Question ID 6abec9a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 6abec9a8
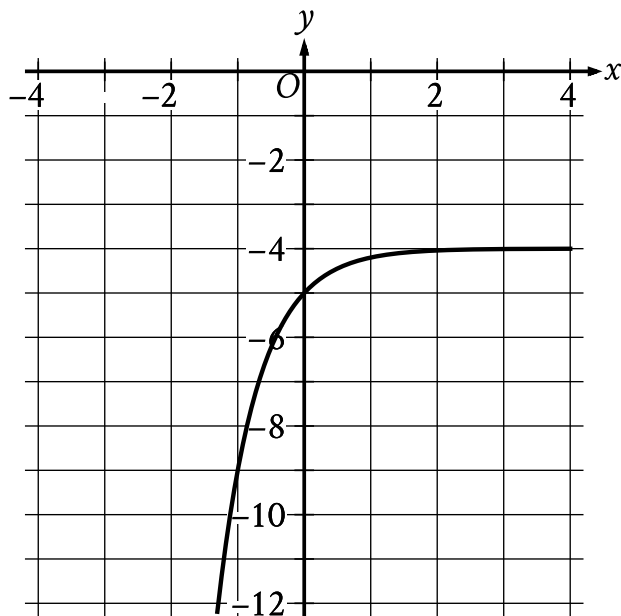
What is the y-intercept of the graph shown?

A. $(-1, -9)$

B. $(0, -5)$

C. $(0, -4)$

D. $(0, 0)$

ID: 6abec9a8 Answer

Correct Answer: B

Rationale

Choice B is correct. The y-intercept of a graph in the xy-plane is the point (x, y) on the graph where $x = 0$. At $x = 0$, the corresponding value of y is -5. Therefore, the y-intercept of the graph shown is $(0, -5)$.

Choice A is incorrect and may result from conceptual errors.
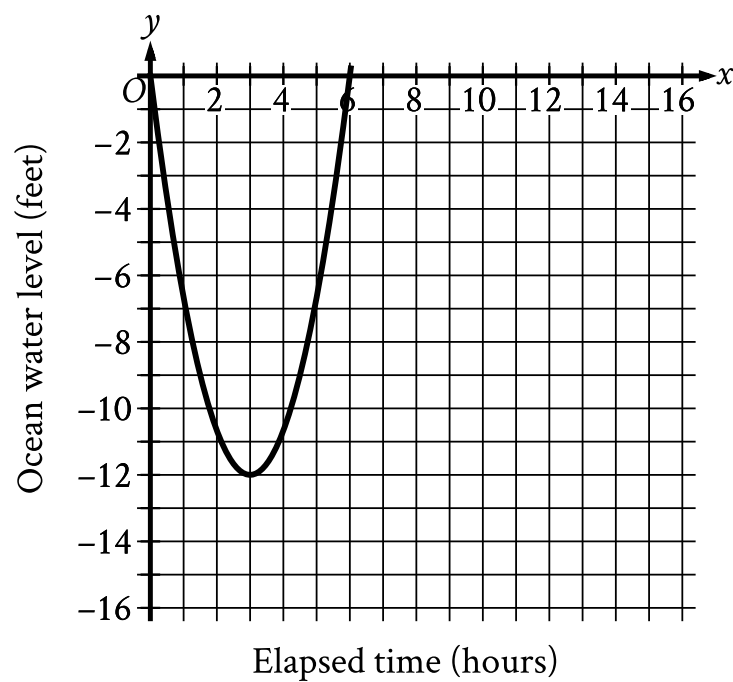
Choice C is incorrect. This is the y-intercept of a graph in the xy-plane that intersects the y-axis at $y = -4$, not $y = -5$.

Choice D is incorrect. This is the y-intercept of a graph in the xy-plane that intersects the y-axis at $y = 0$, not $y = -5$.

Question ID 1ee962ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 1ee962ec

Scientists recorded data about the ocean water levels at a certain location over a period of 6 hours. The graph shown models the data, where $y = 0$ represents sea level. Which table gives values of x and their corresponding values of y based on the model?

