

## Question ID c6a26e14

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: c6a26e14

$$|x + 45| = 48$$

What is the positive solution to the given equation?

- A. 3
- B. 48
- C. 93
- D. 96

## Question ID 07bcecac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 07bcecac

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

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 ad03127d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: ad03127d

$$6r = 7s + t$$

The given equation relates the variables  $r$ ,  $s$ , and  $t$ . Which equation correctly expresses  $s$  in terms of  $r$  and  $t$ ?

- A.  $s = 42r - t$
- B.  $s = 7(6r - t)$
- C.  $s = \frac{6}{7}r - t$
- D.  $s = \frac{6r-t}{7}$

## Question ID 02add2d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 02add2d2

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 f65288e8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f65288e8

$$\frac{1}{x^2 + 10x + 25} = 4$$

If  $x$  is a solution to the given equation, which of the following is a possible value of  $x + 5$ ?

A.  $\frac{1}{2}$

B.  $\frac{5}{2}$

C.  $\frac{9}{2}$

D.  $\frac{11}{2}$

# Question ID 788bfd56

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 788bfd56

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

- A. 0
- B. 16
- C. 40
- D. 76

## Question ID 2c288148

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c288148

$$\sqrt{k-x} = 58-x$$

In the given equation,  $k$  is a constant. The equation has exactly one real solution. What is the minimum possible value of  $4k$ ?

# Question ID 40491607

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 40491607

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

In the  $xy$ -plane, when the graph of the function  $f$ , where  $y = f(x)$ , is shifted up 6 units, the resulting graph is defined by the function  $g$ . If the graph of  $y = g(x)$  crosses through the point  $(4, b)$ , where  $b$  is a constant, what is the value of  $b$ ?

# Question ID 369b7bb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 369b7bb7

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

# Question ID 3206b905

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 3206b905

Which of the following expressions is equivalent to  $8x^{10} - 8x^9 + 88x$ ?

- A.  $x(7x^{10} - 7x^9 + 87x)$
- B.  $x(8^{10} - 8^9 + 88)$
- C.  $8x(x^{10} - x^9 + 11x)$
- D.  $8x(x^9 - x^8 + 11)$

# Question ID f89af023

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID 7902bed0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7902bed0

A machine launches a softball from ground level. The softball reaches a maximum height of **51.84** meters above the ground at **1.8** seconds and hits the ground at **3.6** seconds. Which equation represents the height above ground  $h$ , in meters, of the softball  $t$  seconds after it is launched?

- A.  $h = -t^2 + 3.6$
- B.  $h = -t^2 + 51.84$
- C.  $h = -16(t - 1.8)^2 - 3.6$
- D.  $h = -16(t - 1.8)^2 + 51.84$

## Question ID 4a0d0399

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4a0d0399

The function  $f$  is defined by  $f(x) = a^x + b$ , where  $a$  and  $b$  are constants. In the  $xy$ -plane, the graph of  $y = f(x)$  has an  $x$ -intercept at  $(2, 0)$  and a  $y$ -intercept at  $(0, -323)$ . What is the value of  $b$ ?

## Question ID 768b60d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 768b60d2

For the exponential function  $f$ , the value of  $f(0)$  is  $c$ , where  $c$  is a constant. Of the following equations that define the function  $f$ , which equation shows the value of  $c$  as the coefficient or the base?

- A.  $f(x) = 22(1.5)^{x+1}$
- B.  $f(x) = 33(1.5)^x$
- C.  $f(x) = 49.5(1.5)^{x-1}$
- D.  $f(x) = 74.25(1.5)^{x-2}$

## Question ID e53add44

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

## Question ID f2f3fa00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f2f3fa00

During a 5-second time interval, the average acceleration  $a$ , in meters per second squared, of an object with an initial velocity of 12 meters per second is defined by the

$$a = \frac{v_f - 12}{5}, \text{ where } v_f \text{ is the final velocity of the object in}$$

meters per second. If the equation is rewritten in the form  $v_f = xa + y$ , where  $x$  and  $y$  are constants, what is the value of  $x$ ?

## Question ID b4a6ed81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4a6ed81

The expression  $90y^5 - 54y^4$  is equivalent to  $ry^4(15y - 9)$ , where  $r$  is a constant. What is the value of  $r$ ?

# Question ID 9654add7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9654add7

$$f(x) = -500x^2 + 25,000x$$

The revenue  $f(x)$ , in dollars, that a company receives from sales of a product is given by the function  $f$  above, where  $x$  is the unit price, in dollars, of the product. The graph of  $y = f(x)$  in the  $xy$ -plane intersects the  $x$ -axis at 0 and  $a$ . What does  $a$  represent?

