Functions, Domain, Range, and Properties

Function meaning, domain and range, properties, and basic graph behavior.

Name _____ Date _____

32 main | 2-up grid | 11 pages | visible side quests

Completion Reward

Shown here as a small pack artifact, not a preview destination.

1. What must be true for a relation to be a function?

input	output
1	4
2	5
3	5

A relation is a function only if no input is assigned two different outputs.

A. Each output has exactly one input.
B. Each input has exactly one output.
C. Every output must be positive.
D. The graph must be a line.

1.1. A relation is a function when:

A. each output has one input
B. each input has one output
C. every output is different
D. the graph is a line

1.2. Why is {(2, 5), (2, 7), (4, 1)} not a function?

A. because 2 appears twice with different outputs
B. because 5 is too large
C. because 4 appears once
D. because there are three points

1.3. Can two different inputs share the same output in a function?

A. Yes
B. No
C. Only for lines
D. Only in tables

1.4. Which relation is a function?

A. {(1, 3), (1, 5)}
B. {(2, 4), (3, 4)}
C. {(0, 1), (0, 2)}
D. {(7, 8), (7, 8), (7, 9)}

1.5. The rule 'one output per input' talks about which values?

A. the x-values first
B. the y-values first
C. the slope values
D. the intercept values

2. What does the domain of a function describe?

A. The set of all outputs
B. The graph's slope
C. The function's intercepts only
D. The allowed input values

2.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

2.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

2.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

2.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

2.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

3. What does the range of a function describe?

A. The allowed input values
B. The function's equation only
C. The x-intercepts only
D. The output values the function can produce

3.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

3.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

3.3. If x is the number of tickets sold, which domain value makes sense?

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3.5. On a graph, the domain is usually read along the:

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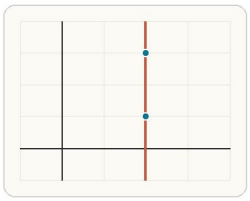
B. vertical axis
C. midline
D. intercepts only

4. What does the vertical line test check?



If a vertical line hits the graph more than once, that x-value would have more than one output.

A. Whether a graph has a y-intercept
B. Whether a graph is increasing
C. Whether a graph gives only one y-value for each x-value
D. Whether a graph is symmetric

4.1. If a vertical line hits a graph twice, the graph is:

A. a function
B. not a function
C. always linear
D. always constant

4.2. Why is x = 4 not a function of x?

A. It has too many y-values for one x-value
B. It has no x-values
C. It is always horizontal
D. It has slope 4

4.3. Which graph would fail the vertical line test?

A. a straight nonvertical line
B. a vertical line
C. a horizontal line
D. a ray with one y for each x

4.4. A parabola opening up passes the vertical line test because:

A. each x gives only one y
B. it is symmetric
C. it has a vertex
D. it crosses the axis

4.5. Why can a graph still be a function even if two points share the same y-value?

A. Functions forbid repeated outputs
B. Functions care only about repeated inputs
C. Outputs must all be positive
D. Vertical lines ignore outputs

5. What does it mean for a function to be increasing on an interval?

A. The graph stays above the x-axis.
B. Larger x-values give larger y-values on that interval.
C. The graph has no intercepts.
D. The function must be linear there.

5.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

5.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

5.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

5.4. In a graph context, the range tells you:

A. Possible input values
B. Possible output values
C. Only negative y-values
D. The x-intercepts

5.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

6. What symmetry does an even function have?

A. Symmetry about the x-axis
B. Symmetry about the origin
C. Symmetry about the y-axis
D. No symmetry at all

6.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

6.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
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B. Possible output values
C. Only negative y-values
D. The x-intercepts

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A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

7. What symmetry does an odd function have?

A. Symmetry about the y-axis
B. Symmetry about the x-axis
C. Symmetry about the origin
D. No symmetry at all

7.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

7.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

7.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

7.4. In a graph context, the range tells you:

A. Possible input values
B. Possible output values
C. Only negative y-values
D. The x-intercepts

7.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

8. What is a maximum value of a function?

A. A highest output value on the interval being discussed
B. A largest input value in the domain
C. The point where x = 0
D. The slope at the y-intercept

