Question ID 2434c419

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

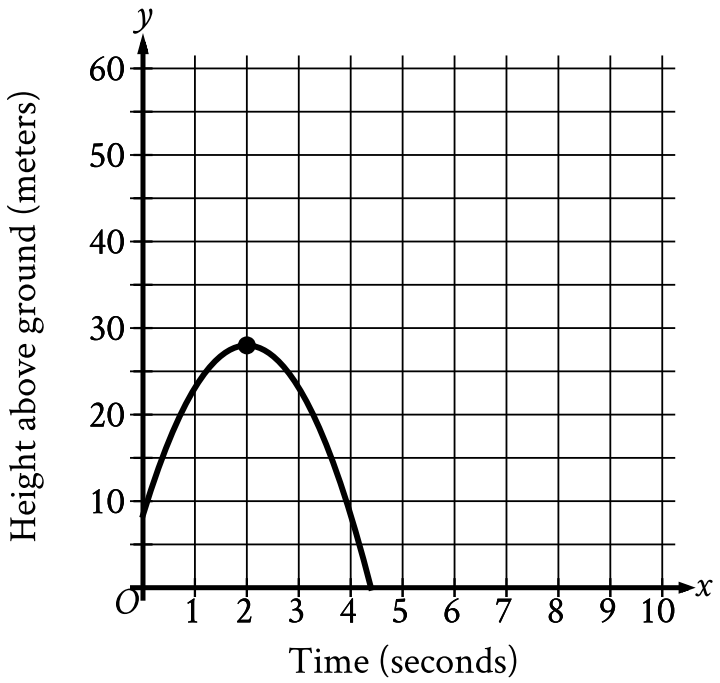
ID: 2434c419

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

Question ID 98579160

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 98579160



An object was launched upward from a platform. The graph shown models the height above ground, y, in meters, of the object x seconds after it was launched. For which of the following intervals of time was the height of the object increasing for the entire interval?

A. From $x = 0$ to $x = 2$

B. From $x = 0$ to $x = 4$

C. From $x = 2$ to $x = 3$

D. From $x = 3$ to $x = 4$

Question ID 319cb885

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 319cb885

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

Question ID 81ebd1e5

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 81ebd1e5

$$q(x) = 32(2^x)$$

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

A.

x	-1	0	1
$q(x)$	-64	0	64

B.

x	-1	0	1
$q(x)$	$\frac{1}{16}$	2	64

C.

x	-1	0	1
$q(x)$	$\frac{1}{16}$	32	64

D.

x	-1	0	1
$q(x)$	16	32	64

Question ID 9f4b5268

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 9f4b5268

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

Question ID 2ebe1df5

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 2ebe1df5

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

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

Question ID 7904edea

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 7904edea

The function f is defined by $f(x) = 4x^{-1}$. What is the value of $f(21)$?

A. -84

B. $\frac{1}{84}$

C. $\frac{4}{21}$

D. $\frac{21}{4}$

Question ID 45962172

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 45962172

The area *A*, in square centimeters, of a rectangular painting can be represented by the expression $w(w + 29)$, where w is the width, in centimeters, of the painting. Which expression represents the length, in centimeters, of the painting?

A. w

B. 29

C. $(w + 29)$

D. $w(w + 29)$

Question ID 8eec350c

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 8eec350c

$$f(t) = 500(0.5)^{\frac{t}{12}}$$

The function f models the intensity of an X-ray beam, in number of particles in the X-ray beam, t millimeters below the surface of a sample of iron. According to the model, what is the estimated number of particles in the X-ray beam when it is at the surface of the sample of iron?

