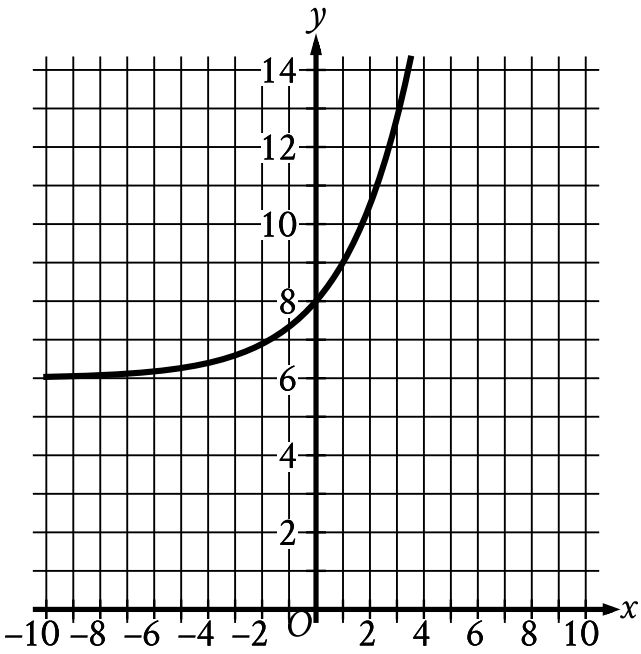
Question ID 5837cfab

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 5837cfab



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

A. $(-8, 0)$

B. $(-6, 0)$

C. $(0, 6)$

D. $(0, 8)$

ID: 5837cfab 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: Medium

Question ID 54531d6a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 54531d6a

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: 54531d6a 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.

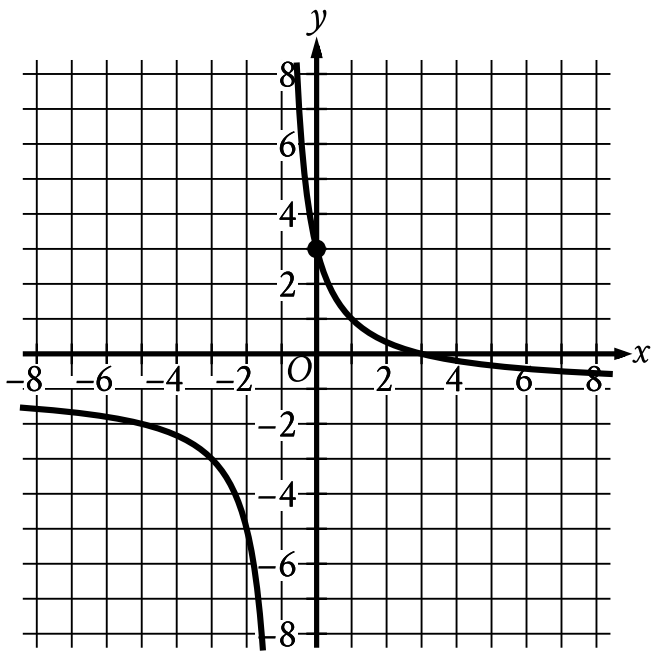
Choice D is incorrect. This equation represents the value of an account if the value of the account increases by a factor of 10, not doubles, every 2, not 10, years.

Question Difficulty: Medium

Question ID f839db39

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: f839db39



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

ID: f839db39 Answer

Correct Answer: 3

Rationale

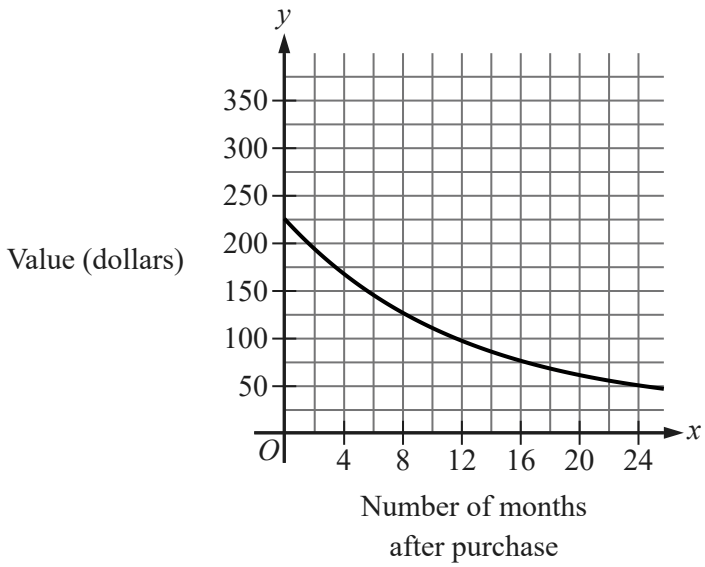
The correct answer is 3. A *y*-intercept of a graph in the *xy*-plane is a point (x, y) on the graph where $x = 0$. For the graph shown, at $x = 0$, the corresponding value of y is 3. Therefore, the *y*-coordinate of the *y*-intercept of the graph shown is 3.

Question Difficulty: Medium

Question ID bdd8a2fe

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: bdd8a2fe



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: bdd8a2fe 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: Medium

Question ID 007febea

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 007febea

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: 007febea 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: Medium

Question ID f3a5805c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: f3a5805c

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

ID: f3a5805c 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: Medium

Question ID 7f73ba98

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 7f73ba98

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: 7f73ba98 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.