8.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

8.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

8.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

8.4. In a graph context, the range tells you:

A. Possible input values
B. Possible output values
C. Only negative y-values
D. The x-intercepts

8.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

9. Which domain matches f(x) = sqrt(x + 4)?

A. x >= -4
B. x <= -4
C. x != -4
D. all real numbers

9.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

9.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

9.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

9.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

9.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

10. Which domain matches g(x) = 1 / (x - 3)?

A. x >= 3
B. x <= 3
C. all real numbers
D. x != 3

10.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

10.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

10.3. If x is the number of tickets sold, which domain value makes sense?

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C. 8
D. -1/2

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B. vertical axis
C. diagonal
D. origin only

10.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

11. Which function is even?

A. f(x) = x^3
B. f(x) = x^2 + 1
C. f(x) = x + 2
D. f(x) = x^3 + 1

11.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

11.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

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A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

12. Which function is odd?

A. f(x) = x^2
B. f(x) = x^2 + 1
C. f(x) = x^3
D. f(x) = |x|

12.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

12.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

12.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

12.4. In a graph context, the range tells you:

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B. Possible output values
C. Only negative y-values
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A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

13. Which mapping is a function?

A. 1 -> 4 and 1 -> 5, 2 -> 6
B. 2 -> 3 and 2 -> 1, 4 -> 6
C. 1 -> 4, 2 -> 5, 3 -> 5
D. 5 -> 2 and 5 -> 7

13.1. A relation is a function when:

A. each output has one input
B. each input has one output
C. every output is different
D. the graph is a line

13.2. Why is {(2, 5), (2, 7), (4, 1)} not a function?

A. because 2 appears twice with different outputs
B. because 5 is too large
C. because 4 appears once
D. because there are three points

13.3. Can two different inputs share the same output in a function?

A. Yes
B. No
C. Only for lines
D. Only in tables

13.4. Which relation is a function?

A. {(1, 3), (1, 5)}
B. {(2, 4), (3, 4)}
C. {(0, 1), (0, 2)}
D. {(7, 8), (7, 8), (7, 9)}

13.5. The rule 'one output per input' talks about which values?

A. the x-values first
B. the y-values first
C. the slope values
D. the intercept values

14. What is the best first step when finding the domain of a rational function?

A. Set the numerator equal to 0.
B. Make every output positive.
C. Differentiate the function.
D. Set the denominator not equal to 0.

14.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

14.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

14.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

14.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

14.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

15. A student says sqrt(x - 7) is defined for x <= 7. What is the mistake?

A. Square-root functions are never defined.
B. The student should have set x = 0 only.
C. The radicand must be at least 0, so x must be at least 7.
D. The student should have made x negative.

15.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

15.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

15.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

15.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

15.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

16. If f(x) = 2x + 1, find f(3). Answer with a number.

16.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

16.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

16.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

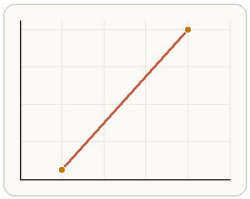
16.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

16.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

17. For f(x) = x^2, find the average rate of change from x = 1 to x = 4. Answer with a number.



Compute average rate of change by comparing the output change to the input change between the two points.

17.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

17.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

17.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

17.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

17.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

18. For f(x) = sqrt(x - 2), what is the smallest allowed x-value? Answer with a number.

18.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

18.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

18.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

18.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

18.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

19. For g(x) = 1 / (x + 5), what x-value is excluded from the domain? Answer with a number.

19.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

19.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

19.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

19.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

19.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

20. For h(x) = x^2 - 4, what is the y-intercept value? Answer with a number.

20.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

20.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

20.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

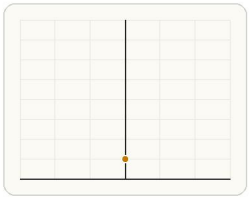
20.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

20.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

21. What is the minimum value of y = x^2 + 1? Answer with a number.



Because the parabola opens upward, its least output is the y-value of the vertex.

21.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

21.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

21.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

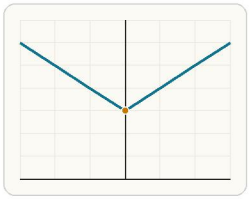
21.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

21.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

22. What is the least possible output of y = |x| + 3? Answer with a number.



The graph of y = |x| + 3 starts at y = 3 and rises on both sides, so 3 is the minimum output.