A. 500

B. 12

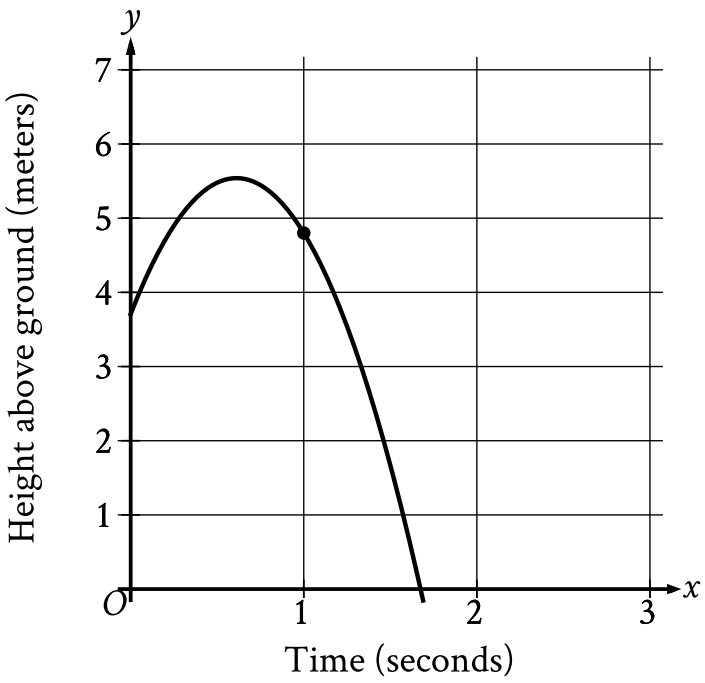
C. 5

D. 2

Question ID 75a64b6b

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 75a64b6b



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.

Question ID 7e46fa03

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

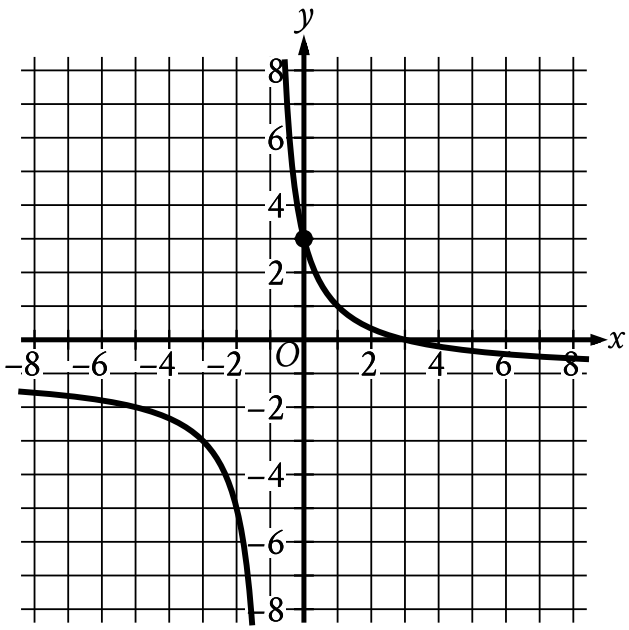
ID: 7e46fa03

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

Question ID e10502ca

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: e10502ca



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

Question ID c359c731

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: c359c731

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.

Question ID 45ed2e6b

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 45ed2e6b

Time (years)	Total amount (dollars)
0	604.00
1	606.42
2	608.84

Rosa opened a savings account at a bank. The table shows the exponential relationship between the time t, in years, since Rosa opened the account and the total amount n, in dollars, in the account. If Rosa made no additional deposits or withdrawals, which of the following equations best represents the relationship between t and n?

A. $n = (1 + 604)^t$

B. $n = (1 + 0.004)^t$

C. $n = 604(1 + 0.004)^t$

D. $n = 0.004(1 + 604)^t$

Question ID a1a27006

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: a1a27006

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.

