

Question ID 8e3878fd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 8e3878fd

$$P(t) = 1,800(1.02)^t$$

The function P gives the estimated number of marine mammals in a certain area, where t is the number of years since a study began. What is the best interpretation of $P(0) = 1,800$ in this context?

- A. The estimated number of marine mammals in the area was 102 when the study began.
- B. The estimated number of marine mammals in the area was 1,800 when the study began.
- C. The estimated number of marine mammals in the area increased by 102 each year during the study.
- D. The estimated number of marine mammals in the area increased by 1,800 each year during the study.

ID: 8e3878fd Answer

Correct Answer: B

Rationale

Choice B is correct. The function P gives the estimated number of marine mammals in a certain area, where t is the number of years since a study began. Since the value of $P(0)$ is the value of $P(t)$ when $t = 0$, it follows that $P(0) = 1,800$ means that the value of $P(t)$ is 1,800 when $t = 0$. Since t is the number of years since the study began, it follows that $t = 0$ is 0 years since the study began, or when the study began. Therefore, the best interpretation of $P(0) = 1,800$ in this context is the estimated number of marine mammals in the area was 1,800 when the study began.

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

Choice C 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 d08a5d15

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: d08a5d15

The function f is defined by $f(x) = 5x^2$. What is the value of $f(8)$?

- A. 40
- B. 50
- C. 80
- D. 320

ID: d08a5d15 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that the function f is defined by $f(x) = 5x^2$. Substituting 8 for x in $f(x) = 5x^2$ yields $f(8) = 5(8)^2$, which is equivalent to $f(8) = 5(64)$, or $f(8) = 320$. Therefore, the value of $f(8)$ is 320.

Choice A is incorrect. This is the value of $f(8)$ if $f(x) = 5x$.

Choice B is incorrect. This is the value of $f(8)$ if $f(x) = 5(x + 2)$.

Choice C is incorrect. This is the value of $f(8)$ if $f(x) = (5x)(2)$.

Question Difficulty: Easy

Question ID 21be3fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 21be3fb

The function g is defined by $g(x) = |x + 18|$. What is the value of $g(4)$?

- A. -18
- B. -4
- C. 14
- D. 22

ID: 21be3fb Answer

Correct Answer: D

Rationale

Choice D is correct. The value of $g(4)$ is the value of $g(x)$ when $x = 4$. Substituting 4 for x in the given equation yields $g(4) = |4 + 18|$, which is equivalent to $g(4) = |22|$, or $g(4) = 22$. Therefore, the value of $g(4)$ is 22.

Choice A is incorrect. This would be the value of $g(4)$ if function g was defined by $g(x) = -|18|$, not $g(x) = |x + 18|$.

Choice B is incorrect. This would be the value of $g(4)$ if function g was defined by $g(x) = -|x|$, not $g(x) = |x + 18|$.

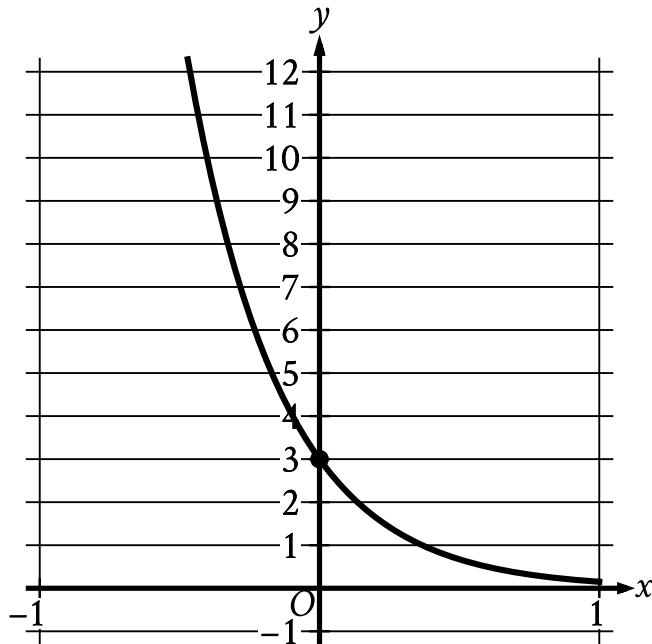
Choice C is incorrect. This would be the value of $g(4)$ if function g was defined by $g(x) = |-x + 18|$, not $g(x) = |x + 18|$.

Question Difficulty: Easy

Question ID feea2bbd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: feea2bbd



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

ID: feea2bbd Answer

Correct Answer: 3

Rationale

The correct answer is **3**. It's given that the y -intercept of the graph shown is $(0, y)$. The graph passes through the point $(0, 3)$. Therefore, the value of y is **3**.

Question Difficulty: Easy

Question ID ba5a8050

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: ba5a8050

The graph shows the predicted value y , in dollars, of a certain sport utility vehicle x years after it is first purchased.



Which of the following is closest to the predicted value of the sport utility vehicle 3 years after it is first purchased?

- A. \$9,619
- B. \$13,632
- C. \$19,320
- D. \$23,000

ID: ba5a8050 Answer

Correct Answer: B

Rationale

Choice B is correct. For the graph shown, the horizontal axis represents the number of years after a certain sport utility vehicle is first purchased, and the vertical axis represents the predicted value, in dollars, of the sport utility vehicle. According to the graph, 3 years after the sport utility vehicle is purchased, the predicted value of the sport utility vehicle is between

\$10,000 and **\$15,000**. Of the given choices, only **\$13,632** is between **\$10,000** and **\$15,000**. Therefore, **\$13,632** is closest to the predicted value of the sport utility vehicle **3** years after it is first purchased.

Choice A is incorrect. This is closest to the predicted value of the sport utility vehicle **5** years after it is first purchased.

Choice C is incorrect. This is closest to the predicted value of the sport utility vehicle **1** year after it is first purchased.

Choice D is incorrect. This is closest to the predicted value of the sport utility vehicle when it is first purchased.

Question Difficulty: Easy

Question ID e2abeaa7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: e2abeaa7

The function f is defined by $f(x) = x^3 + 9$. What is the value of $f(2)$?

- A. 14
- B. 15
- C. 17
- D. 18

ID: e2abeaa7 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $f(x) = x^3 + 9$. Substituting 2 for x in this equation yields $f(2) = (2)^3 + 9$. This is equivalent to $f(2) = 8 + 9$, or $f(2) = 17$.

Choice A is incorrect. This is the value of $2 + 3 + 9$, not $2^3 + 9$.

Choice B is incorrect. This is the value of $2(3) + 9$, not $2^3 + 9$.

Choice D is incorrect. This is the value of $3^2 + 9$, not $2^3 + 9$.

Question Difficulty: Easy

Question ID c3018583

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: c3018583

A ball is dropped from an initial height of **22** feet and bounces off the ground repeatedly. The function h estimates that the maximum height reached after each time the ball hits the ground is **85%** of the maximum height reached after the previous time the ball hit the ground. Which equation defines h , where $h(n)$ is the estimated maximum height of the ball after it has hit the ground n times and n is a whole number greater than **1** and less than **10**?

- A. $h(n) = 22(0.22)^n$
- B. $h(n) = 22(0.85)^n$
- C. $h(n) = 85^{msup}$
- D. $h(n) = 85(0.85)^n$

ID: c3018583 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that for the function h , $h(n)$ is the estimated maximum height, in feet, of the ball after it has hit the ground n times. It's also given that the function h estimates that the maximum height reached after each time the ball hits the ground is **85%** of the maximum height reached after the previous time the ball hit the ground. It follows that h is a decreasing exponential function that can be written in the form $h(n) = a(\frac{p}{100})^n$, where a is the initial height, in feet, the ball was dropped from and the function estimates that the maximum height reached after each time the ball hits the ground is $p\%$ of the maximum height reached after the previous time the ball hit the ground. It's given that the ball is dropped from an initial height of **22** feet. Therefore, $a = 22$. Since the function h estimates that the maximum height reached after each time the ball hits the ground is **85%** of the maximum height reached after the previous time the ball hit the ground, $p = 85$. Substituting **22** for a and **85** for p in the equation $h(n) = a(\frac{p}{100})^n$ yields $h(n) = 22(\frac{85}{100})^n$, or $h(n) = 22(0.85)^n$.

Choice A is incorrect. This function estimates that the maximum height reached after each time the ball hits the ground is **22%**, not **85%**, of the maximum height reached after the previous time the ball hit the ground.

Choice C is incorrect. This function estimates that the ball is dropped from an initial height of **85** feet, not **22** feet, and that the maximum height reached after each time the ball hits the ground is **22%**, not **85%**, of the maximum height reached after the previous time the ball hit the ground.

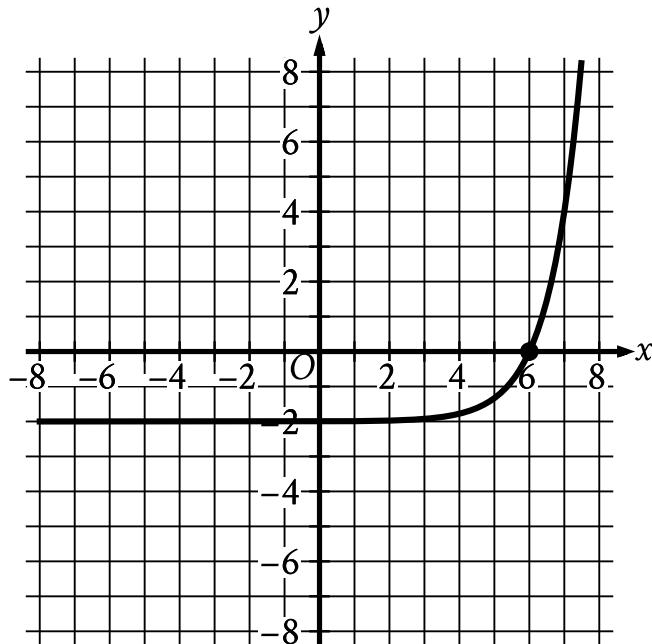
Choice D is incorrect. This function estimates that the ball is dropped from an initial height of **85** feet, not **22** feet.