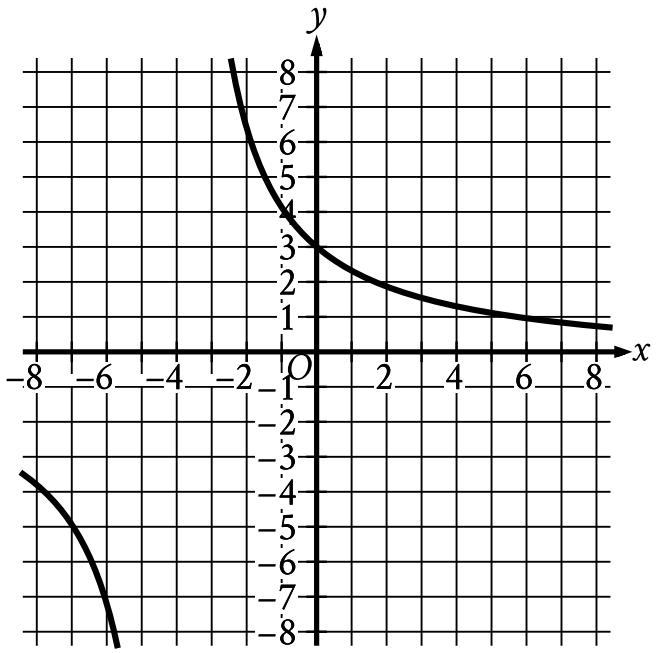
Choice D is incorrect. This is the value of $8(3) + 1$, not $\sqrt{8(3) + 1}$.

Question Difficulty: Medium

Question ID 9af7b53c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 9af7b53c



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

ID: 9af7b53c Answer

Correct Answer: 3

Rationale

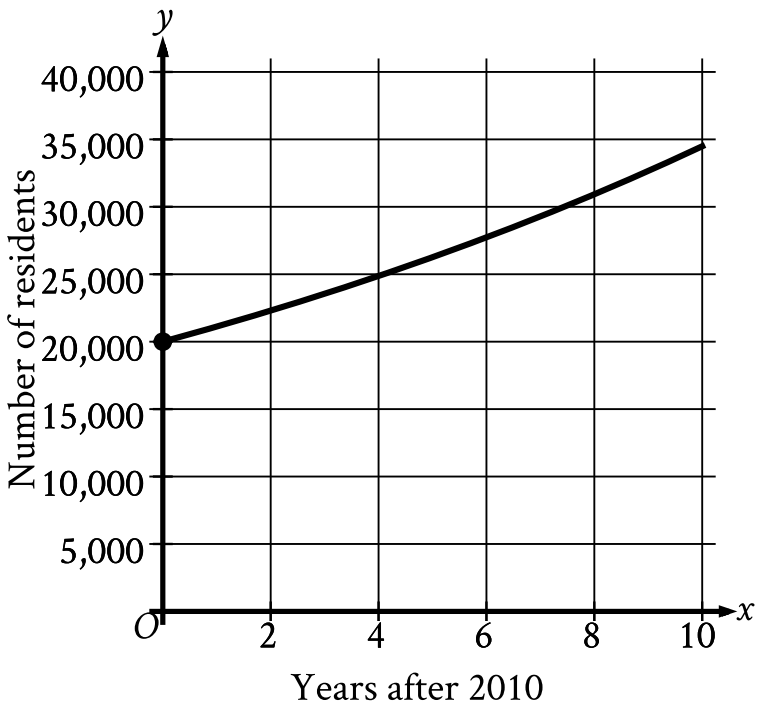
The correct answer is 3. The value of $f(0)$ is the value of y on the graph of $y = f(x)$ in the *xy*-plane that corresponds with $x = 0$. It's given that the value of $f(0)$ is an integer. For the graph of $y = f(x)$ shown, when $x = 0$, the corresponding integer value of y is 3. Therefore, the value of $f(0)$ is 3.

Question Difficulty: Medium

Question ID 7ef52fbe

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 7ef52fbe



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: 7ef52fbe 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: Medium

Question ID 7cc9992e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 7cc9992e

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: 7cc9992e 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 $f(x) = x^3 + 15$.

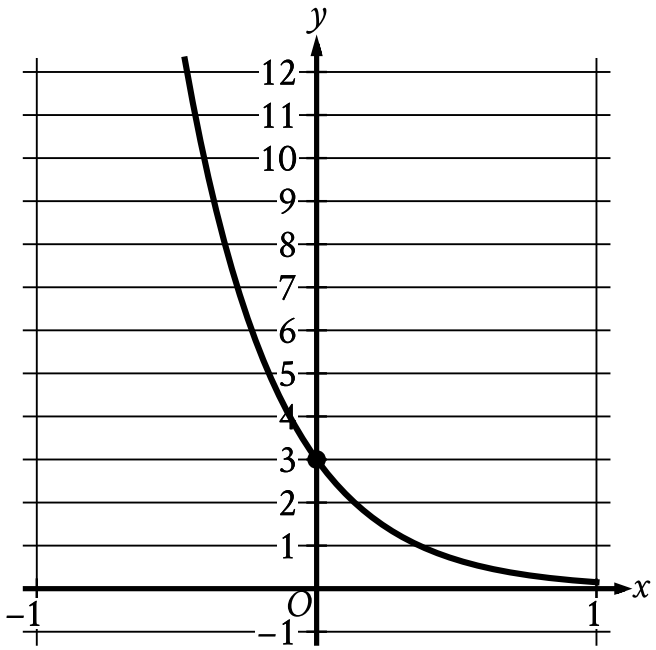
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium

