {2, 3}
(D) {1, 2, 3}

**Correct Answer: D**

*Explanation: The domain of g = {(1, 0), (2, 2), (3, 4)} is {1, 2, 3}.*

**45. The range of g = {(1, 0), (2, 2), (3, 4)} is:**

(A) {0, 2, 4}
(B) {1, 2, 3}
(C) {0, 1, 2, 3, 4}
(D) {1, 4}

**Correct Answer: A**

*Explanation: Range is the set of second coordinates, so the correct choice is {0, 2, 4}.*

**46. If |X| = 3 and |Y| = 2, the number of binary relations from Y to X is:**

(A) $2^9$
(B) $2^6$
(C) 6
(D) 9

**Correct Answer: B**

*Explanation: If |X| = 3 and |Y| = 2, the number of binary relations from Y to X is $2^6$.*

**47. The x-intercept of every point on the y-axis is:**

(A) 1
(B) undefined always
(C) 0
(D) −1

**Correct Answer: C**

*Explanation: The x-intercept of every point on the y-axis is 0.*

**48. The graph of y = 2$x^2$ − 1 cuts the y-axis at:**

(A) (0, 1)
(B) (−1, 0)

(C) (1, 0)
(D) (0, −1)

**Correct Answer: D**

*Explanation: Substitute x = 0 to get y = −1, so the correct choice is (0, −1).*

**49. A quadratic $y = ax^2 + bx + c$ opens upward when:**

(A) a > 0
(B) a < 0
(C) b > 0
(D) c > 0

**Correct Answer: A**

*Explanation: A quadratic $y = ax^2 + bx + c$ opens upward when a > 0.*

**50. The graph of $y = -x^2 - 4x$ opens:**

(A) upward
(B) downward
(C) horizontally
(D) is a line

**Correct Answer: B**

*Explanation: The graph of $y = -x^2 - 4x$ opens downward.*

**51. For $y = ax^2 + bx + c$ through (−1, 0), (1, 0), and (0, 10):**

(A) a = 1 always
(B) b = 10
(C) c = 10 and a + b + c = 0 gives a = −10, b = 0, c = 10
(D) c = 0

**Correct Answer: C**

*Explanation: For $y = ax^2 + bx + c$ through (−1, 0), (1, 0), and (0, 10) c = 10 and a + b + c = 0 gives a = −10, b = 0, c = 10.*

**52. If $f(x) = x^2 - x - 6$ and f(x) = f(3), then x equals:**

(A) 3 only
(B) −2 only
(C) 0
(D) 3 or −2

**Correct Answer: D**

*Explanation: If $f(x) = x^2 - x - 6$ and f(x) = f(3), then x equals 3 or −2.*

**53. The inverse of f(x) = 3x/(2x − 1) is found by:**

(A) swapping x and y and solving for y
(B) adding 1 only
(C) squaring both sides
(D) differentiating

**Correct Answer: A**

*Explanation: The inverse of f(x) = 3x/(2x − 1) is found by swapping x and y and solving for y.*

**54. For f(x) = 3x/(2x − 1), f□¹(x) is undefined when:**

(A) x = 2/3
(B) x = 3/2
(C) x = 0
(D) x = 1

**Correct Answer: B**

*Explanation: For f(x) = 3x/(2x − 1), f□¹(x) is undefined when x = 3/2.*

**55. If f(x) = 3x/(2x − 1), then f□¹(−1) equals:**

(A) −1

(B) 1
(C) 1/5
(D) 5

**Correct Answer: C**

*Explanation: If f(x) = 3x/(2x − 1), then f□¹(−1) equals 1/5.*

**56. To solve f(x) = x − 2 and g(x) = x² − 4x + 2 graphically, find:**

(A) y-intercept only
(B) asymptotes only
(C) domain only
(D) intersection points of the two graphs

**Correct Answer: D**

*Explanation: To solve f(x) = x − 2 and g(x) = x² − 4x + 2 graphically, find intersection points of the two graphs.*

**57. Solving x − 2 = x² − 4x + 2 gives intersections at:**

(A) x = 1 and x = 4
(B) x = 0 only
(C) x = −1 only
(D) no real x

**Correct Answer: A**

*Explanation: x² − 5x + 4 = 0 → (x − 1)(x − 4) = 0, so the correct choice is x = 1 and x = 4.*

**58. The gradient of a curve at a point is shown by:**

(A) the y-intercept
(B) the slope of the tangent line there
(C) the x-intercept only
(D) area under graph