Question Difficulty: Easy

Question ID 71dfd66d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 71dfd66d



What is the x -coordinate of the x -intercept of the graph shown?

ID: 71dfd66d Answer

Correct Answer: 6

Rationale

The correct answer is **6**. An x -intercept of a graph is a point on the graph where it intersects the x -axis, or where the value of y is **0**. The graph shown intersects the x -axis at the point **(6, 0)**. Therefore, the x -coordinate of the x -intercept of the graph shown is **6**.

Question Difficulty: Easy

Question ID 32f0047f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 32f0047f

$$P(t) = 24.8(1.036)^t$$

The function P gives the predicted population, in millions, of a certain country for the period from **1984** to **2018**, where t is the number of years after **1984**. According to the model, what is the best interpretation of the statement " $P(8)$ is approximately equal to **32.91**"?

- A. In **1984**, the predicted population of this country was approximately **8** million.
- B. In **1984**, the predicted population of this country was approximately **32.91** million.
- C. **8** years after **1984**, the predicted population of this country was approximately **32.91** million.
- D. **32.91** years after **1984**, the predicted population of this country was approximately **8** million.

ID: 32f0047f Answer

Correct Answer: C

Rationale

Choice C is correct. The function P gives the predicted population, in millions, of a certain country for the period from **1984** to **2018**, where t is the number of years after **1984**. Since the value of $P(8)$ is the value of $P(t)$ when $t = 8$, it follows that " $P(8)$ is approximately equal to **32.91**" means that the value of $P(t)$ is approximately equal to **32.91** when $t = 8$. Therefore, the best interpretation of the statement " $P(8)$ is approximately equal to **32.91**" is that **8** years after **1984**, the predicted population of this country was approximately **32.91** million.

Choice A is incorrect. In **1984**, the predicted population of this country was **24.8** million, not approximately **8** million.

Choice B is incorrect. In **1984**, the predicted population of this country was **24.8** million, not approximately **32.91** million.

Choice D is incorrect. **32.91** years after **1984**, the predicted population of this country was $24.8(1.036)^{32.91}$ million, or approximately **79.42** million, not approximately **8** million.

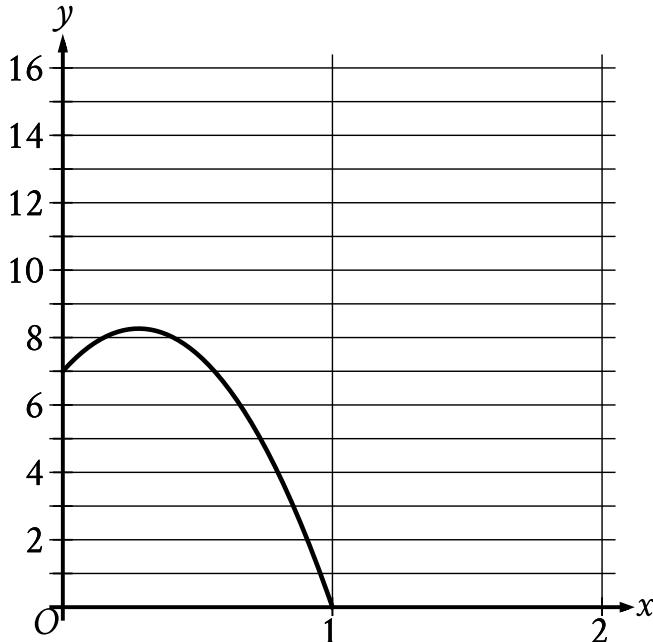
Question Difficulty: Easy

Question ID 5a0d5e4b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

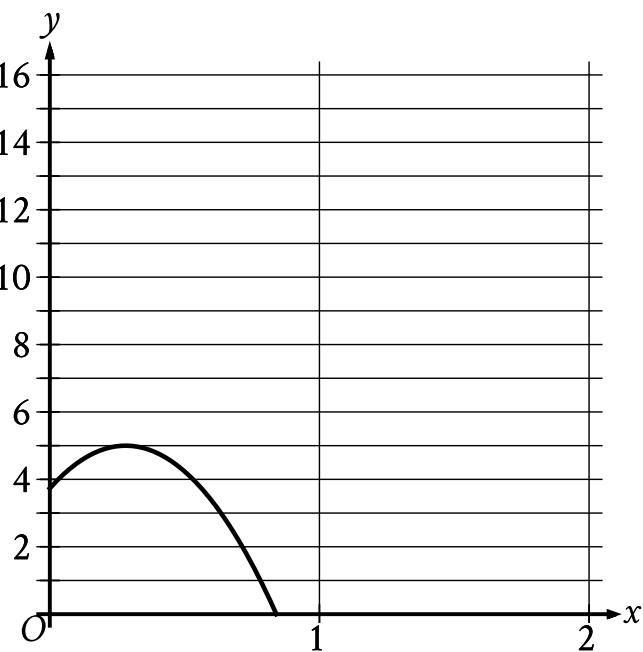
ID: 5a0d5e4b

During the first part of an experiment, a ball was launched from a 7-foot-tall platform. The graph shows the height y , in feet, of the ball x seconds after it was launched during the first part of the experiment.

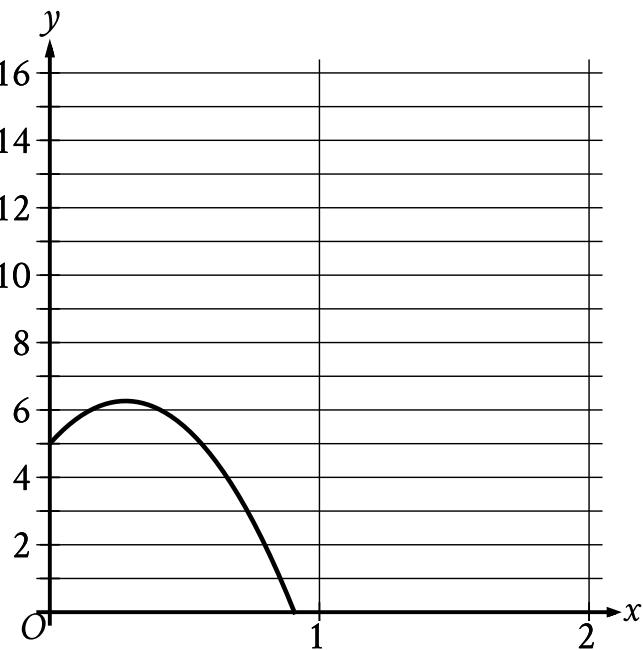


During the second part of the experiment, the ball was launched the same way, but from a platform that is 2 feet shorter than the first platform. Which of the following graphs could represent the height y , in feet, of the ball x seconds after it was launched during the second part of the experiment?

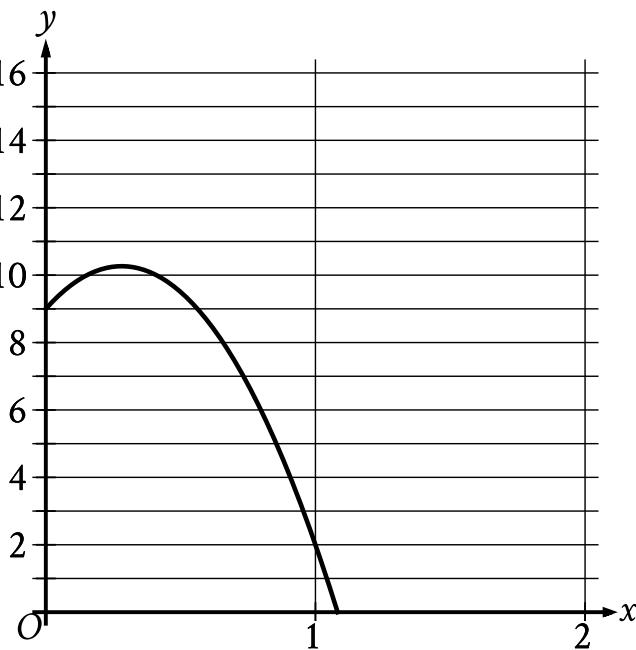
A.



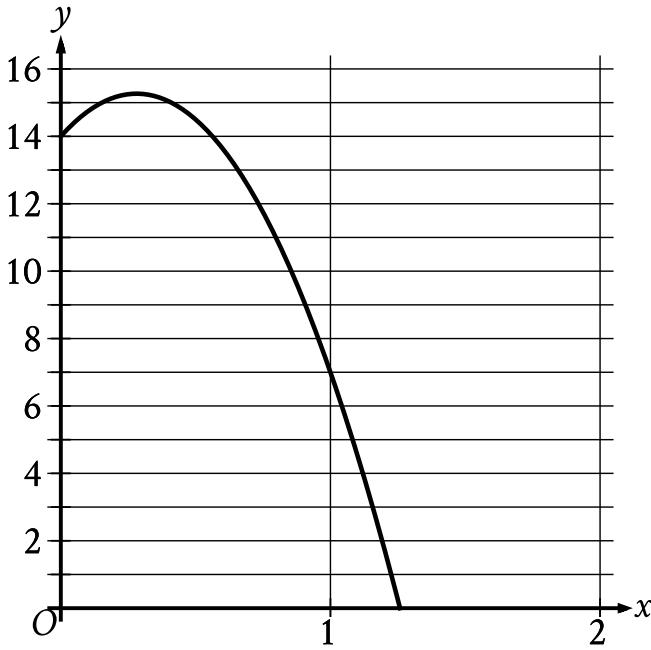
B.