A.

x	y
0	-12
0	3
3	6

B.

x	y
0	0
3	12
0	-6

C.

x	y
0	0
3	-12

6	0

D.

x	y
0	0
12	3
−6	0

Correct Answer: C

Rationale

Choice C is correct. Each point (x, y) on the graph represents an elapsed time x, in hours, and the corresponding ocean water level y, in feet, at a certain location based on the model. The graph shown passes through the points $(0, 0)$, $(3, -12)$, and $(6, 0)$. Thus, the table in choice C gives the values of x and their corresponding values of y based on the model.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 788bfd56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 788bfd56

The function f is defined by $f(x) = 4 + \sqrt{x}$. What is the value of $f(144)$?

A. 0

B. 16

C. 40

D. 76

ID: 788bfd56 Answer

Correct Answer: B

Rationale

Choice B is correct. The value of $f(144)$ is the value of $f(x)$ when $x = 144$. It's given that the function f is defined by $f(x) = 4 + \sqrt{x}$. Substituting 144 for x in this equation yields $f(144) = 4 + \sqrt{144}$. Since the positive square root of 144 is 12, it follows that this equation can be rewritten as $f(144) = 4 + 12$, or $f(144) = 16$. Therefore, the value of $f(144)$ is 16.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect. This is the value of $f(1{,}296)$, not $f(144)$.

Choice D is incorrect. This is the value of $f(5{,}184)$, not $f(144)$.
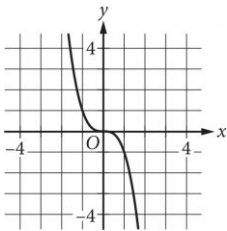
Question Difficulty: Easy

Question ID b39d74a0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

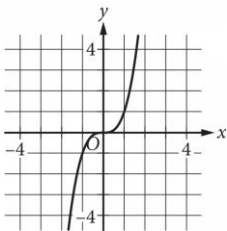**ID: b39d74a0**

x	y
0	0
1	1
2	8
3	27

The table shown includes some values of x and their corresponding values of y. Which of the following graphs in the xy-plane could represent the relationship between x and y?
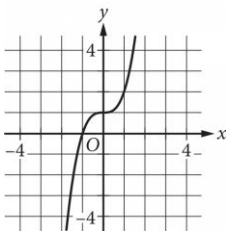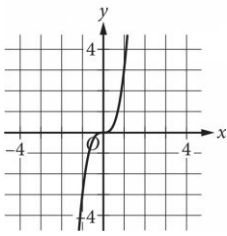
A.

B.

C.

D.

Correct Answer: B

Rationale

Choice B is correct. Each pair of values shown in the table gives the ordered pair of coordinates for a point that lies on the graph that represents the relationship between x and y in the xy-plane: $(0,0)$, $(1,1)$, $(2,8)$, and $(3,27)$. Only the graph in choice B passes through the points listed in the table that are visible in the given choices.

Choices A, C, and D are incorrect. None of these graphs passes through the point $(1,1)$.

Question Difficulty: Easy

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 5377d9cf

If $f(x) = \dfrac{x^2 - 6x + 3}{x - 1}$,

what is $f(-1)$?

A. −5

B. −2

C. 2

D. 5

ID: 5377d9cf Answer

Correct Answer: A

Rationale

Choice A is correct. Substituting −1 for x in the equation that defines f gives $f(-1) = \dfrac{(-1)^2 - 6(-1) + 3}{(-1) - 1}$.

Simplifying the expressions in the numerator and denominator yields $\dfrac{1 + 6 + 3}{-2}$, which is equal to $\dfrac{10}{-2}$ or −5.

Choices B, C, and D are incorrect and may result from misapplying the order of operations when substituting −1 for x.

Question Difficulty: Easy

Question ID 75915e3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 75915e3c

$$f(x) = 2(3^x)$$

For the function f defined above, what is the value of $f(2)$?