- A. The revenue, in dollars, when the unit price of the product is \$0
- B. The unit price, in dollars, of the product that will result in maximum revenue
- C. The unit price, in dollars, of the product that will result in a revenue of \$0
- D. The maximum revenue, in dollars, that the company can make

# Question ID 4618501a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4618501a

$$f(x) = 3,000(0.75)^x$$

A conservation scientist implemented a program to reduce the population of a certain species in an area. The given function estimates this species' population  $x$  years after 2008, where  $x \leq 8$ . Which of the following is the best interpretation of 3,000 in this context?

- A. The estimated percent decrease in the population for this species and area every 8 years after 2008
- B. The estimated percent decrease in the population for this species and area each year after 2008
- C. The estimated population for this species and area 8 years after 2008
- D. The estimated initial population for this species and area in 2008

# Question ID 34847f8a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 34847f8a

$$\frac{2}{x-2} + \frac{3}{x+5} = \frac{rx+t}{(x-2)(x+5)}$$

The equation above is true for all  $x > 2$ , where  $r$  and  $t$  are positive constants. What is the value of  $rt$ ?

- A. -20
- B. 15
- C. 20
- D. 60

## Question ID cc776a04

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: cc776a04

Which of the following is an equivalent form of

$$(1.5x - 2.4)^2 - (5.2x^2 - 6.4) ?$$

- A.  $-2.2x^2 + 1.6$
- B.  $-2.2x^2 + 11.2$
- C.  $-2.95x^2 - 7.2x + 12.16$
- D.  $-2.95x^2 - 7.2x + 0.64$

# Question ID 263f9937

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 150px; height: 10px; background-color: #0056b3;"></div> <div style="width: 180px; height: 10px; background-color: #0056b3;"></div>

ID: 263f9937

## Growth of a Culture of Bacteria

Day	Number of bacteria per milliliter at end of day
1	$2.5 \times 10^5$
2	$5.0 \times 10^5$
3	$1.0 \times 10^6$

A culture of bacteria is growing at an exponential rate, as shown in the table above. At this rate, on which day would the number of bacteria per milliliter reach  $5.12 \times 10^8$ ?

- A. Day 5
- B. Day 9
- C. Day 11
- D. Day 12

# Question ID 4ac59df6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4ac59df6

Which expression is equivalent to  $(8yz)(y)(7z)$ ?

- A.  $56y^2z^2$
- B.  $56y^2z$
- C.  $56yz$
- D.  $16yz$

## Question ID fada6b03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fada6b03

$$2x^2 - 8x - 7 = 0$$

One solution to the given equation can be written as  $\frac{8-\sqrt{k}}{4}$ , where  $k$  is a constant. What is the value of  $k$ ?

# Question ID 926c246b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

## Question ID 84e5e36c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 84e5e36c

$$\begin{aligned}y &= 76 \\y &= x^2 - 5\end{aligned}$$

The graphs of the given equations in the  $xy$ -plane intersect at the point  $(x, y)$ . What is a possible value of  $x$ ?

A.  $-\frac{76}{5}$

B.  $-9$

C.  $5$

D.  $76$

# Question ID ff2c1431

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: ff2c1431

$$7m = 5(n + p)$$

The given equation relates the positive numbers  $m$ ,  $n$ , and  $p$ . Which equation correctly gives  $n$  in terms of  $m$  and  $p$ ?

- A.  $n = \frac{5p}{7m}$
- B.  $n = \frac{7m}{5} - p$
- C.  $n = 5(7m) + p$
- D.  $n = 7m - 5 - p$

## Question ID 137cc6fd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 137cc6fd

$$\sqrt[5]{70n} \left( \sqrt[6]{70n} \right)^2$$

For what value of  $x$  is the given expression equivalent to  $(70n)^{30x}$ , where  $n > 1$ ?

## Question ID 6ce95fc8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6ce95fc8

$$2x^2 - 2 = 2x + 3$$

Which of the following is a solution to the equation above?

- A. 2
- B.  $1 - \sqrt{11}$
- C.  $\frac{1}{2} + \sqrt{11}$
- D.  $\frac{1 + \sqrt{11}}{2}$

# Question ID 4dd4efcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 4dd4efcf

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

In the given quadratic function,  $a$  and  $c$  are constants. The graph of  $y = f(x)$  in the  $xy$ -plane is a parabola that opens upward and has a vertex at the point  $(h, k)$ , where  $h$  and  $k$  are constants. If  $k < 0$  and  $f(-9) = f(3)$ , which of the following must be true?