C.



D.

**ID: 5a0d5e4b Answer**

Correct Answer: B

Rationale

Choice B is correct. It's given that y represents the height, in feet, of the ball x seconds after it was launched. It's also given that during the first part of an experiment, a ball was launched from a 7-foot-tall platform. Therefore, the y -coordinate of the y -intercept of the given graph, 7, represents the platform height, in feet. During the second part of the experiment, the platform the ball was launched from was 2 feet shorter than the platform in the first part of the experiment. It follows that the height of the platform in the second part of the experiment was $7 - 2$ feet, or 5 feet. Therefore, the y -coordinate of the y -intercept of the graph representing the second part of the experiment must be 5. Only choice B satisfies this condition.

Choice A is incorrect. This could represent the graph if the ball were launched from a platform that was about 3 feet shorter rather than 2 feet shorter.

Choice C is incorrect. This could represent the graph if the ball were launched from a platform that was **2** feet taller rather than **2** feet shorter.

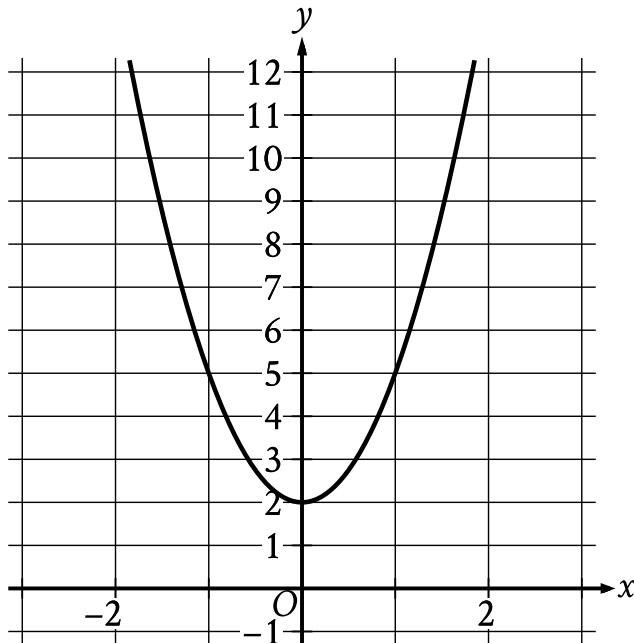
Choice D is incorrect. This could represent the graph if the ball were launched from a platform that was twice as tall rather than **2** feet shorter.

Question Difficulty: Easy

Question ID 0b95a3c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 0b95a3c1



The graph of the quadratic function $y = f(x)$ is shown. What is the vertex of the graph?

- A. $(0, -2)$
- B. $(0, -3)$
- C. $(0, 2)$
- D. $(0, 3)$

ID: 0b95a3c1 Answer

Correct Answer: C

Rationale

Choice C is correct. The vertex of the graph of a quadratic function in the xy -plane is the point at which the graph is either at its minimum or maximum y -value. In the graph shown, the minimum y -value occurs at the point $(0, 2)$.

Choice A is incorrect. The graph shown doesn't pass through the point $(0, -2)$.

Choice B is incorrect. The graph shown doesn't pass through the point $(0, -3)$.

Choice D is incorrect. The graph shown doesn't pass through the point $(0, 3)$.

Question Difficulty: Easy

Question ID e00137af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: e00137af

The function g is defined by $g(x) = x^2 + 9$. For which value of x is $g(x) = 25$?

- A. 4
- B. 5
- C. 9
- D. 13

ID: e00137af Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that $g(x) = x^2 + 9$. Substituting 25 for $g(x)$ in this equation yields $25 = x^2 + 9$. Subtracting 9 from both sides of this equation yields $16 = x^2$. Taking the square root of each side of this equation yields $x = \pm 4$. It follows that $g(x) = 25$ when the value of x is 4 or -4. Only 4 is listed among the choices.

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

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

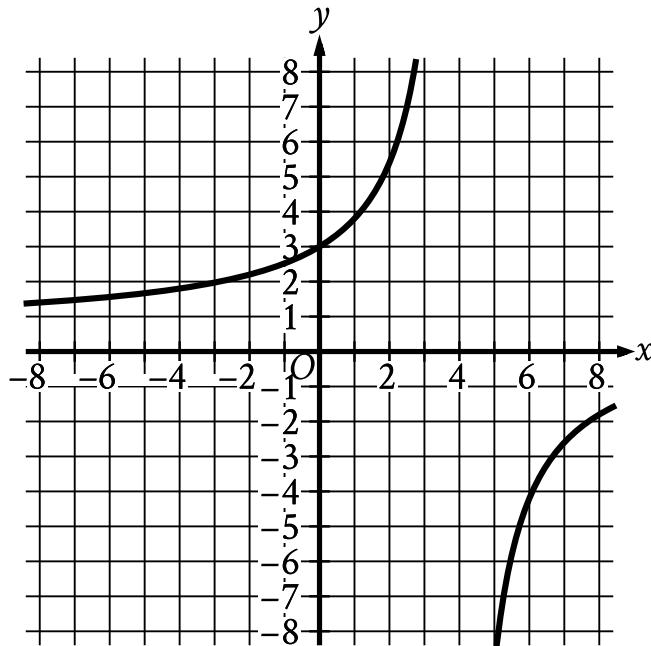
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 7f26b325

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 7f26b325



The graph of $y = f(x)$ is shown in the xy -plane. What is the value of $f(0)$?

- A. -3
- B. 0
- C. $\frac{3}{5}$
- D. 3

ID: 7f26b325 Answer

Correct Answer: D

Rationale

Choice D is correct. Because the graph of $y = f(x)$ is shown, the value of $f(0)$ is the value of y on the graph that corresponds with $x = 0$. When $x = 0$, the corresponding value of y is 3 . Therefore, the value of $f(0)$ is 3 .

Choice A is incorrect and may result from conceptual errors.

Choice B is incorrect and may result from conceptual errors.

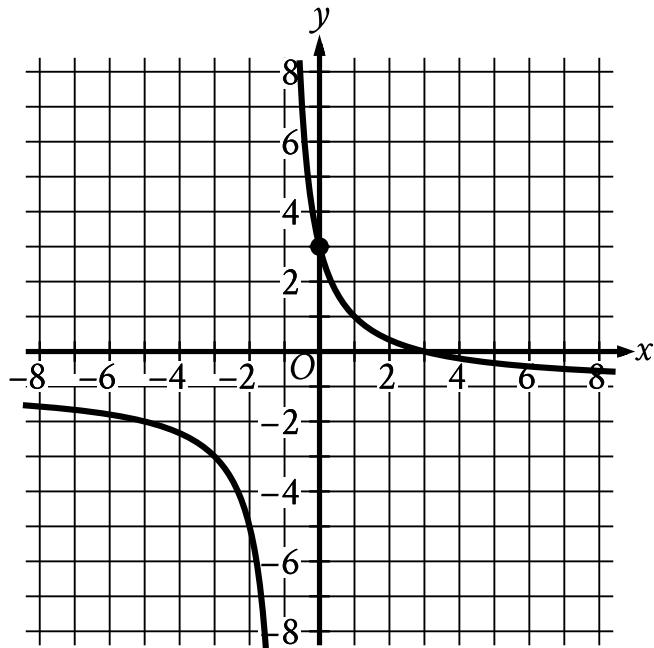
Choice C is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 49f6315b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 49f6315b



What is the y -coordinate of the y -intercept of the graph shown?

ID: 49f6315b Answer

Correct Answer: 3

Rationale

The correct answer is **3**. A y -intercept of a graph in the xy -plane is a point (x, y) on the graph where $x = 0$. For the graph shown, at $x = 0$, the corresponding value of y is **3**. Therefore, the y -coordinate of the y -intercept of the graph shown is **3**.

Question Difficulty: Easy

Question ID 14a9a45d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 14a9a45d

The function f is defined by $f(x) = \frac{1}{6x}$. What is the value of $f(x)$ when $x = 3$?

- A. $\frac{1}{3}$
- B. $\frac{1}{6}$
- C. $\frac{1}{9}$
- D. $\frac{1}{18}$

ID: 14a9a45d Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that $f(x) = \frac{1}{6x}$. Substituting 3 for x in this equation yields $f(3) = \frac{1}{6(3)}$, or $f(3) = \frac{1}{18}$. Therefore, when $x = 3$, the value of $f(x)$ is $\frac{1}{18}$.

Choice A is incorrect. This is the value of $f(x)$ when $x = 0.5$.

Choice B is incorrect. This is the value of $f(x)$ when $x = 1$.

Choice C is incorrect. This is the value of $f(x)$ when $x = 1.5$.

Question Difficulty: Easy

Question ID 74b8e0a0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 74b8e0a0

The function f is defined by $f(x) = \frac{16}{x}$. What is the value of $f(x)$ when $x = 17$?

