SAT Math

Nonlinear Functions 2

Question #	ID

2.1 f89af023

A rectangular volleyball court has an area of 162 square meters. If the length of the court is twice the width, what is the width of the court, in meters?

A. 9

B. 18

C. 27

D. 54

2.2 e53add44

$S(n) = 38{,}000a^n$

The function *S* above models the annual salary, in dollars, of an employee *n* years after starting a job, where *a* is a constant. If the employee's salary increases by 4% each year, what is the value of *a* ?

A. 0.04

B. 0.4

C. 1.04

D. 1.4

2.3 926c246b

$D = 5{,}640(1.9)^t$

The equation above estimates the global data traffic *D*, in terabytes, for the year that is *t* years after 2010. What is the best interpretation of the number 5,640 in this context?

A. The estimated amount of increase of data traffic, in terabytes, each year

B. The estimated percent increase in the data traffic, in terabytes, each year

C. The estimated data traffic, in terabytes, for the year that is *t* years after 2010

D. The estimated data traffic, in terabytes, in 2010

2.4 50e40f08

$$f(x) = (x + 6)(x - 4)$$

If the given function f is graphed in the *xy*-plane, where $y = f(x)$, what is the *x*-coordinate of an *x*-intercept of the graph?

SAT Math

Nonlinear Functions 2

Question # **ID**

2.5 be0c419e

Immanuel purchased a certain rare coin on January 1. The function $f(x) = 65(1.03)^x$, where $0 \leq x \leq 10$, gives the predicted value, in dollars, of the rare coin x years after Immanuel purchased it. What is the best interpretation of the statement "$f(8)$ is approximately equal to 82" in this context?

A. When the rare coin's predicted value is approximately 82 dollars, it is 8% greater than the predicted value, in dollars, on January 1 of the previous year.

B. When the rare coin's predicted value is approximately 82 dollars, it is 8 times the predicted value, in dollars, on January 1 of the previous year.

C. From the day Immanuel purchased the rare coin to 8 years after Immanuel purchased the coin, its predicted value increased by a total of approximately 82 dollars.

D. 8 years after Immanuel purchased the rare coin, its predicted value is approximately 82 dollars.

2.6 a31417d1

From 2005 through 2014, the number of music CDs sold in the United States declined each year by approximately 15% of the number sold the preceding year. In 2005, approximately 600 million CDs were sold in the United States. Of the following, which best models *C*, the number of millions of CDs sold in the United States, *t* years after 2005?

A. $C = 600(0.15)^t$

B. $C = 600(0.85)^t$

C. $C = 600(1.15)^t$

D. $C = 600(1.85)^t$

2.7 c4cd5bcc

In the *xy*-plane, the *y*-coordinate of the *y*-intercept of the graph of the function *f* is *c*. Which of the following must be equal to *c* ?

A. $f(0)$

B. $f(1)$

C. $f(2)$

D. $f(3)$

SAT Math

Nonlinear Functions 2

Question #	ID

2.8 78d5f91a

$$f(x) = x^3 + 3x^2 - 6x - 1$$

For the function f defined above, what is the value of $f(-1)$?

A. -11

B. -7

C. 7

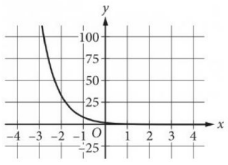
D. 11

2.9 d675744f

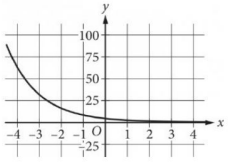
$$y = 4(2^x)$$

Which of the following is the graph in the xy-plane of the given equation?

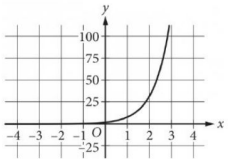
A.



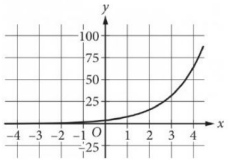
B.



C.



D.



SAT Math

Nonlinear Functions 2

Question #	ID

2.10 f44a29a8

An object's kinetic energy, in joules, is equal to the product of one-half the object's mass, in kilograms, and the square of the object's speed, in meters per second. What is the speed, in meters per second, of an object with a mass of 4 kilograms and kinetic energy of 18 joules?

A. 3

B. 6

C. 9

D. 36

2.11 d71f6dbf

The height, in feet, of an object x seconds after it is thrown straight up in the air can be modeled by the function $h(x) = -16x^2 + 20x + 5$. Based on the model, which of the following statements best interprets the equation $h(1.4) = 1.64$?

A. The height of the object 1.4 seconds after being thrown straight up in the air is 1.64 feet.

B. The height of the object 1.64 seconds after being thrown straight up in the air is 1.4 feet.

C. The height of the object 1.64 seconds after being thrown straight up in the air is approximately 1.4 times as great as its initial height.