Question ID c1a7ddea

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: c1a7ddea



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: c1a7ddea Answer

Correct Answer: 3

Rationale

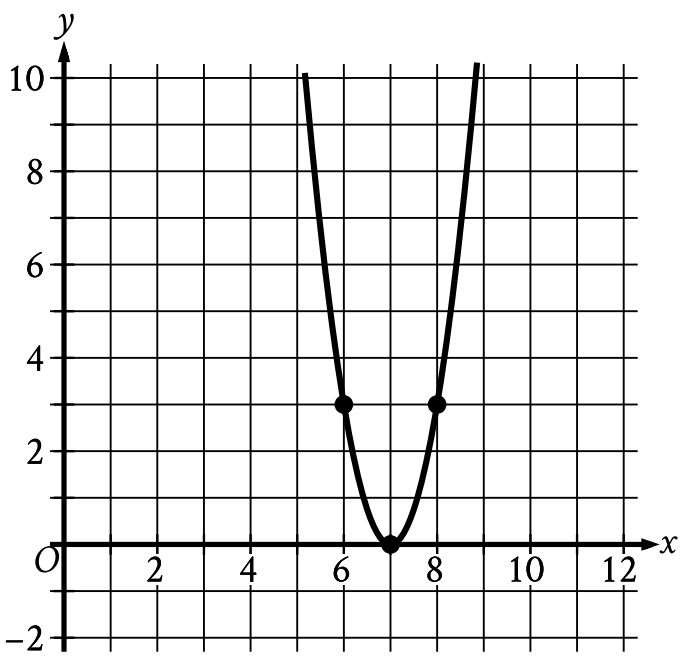
The correct answer is 3. It's given that the *y*-intercept of the graph shown is $(0, y)$. The graph passes through the point $(0, 3)$. Therefore, the value of y is 3.

Question Difficulty: Medium

Question ID 4896d9c5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 4896d9c5



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

ID: 4896d9c5 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.

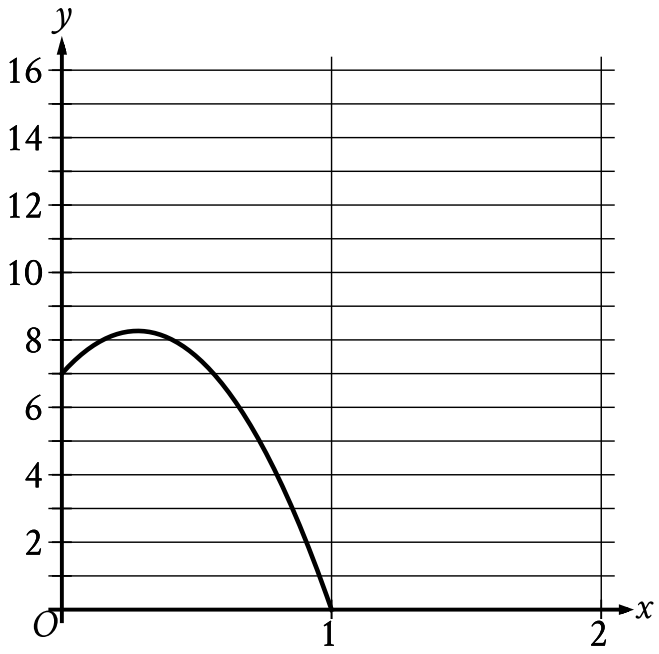
Question Difficulty: Medium

Question ID 1391c931

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

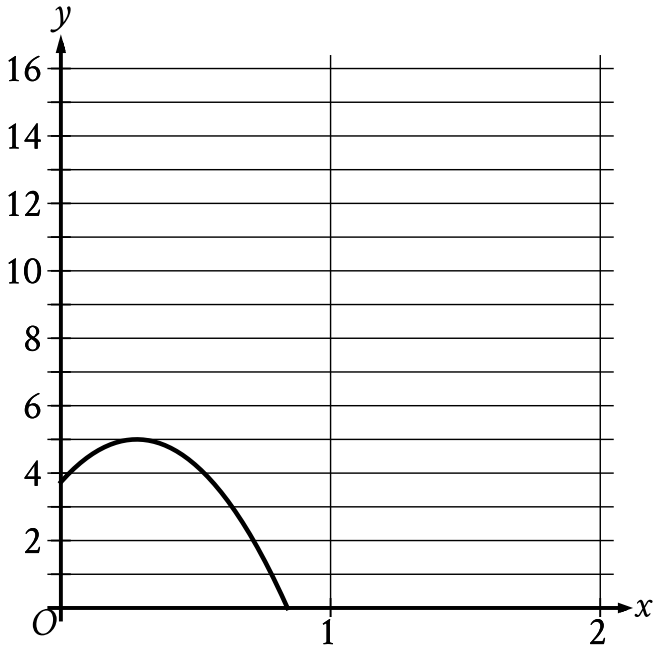
ID: 1391c931

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.