- A. $\frac{16}{17}$
- B. $\frac{17}{16}$
- C. 16
- D. 17

ID: 74b8e0a0 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that $f(x) = \frac{16}{x}$. Substituting 17 for x in this function yields $f(17) = \frac{16}{17}$. Therefore, when $x = 17$, the value of $f(x)$ is $\frac{16}{17}$.

Choice B is incorrect. This is the value of the reciprocal of $f(x)$ when $x = 17$.

Choice C is incorrect. This is the value of $f(x)$ when $x = 1$.

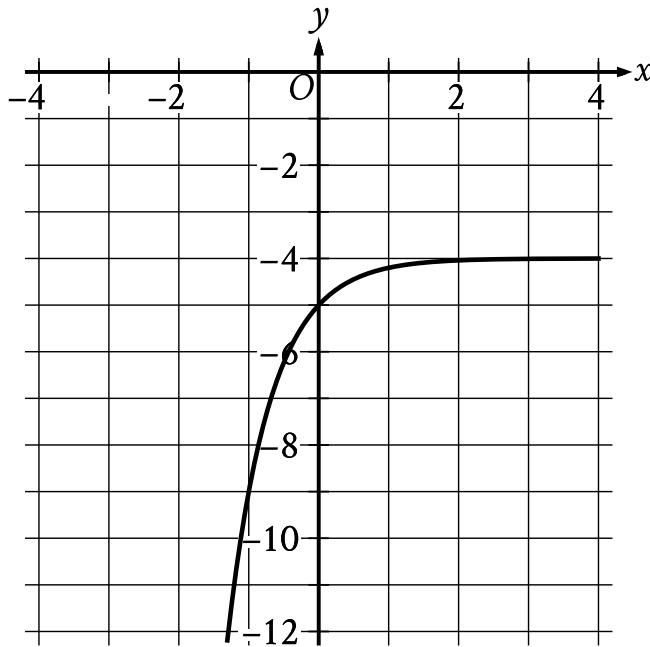
Choice D is incorrect. This is the value of x when $x = 17$.

Question Difficulty: Easy

Question ID 9322d5de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 9322d5de



What is the y -intercept of the graph shown?

- A. $(-1, -9)$
- B. $(0, -5)$
- C. $(0, -4)$
- D. $(0, 0)$

ID: 9322d5de 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 Difficulty: Easy

Question ID bb4474ea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: bb4474ea

The function f is defined by $f(x) = 10x^2 - 32x - 152$. What is the value of $f(0)$?

- A. **-152**
- B. **-32**
- C. **0**
- D. **10**

ID: bb4474ea Answer

Correct Answer: A

Rationale

Choice A is correct. The value of $f(0)$ is the value of $f(x)$ when $x = 0$. The function f is defined by $f(x) = 10x^2 - 32x - 152$. Substituting 0 for x in this equation yields $f(0) = 10(0)^2 - 32(0) - 152$. This equation can be rewritten as $f(0) = 10(0) - 0 - 152$, or $f(0) = -152$. Therefore, the value of $f(0)$ is **-152**.

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

Choice C 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 5964ec17

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 5964ec17

The function f is defined by $f(x) = x^2 + x + 71$. What is the value of $f(2)$?

ID: 5964ec17 Answer

Correct Answer: 77

Rationale

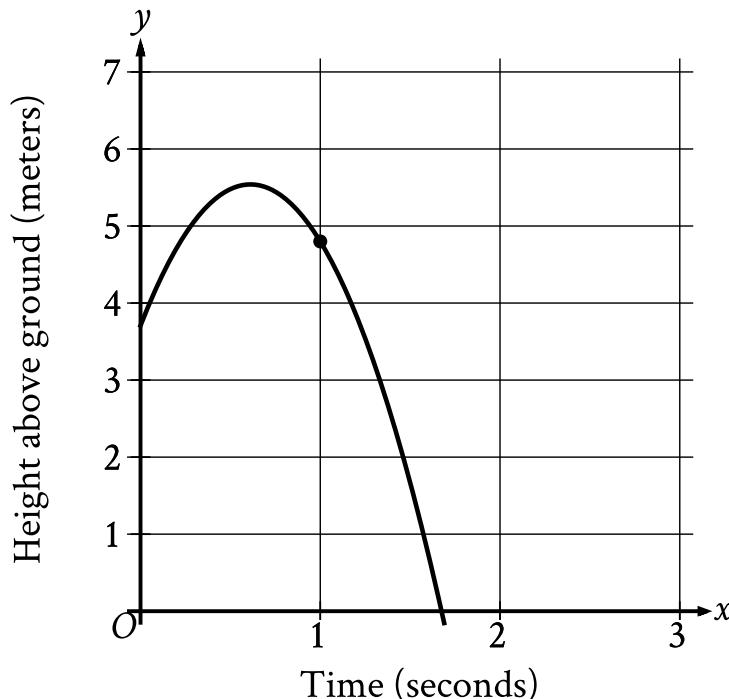
The correct answer is 77. It's given that the function f is defined by $f(x) = x^2 + x + 71$. Substituting 2 for x in function f yields $f(2) = (2)^2 + 2 + 71$, which is equivalent to $f(2) = 4 + 2 + 71$, or $f(2) = 77$. Therefore, the value of $f(2)$ is 77.

Question Difficulty: Easy

Question ID 67906a7c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 67906a7c



The graph shows the height above ground, in meters, of a ball x seconds after the ball was launched upward from a platform. Which statement is the best interpretation of the marked point $(1.0, 4.8)$ in this context?

- A. 1.0 second after being launched, the ball's height above ground is 4.8 meters.
- B. 4.8 seconds after being launched, the ball's height above ground is 1.0 meter.
- C. The ball was launched from an initial height of 1.0 meter with an initial velocity of 4.8 meters per second.
- D. The ball was launched from an initial height of 4.8 meters with an initial velocity of 1.0 meter per second.

ID: 67906a7c Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the graph shows the height above ground, in meters, of a ball x seconds after the ball was launched upward from a platform. In the graph shown, the x -axis represents time, in seconds, and the y -axis represents the height of the ball above ground, in meters. It follows that for the marked point $(1.0, 4.8)$, 1.00 represents the time, in seconds, after the ball was launched upward from a platform and 4.80 represents the height of the ball above ground, in meters. Therefore, the best interpretation of the marked point $(1.0, 4.8)$ is 1.00 second after being launched, the ball's height above ground is 4.80 meters.

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 76bb62a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 76bb62a9

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: 76bb62a9 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 ec6f1063

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: ec6f1063

The function g is defined by $g(x) = \sqrt{8x + 1}$. What is the value of $g(3)$?

- A. $\frac{5}{8}$
- B. $\frac{25}{8}$
- C. 5
- D. 25

ID: ec6f1063 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the function g is defined by $g(x) = \sqrt{8x + 1}$. Substituting 3 for x in the given function yields $g(3) = \sqrt{8(3) + 1}$, which is equivalent to $g(3) = \sqrt{25}$, or $g(3) = 5$. Therefore, the value of $g(3)$ is 5.

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

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

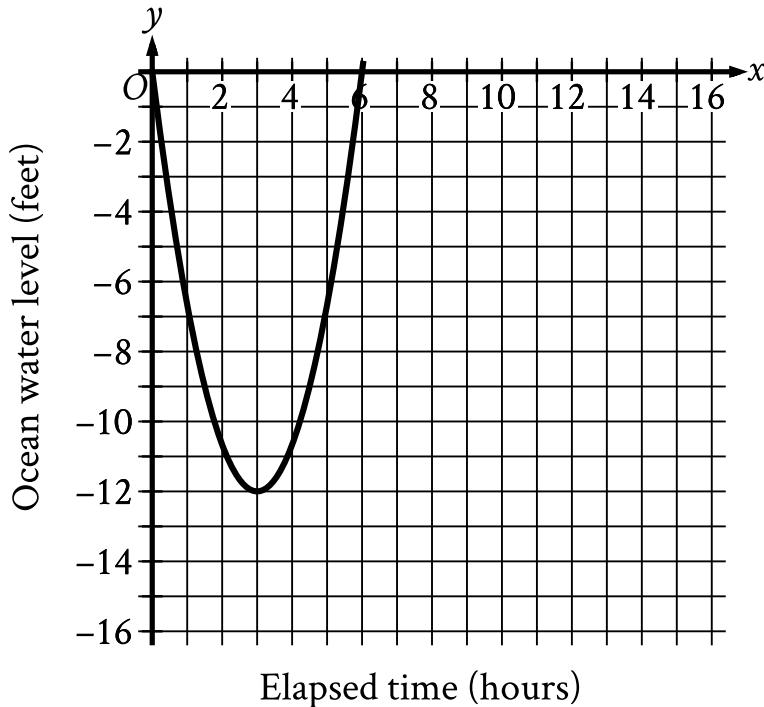
Choice D is incorrect. This is the value of $8(3) + 1$, not $\sqrt{8(3) + 1}$.

Question Difficulty: Easy

Question ID 1bb4e088

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 1bb4e088



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

ID: 1bb4e088 Answer

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.