**Correct Answer: B**

*Explanation: The gradient of a curve at a point is shown by the slope of the tangent line there.*

**59. A system of one linear and one quadratic equation can be solved by:**

(A) adding exponents
(B) ignoring the linear part
(C) graphing both and reading intersections
(D) only factoring

**Correct Answer: C**

*Explanation: A system of one linear and one quadratic equation can be solved by graphing both and reading intersections.*

**60. For f(n) = 120(0.9)^n mg, the medicine decays:**

(A) linearly by 120
(B) not at all
(C) by absolute value only
(D) exponentially by 10% each hour

**Correct Answer: D**

*Explanation: For f(n) = 120(0.9)^n mg, the medicine decays exponentially by 10% each hour.*

**61. If A(t) = |2 cos(t)| and t = 5 seconds, amplitude is:**

(A) |2 cos(5)|
(B) 2 only
(C) 0 always
(D) 5

**Correct Answer: A**

*Explanation: If A(t) = |2 cos(t)| and t = 5 seconds, amplitude is |2 cos(5)|.*

**62. The graph of y = x^n for even positive integer n is:**

(A) only in QI
(B) symmetric about the y-axis
(C) a straight line
(D) undefined at 0 always

**Correct Answer: B**

*Explanation: The graph of y = x^n for even positive integer n is symmetric about the y-axis.*

**63. The graph of y = x^n for odd positive integer n passes through:**

(A) only (1, 1)
(B) no origin
(C) (0, 0) with symmetry about the origin
(D) vertical asymptote at 0

**Correct Answer: C**

*Explanation: Odd powers are origin-symmetric, so the correct choice is (0, 0) with symmetry about the origin.*

**64. An into function may leave some codomain elements:**

(A) all mapped
(B) doubly mapped
(C) as inputs
(D) unmapped

**Correct Answer: D**

*Explanation: Into means range may be smaller than codomain.*

**65. An onto function satisfies:**

(A) range = codomain
(B) range empty
(C) domain empty
(D) f(x) = c only

**Correct Answer: A**

*Explanation: Every codomain element is hit at least once.*

**66. Mapping diagram h with 0→a, 2→b, 4→c is:**

(A) not a function
(B) one-to-one
(C) constant
(D) undefined

**Correct Answer: B**

*Explanation: Mapping diagram h with 0→a, 2→b, 4→c is one-to-one.*

**67. Mapping g with 0→5, 2→7, 4→7 is a function but:**

(A) not a function
(B) bijective
(C) not one-to-one because 2 and 4 share output 7
(D) without range

**Correct Answer: C**

*Explanation: Two inputs share the same output, so it is not injective.*

**68. If X = prime factors of 6 and Y = {0, 1, 2}, f: X → Y with (x, y) such that x − y = 1:**

(A) always bijective
(B) always constant
(C) has no domain
(D) check pairs (2,1) and (3,2) for injectivity/bijectivity

**Correct Answer: D**

*Explanation: X = {2, 3}; valid pairs are (2,1) and (3,2), giving a bijection between two-element sets.*

**69. Celsius C = 5/9(F − 32) solved for F gives:**

(A) F = 9C/5 + 32
(B) F = C + 32
(C) F = 5C/9
(D) F = 32C

**Correct Answer: A**

*Explanation: Celsius C = 5/9(F − 32) solved for F gives F = 9C/5 + 32.*

**70. 25°C converts to Fahrenheit using F = 9C/5 + 32 as:**

(A) 45°F
(B) 77°F
(C) 57°F
(D) 25°F

**Correct Answer: B**

*Explanation: 9×25/5 + 32 = 45 + 32 = 77, so the correct choice is 77°F.*

**71. Independent quantity in a calculator input means:**

(A) the displayed result
(B) the battery level
(C) the chosen input value
(D) the key color

**Correct Answer: C**

*Explanation: Input is controlled independently before processing.*

**72. Dependent quantity in function language means:**

(A) input chosen freely always
(B) constant only
(C) domain element only
(D) output determined by input

**Correct Answer: D**

*Explanation: Dependent quantity in function language means output determined by input.*

**73. The modulus function is another name for:**

(A) absolute value function
(B) identity function
(C) reciprocal function
(D) constant function

**Correct Answer: A**

*Explanation: The modulus function is another name for absolute value function.*

**74. A graph that never touches an asymptote:**

(A) y = x through origin
(B) y = 1/x approaching axes
(C) y = 3 horizontal
(D) y = |x| at vertex