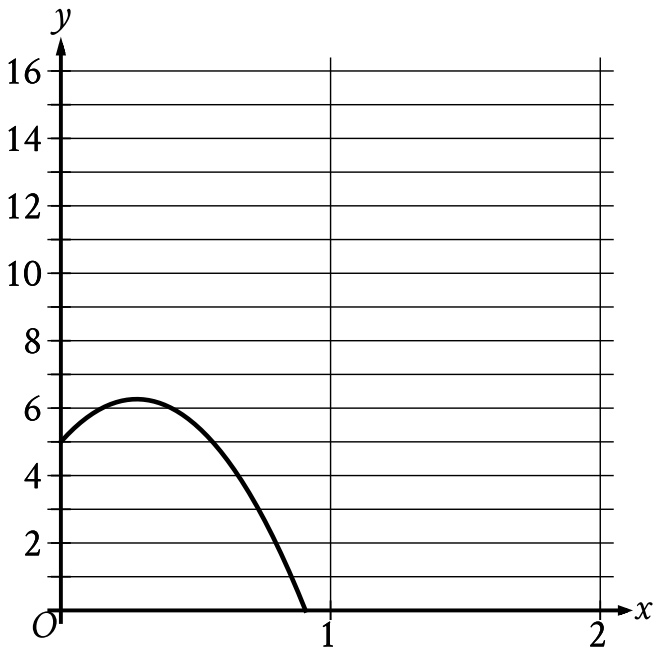


During the second part of the experiment, the ball was launched the same way, but from a platform that is 2 feet shorter than the first platform. Which of the following graphs could represent the height y, in feet, of the ball x seconds after it was launched during the second part of the experiment?

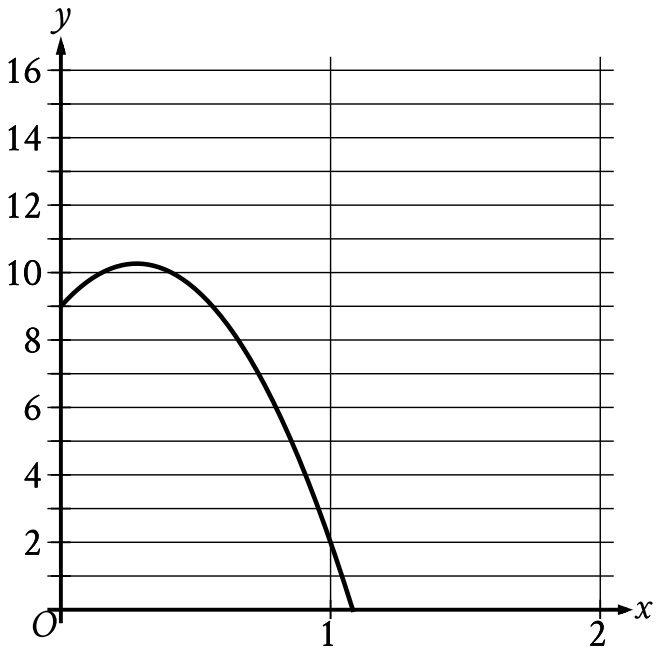
A.



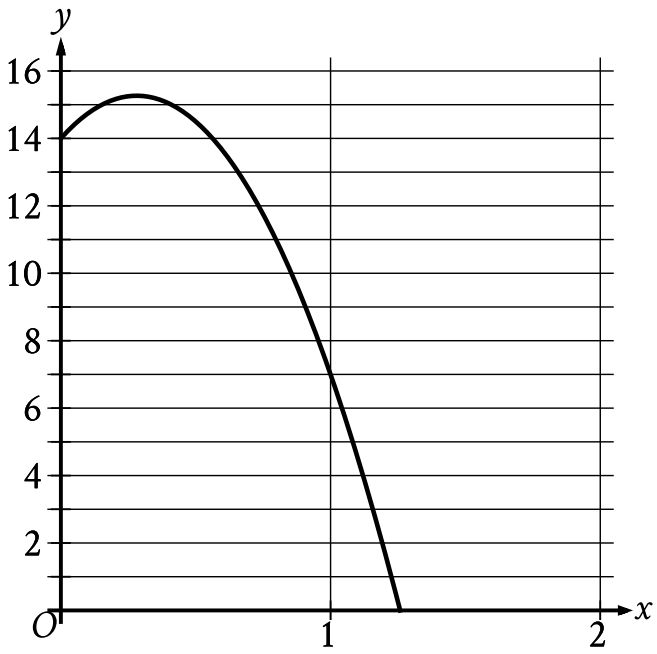
B.



C.



D.



ID: 1391c931 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: Medium

Question ID 3d17c059

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 3d17c059

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

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: 3d17c059 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: Medium

Question ID 80dc17e1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 80dc17e1

At the time of posting a video, a social media channel had 53 subscribers. Each day for five days after the video was posted, the number of subscribers doubled from the number the previous day. Which equation gives the total number of subscribers, n, to the channel d days after the video was posted?