D. The speed of the object 1.4 seconds after being thrown straight up in the air is approximately 1.64 feet per second.

2.12 6676f055

$f(\theta) = -0.28(\theta - 27)^2 + 880$

An engineer wanted to identify the best angle for a cooling fan in an engine in order to get the greatest airflow. The engineer discovered that the function above models the airflow $f(\theta)$, in cubic feet per minute, as a function of the angle of the fan θ, in degrees. According to the model, what angle, in degrees, gives the greatest airflow?

A. −0.28

B. 0.28

C. 27

D. 880

SAT Math

Nonlinear Functions 2

Question # **ID**

2.13 dd8ac009

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. $d = 0.006(670t)$

D. $d = 670(0.006 + t)$

2.14 281a4f3b

A certain college had 3,000 students enrolled in 2015. The college predicts that after 2015, the number of students enrolled each year will be 2% less than the number of students enrolled the year before. Which of the following functions models the relationship between the number of students enrolled, $f(x)$, and the number of years after 2015, x ?

A. $f(x) = 0.02(3{,}000)^x$

B. $f(x) = 0.98(3{,}000)^x$

C. $f(x) = 3{,}000(0.02)^x$

D. $f(x) = 3{,}000(0.98)^x$

2.15 100030d9

A rubber ball bounces upward one-half the height that it falls each time it hits the ground. If the ball was originally dropped from a distance of 20.0 feet above the ground, what was its maximum height above the ground, in feet, between the third and fourth time it hit the ground?

2.16 c7a187a7

$$f(x) = x^2 - 18x - 360$$

If the given function f is graphed in the xy-plane, where $y = f(x)$, what is an x-intercept of the graph?

A. $(-12, 0)$

B. $(-30, 0)$

C. $(-360, 0)$

D. $(12, 0)$

SAT Math

Nonlinear Functions 2

Question #	ID

2.17 e1391dd6

According to Moore's law, the number of transistors included on microprocessors doubles every 2 years. In 1985, a microprocessor was introduced that had 275,000 transistors. Based on this information, in which of the following years does Moore's law estimate the number of transistors to reach 1.1 million?

A. 1987

B. 1989

C. 1991

D. 1994

2.18 5bf0f84a

$h(t) = -16t^2 + 110t + 72$

The function above models the height h, in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

A. The initial height, in feet, of the object

B. The maximum height, in feet, of the object

C. The initial speed, in feet per second, of the object

D. The maximum speed, in feet per second, of the object

2.19 70ebd3d0

$N(d) = 115(0.90)^d$

The function N defined above can be used to model the number of species of brachiopods at various ocean depths d, where d is in hundreds of meters. Which of the following does the model predict?

A. For every increase in depth by 1 meter, the number of brachiopod species decreases by 115.

B. For every increase in depth by 1 meter, the number of brachiopod species decreases by 10%.

C. For every increase in depth by 100 meters, the number of brachiopod species decreases by 115.

D. For every increase in depth by 100 meters, the number of brachiopod species decreases by 10%.

SAT Math

Nonlinear Functions 2

Question # **ID**

2.20 97158b3a

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. $w(w + 29)$

2.21 dba7432e

x	$f(x)$
0	5
1	$\frac{5}{2}$
2	$\frac{5}{4}$
3	$\frac{5}{8}$

The table above gives the values of the function f for some values of x. Which of the following equations could define f ?

A. $f(x) = 5(2^{x+1})$

B. $f(x) = 5(2^{x})$

C. $f(x) = 5(2^{-(x+1)})$

D. $f(x) = 5(2^{-x})$

2.22 f5e8ccf1

$$f(x) = (x+4)(x-1)(2x-3)$$

The function f is defined above. Which of the following is NOT an x-intercept of the graph of the function in the xy-plane?

A. $(-4, 0)$

B. $\left(-\frac{2}{3}, 0\right)$

C. $(1, 0)$

D. $\left(\frac{3}{2}, 0\right)$

SAT Math

Nonlinear Functions 2

Question #	ID

2.23 5c00c2c1

There were no jackrabbits in Australia before 1788 when 24 jackrabbits were introduced. By 1920 the population of jackrabbits had reached 10 billion. If the population had grown exponentially, this would correspond to a 16.2% increase, on average, in the population each year. Which of the following functions best models the population $p(t)$ of jackrabbits t years after 1788?

A. $p(t) = 1.162(24)^t$

B. $p(t) = 24(2)^{1.162t}$

C. $p(t) = 24(1.162)^t$

D. $p(t) = (24, \cdot, 1.162)^t$

2.24 15c364bf

A sample of a certain isotope takes 29 years to decay to half its original mass. The function $s(t) = 184(0.5)^{\frac{t}{29}}$ gives the approximate mass of this isotope, in grams, that remains t years after a 184-gram sample starts to decay. Which statement is the best interpretation of $s(87) = 23$ in this context?