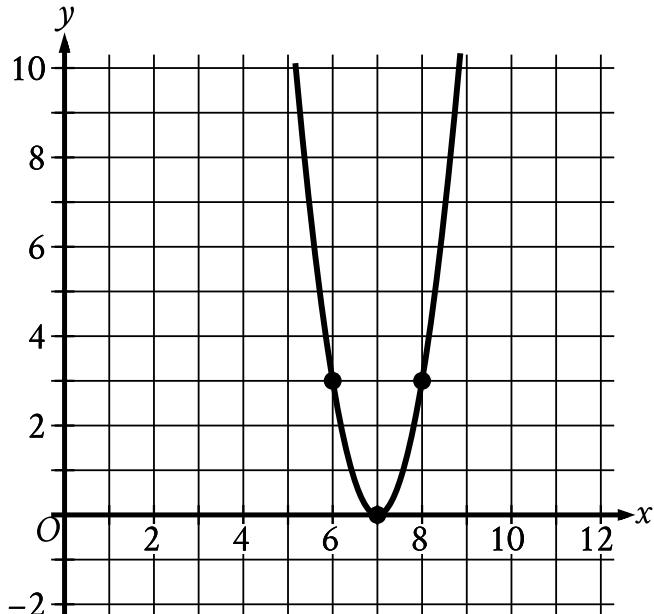
- I.  $c < 0$
- II.  $a \geq 1$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

# Question ID cc2601cb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: cc2601cb



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

# Question ID 6bcdcac03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6bcdcac03

$$x^2 = -841$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

## Question ID f5aa5040

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

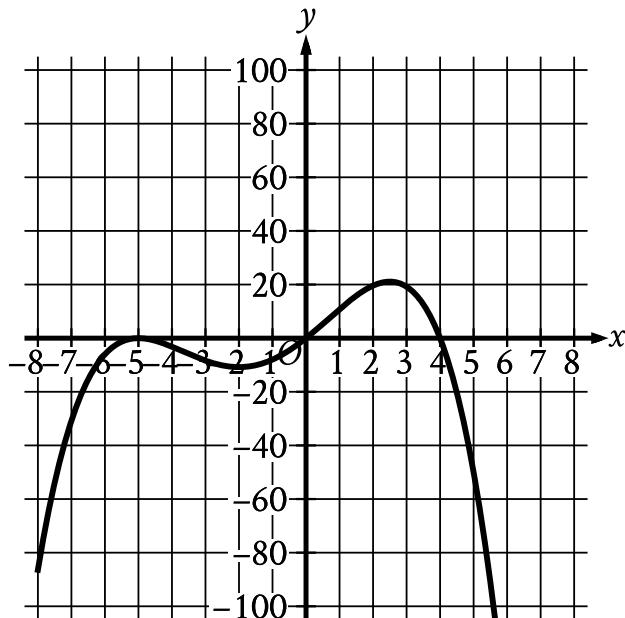
ID: f5aa5040

In the  $xy$ -plane, a line with equation  $2y = c$  for some constant  $c$  intersects a parabola at exactly one point. If the parabola has equation  $y = -2x^2 + 9x$ , what is the value of  $c$ ?

# Question ID 252a3b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

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

## Question ID 2992ac30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2992ac30

$$P(t) = 260(1.04)^{(\frac{6}{4})t}$$

The function  $P$  models the population, in thousands, of a certain city  $t$  years after 2003. According to the model, the population is predicted to increase by 4% every  $n$  months. What is the value of  $n$ ?

- A. 8
- B. 12
- C. 18
- D. 72

# Question ID 58443765

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 58443765

$$y = 5x + 4$$

$$y = 5x^2 + 4$$

Which ordered pair  $(x, y)$  is a solution to the given system of equations?

- A.  $(0, 0)$
- B.  $(0, 4)$
- C.  $(8, 44)$
- D.  $(8, 84)$

# Question ID 3d7d7534

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3d7d7534

$$(d - 30)(d + 30) - 7 = -7$$

What is a solution to the given equation?

## Question ID 841ef26c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 841ef26c

$$f(x) = 4x^2 + 64x + 262$$

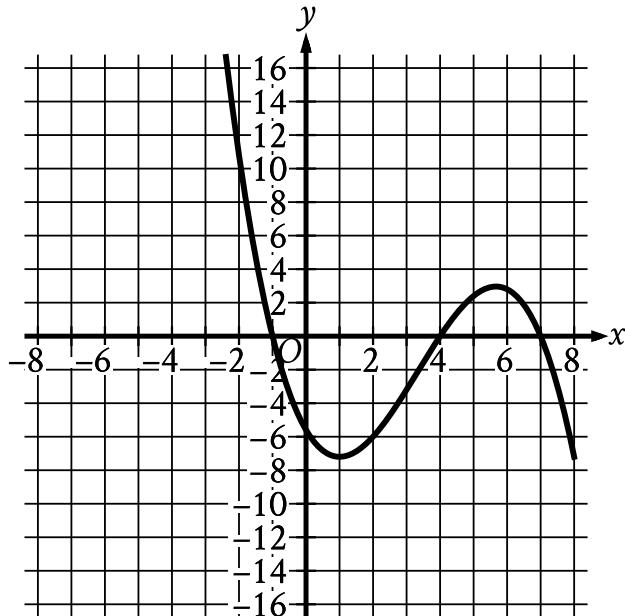
The function  $g$  is defined by  $g(x) = f(x + 5)$ . For what value of  $x$  does  $g(x)$  reach its minimum?