**Correct Answer: B**

*Explanation: A graph that never touches an asymptote y = 1/x approaching axes.*

**75. Sketching $y = x^2$ requires plotting:**

(A) only one point
(B) a hyperbola
(C) a parabola through (0, 0) if c = 0
(D) parallel lines

**Correct Answer: C**

*Explanation: Basic quadratic graphs are parabolas, so the correct choice is a parabola through (0, 0) if c = 0.*

**76. For y = mx + c, larger m makes the line:**

(A) horizontal
(B) vertical always
(C) lower on y-axis only
(D) steeper

**Correct Answer: D**

*Explanation: For y = mx + c, larger m makes the line steeper.*

**77. Function notation f(x) replaces:**

(A) the variable x in the rule with a specific input
(B) the equals sign
(C) the domain
(D) the range only

**Correct Answer: A**

*Explanation: f(2) means substitute 2 for x in the defining expression.*

**78. If a relation repeats a first coordinate with different second coordinates, it:**

(A) is always bijective
(B) fails the function test
(C) is always linear
(D) has empty domain

**Correct Answer: B**

*Explanation: One input cannot produce two outputs, so the correct choice is fails the function test.*

**79. The vertex of y = |x| is at:**

(A) (1, 1)
(B) (0, 1)
(C) (0, 0)
(D) (−1, 0)

**Correct Answer: C**

*Explanation: The V meets at the origin, so the correct choice is (0, 0).*

**80. For $y = x^3$, f(−2) equals:**

(A) 8
(B) −6
(C) 6
(D) −8

**Correct Answer: D**

*Explanation: $(-2)^3 = -8$, so the correct choice is −8.*

## B. Less Important / Secondary Topics

**81. René Descartes linked algebra and geometry using coordinates in:**

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

**Correct Answer: A**

*Explanation: René Descartes linked algebra and geometry using coordinates in 1637.*

**82. A calculator machine analogy compares a function to:**

(A) only storage
(B) input → process → output
(C) only printing
(D) random guessing

**Correct Answer: B**

*Explanation: A calculator machine analogy compares a function to input → process → output.*

**83. Cash register totals illustrate:**

(A) only constants
(B) only inverse functions
(C) dependent outputs from item-price inputs
(D) no process

**Correct Answer: C**

*Explanation: Cash register totals illustrate dependent outputs from item-price inputs.*

**84. Venn diagrams help classify functions as:**

(A) only linear
(B) only quadratic
(C) only exponential
(D) into, onto, and one-to-one

**Correct Answer: D**

*Explanation: Arrow diagrams show how sets map, so the correct choice is into, onto, and one-to-one.*

**85. A photocopier value model V(t) = 9500 − 860t is:**

(A) linear depreciation
(B) exponential growth
(C) quadratic only
(D) constant

**Correct Answer: A**

*Explanation: A photocopier value model V(t) = 9500 − 860t is linear depreciation.*

**86. Sound amplitude A(t) = |2 cos(t)| uses:**

(A) only linear terms
(B) absolute value of a trigonometric expression
(C) only reciprocals
(D) only identity

**Correct Answer: B**

*Explanation: Sound amplitude A(t) = |2 cos(t)| uses absolute value of a trigonometric expression.*

**87. Medicine decay f(n) = 120(0.9)^n is modeled by:**

(A) adding 0.9 each hour
(B) linear subtraction only
(C) repeated multiplication by 0.9
(D) absolute value only

**Correct Answer: C**

*Explanation: Medicine decay f(n) = 120(0.9)^n is modeled by repeated multiplication by 0.9.*

**88. Feasible graph reading for intersections uses:**

(A) only y-axis
(B) only largest x
(C) only origin
(D) common coordinates on both curves

**Correct Answer: D**

*Explanation: Feasible graph reading for intersections uses common coordinates on both curves.*

**89. The identity graph y = x has slope:**

(A) 1
(B) 0
(C) −1
(D) undefined

**Correct Answer: A**

*Explanation: Rise over run is 1 for equal steps in x and y.*

**90. A constant graph y = 4 has slope:**

(A) 4
(B) 0
(C) 1
(D) undefined vertical

**Correct Answer: B**

*Explanation: Horizontal lines have zero slope, so the correct choice is 0.*

**91. An exponential graph rises faster than a linear one for large x when base:**

(A) < 0 only
(B) = 0
(C) > 1
(D) = 1 only

**Correct Answer: C**

*Explanation: An exponential graph rises faster than a linear one for large x when base > 1.*