A. $n =$ msup

B. $n = 53(2)^d$

C. $n = 53$msup

D. $n =$ msup $+ d$

ID: 80dc17e1 Answer

Correct Answer: B

Rationale

Choice B is correct. It's given that each day for five days after a social media channel posted a video, the number of subscribers doubled from the number the previous day. Since the number of subscribers doubled each day, the relationship between n and d can be represented by an exponential equation of the form $n = ab^d$, where a is the number of subscribers at the time of posting the video and the number of subscribers to the channel increases by a factor of b each day. It's given that at the time of posting the video, the channel had 53 subscribers. Therefore, $a = 53$. It's also given that the number of subscribers doubled, or increased by a factor of 2, from the number the previous day. Therefore, $b = 2$. Substituting 53 for a and 2 for b in the equation $n = ab^d$ yields $n = 53(2)^d$.

Choice A is incorrect. This equation gives the total number of subscribers to a channel for which the initial number of subscribers was 1 and the number increased each day by 53 times the number from the previous day.

Choice C is incorrect. This equation gives the total number of subscribers to a channel for which the number of subscribers each day was half the number from the previous day, rather than double the number.

Choice D is incorrect and may result from conceptual errors.

Question Difficulty: Medium

Question ID abe39f57

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: abe39f57

The function $f(x) = 240{,}000(1.22)^x$ gives a company's predicted annual revenue, in dollars, x years after the company started selling jewelry online, where $0 < x \leq 10$. What is the best interpretation of the statement "$f(5)$ is approximately equal to $648{,}650$" in this context?

A. 5 years after the company started selling jewelry online, its predicted annual revenue is approximately $648{,}650$ dollars.

B. 5 years after the company started selling jewelry online, its predicted annual revenue will have increased by a total of approximately $648{,}650$ dollars.

C. When the company's predicted annual revenue is approximately $648{,}650$ dollars, it is 5 times the predicted annual revenue for the previous year.

D. When the company's predicted annual revenue is approximately $648{,}650$ dollars, it is 5% greater than the predicted annual revenue for the previous year.

ID: abe39f57 Answer

Correct Answer: A

Rationale

Choice A is correct. It's given that the function f gives a company's predicted annual revenue, in dollars, x years after the company started selling jewelry 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 $648{,}650$" means that $f(x)$ is approximately equal to $648{,}650$ when $x = 5$. Therefore, the best interpretation of the given statement is that 5 years after the company started selling jewelry online, its predicted annual revenue is approximately $648{,}650$ dollars.

Choice B is incorrect. The function f gives the predicted annual revenue, not the predicted increase in annual revenue.

Choice C is incorrect and may result from conceptual errors.

Choice D is incorrect. In the given function, x represents the number of years after the company started selling jewelry online, not the percent increase in revenue from the previous year.

Question Difficulty: Medium

Question ID adb4881c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: adb4881c

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: adb4881c 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: Medium

Question ID e325a6f4

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: e325a6f4

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: e325a6f4 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: Medium

Question ID a1e5d079

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: a1e5d079

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: a1e5d079 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: Medium

Question ID 0e881c14

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 0e881c14

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: 0e881c14 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: Medium

Question ID 8f42f8bb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 8f42f8bb

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

ID: 8f42f8bb Answer

Correct Answer: 77

Rationale

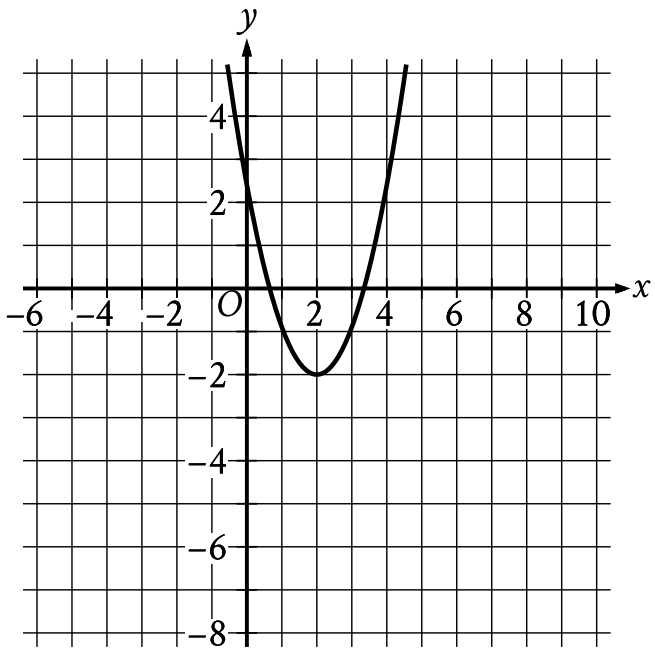
The correct answer is 77. It's given that the function f is defined by $f(x) = x^2 + x + 71$. Substituting 2 for x in function f yields $f(2) = (2)^2 + 2 + 71$, which is equivalent to $f(2) = 4 + 2 + 71$, or $f(2) = 77$. Therefore, the value of $f(2)$ is 77.