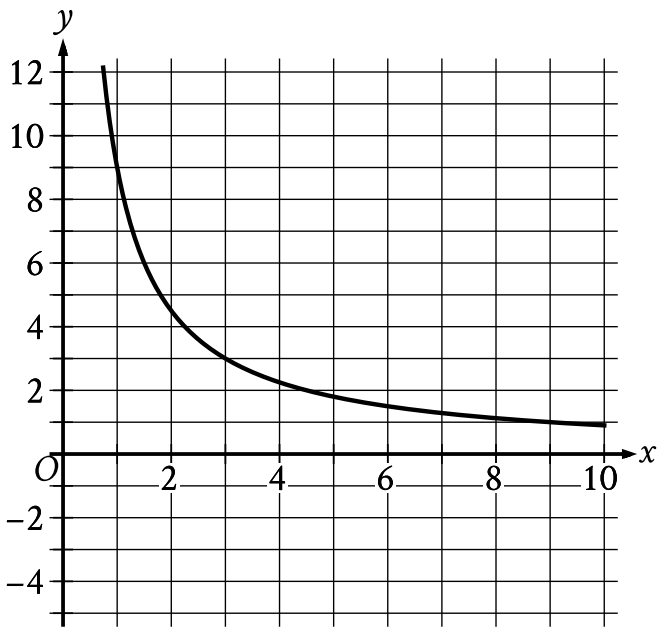
C. When the company's predicted annual revenue is approximately $518{,}748$ dollars, it is 5 times the predicted annual revenue for the previous year.

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.

Question ID f8c4065f

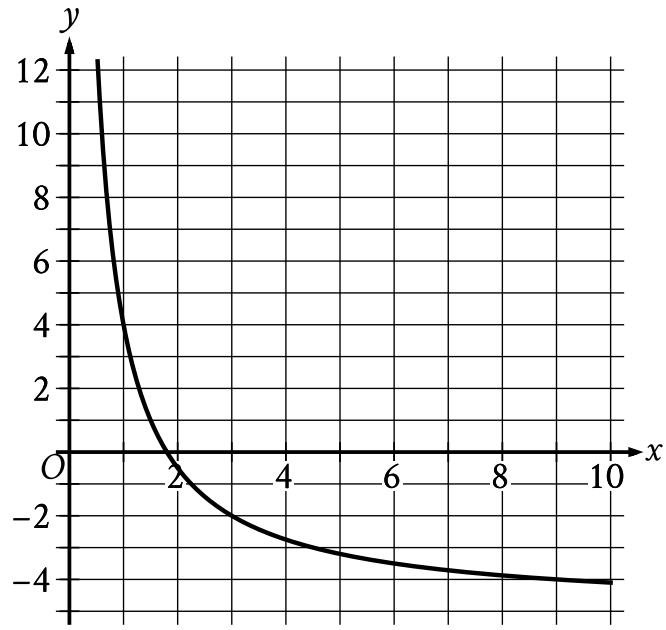
Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: f8c4065f

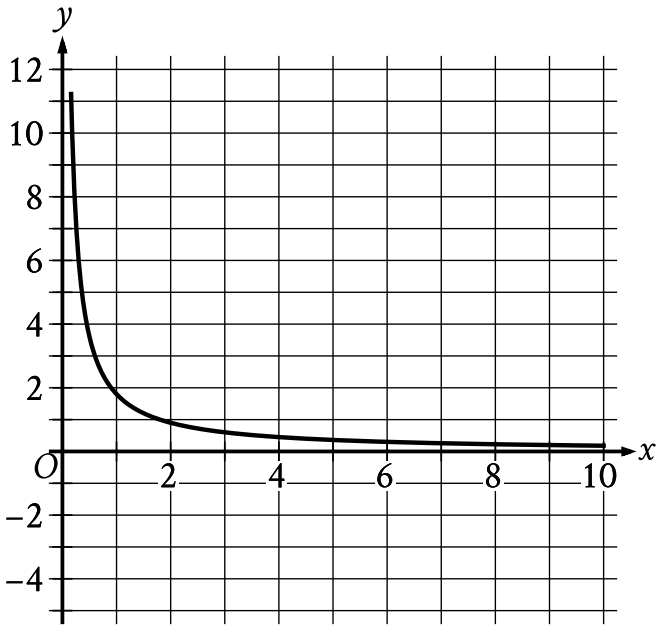


The graph of the rational function f is shown, where $y = f(x)$ and $x \geq 0$. Which of the following is the graph of $y = f(x) + 5$, where $x \geq 0$?