22.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

22.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

22.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

22.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

22.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

23. If p(x) = x^3 - 2, find p(-1). Answer with a number.

23.1. If f(x) = 3x + 2, what is f(4)?

A. 10
B. 12
C. 14
D. 18

23.2. If g(x) = 5 - 2x, what is g(-3)?

A. -1
B. 11
C. 1
D. -11

23.3. If h(x) = x^2 + 1, what is h(2)?

A. 3
B. 4
C. 5
D. 6

23.4. If r(x) = 7x - 9, what is r(0)?

A. -9
B. 0
C. 7
D. 9

23.5. If s(x) = 2x + 1, which is larger?

A. s(1)
B. s(3)
C. they are equal
D. cannot tell

24. Which student correctly finds the average rate of change of f(x) = x^2 from x = 1 to x = 3?

A. Student B: (3 - 1) / (9 - 1) = 2 / 8 = 0.25.
B. Student A: (9 - 1) / (3 - 1) = 8 / 2 = 4.
C. Student C: 3^2 - 1 = 8 so the answer is 8.
D. Student D: 1^2 + 3^2 = 10 so the answer is 10.

24.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

24.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

24.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

24.4. In a graph context, the range tells you:

A. Possible input values
B. Possible output values
C. Only negative y-values
D. The x-intercepts

24.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

25. State the domain of f(x) = sqrt(x - 1). Answer as an inequality in x.

25.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

25.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

25.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

25.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

25.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

26. State the domain of g(x) = 1 / (x + 2). Answer as a restriction on x.

26.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

26.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

26.3. If x is the number of tickets sold, which domain value makes sense?

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B. 1.5
C. 8
D. -1/2

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A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

26.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

27. State the range of y = x^2. Answer as an inequality in y.

27.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

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D. ordered pairs only

27.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

27.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

27.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

28. State the range of y = -x^2 + 4. Answer as an inequality in y.

28.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

28.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

28.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

28.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

28.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only

29. Classify f(x) = x^2 + 3 as even or odd. Answer with one word.

29.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

29.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

29.3. In a graph context, the domain tells you:

A. Possible input values
B. Possible output values
C. Only positive x-values
D. The slope of the graph

29.4. In a graph context, the range tells you:

A. Possible input values
B. Possible output values
C. Only negative y-values
D. The x-intercepts

29.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

30. Classify f(x) = x^3 as even or odd. Answer with one word.

30.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

30.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

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A. Possible input values
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A. Possible input values
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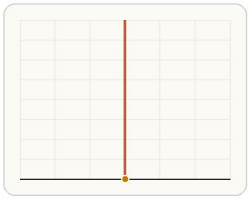
30.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

31. For y = x^2, state the axis of symmetry. Answer as an equation.



The axis of symmetry is the vertical line that passes through the vertex and reflects the graph onto itself.

31.1. If f(x) = 2x + 3, what is f(4)?

A. 7
B. 8
C. 11
D. 14

31.2. Which relation is a function?

A. One input goes to two outputs
B. Each input has exactly one output
C. Every output has exactly one input
D. The graph must be a line

31.3. In a graph context, the domain tells you:

A. Possible input values
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C. Only positive x-values
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A. Possible input values
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31.5. What does the point (3, 10) on a function graph mean?

A. The output is 3 when the input is 10
B. The input is 3 and the output is 10
C. The slope is 10/3
D. The function has no domain

32. State the domain of h(x) = sqrt(9 - x). Answer as an inequality in x.

32.1. The domain of a function is the set of:

A. inputs
B. outputs
C. slopes
D. intercepts

32.2. The range of a function is the set of:

A. inputs
B. outputs
C. equations
D. ordered pairs only

32.3. If x is the number of tickets sold, which domain value makes sense?

A. -3
B. 1.5
C. 8
D. -1/2

32.4. On a graph, the range is usually read along the:

A. horizontal axis
B. vertical axis
C. diagonal
D. origin only

32.5. On a graph, the domain is usually read along the:

A. horizontal axis
B. vertical axis
C. midline
D. intercepts only