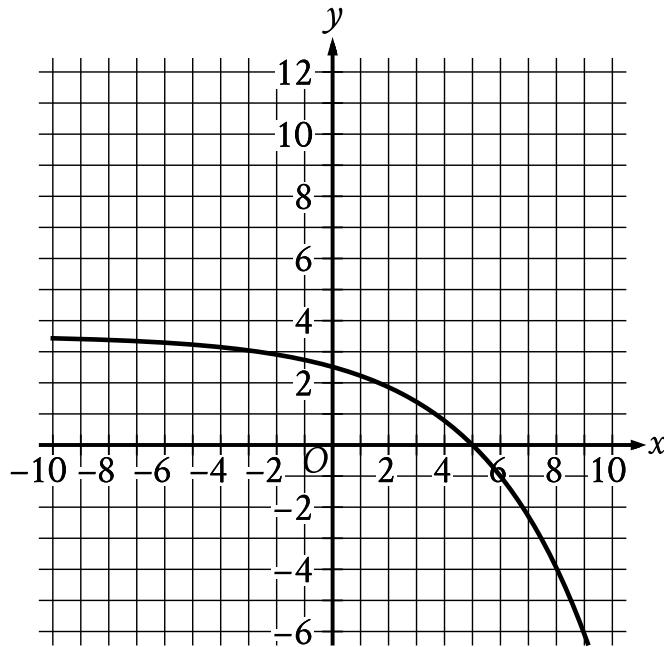
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID f89a2cb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: f89a2cb0



What is the x -intercept of the graph shown?

- A. $(-5, 0)$
- B. $(5, 0)$
- C. $(-2, 0)$
- D. $(2, 0)$

ID: f89a2cb0 Answer

Correct Answer: B

Rationale

Choice B is correct. An x -intercept of a graph in the xy -plane is a point at which the graph crosses the x -axis. The graph shown crosses the x -axis at the point $(5, 0)$. Therefore, the x -intercept of the graph shown is $(5, 0)$.

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

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

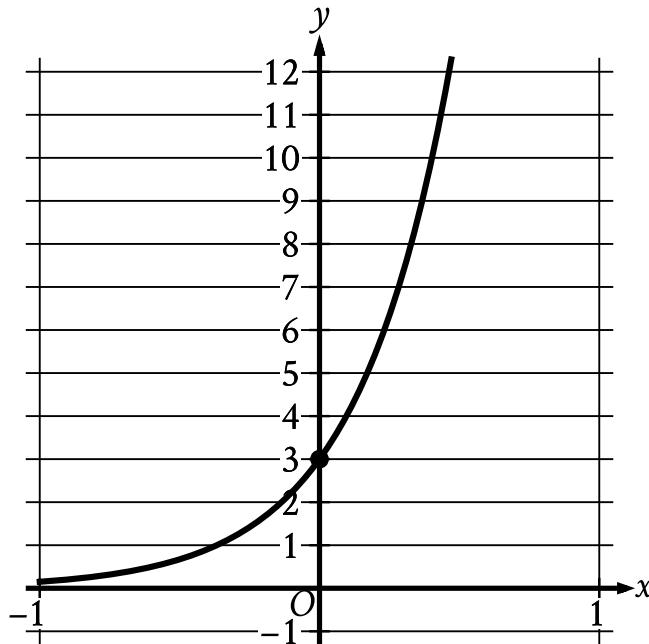
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 066299f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 066299f1



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

ID: 066299f1 Answer

Correct Answer: 3

Rationale

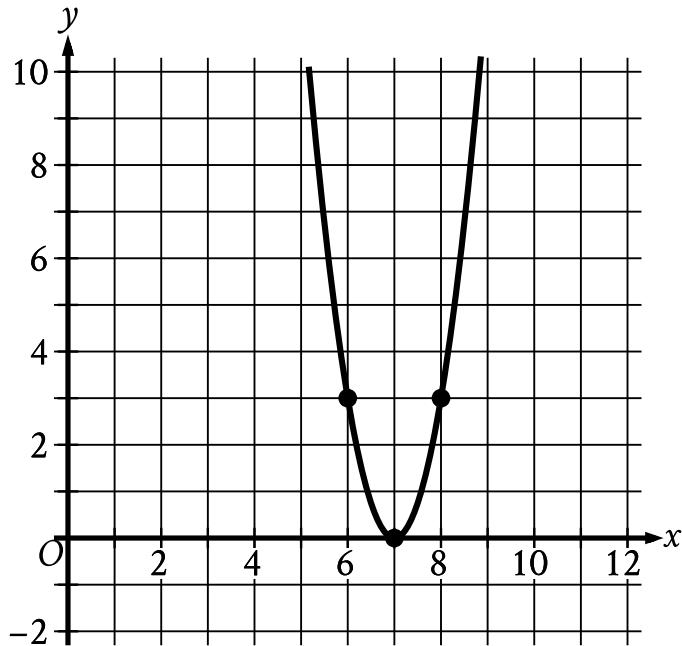
The correct answer is 3. For the graph of the exponential function f shown, where $y = f(x)$, it's given that the y -intercept of the graph is $(0, y)$. The graph intersects the y -axis at the point $(0, 3)$. Therefore, the value of y is 3.

Question Difficulty: Easy

Question ID afa732b9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: afa732b9



The x-intercept of the graph shown is $(x, 0)$. What is the value of x ?

ID: afa732b9 Answer

Correct Answer: 7

Rationale

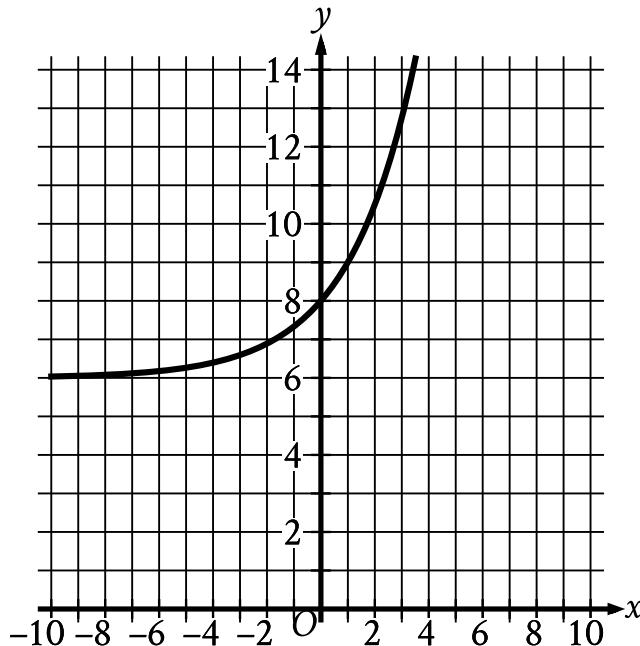
The correct answer is 7. It's given that the x-intercept of the graph shown is $(x, 0)$. The graph passes through the point $(7, 0)$. Therefore, the value of x is 7.

Question Difficulty: Easy

Question ID f8879c84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: f8879c84



What is the y -intercept of the graph shown?

- A. $(-8, 0)$
- B. $(-6, 0)$
- C. $(0, 6)$
- D. $(0, 8)$

ID: f8879c84 Answer

Correct Answer: D

Rationale

Choice D is correct. The y -intercept of a graph in the xy -plane is the point at which the graph crosses the y -axis. The graph shown crosses the y -axis at the point $(0, 8)$. Therefore, the y -intercept of the graph shown is $(0, 8)$.

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

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

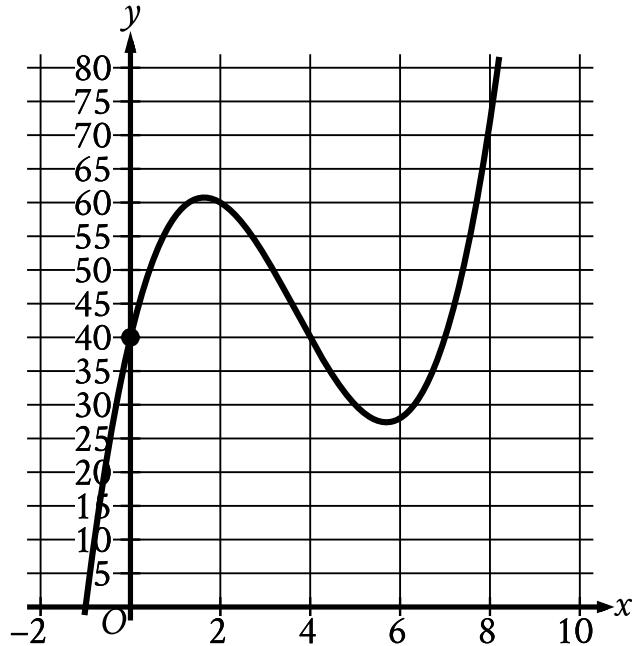
Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID ff31d6d6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: ff31d6d6



The y -intercept of the graph shown is (x, y) . What is the value of y ?

ID: ff31d6d6 Answer

Correct Answer: 40

Rationale

The correct answer is 40. The y -intercept of a graph in the xy -plane is the point (x, y) on the graph where $x = 0$. The y -intercept of the graph shown is $(0, 40)$. Therefore, the value of y is 40.

Question Difficulty: Easy

Question ID a2786d4b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: a2786d4b

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

ID: a2786d4b 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 07173576

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 07173576

The function h is defined by $h(x) = \frac{8}{5x+6}$. What is the value of $h(2)$?

ID: 07173576 Answer

Correct Answer: .5, 1/2

Rationale

The correct answer is $\frac{1}{2}$. The value of $h(2)$ is the value of $h(x)$ when $x = 2$. Substituting 2 for x in the given equation yields $h(2) = \frac{8}{5(2)+6}$, which is equivalent to $h(2) = \frac{8}{16}$, or $h(2) = \frac{1}{2}$. Therefore, the value of $h(2)$ is $\frac{1}{2}$. Note that $1/2$ and $.5$ are examples of ways to enter a correct answer.

Question Difficulty: Easy

Question ID d25b0c19

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: d25b0c19

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: d25b0c19 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 $f(x) = x^3 + 15$.