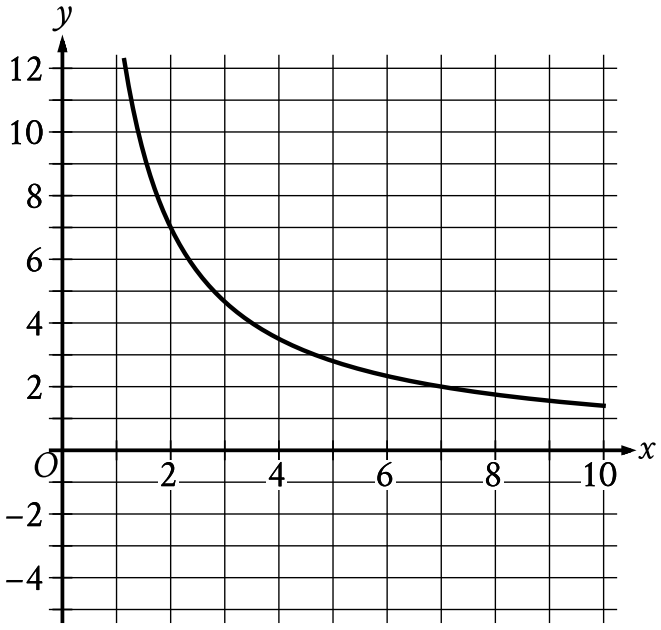
A.



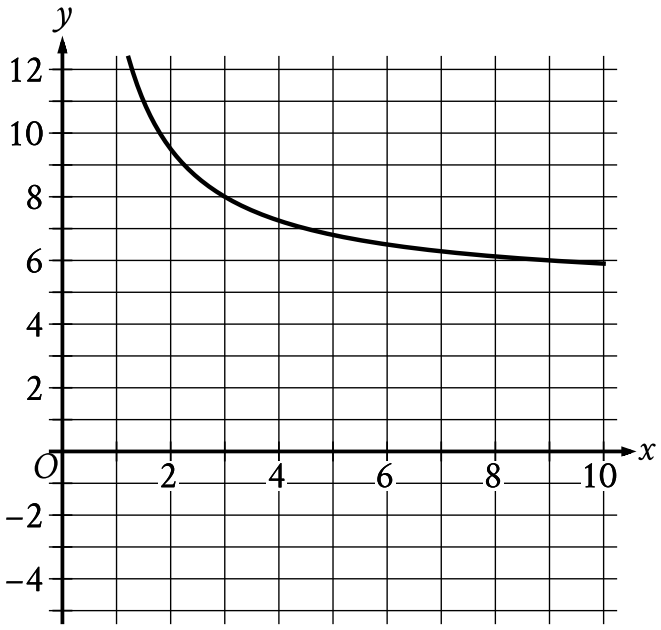
B.



C.



D.



Question ID e3571ba2

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: e3571ba2

The number of bacteria in a liquid medium doubles every day. There are $44{,}000$ bacteria in the liquid medium at the start of an observation. Which represents the number of bacteria, y, in the liquid medium t days after the start of the observation?

A. $y = \frac{1}{2}(44{,}000)^t$

B. $y = 2(44{,}000)^t$

C. $y = 44{,}000\left(\frac{1}{2}\right)^t$

D. $y = 44{,}000(2)^t$

Question ID 52bceaab

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 52bceaab

An object is kicked from a platform. The equation $h = -4.9t^2 + 7t + 9$ represents this situation, where h is the height of the object above the ground, in meters, t seconds after it is kicked. Which number represents the height, in meters, from which the object was kicked?

A. 0

B. 4.9

C. 7

D. 9

Question ID db85220f

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: db85220f

Time (years)	Total amount (dollars)
0	670.00
1	674.02
2	678.06

Sara opened a savings account at a bank. The table shows the exponential relationship between the time t, in years, since Sara opened the account and the total amount d, in dollars, in the account. If Sara made no additional deposits or withdrawals, which of the following equations best represents the relationship between t and d?