- A. -13
- B. -8
- C. -5
- D. -3

# Question ID cc6ccd71

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: cc6ccd71



The graph of  $y = f(x)$  is shown, where the function  $f$  is defined by  $f(x) = ax^3 + bx^2 + cx + d$  and  $a, b, c$ , and  $d$  are constants. For how many values of  $x$  does  $f(x) = 0$ ?

- A. One
- B. Two
- C. Three
- D. Four

# Question ID 70482e20

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70482e20

Which expression is equivalent to  $11x^3 - 5x^3$ ?

- A.  $16x^3$
- B.  $6x^3$
- C.  $6x^6$
- D.  $16x^6$

## Question ID 8452c42b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8452c42b

Which expression is equivalent to  $50x^2 + 5x^2$ ?

- A.  $250x^2$
- B.  $10x^2$
- C.  $45x^2$
- D.  $55x^2$

# Question ID b39d74a0

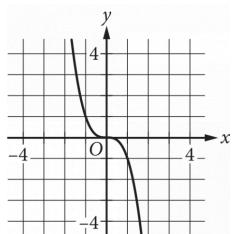
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: b39d74a0

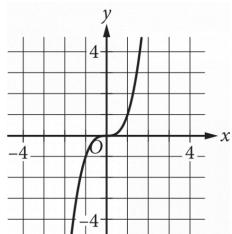
x	y
0	0
1	1
2	8
3	27

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

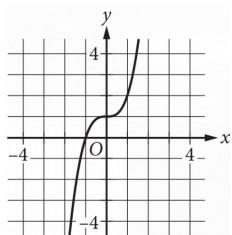
A.



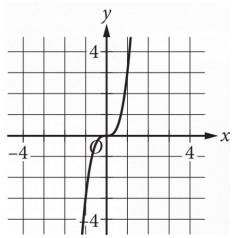
B.



C.



D.



## Question ID ea6d05bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

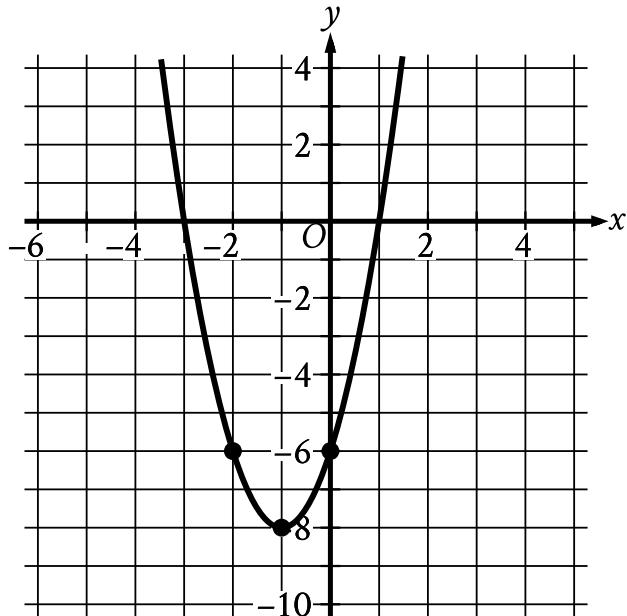
ID: ea6d05bb

The expression  $(3x - 23)(19x + 6)$  is equivalent to the expression  $ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants. What is the value of  $b$ ?

# Question ID 09d21d79

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 09d21d79



The graph of  $y = 2x^2 + bx + c$  is shown, where  $b$  and  $c$  are constants. What is the value of  $bc$ ?

## Question ID 722de804

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 722de804

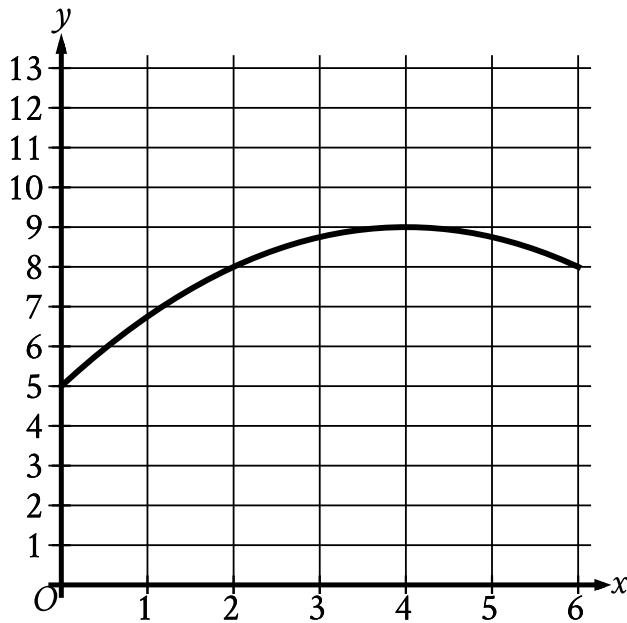
$$(x - 47)^2 = 1$$

What is the sum of the solutions to the given equation?