Question Difficulty: Medium

Question ID cea4f5bb

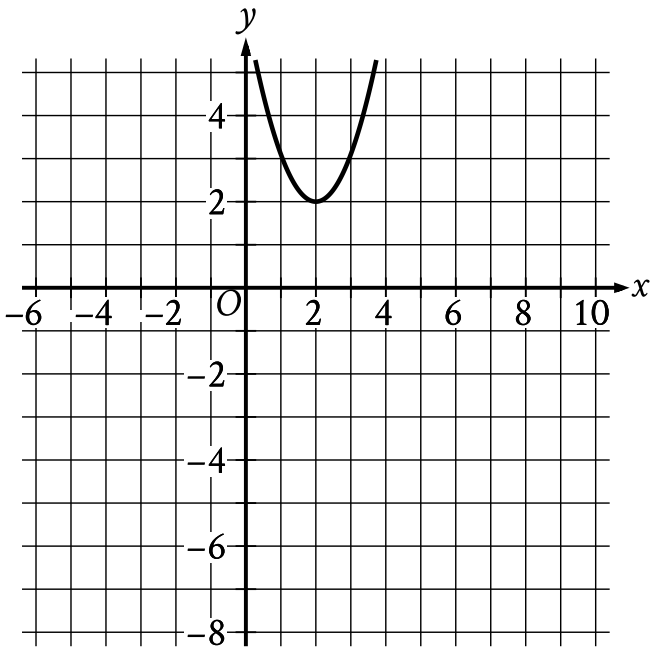
Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: cea4f5bb

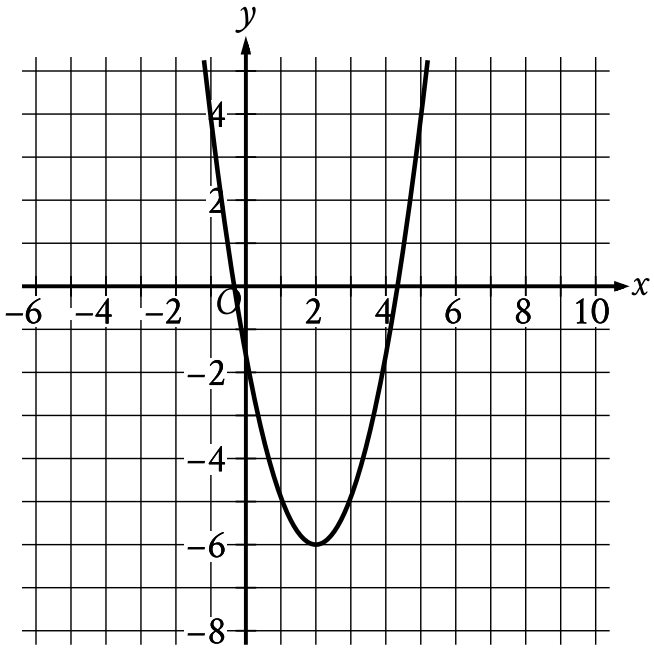


The graph shown will be translated up 4 units. Which of the following will be the resulting graph?

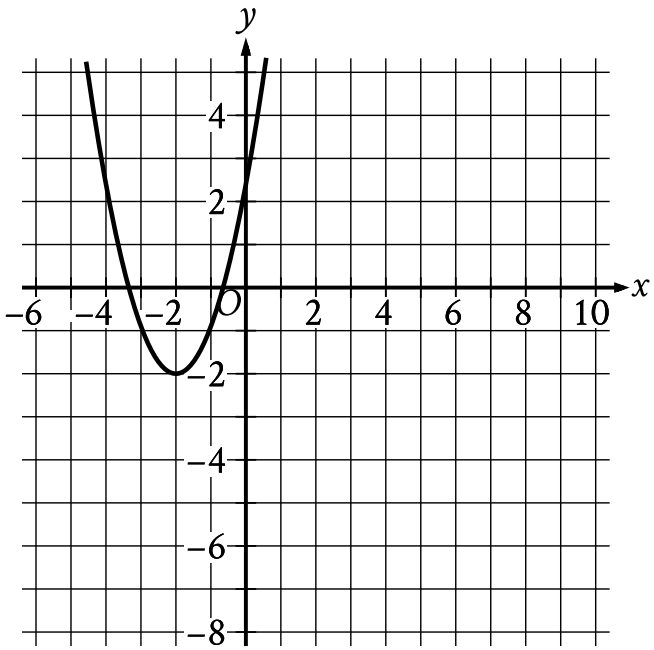
A.



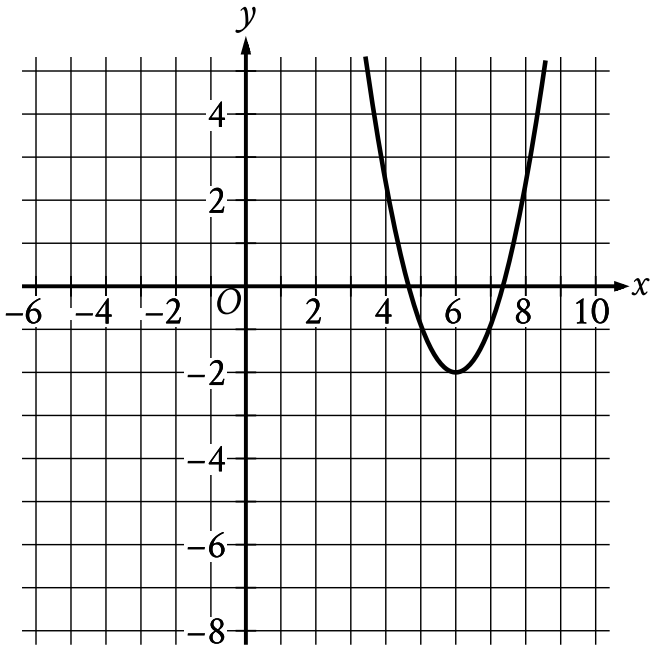
B.