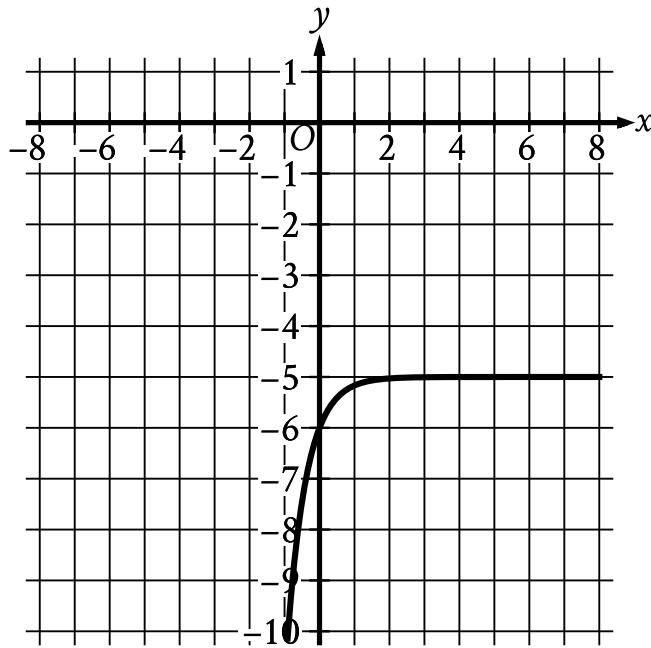
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID f4d12865

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: f4d12865



What is the y -intercept of the graph shown?

- A. $(0, -6)$
- B. $(-6, 0)$
- C. $(0, 0)$
- D. $(-5, -5)$

ID: f4d12865 Answer

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.

Question Difficulty: Easy

Question ID 8a3fa8c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 8a3fa8c4

The kinetic energy, in joules, of an object with mass 9 kilograms traveling at a speed of v meters per second is given by the function K , where $K(v) = \frac{9}{2}v^2$. Which of the following is the best interpretation of $K(34) = 5,202$ in this context?

- A. The object traveling at 34 meters per second has a kinetic energy of 5,202 joules.
- B. The object traveling at 340 meters per second has a kinetic energy of 5,202 joules.
- C. The object traveling at 5,202 meters per second has a kinetic energy of 34 joules.
- D. The object traveling at 23,409 meters per second has a kinetic energy of 34 joules.

ID: 8a3fa8c4 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the kinetic energy, in joules, of an object with a mass of 9 kilograms traveling at a speed of v meters per second is given by the function K , where $K(v) = \frac{9}{2}v^2$. It follows that in the equation $K(34) = 5,202$, 34 is the value of v , or the speed of the object, in meters per second, and 5,202 is the kinetic energy, in joules, of the object at that speed. Therefore, the best interpretation of $K(34) = 5,202$ in this context is the object traveling at 34 meters per second has a kinetic energy of 5,202 joules.

Choice B is incorrect. The object traveling at 340 meters per second has a kinetic energy of 520,200 joules.

Choice C is incorrect. The object traveling at 5,202 meters per second has a kinetic energy of 121,773,618 joules.

Choice D is incorrect. The object traveling at 23,409 meters per second has a kinetic energy of 2,465,915,764.5 joules.

Question Difficulty: Easy

Question ID cbfcd000

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: cbfcd000

The y -intercept of the graph of $y = x^2 + 31$ in the xy -plane is $(0, y)$. What is the value of y ?

ID: cbfcd000 Answer

Correct Answer: 31

Rationale

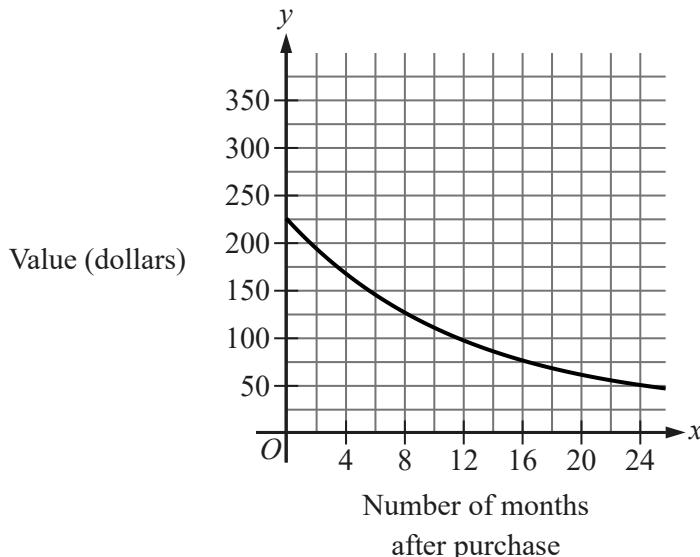
The correct answer is **31**. It's given that the y -intercept of the graph of $y = x^2 + 31$ in the xy -plane is $(0, y)$. Substituting **0** for x in the given equation yields $y = (0)^2 + 31$, or $y = 31$. Thus, the value of y is **31**.

Question Difficulty: Easy

Question ID 74e3e032

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 74e3e032



The graph shown gives the estimated value, in dollars, of a tablet as a function of the number of months since it was purchased. What is the best interpretation of the y -intercept of the graph in this context?

- A. The estimated value of the tablet was \$225 when it was purchased.
- B. The estimated value of the tablet 24 months after it was purchased was \$225.
- C. The estimated value of the tablet had decreased by \$225 in the 24 months after it was purchased.
- D. The estimated value of the tablet decreased by approximately 2.25% each year after it was purchased.

ID: 74e3e032 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the graph shown gives the estimated value y , in dollars, of a tablet as a function of the number of months since it was purchased, x . The y -intercept of a graph is the point at which the graph intersects the y -axis, or when x is 0. The graph shown intersects the y -axis at the point $(0, 225)$. It follows that 0 months after the tablet was purchased, or when the tablet was purchased, the estimated value of the tablet was 225 dollars. Therefore, the best interpretation of the y -intercept is that the estimated value of the tablet was \$225 when it was purchased.

Choice B is incorrect. The estimated value of the tablet 24 months after it was purchased was \$50, not \$225.

Choice C is incorrect. The estimated value of the tablet had decreased by $\$225 - \50 , or \$175, not \$225, in the 24 months after it was purchased.

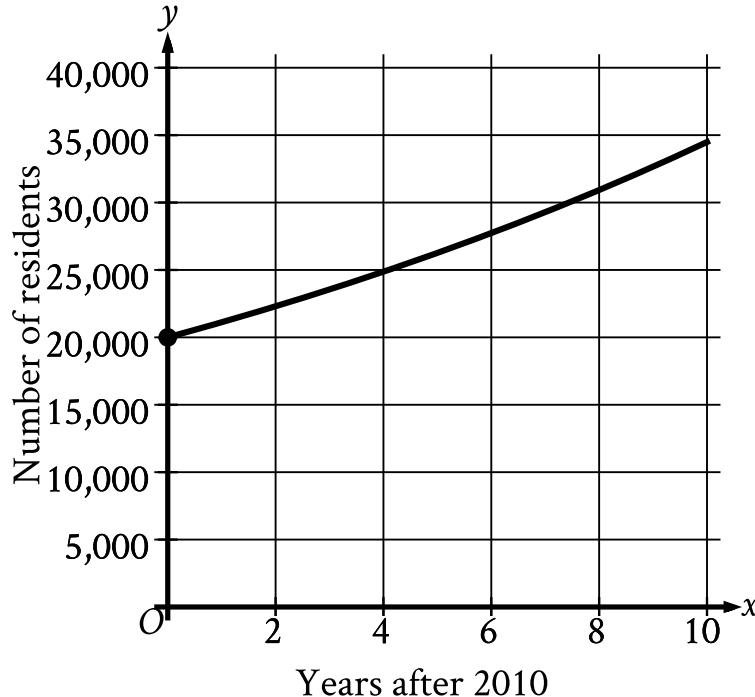
Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID 0ad45980

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 0ad45980



The graph shown models the number of residents of a certain city x years after 2010. How many residents does this model estimate the city had in 2010?

- A. 0
- B. 2,000
- C. 20,000
- D. 25,000

ID: 0ad45980 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that x represents years after 2010. Therefore, 2010 is represented by $x = 0$. On the model shown, the point with an x -coordinate of 0 has a y -coordinate of 20,000. Thus, the model estimates that in 2010, the city had 20,000 residents.

Choice A is incorrect. This is the value of x that represents the year 2010.

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

Choice D is incorrect. This is approximately the number of residents the model estimates the city had in **2014**, not **2010**.

Question Difficulty: Easy

Question ID 5ba6bd07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 5ba6bd07

$$h(x) = x^2 - 3$$

Which table gives three values of x and their corresponding values of $h(x)$ for the given function h ?

A.

x	1	2	3
$h(x)$	4	5	6

B.

x	1	2	3
$h(x)$	-2	1	6

C.

x	1	2	3
$h(x)$	-1	1	3

D.

x	1	2	3
$h(x)$	-2	1	3

ID: 5ba6bd07 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that $h(x) = x^2 - 3$. Each table gives 1, 2, and 3 as the three given values of x . Substituting 1 for x in the equation $h(x) = x^2 - 3$ yields $h(1) = (1)^2 - 3$, or $h(1) = -2$. Substituting 2 for x in the equation $h(x) = x^2 - 3$ yields $h(2) = (2)^2 - 3$, or $h(2) = 1$. Finally, substituting 3 for x in the equation $h(x) = x^2 - 3$ yields $h(3) = (3)^2 - 3$, or $h(3) = 6$. Therefore, $h(x)$ is -2 when x is 1, $h(x)$ is 1 when x is 2, and $h(x)$ is 6 when x is 3. Choice B is a table with these values of x and their corresponding values of $h(x)$.