# Question ID 95d1c344

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 95d1c344



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 0536ad4f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 0536ad4f

Which expression is equivalent to  $20w - (4w + 3w)$ ?

- A.  $10w$
- B.  $13w$
- C.  $19w$
- D.  $21w$

# Question ID 433184f1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 433184f1

Which expression is equivalent to  $\frac{4}{4x-5} - \frac{1}{x+1}$ ?

- A.  $\frac{1}{(x+1)(4x-5)}$
- B.  $\frac{3}{3x-6}$
- C.  $-\frac{1}{(x+1)(4x-5)}$
- D.  $\frac{9}{(x+1)(4x-5)}$

## Question ID d135f4bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d135f4bf

The function  $f$  is defined by  $f(x) = (x - 6)(x - 2)(x + 6)$ . In the  $xy$ -plane, the graph of  $y = g(x)$  is the result of translating the graph of  $y = f(x)$  up 4 units. What is the value of  $g(0)$ ?

# Question ID 1d3fee25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1d3fee25

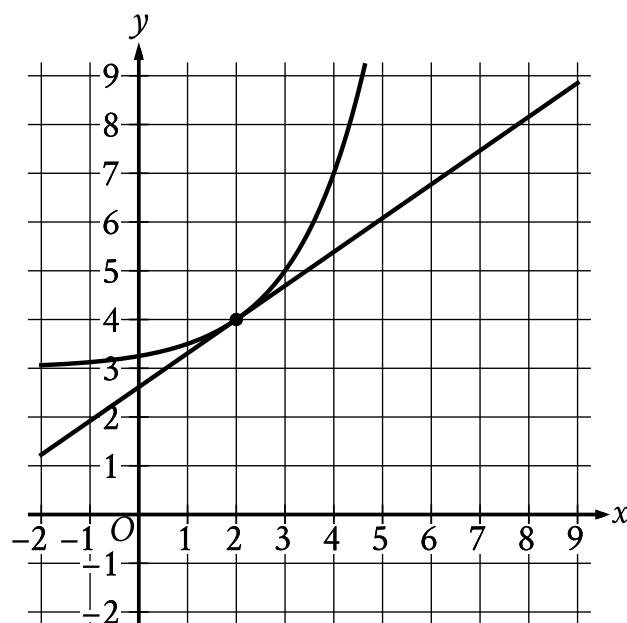
Which of the following is equivalent to  $3(x + 5) - 6$ ?

- A.  $3x - 3$
- B.  $3x - 1$
- C.  $3x + 9$
- D.  $15x - 6$

# Question ID 4ca30186

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 4ca30186



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution  $(x, y)$  to this system?

- A.  $(0, 0)$
- B.  $(0, 2)$
- C.  $(2, 4)$
- D.  $(4, 0)$

## Question ID 911383f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 50%; background-color: #D9D9D9; height: 10px;"></div>

ID: 911383f2

$$(x - 4)(x + 2)(x - 1) = 0$$

What is the product of the solutions to the given equation?

- A. 8
- B. 3
- C. -3
- D. -8

## Question ID d8789a4c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d8789a4c

$$\frac{x^2 - c}{x - b}$$

In the expression above,  $b$  and  $c$  are positive integers. If the expression is equivalent to  $x + b$  and  $x \neq b$ , which of the following could be the value of  $c$ ?

- A. 4
- B. 6
- C. 8
- D. 10

## Question ID b80d10d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: b80d10d7

$$\frac{2(x+1)}{x+5} = 1 - \frac{1}{x+5}$$

What is the solution to the equation above?

- A. 0
- B. 2
- C. 3
- D. 5

# Question ID fde6f3bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: fde6f3bb

$$\begin{aligned}g(x) &= \frac{3}{5}x + \frac{7}{6} \\h(x) &= 6x - 5\end{aligned}$$

The functions  $g$  and  $h$  are defined by the equations shown. Which expression is equivalent to  $g(x) \cdot h(x)$ ?

- A.  $\frac{18x^2}{5} - \frac{35}{6}$
- B.  $\frac{18x^2}{5} + \frac{27x}{11} - \frac{35}{6}$
- C.  $\frac{18x^2}{5} - 4x - \frac{35}{6}$
- D.  $\frac{18x^2}{5} + 4x - \frac{35}{6}$

# Question ID d4950429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID 752055d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 752055d1

A scientist initially measures **12,000** bacteria in a growth medium. **4** hours later, the scientist measures **24,000** bacteria. Assuming exponential growth, the formula  $P = C(2)^{rt}$  gives the number of bacteria in the growth medium, where  $r$  and  $C$  are constants and  $P$  is the number of bacteria  $t$  hours after the initial measurement. What is the value of  $r$ ?