C.



D.



ID: cea4f5bb 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.

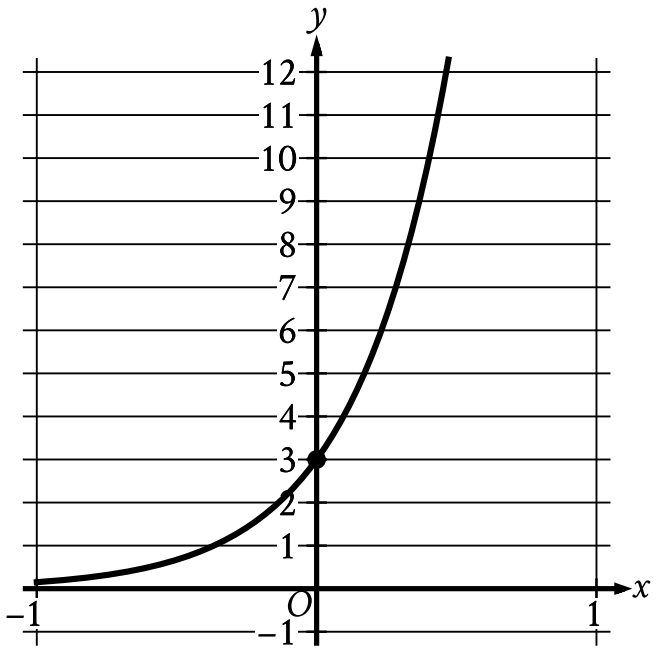
Choice D is incorrect. This is the result of translating the graph right, rather than up, 4 units.

Question Difficulty: Medium

Question ID bf7a9e82

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: bf7a9e82



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: bf7a9e82 Answer

Correct Answer: 3

Rationale

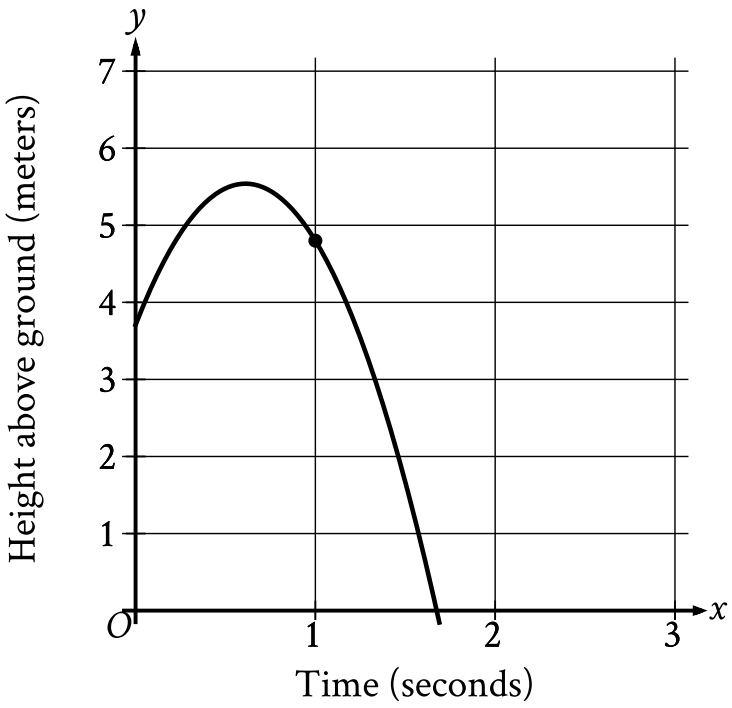
The correct answer is 3. For the graph of the exponential function f shown, where $y = f(x)$, it's given that the *y*-intercept of the graph is $(0, y)$. The graph intersects the *y*-axis at the point $(0, 3)$. Therefore, the value of y is 3.

Question Difficulty: Medium

Question ID a0cf76e5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: a0cf76e5



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: a0cf76e5 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: Medium

Question ID 000e18d5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 000e18d5

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: 000e18d5 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: Medium

Question ID 5c4e5729

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 5c4e5729

$$y = -\frac{1}{4}x^2 + 2x + 29$$

The given equation models a company's scheduled deliveries over 8 months, where y is the estimated number of scheduled deliveries x months after the end of May 2012, where $0 \leq x \leq 8$. Which statement is the best interpretation of the *y*-intercept of the graph of this equation in the *xy*-plane?