A. 9

B. 12

C. 18

D. 36

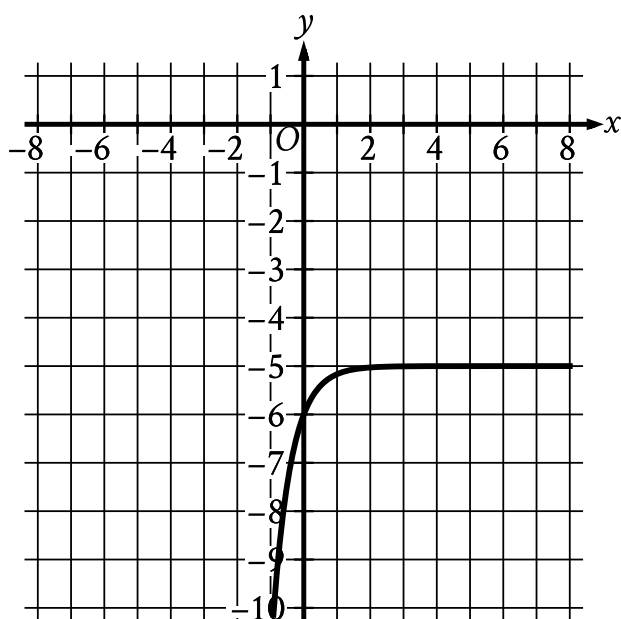**ID: 75915e3c Answer**

Correct Answer: C

Rationale

Choice C is correct. The value of $f(2)$ is found by evaluating the expression $2(3^x)$ when $x = 2$. Substituting 2 for x in the given equation yields $f(2) = 2(3^2)$. Simplifying 3^2 in the equation results in $f(2) = 2(9)$. Evaluating the right-hand side of the equation yields $f(2) = 18$. Therefore, the value of $f(2)$ is 18.

Choice A is incorrect and may result from evaluating the expression as (3^2). Choice B is incorrect and may result from evaluating the expression as $2(3 \cdot 2)$. Choice D is incorrect and may result from evaluating the expression as $(2 \cdot 3)^2$.

Question Difficulty: Easy

Question ID 7160cbb3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

What is the y-intercept of the graph shown?

A. $(0, -6)$

B. $(-6, 0)$

C. $(0, 0)$

D. $(-5, -5)$

Correct Answer: A

Rationale

Choice A is correct. The y-intercept of a graph in the xy-plane is the point (x, y) on the graph where $x = 0$. For the graph shown, at $x = 0$, the corresponding value of y is -6. Therefore, the y-intercept of the graph shown is $(0, -6)$.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■☐☐

ID: 72ae8a87

The function $f(x) = 200,000(1.21)^x$ gives a company's predicted annual revenue, in dollars, x years after the company started selling light bulbs online, where $0 < x \leq 10$. What is the best interpretation of the statement "$f(5)$ is approximately equal to $518,748$" in this context?

A. 5 years after the company started selling light bulbs online, its predicted annual revenue is approximately $518,748$ dollars.

B. 5 years after the company started selling light bulbs online, its predicted annual revenue will have increased by a total of approximately $518,748$ dollars.

C. When the company's predicted annual revenue is approximately $518,748$ dollars, it is 5 times the predicted annual revenue for the previous year.

D. When the company's predicted annual revenue is approximately $518,748$ dollars, it is 5% greater than the predicted annual revenue for the previous year.

ID: 72ae8a87 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the function $f(x) = 200,000(1.21)^x$ gives a company's predicted annual revenue, in dollars, x years after the company started selling light bulbs online. It follows that $f(x)$ represents the company's predicted annual revenue, in dollars, x years after the company started selling light bulbs online. Since the value of $f(5)$ is the value of $f(x)$ when $x = 5$, it follows that "$f(5)$ is approximately equal to $518,748$" means that $f(x)$ is approximately equal to $518,748$ when $x = 5$. Therefore, the best interpretation of the statement "$f(5)$ is approximately equal to $518,748$" in this context is 5 years after the company started selling light bulbs online, its predicted annual revenue is approximately $518,748$ dollars.