- A.  $\frac{1}{12,000}$
- B.  $\frac{1}{4}$
- C. 4
- D. **12,000**

## Question ID d0a53ef5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: d0a53ef5

$$\sqrt{(x - 2)^2} = \sqrt{3x + 34}$$

What is the smallest solution to the given equation?

## Question ID fcdf87b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #002B36; height: 10px;"></div> <div style="width: 20%; background-color: #002B36; height: 10px;"></div> <div style="width: 60%; background-color: #D9D9D9; height: 10px;"></div>

ID: fcdf87b7

$$y = x^2 - 4x + 4$$

$$y = 4 - x$$

If the ordered pair  $(x, y)$  satisfies the system of equations above,

what is one possible value of  $x$ ?

## Question ID 3148fe3e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 3148fe3e

$$x^2 + y + 10 = 10$$

$$8x + 16 - y = 0$$

The solution to the given system of equations is  $(x, y)$ . What is the value of  $x$ ?

- A.  $-16$
- B.  $-4$
- C.  $2$
- D.  $8$

# Question ID 271ffad7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 271ffad7

A quadratic function models a projectile's height, in meters, above the ground in terms of the time, in seconds, after it was launched. The model estimates that the projectile was launched from an initial height of **7** meters above the ground and reached a maximum height of **51.1** meters above the ground **3** seconds after the launch. How many seconds after the launch does the model estimate that the projectile will return to a height of **7** meters?

- A. **3**
- B. **6**
- C. **7**
- D. **9**

# Question ID ee857afb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ee857afb

$$y = x^2 - 14x + 22$$

The given equation relates the variables  $x$  and  $y$ . For what value of  $x$  does the value of  $y$  reach its minimum?

## Question ID a520ba07

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a520ba07

$$\sqrt[3]{x^3y^6}$$

Which of the following expressions is equivalent to the expression above?

- A.  $y^2$
- B.  $xy^2$
- C.  $y^3$
- D.  $xy^3$

## Question ID 5b6af6b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5b6af6b1

Which expression is equivalent to  $(d - 6)(8d^2 - 3)$ ?

- A.  $8d^3 - 14d^2 - 3d + 18$
- B.  $8d^3 - 17d^2 + 48$
- C.  $8d^3 - 48d^2 - 3d + 18$
- D.  $8d^3 - 51d^2 + 48$

# Question ID 652054da

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 652054da

An oceanographer uses the equation  $s = \frac{3}{2}p$  to model the speed  $s$ , in knots, of an ocean wave, where  $p$  represents the period of the wave, in seconds. Which of the following represents the period of the wave in terms of the speed of the wave?

- A.  $p = \frac{2}{3}s$
- B.  $p = \frac{3}{2}s$
- C.  $p = \frac{2}{3} + s$
- D.  $p = \frac{3}{2} + s$

## Question ID 0380bbdc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0380bbdc

If  $4\sqrt{2x} = 16$ , what is the value of  $6x$ ?

- A. 24
- B. 48
- C. 72
- D. 96

## Question ID 837e9da7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 837e9da7

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.  $\frac{1}{18}$

## Question ID a255ae72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a255ae72

If  $x^2 = a + b$  and  $y^2 = a + c$ , which of the

following is equal to  $(x^2 - y^2)^2$ ?

- A.  $a^2 - 2ac + c^2$
- B.  $b^2 - 2bc + c^2$
- C.  $4a^2 - 4abc + c^2$
- D.  $4a^2 - 2abc + b^2c^2$

## Question ID dd3b1e1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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  $b$ ?

## Question ID 3de7a7d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3de7a7d7

Which of the following is a solution to the equation  $2x^2 - 4 = x^2$ ?

- A. 1
- B. 2
- C. 3
- D. 4

## Question ID 70f98ab4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 70f98ab4

$$q - 29r = s$$

The given equation relates the positive numbers  $q$ ,  $r$ , and  $s$ . Which equation correctly expresses  $q$  in terms of  $r$  and  $s$ ?

- A.  $q = s - 29r$
- B.  $q = s + 29r$
- C.  $q = 29rs$
- D.  $q = -\frac{s}{29r}$

# Question ID 35e05e19

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 35e05e19

A park ranger hung squirrel houses each in the shape of a right rectangular prism for fox squirrels. Each house has a height of **11** inches. The length of each house's base is  $x$  inches, which is **1** inch more than the width of the house's base. Which function  $V$  gives the volume of each house, in cubic inches, in terms of the length of the house's base?