A. At the end of May 2012, the estimated number of scheduled deliveries was 0.

B. At the end of May 2012, the estimated number of scheduled deliveries was 29.

C. At the end of June 2012, the estimated number of scheduled deliveries was 0.

D. At the end of June 2012, the estimated number of scheduled deliveries was 29.

ID: 5c4e5729 Answer

Correct Answer: B

Rationale

Choice B is correct. The *y*-intercept of a graph in the *xy*-plane is the point where $x = 0$. For the given equation, the *y*-intercept of the graph in the *xy*-plane can be found by substituting 0 for x in the equation, which yields $y = -\frac{1}{4}(0)^2 + 2(0) + 29$, or $y = 29$. Therefore, the *y*-intercept of the graph is $(0, 29)$. It's given that y is the estimated number of scheduled deliveries x months after the end of May 2012. Therefore, $x = 0$ represents 0 months after the end of May 2012, or the end of May 2012. Thus, the best interpretation of the *y*-intercept of the graph of this equation in the *xy*-plane is that at the end of May 2012, the estimated number of scheduled deliveries was 29.

Choice A 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: Medium

Question ID d1590ce5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: d1590ce5

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

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: d1590ce5 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: Medium

Question ID 74fbf6c6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 74fbf6c6

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: 74fbf6c6 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: Medium

Question ID ab53bdba

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: ab53bdba

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: ab53bdba 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 $g(x) = |x + 18|$.

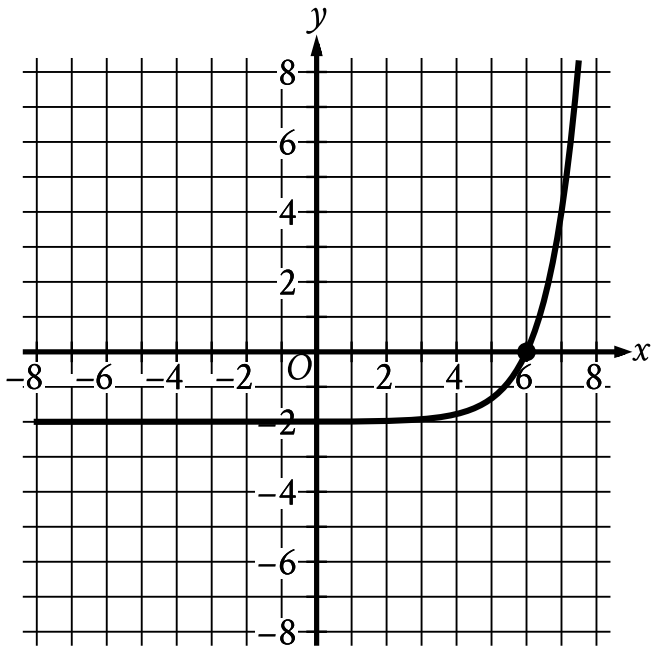
Choice C is incorrect. This would be the value of $g(4)$ if function g was defined by $g(x) = |-x + 18|$, not $g(x) = |x + 18|$.

Question Difficulty: Medium

Question ID 788ffeb1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 788ffeb1



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

ID: 788ffeb1 Answer

Correct Answer: 6

Rationale

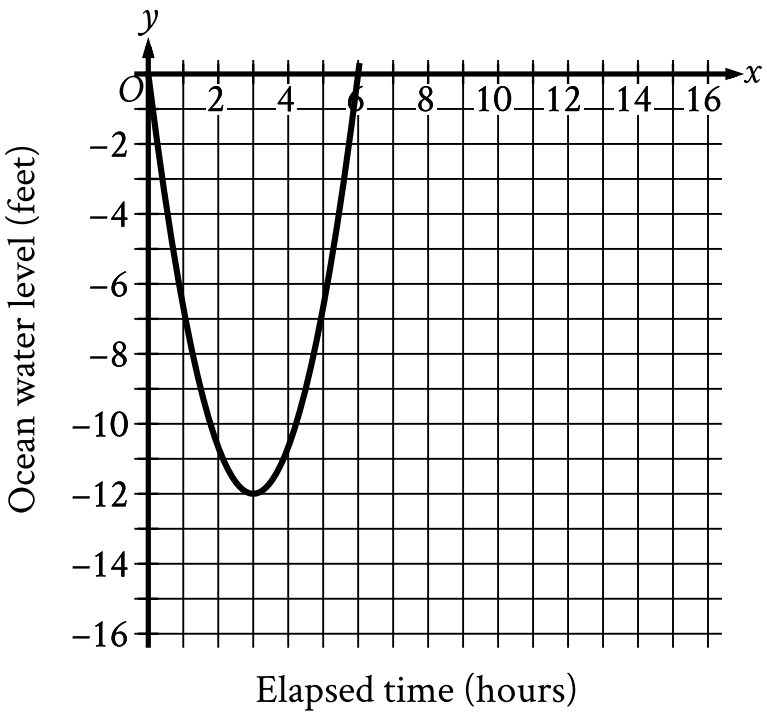
The correct answer is 6. An *x*-intercept of a graph is a point on the graph where it intersects the *x*-axis, or where the value of y is 0. The graph shown intersects the *x*-axis at the point $(6, 0)$. Therefore, the *x*-coordinate of the *x*-intercept of the graph shown is 6.

Question Difficulty: Medium

Question ID 15fe2938

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 15fe2938



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: 15fe2938 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: Medium

Question ID d9a7dc38

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: d9a7dc38

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

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: d9a7dc38 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: Medium

Question ID a4cb920c

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: a4cb920c

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

ID: a4cb920c 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: Medium

Question ID 569c8d35

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Advanced Math	Nonlinear functions	Medium

ID: 569c8d35

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: 569c8d35 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: Medium