A. $d = 0.006(1 + 670)^t$

B. $d = 670(1 + 0.006)^t$

C. $d = (1 + 0.006)^t$

D. $d = (1 + 670)^t$

Question ID 0eced2ad

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 0eced2ad

A function p estimates that there were $2{,}000$ animals in a population in 1998. Each year from 1998 to 2010, the function estimates that the number of animals in this population increased by 3% of the number of animals in the population the previous year. Which equation defines this function, where $p(x)$ is the estimated number of animals in the population x years after 1998?

A. $p(x) = 2{,}000(3)^x$

B. $p(x) = 2{,}000(1.97)^x$

C. $p(x) = 2{,}000(1.03)^x$

D. $p(x) = 2{,}000(0.97)^x$

Question ID 6d84ee10

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 6d84ee10

An egg is thrown from a rooftop. The equation $h = -4.9t^2 + 9t + 18$ represents this situation, where h is the height of the egg above the ground, in meters, t seconds after it is thrown. According to the equation, what is the height, in meters, from which the egg was thrown?

Question ID db14a20c

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: db14a20c

The function f is defined by $f(x) = 270(0.1)^x$. What is the value of $f(0)$?

A. 0

B. 1

C. 27

D. 270

Question ID 0fb16f2f

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 0fb16f2f

A model predicts that the population of Bergen was $15{,}000$ in 2005. The model also predicts that each year for the next 5 years, the population p increased by 4% of the previous year's population. Which equation best represents this model, where x is the number of years after 2005, for $x \leq 5$?

A. $p = 0.96(15{,}000)^x$

B. $p = 1.04(15{,}000)^x$

C. $p = 15{,}000(0.96)^x$

D. $p = 15{,}000(1.04)^x$

Question ID 4690d45d

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 4690d45d

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

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.

Question ID b3f03f6a

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: b3f03f6a

A rectangle has a length that is 15 times its width. The function $y = (15w)(w)$ represents this situation, where y is the area, in square feet, of the rectangle and $y > 0$. Which of the following is the best interpretation of $15w$ in this context?

A. The length of the rectangle, in feet

B. The area of the rectangle, in square feet

C. The difference between the length and the width of the rectangle, in feet

D. The width of the rectangle, in feet

Question ID 155d1adf

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 155d1adf

A rectangle has a length of x units and a width of $(x - 15)$ units. If the rectangle has an area of 76 square units, what is the value of x?

A. 4

B. 19

C. 23

D. 76

Question ID 2b8f11e6

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 2b8f11e6

The function f is defined by $f(x) = 7x^3$. In the *xy*-plane, the graph of $y = g(x)$ is the result of shifting the graph of $y = f(x)$ down 2 units. Which equation defines function g?

A. $g(x) = \frac{7}{2}x^3$

B. $g(x) = 7x^{\frac{3}{2}}$

C. $g(x) = 7x^3 + 2$

D. $g(x) = 7x^3 - 2$

Question ID b35afde7

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: b35afde7

The area A, in square centimeters, of a rectangular cutting board can be represented by the expression $w(w+9)$, where w is the width, in centimeters, of the cutting board. Which expression represents the length, in centimeters, of the cutting board?

A. $w(w+9)$

B. w

C. 9

D. $(w+9)$

Question ID 38bdfb69

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 38bdfb69

$$y = 0.25x^2 - 7.5x + 90.25$$

The equation gives the estimated stock price y, in dollars, for a certain company x days after a new product launched, where $0 \leq x \leq 20$. Which statement is the best interpretation of $(x, y) = (1, 83)$ in this context?