Choice A is incorrect. This is a table of values for the function $h(x) = x + 3$, not $h(x) = x^2 - 3$.

Choice C is incorrect. This is a table of values for the function $h(x) = 2x - 3$, not $h(x) = x^2 - 3$.

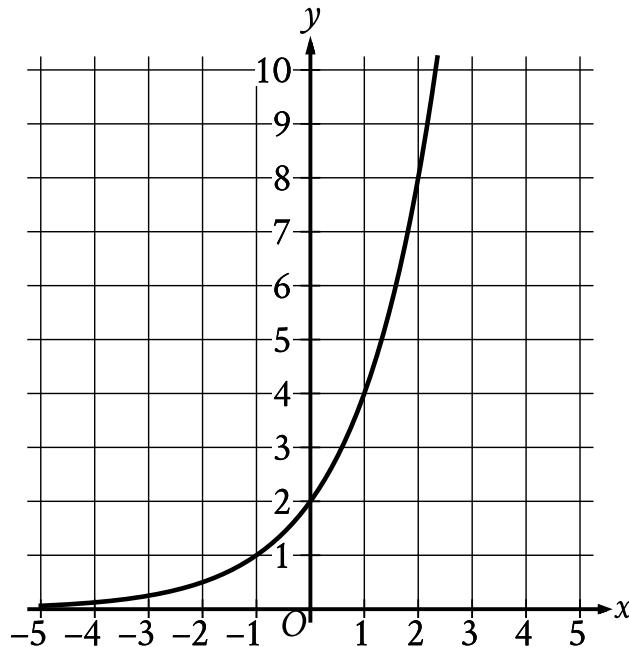
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID 4f5ff634

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 4f5ff634



What is the y -intercept of the graph shown?

- A. $(0, 0)$
- B. $(0, 2)$
- C. $(2, 0)$
- D. $(2, 2)$

ID: 4f5ff634 Answer

Correct Answer: B

Rationale

Choice B is correct. The y -intercept of a graph in the xy -plane is the point at which the graph crosses the y -axis. The graph shown crosses the y -axis at the point $(0, 2)$. Therefore, the y -intercept of the graph shown is $(0, 2)$.

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

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

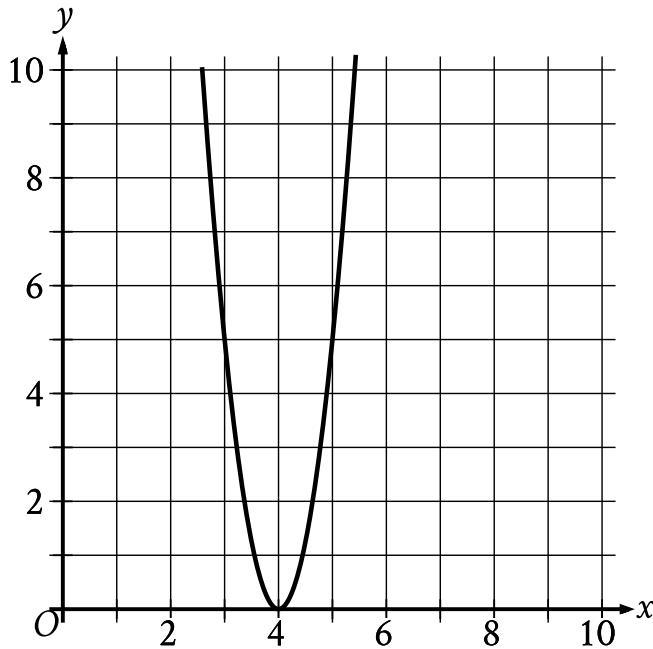
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Easy

Question ID f4006172

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: f4006172



What is the x -intercept of the graph shown?

- A. $(-5, 0)$
- B. $(5, 0)$
- C. $(-4, 0)$
- D. $(4, 0)$

ID: f4006172 Answer

Correct Answer: D

Rationale

Choice D is correct. The x -intercept of the graph shown is the point (x, y) on the graph where $y = 0$. At $y = 0$, the corresponding value of x is 4. Therefore, the x -intercept of the graph shown is $(4, 0)$.

Choice A is incorrect. This is the x -intercept of a graph in the xy -plane that intersects the x -axis at $x = -5$, not $x = 4$.

Choice B is incorrect. This is the x -intercept of a graph in the xy -plane that intersects the x -axis at $x = 5$, not $x = 4$.

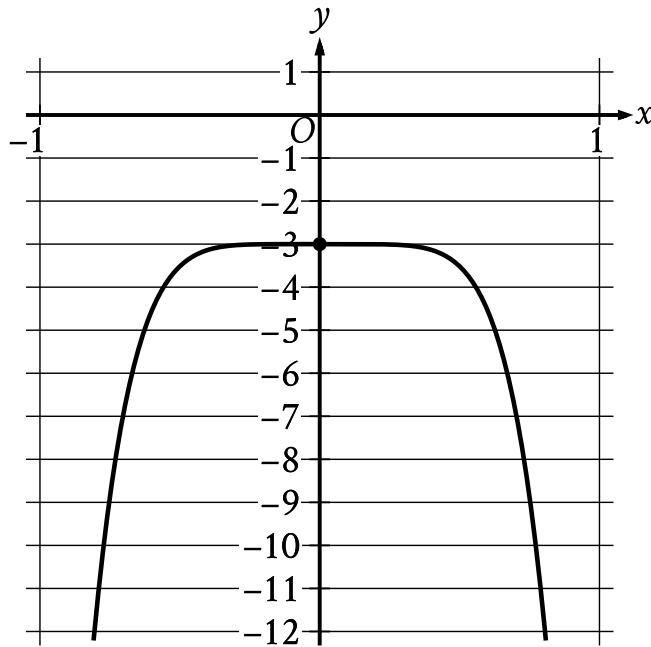
Choice C is incorrect. This is the x -intercept of a graph in the xy -plane that intersects the x -axis at $x = -4$, not $x = 4$.

Question Difficulty: Easy

Question ID 089483cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: 089483cd



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: 089483cd 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 a4ac7f91

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: a4ac7f91

The function f is defined by $f(x) = 8\sqrt{x}$. For what value of x does $f(x) = 48$?

- A. 6
- B. 8
- C. 36
- D. 64

ID: a4ac7f91 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that $f(x) = 8\sqrt{x}$. Substituting 48 for $f(x)$ in this equation yields $48 = 8\sqrt{x}$. Dividing both sides of this equation by 8 yields $6 = \sqrt{x}$. This can be rewritten as $\sqrt{x} = 6$. Squaring both sides of this equation yields $x = 36$. Therefore, the value of x for which $f(x) = 48$ is 36.

Choice A is incorrect. If $x = 6$, $f(x) = 8\sqrt{6}$, not 48.

Choice B is incorrect. If $x = 8$, $f(x) = 8\sqrt{8}$, not 48.

Choice D is incorrect. If $x = 64$, $f(x) = 8\sqrt{64}$, which is equivalent to 64, not 48.

Question Difficulty: Easy

Question ID b5b477cb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: b5b477cb

An investment account was opened with an initial value of \$890. The value of the account doubled every 10 years. Which equation represents the value of the account $M(t)$, in dollars, t years after the account was opened?

- A. $M(t) = 890\left(\frac{1}{2}\right)^{\frac{t}{10}}$
- B. $M(t) = 890\left(\frac{1}{10}\right)^{\frac{t}{2}}$
- C. $M(t) = 890(2)^{\frac{t}{10}}$
- D. $M(t) = 890(10)^{\frac{t}{2}}$

ID: b5b477cb Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that t represents the number of years since the account was opened. Therefore, $\frac{t}{10}$ represents the number of 10-year periods since the account was opened. Since the value of the account doubles during each of these 10-year periods, the value of the account can be found by multiplying the initial value by $\frac{t}{10}$ factors of 2. This is equivalent to $2^{\frac{t}{10}}$. It's given that the initial value of the account is \$890. Therefore, the value of the account $M(t)$, in dollars, t years after the account was opened can be represented by $M(t) = 890(2)^{\frac{t}{10}}$.

Choice A is incorrect. This equation represents the value of an account if the value of the account halves, not doubles, every 10 years.

Choice B is incorrect. This equation represents the value of an account if the value of the account decreases by 90%, not doubles, every 2, not 10, years.

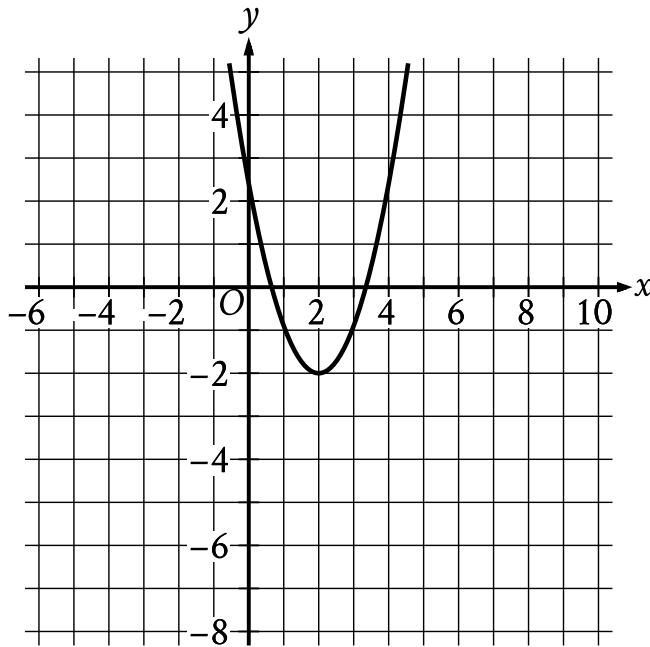
Choice D is incorrect. This equation represents the value of an account if the value of the account increases by a factor of 10, not doubles, every 2, not 10, years.