A. Approximately 23 grams of the sample remains 87 years after the sample starts to decay.

B. The mass of the sample has decreased by approximately 23 grams 87 years after the sample starts to decay.

C. The mass of the sample has decreased by approximately 87 grams 23 years after the sample starts to decay.

D. Approximately 87 grams of the sample remains 23 years after the sample starts to decay.

2.25 203774bc

The product of two positive integers is 546. If the first integer is 11 greater than twice the second integer, what is the smaller of the two integers?

A. 7

B. 14

C. 39

D. 78

SAT Math

Nonlinear Functions 2

Question # **ID**

2.26 b7cd6ca6

The equation $E(t) = 5(1.8)^t$ gives the estimated number of employees at a restaurant, where t is the number of years since the restaurant opened. Which of the following is the best interpretation of the number 5 in this context?

A. The estimated number of employees when the restaurant opened

B. The increase in the estimated number of employees each year

C. The number of years the restaurant has been open

D. The percent increase in the estimated number of employees each year

2.27 341ba5db

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

What is the minimum value of the given function?

A. 0

B. 55

C. 110

D. $3{,}025$

2.28 45df91ee

$$g(x) = 11\left(\tfrac{1}{12}\right)^x$$

If the given function g is graphed in the xy-plane, where $y = g(x)$, what is the y-intercept of the graph?

A. $(0, 11)$

B. $(0, 132)$

C. $(0, 1)$

D. $(0, 12)$

2.29 d4950429

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

SAT Math

Nonlinear Functions 2

Question # **ID**

2.30 3918e8bc

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?

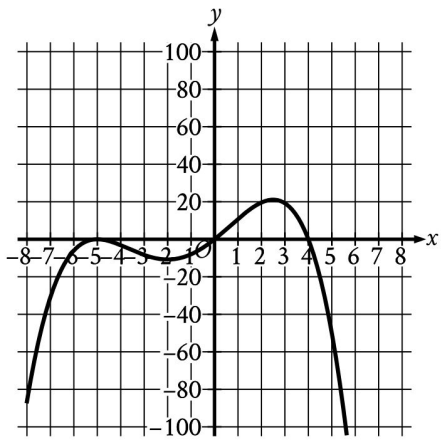
A. 0

B. 4.9

C. 7

D. 9

2.31 252a3b3a



Which of the following could be the equation of the graph shown in the *xy*-plane?

A. $y = -\frac{1}{10}x(x-4)(x+5)$

B. $y = -\frac{1}{10}x(x-4)(x+5)^2$

C. $y = -\frac{1}{10}x(x-5)(x+4)$

D. $y = -\frac{1}{10}x(x-5)^2(x+4)$

2.32 0aaef7aa

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

SAT Math

Nonlinear Functions 2

Question # **ID**

2.33 3c600337

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

2.34 99c5e794

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. $p = 0.96$msup

B. $p = 1.04$msup

C. $p = 15{,}000$msup

D. $p = 15{,}000$msup

2.35 f880f910

The area of a triangle is 270 square centimeters. The length of the base of the triangle is 12 centimeters greater than the height of the triangle. What is the height, in centimeters, of the triangle?

A. 15

B. 18

C. 30

D. 36

2.36 68607eca

On April 1, there were 233 views of an advertisement posted on a website. Every 2 days after April 1, the number of views of the advertisement had increased by 70% of the number of views 2 days earlier. The function f gives the predicted number of views x days after April 1. Which equation defines f?

A. $f(x) = 233(0.70)^{\frac{x}{2}}$

B. $f(x) = 233(0.70)^{2x}$

C. $f(x) = 233(1.70)^{\frac{x}{2}}$

D. $f(x) = 233(1.70)^{2x}$

SAT Math

Nonlinear Functions 2

Question #	ID

2.37 dd3b1e1a

$$f(x) = x^5 + 9x + 17$$

For the given function f, the graph of $y = f(x)$ in the *xy*-plane passes through the point $(0, b)$, where b is a constant. What is the value of b?

2.38 1d3c5c95

$$f(x) = 4{,}000(0.75)^x$$

An entomologist recommended a program to reduce a certain invasive beetle population in an area. The given function estimates this beetle species' population x years after 2012, where $x \leq 7$. Which of the following is the best interpretation of $4{,}000$ in this context?

A. The estimated initial beetle population for this species and area in 2012

B. The estimated beetle population for this species and area 7 years after 2012

C. The estimated percent decrease in the beetle population for this species and area each year after 2012

D. The estimated percent decrease in the beetle population for this species and area every 7 years after 2012