A. The company's estimated stock price increased $\$83$ every day after the new product launched.

B. The company's estimated stock price increased $\$1$ every 83 days after the new product launched.

C. 1 day after the new product launched, the company's estimated stock price is $\$83$.

D. 83 days after the new product launched, the company's estimated stock price is $\$1$.

Question ID db9e8c54

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: db9e8c54

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. $h(n) = 22(0.85)^n$

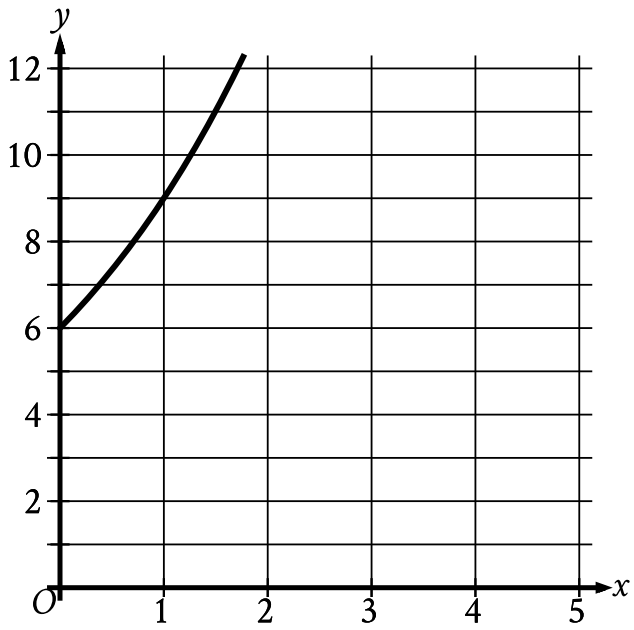
C. $h(n) = 85(0.22)^n$

D. $h(n) = 85(0.85)^n$

Question ID 2bd489b5

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 2bd489b5



The graph gives the estimated population y, in thousands, of a town x years since 2003, where $0 \leq x \leq 5$. Which of the following best describes the increase in the estimated population from $x = 0$ to $x = 1$?

A. The estimated population at $x = 1$ is 0.5 times the estimated population at $x = 0$.

B. The estimated population at $x = 1$ is 1.5 times the estimated population at $x = 0$.

C. The estimated population at $x = 1$ is 2.5 times the estimated population at $x = 0$.

D. The estimated population at $x = 1$ is 3.5 times the estimated population at $x = 0$.

Question ID 44c23cf1

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 44c23cf1

The function $f(w) = 6w^2$ gives the area of a rectangle, $\text{in square feet } (\text{ft}^2)$, if its width is w ft and its length is 6 times its width. Which of the following is the best interpretation of $f(14) = 1{,}176$?

A. If the width of the rectangle is 14 ft, then the area of the rectangle is $1{,}176$ ft^2.

B. If the width of the rectangle is 14 ft, then the length of the rectangle is $1{,}176$ ft.

C. If the width of the rectangle is $1{,}176$ ft, then the length of the rectangle is 14 ft.

D. If the width of the rectangle is $1{,}176$ ft, then the area of the rectangle is 14 ft^2.

Question ID 7e7255de

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 7e7255de

The function p is defined by $p(n) = 7n^3$. What is the value of n when $p(n)$ is equal to 56?

A. 2

B. $\frac{8}{3}$

C. 7

D. 8

Question ID 9514e764

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 9514e764

$$g(x) = x^2 + 55$$

What is the minimum value of the given function?

A. 0

B. 55

C. 110

D. $3{,}025$

Question ID 194aa933

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 194aa933

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

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.

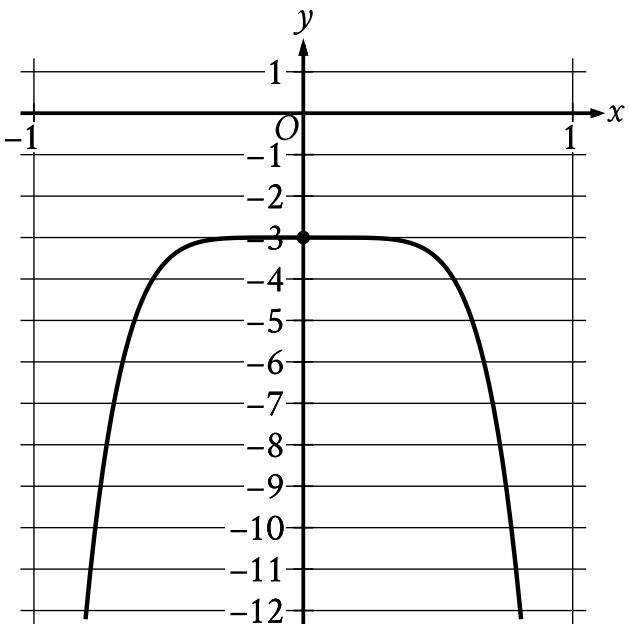
C. 8 years after 1984, the predicted population of this country was approximately 32.91 million.