- A.  $V(x) = 11x(x - 1)$
- B.  $V(x) = 11x(x + 1)$
- C.  $V(x) = x(x + 11)(x - 1)$
- D.  $V(x) = x(x + 11)(x + 1)$

## Question ID 2c05d312

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c05d312

$$57x^2 + (57b + a)x + ab = 0$$

In the given equation,  $a$  and  $b$  are positive constants. The product of the solutions to the given equation is  $kab$ , where  $k$  is a constant. What is the value of  $k$ ?

- A.  $\frac{1}{57}$
- B.  $\frac{1}{19}$
- C. 1
- D. 57

# Question ID 1fe32f7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1fe32f7d

$$-x^2 + bx - 676 = 0$$

In the given equation,  $b$  is a positive integer. The equation has no real solution. What is the greatest possible value of  $b$ ?

## Question ID a45ffacb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: a45ffacb

Function  $f$  is defined by  $f(x) = -ax + b$ , where  $a$  and  $b$  are constants. In the  $xy$ -plane, the graph of  $y = f(x) - 15$  has a  $y$ -intercept at  $(0, -\frac{99}{7})$ . The product of  $a$  and  $b$  is  $\frac{65}{7}$ . What is the value of  $a$ ?

## Question ID 95ed0b69

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 95ed0b69

$$p = \frac{k}{4j+9}$$

The given equation relates the distinct positive numbers  $p$ ,  $k$ , and  $j$ . Which equation correctly expresses  $4j + 9$  in terms of  $p$  and  $k$ ?

- A.  $4j + 9 = \frac{k}{p}$
- B.  $4j + 9 = kp$
- C.  $4j + 9 = k - p$
- D.  $4j + 9 = \frac{p}{k}$

# Question ID 463eec13

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 463eec13

If  $x \neq 0$ , which of the following expressions is

$$\frac{\sqrt{16x^4y^8}}{x^3} \quad ?$$

- A.  $8x^2y^4$
- B.  $4xy^4$
- C.  $4x^{-2}y^2$
- D.  $4x^{-1}y^4$

## Question ID 821e724e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 821e724e

The function  $g$  is defined by  $g(x) = (x + 14)(t - x)$ , where  $t$  is a constant. In the  $xy$ -plane, the graph of  $y = g(x)$  passes through the point  $(24, 0)$ . What is the value of  $g(0)$ ?

# Question ID 341ba5db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 341ba5db

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

What is the minimum value of the given function?

- A. 0
- B. 55
- C. 110
- D. 3,025

# Question ID d8e84431

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: d8e84431

The area of a rectangular banner is **2,661** square inches. The banner's length  $x$ , in inches, is **24** inches longer than its width, in inches. Which equation represents this situation?

- A.  $0 = x^2 - 24x - 2,661$
- B.  $0 = x^2 - 24x + 2,661$
- C.  $0 = x^2 + 24x - 2,661$
- D.  $0 = x^2 + 24x + 2,661$

# Question ID 18e35375

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 18e35375

$$f(x) = (x - 14)(x + 19)$$

The function  $f$  is defined by the given equation. For what value of  $x$  does  $f(x)$  reach its minimum?

- A.  $-266$
- B.  $-19$
- C.  $-\frac{33}{2}$
- D.  $-\frac{5}{2}$

## Question ID c303ad23

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c303ad23

If  $3x^2 - 18x - 15 = 0$ , what is the value of  $x^2 - 6x$ ?

# Question ID 6e02cd78

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e02cd78

In the  $xy$ -plane, what is the  $y$ -coordinate of the point of intersection of the graphs of  $y = (x - 1)^2$  and  $y = 2x - 3$ ?

## Question ID 15c364bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.

## Question ID 2cb17792

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2cb17792

$$\begin{aligned}y + k &= x + 26 \\y - k &= x^2 - 5x\end{aligned}$$

In the given system of equations,  $k$  is a constant. The system has exactly one distinct real solution. What is the value of  $k$ ?

# Question ID ce508fb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ce508fb0

The functions  $f$  and  $g$  are defined by the given equations.

$$f(x) = 3 + |-2x - x^2|$$

$$g(w) = \left| \frac{-w}{w-1} \right| - w + 5$$

If  $f(-4) = c$ , where  $c$  is a constant, what is the value of  $g(c)$ ?