**92. Square root graph y = √x stays in:**

(A) second quadrant only
(B) third quadrant
(C) fourth only
(D) first quadrant including origin

**Correct Answer: D**

*Explanation: Square root graph y = √x stays in first quadrant including origin.*

**93. Reciprocal graph branches lie in:**

(A) quadrants I and III for y = 1/x
(B) only quadrant IV
(C) only on axes
(D) only at origin

**Correct Answer: A**

*Explanation: Same-sign x and y give positive 1/x, so the correct choice is quadrants I and III for y = 1/x.*

**94. Even power graphs $y = x^2$, $x^4$ share:**

(A) origin symmetry only
(B) y-axis symmetry
(C) horizontal asymptotes
(D) no symmetry

**Correct Answer: B**

*Explanation: Replacing x by −x gives the same y for even exponents.*

**95. Odd power graphs y = x, $x^3$ share:**

(A) y-axis symmetry only
(B) horizontal lines
(C) origin symmetry
(D) no defined domain

**Correct Answer: C**

*Explanation: f(−x) = −f(x) for odd powers, so the correct choice is origin symmetry.*

**96. Gradient through a tangent estimates:**

(A) total area
(B) y-intercept only
(C) domain size
(D) instantaneous rate of change

**Correct Answer: D**

*Explanation: Tangent slope measures local steepness, so the correct choice is instantaneous rate of change.*

**97. Binary relations differ from functions because relations:**

(A) may assign multiple outputs to one input
(B) always have empty range
(C) never use pairs
(D) always bijective

**Correct Answer: A**

*Explanation: Binary relations differ from functions because relations may assign multiple outputs to one input.*

**98. If f is bijective, its inverse exists and:**

(A) doubles outputs
(B) undoes the mapping
(C) removes domain
(D) always equals $x^2$

**Correct Answer: B**

*Explanation: If f is bijective, its inverse exists and undoes the mapping.*

**99. Composite order f(g(x)) means:**

(A) apply f first always
(B) add f and g
(C) apply g first, then f
(D) multiply domains

**Correct Answer: C**

*Explanation: Inner function g is evaluated before outer f.*

**100. Real-life function examples include:**

(A) only ancient numerals
(B) only Roman dates
(C) only prime lists
(D) cost from items sold and depreciation over time

**Correct Answer: D**

*Explanation: Real-life function examples include cost from items sold and depreciation over time.*

**101. The range of a quadratic may be found from:**

(A) vertex y-value when $a \neq 0$
(B) x-intercept only
(C) domain only
(D) always all reals for any quadratic

**Correct Answer: A**

*Explanation: The range of a quadratic may be found from vertex y-value when $a \neq 0$.*

**102. A linear function f(x) = mx + c crosses the y-axis at:**

(A) (c, 0)
(B) (0, c)
(C) (0, m)
(D) (m, 0)

**Correct Answer: B**

*Explanation: Set x = 0 to read the intercept c, so the correct choice is (0, c).*

**103. Horizontal line test relates to:**

(A) only constants
(B) only reciprocals
(C) one-to-one functions
(D) only square roots

**Correct Answer: C**

*Explanation: If every horizontal line hits at most once, the function is injective.*

**104. Vertical line test on a graph checks:**

(A) only slope
(B) only intercepts
(C) only symmetry
(D) whether the graph represents a function

**Correct Answer: D**

*Explanation: A vertical line must not hit the graph more than once.*

**105. The reciprocal of a large number is:**

(A) small
(B) large
(C) zero
(D) always 1

**Correct Answer: A**

*Explanation: The reciprocal of a large number is small.*

**106. The reciprocal of a small positive number is:**

(A) small
(B) large
(C) zero
(D) negative always

**Correct Answer: B**

*Explanation: The reciprocal of a small positive number is large.*

**107. Function types injective, surjective, bijective come from:**

(A) only graph color
(B) page number
(C) how inputs map to outputs
(D) coefficient sign only

**Correct Answer: C**

*Explanation: Mapping properties define these standard classifications.*

**108. Graphical solution of linear and quadratic systems gives:**

(A) only slope
(B) only asymptotes
(C) only domain
(D) intersection coordinates

**Correct Answer: D**

*Explanation: Graphical solution of linear and quadratic systems gives intersection coordinates.*