Choice B is incorrect and may result from conceptual errors.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 09f58996

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 09f58996

The function f is defined by $f(x) = 6 + \sqrt{x}$. What is the value of $f(36)$?

ID: 09f58996 Answer

Correct Answer: 12

Rationale

The correct answer is 12. The value of $f(36)$ is the value of $f(x)$ when $x = 36$. Substituting 36 for x in the given equation yields $f(36) = 6 + \sqrt{36}$, which is equivalent to $f(36) = 6 + 6$, or $f(36) = 12$. Thus, the value of $f(36)$ is 12.

Question Difficulty: Easy

Question ID ebe4bde0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: ebe4bde0
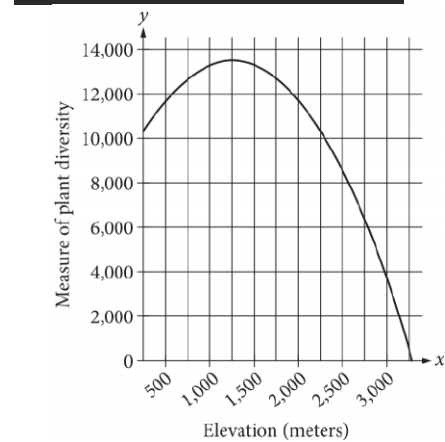
Elevation (meters)

The quadratic function graphed above models a particular measure of plant diversity as a function of the elevation in a region of Switzerland. According to the model, which of the following is closest to the elevation, in meters, at which plant diversity is greatest?

A. 13,500

B. 3,000

C. 1,250

D. 250

ID: ebe4bde0 Answer

Correct Answer: C

Rationale

Choice C is correct. Each point (x, y) on the graph represents the elevation x, in meters, and the corresponding measure of plant diversity y in a region of Switzerland. Therefore, the point on the graph with the greatest y-coordinate represents the location that has the greatest measure of plant diversity in the region. The greatest y-coordinate of any point on the graph is approximately 13,500. The x-coordinate of that point is approximately 1,250. Therefore, the closest elevation at which the plant diversity is the greatest is 1,250 meters.

Choice A is incorrect. This value is closest to the greatest y-coordinate of any point on the graph and therefore represents the greatest measure of plant diversity, not the elevation where the greatest measure of plant diversity occurs. Choice B is incorrect. At an elevation of 3,000 meters the measure of plant diversity is approximately 4,000. Because there are points on the graph with greater y-coordinates, 4,000 can't be the greatest measure of plant diversity, and 3,000 meters isn't the elevation at which the greatest measure of plant diversity occurs. Choice D is incorrect. At an elevation of 250 meters, the measure of plant diversity is approximately 11,000. Because there are points on the graph with greater y-coordinates, 11,000 can't be the

greatest measure of plant diversity and 250 meters isn't the elevation at which the greatest measure of plant diversity occurs.
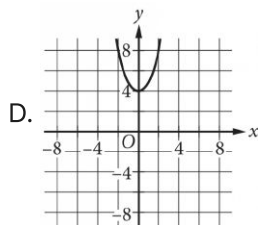
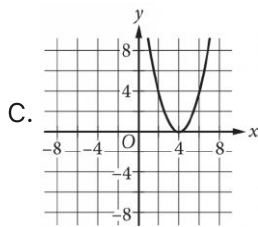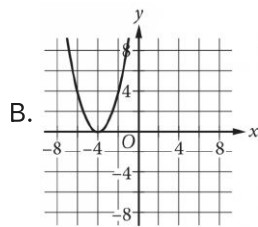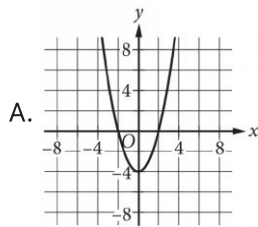Question Difficulty: Easy

Question ID d46da42c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: d46da42c

$$f(x) = x^2 + 4$$

The function f is defined as shown. Which of the following graphs in the xy-plane could be the graph of $y = f(x)$?