Question Difficulty: Easy

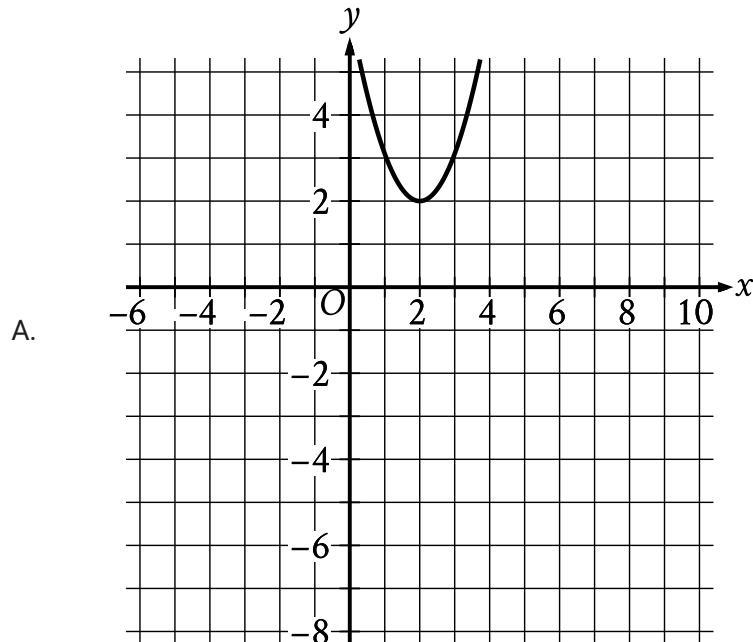
Question ID f163697b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

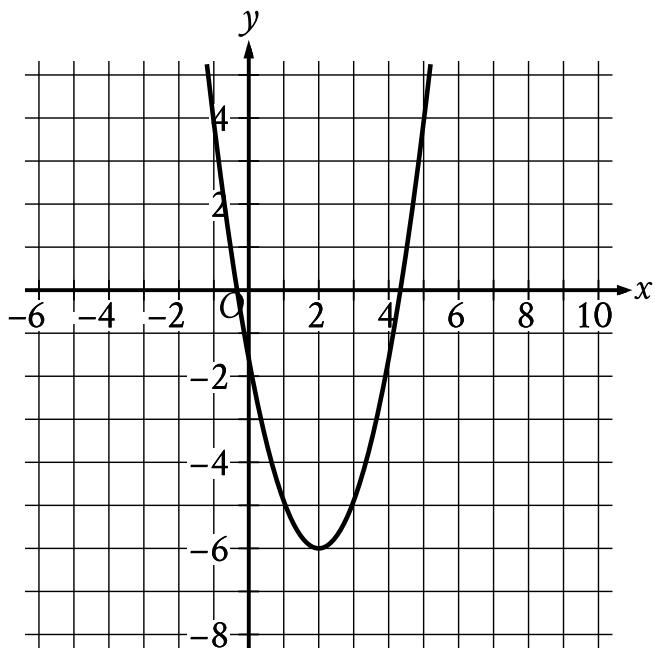
ID: f163697b



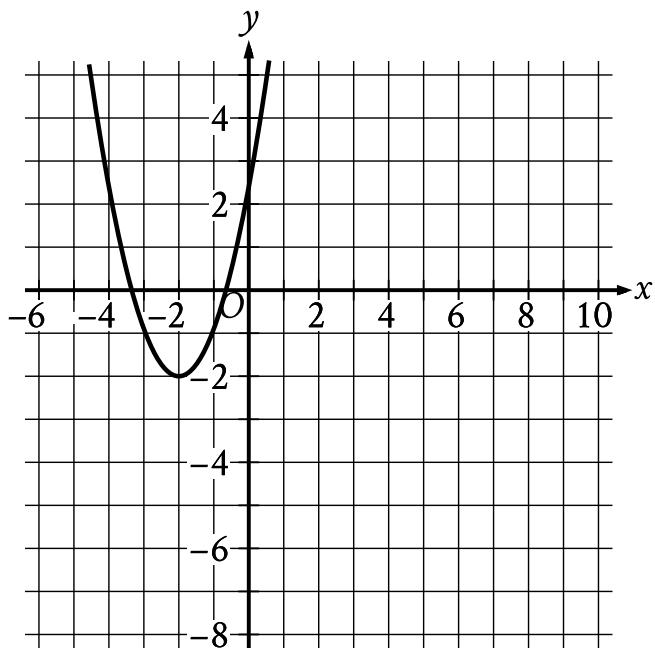
The graph shown will be translated up 4 units. Which of the following will be the resulting graph?



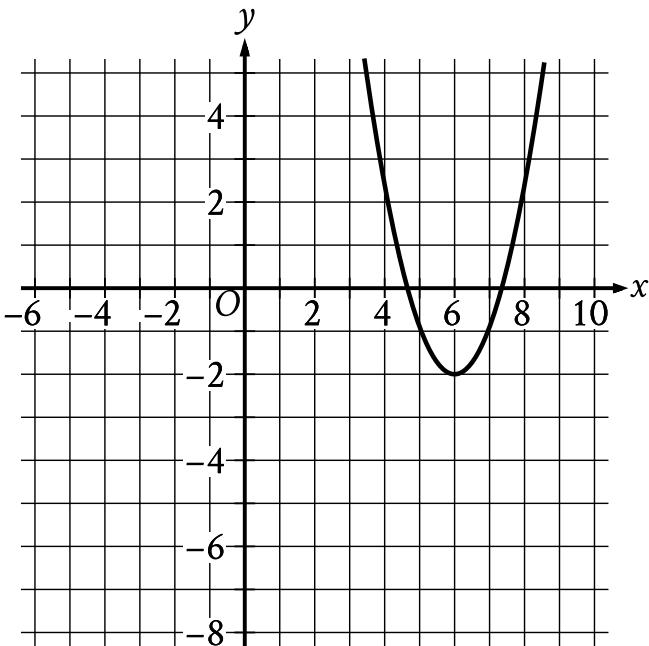
B.



C.



D.



ID: f163697b Answer

Correct Answer: A

Rationale

Choice A is correct. When a graph is translated up 4 units, each point on the resulting graph is 4 units above the point on the original graph. In other words, the y-value of each point on the graph increases by 4. The graph shown passes through the points $(1, -1)$, $(2, -2)$, and $(3, -1)$. It follows that when the graph shown is translated up 4 units, the resulting graph will pass through the points $(1, -1 + 4)$, $(2, -2 + 4)$, and $(3, -1 + 4)$. These points are $(1, 3)$, $(2, 2)$, and $(3, 3)$, respectively. Of the given choices, only the graph in choice A passes through the points $(1, 3)$, $(2, 2)$, and $(3, 3)$.

Choice B is incorrect. This is the result of translating the graph down, rather than up, 4 units.

Choice C is incorrect. This is the result of translating the graph left, rather than up, 4 units.

Choice D is incorrect. This is the result of translating the graph right, rather than up, 4 units.

Question Difficulty: Easy

Question ID e577d895

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: e577d895

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: e577d895 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.

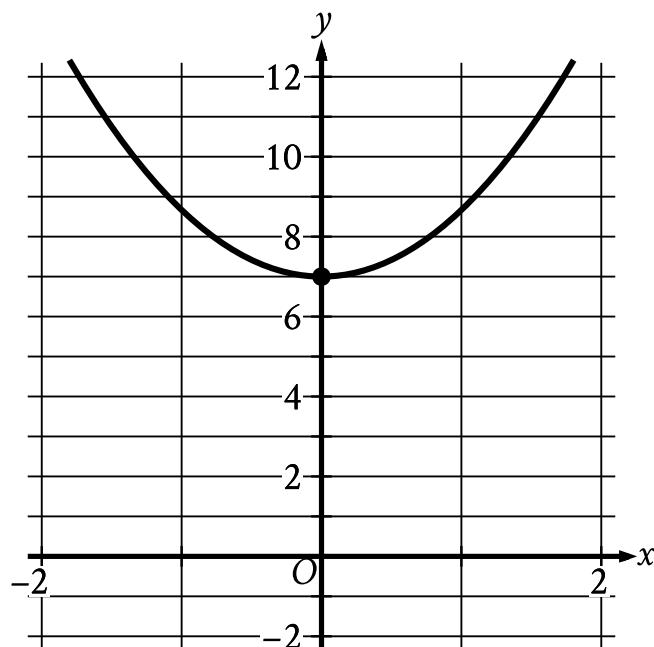
Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Easy

Question ID df0ef976

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	Easy

ID: df0ef976



The parabola shown intersects the y -axis at the point (x, y) . What is the value of y ?

ID: df0ef976 Answer

Correct Answer: 7

Rationale

The correct answer is 7. It's given that the parabola intersects the y -axis at the point (x, y) . The graph shows that the parabola intersects the y -axis at the point $(0, 7)$. Therefore, the value of y is 7.

Question Difficulty: Easy