D. 32.91 years after 1984, the predicted population of this country was approximately 8 million.

Question ID baf439a1

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: baf439a1

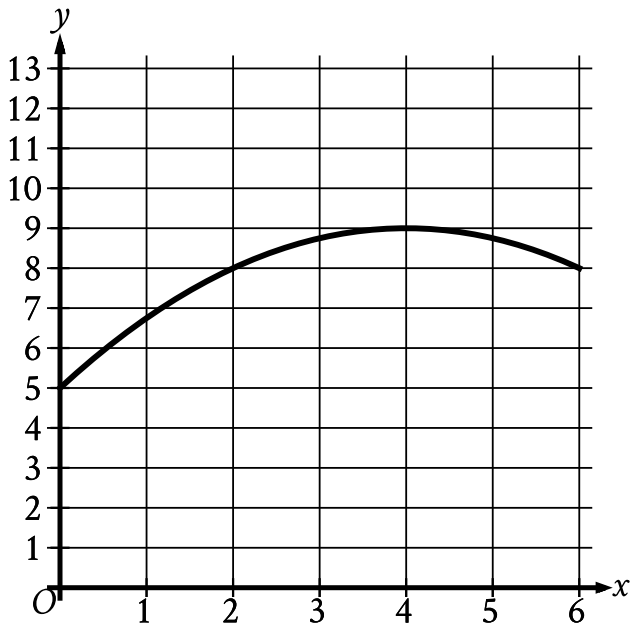


The graph of the polynomial function f, where $y = f(x)$, is shown. The y-intercept of the graph is $(0, y)$. What is the value of y?

Question ID fb72f2ed

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: fb72f2ed



The graph models the number of active projects a company was working on x months after the end of November 2012, where $0 \leq x \leq 6$. According to the model, what is the predicted number of active projects the company was working on at the end of November 2012?

A. 0

B. 5

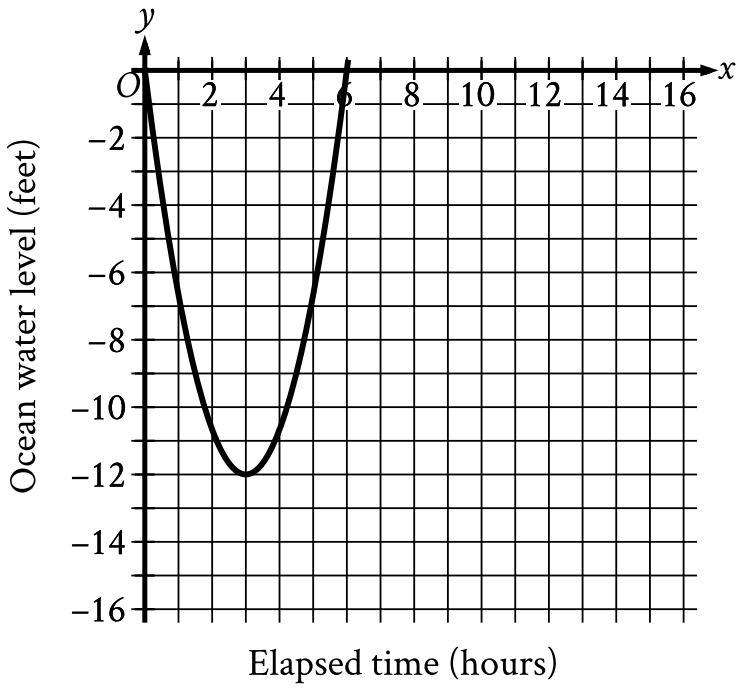
C. 8

D. 9

Question ID d84cbe50

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: d84cbe50



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

Question ID 27711b27

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 27711b27

A company has a newsletter. In January 2018, there were $1{,}300$ customers subscribed to the newsletter. For the next 24 months after January 2018, the total number of customers subscribed to the newsletter each month was 7% greater than the total number subscribed the previous month. Which equation gives the total number of customers, c, subscribed to the company's newsletter m months after January 2018, where $m \leq 24$?