A.

B.

C.

D.

ID: d46da42c Answer

Correct Answer: D

Rationale

Choice D is correct. For the quadratic function $f(x) = x^2 + 4$, the vertex of the graph is $(0,4)$, and because the x^2 term is positive, the vertex is the minimum of the function. Choice D is the only option that meets these conditions.

Choices A, B, and C are incorrect. The vertex of each of these graphs doesn't correspond to the minimum of the given function.

Question Difficulty: Easy

Question ID 79ba511a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: 79ba511a

The function f is defined by $f(x) = x^3 + 15$. What is the value of $f(2)$?

A. 20

B. 21

C. 23

D. 24

ID: 79ba511a Answer

Correct Answer: C

Rationale

Choice C is correct. The value of $f(2)$ is the value of $f(x)$ when $x = 2$. Substituting 2 for x in the given function yields $f(2) = (2)^3 + 15$, or $f(2) = 8 + 15$, which is equivalent to $f(2) = 23$. Therefore, the value of $f(2)$ is 23.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect. This is the value of $f(2)$ when $f(x) = x(3) + 15$, rather than $f(x) = x^3 + 15$.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 50418728

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■☐☐

ID: 50418728
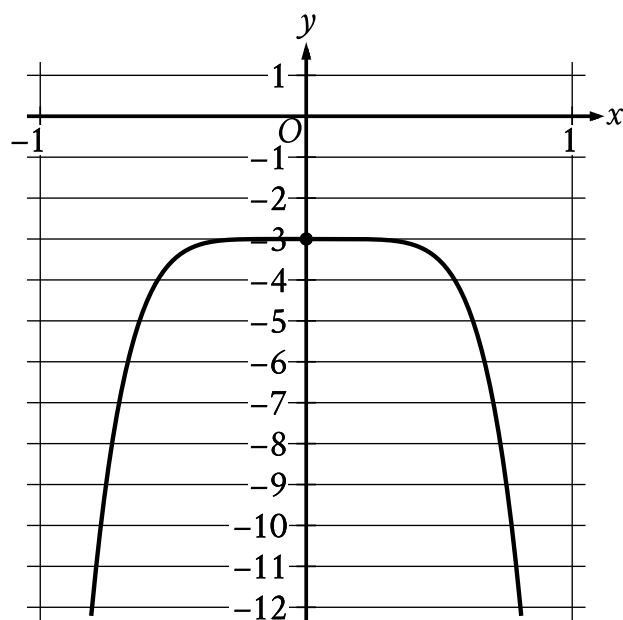
The graph of the polynomial function f, where $y = f(x)$, is shown. The y-intercept of the graph is $(0, y)$. What is the value of y?

ID: 50418728 Answer

Correct Answer: -3

Rationale

The correct answer is -3. The y-intercept of the graph of a function in the xy-plane is the point where the graph crosses the y-axis. The graph of the polynomial function shown crosses the y-axis at the point $(0, -3)$. It's given that the y-intercept of the graph is $(0, y)$. Thus, the value of y is -3.

Question Difficulty: Easy

Question ID ee05c84e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	■□□

ID: ee05c84e

$$f(x) = (x + 0.25x)(50 - x)$$

The function f is defined above. What is the value of $f(20)$?

A. 250

B. 500

C. 750

D. 2,000

ID: ee05c84e Answer

Correct Answer: C

Rationale

Choice C is correct. Adding the like terms x and $0.25x$ yields the equation $f(x) = (1.25x)(50 - x)$. Substituting 20 for x yields $f(20) = (1.25(20))(50 - 20)$. The product $1.25(20)$ is equal to 25, and the difference $50 - 20$ is equal to 30. Substituting these values in the given equation gives $f(20) = (25)(30)$, and multiplying 25 by 30 results in $f(20) = 750$.

Choices A, B, and D are incorrect and may result from conceptual or computational errors when finding the value of $f(20)$.

Question Difficulty: Easy