A. $c = 1{,}300(0.07)^m$

B. $c = 1{,}300(1.07)^m$

C. $c = 1{,}300(1.7)^m$

D. $c = 1{,}300(7)^m$

Question ID 0fb16f2f

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 0fb16f2f

A model predicts that the population of Bergen was $15{,}000$ in 2005. The model also predicts that each year for the next 5 years, the population p increased by 4% of the previous year's population. Which equation best represents this model, where x is the number of years after 2005, for $x \leq 5$?

A. $p = 0.96(15{,}000)^x$

B. $p = 1.04(15{,}000)^x$

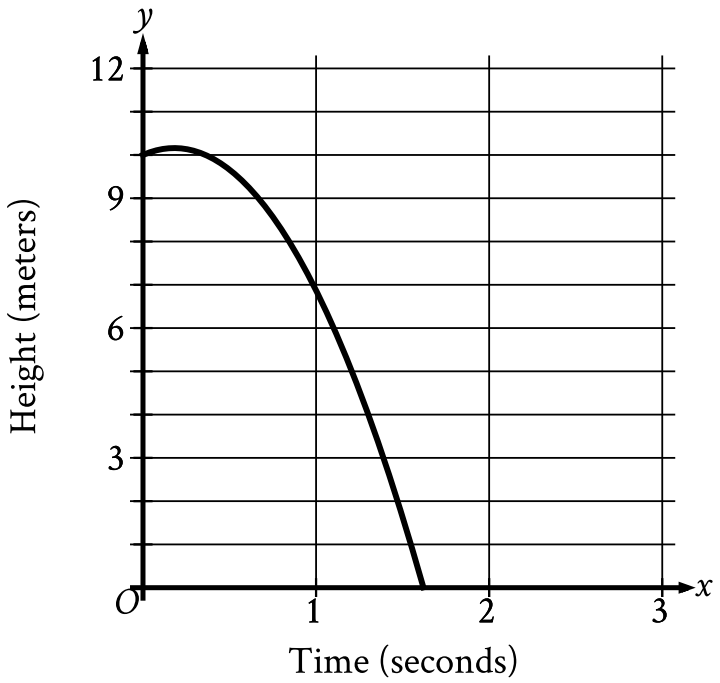
C. $p = 15{,}000(0.96)^x$

D. $p = 15{,}000(1.04)^x$

Question ID 05e193b5

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 05e193b5



A competitive diver dives from a platform into the water. The graph shown gives the height above the water y, in meters, of the diver x seconds after diving from the platform. What is the best interpretation of the *x*-intercept of the graph?

A. The diver reaches a maximum height above the water at 1.6 seconds.

B. The diver hits the water at 1.6 seconds.

C. The diver reaches a maximum height above the water at 0.2 seconds.

D. The diver hits the water at 0.2 seconds.

Question ID 4cc2980e

Assessment	Test	Domain	Skill	Difficulty
PSAT/NMSQT & PSAT 10	Math	Advanced Math	Nonlinear functions	

ID: 4cc2980e

A company opens an account with an initial balance of $\$36{,}100.00$. The account earns interest, and no additional deposits or withdrawals are made. The account balance is given by an exponential function A, where $A(t)$ is the account balance, in dollars, t years after the account is opened. The account balance after 13 years is $\$68{,}071.93$. Which equation could define A?

A. $A(t) = 36{,}100.00(1.05)^t$

B. $A(t) = 31{,}971.93(1.05)^t$

C. $A(t) = 31{,}971.93(0.05)^t$

D. $A(t) = 36{,}100.00(0.05)^t$