## Question ID 74473be4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 74473be4

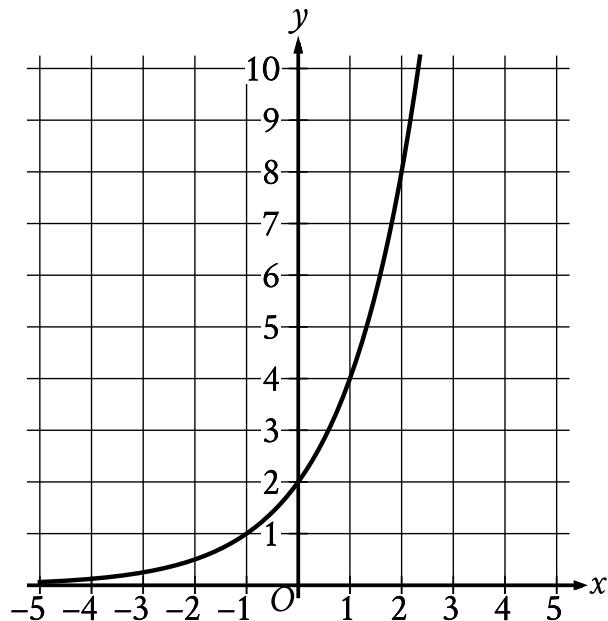
Which quadratic equation has no real solutions?

- A.  $x^2 + 14x - 49 = 0$
- B.  $x^2 - 14x + 49 = 0$
- C.  $5x^2 - 14x - 49 = 0$
- D.  $5x^2 - 14x + 49 = 0$

# Question ID b5c43226

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: b5c43226



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

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

## Question ID 13e5a5d5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 13e5a5d5

$$5|x| = 45$$

What is the positive solution to the given equation?

## Question ID 7bd10ef3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7bd10ef3

$$2x^2 - 4x = t$$

In the equation above,  $t$  is a constant. If the equation has no real solutions, which of the following could be the value of  $t$ ?

- A.  $-3$
- B.  $-1$
- C.  $1$
- D.  $3$

# Question ID 2fec8bf4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2fec8bf4

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

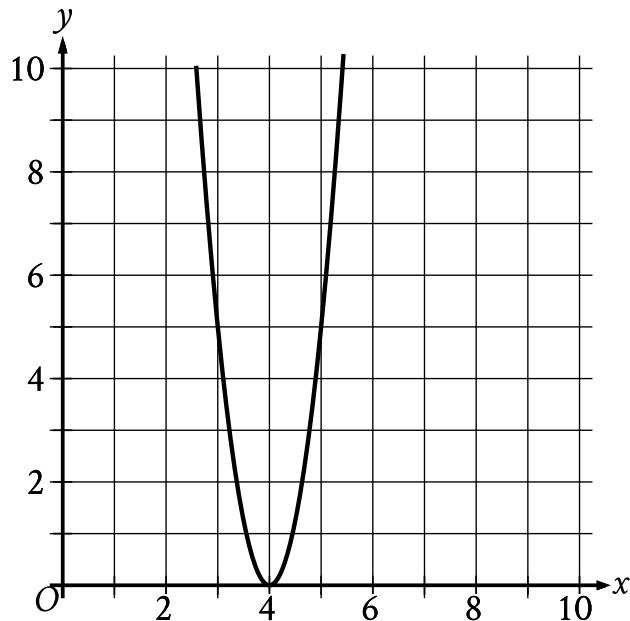
The function  $P$  gives the estimated number of marine mammals in a certain area, where  $t$  is the number of years since a study began. What is the best interpretation of  $P(0) = 1,800$  in this context?

- 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 e166aca6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: e166aca6



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

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

# Question ID f28944ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: f28944ff

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

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 11ccf3e1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 11ccf3e1

$$14j + 5k = m$$

The given equation relates the numbers  $j$ ,  $k$ , and  $m$ . Which equation correctly expresses  $k$  in terms of  $j$  and  $m$ ?

- A.  $k = \frac{m-14j}{5}$
- B.  $k = \frac{1}{5}m - 14j$
- C.  $k = \frac{14j-m}{5}$
- D.  $k = 5m - 14j$

# Question ID 50e40f08

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 40%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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?

## Question ID e11294f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e11294f9

The solutions to  $x^2 + 6x + 7 = 0$  are  $r$  and  $s$ , where  $r < s$ . The solutions to  $x^2 + 8x + 8 = 0$  are  $t$  and  $u$ , where  $t < u$ . The solutions to  $x^2 + 14x + c = 0$ , where  $c$  is a constant, are  $r + t$  and  $s + u$ . What is the value of  $c$ ?

## Question ID 772de699

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 772de699

Which expression is equivalent to  $23x^3 + 2x^2 + 9x$ ?

- A.  $23x(x^2 + 2x + 9)$
- B.  $9x(23x^3 + 2x^2 + 1)$
- C.  $x(23x^2 + 2x + 9)$
- D.  $34(x^3 + x^2 + x)$

# Question ID 03ff48d2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 03ff48d2

$$x(kx - 56) = -16$$

In the given equation,  $k$  is an integer constant. If the equation has no real solution, what is the least possible value of  $k$ ?

## Question ID 7028c74f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7028c74f

$$5(x + 7) = 15(x - 17)(x + 7)$$

What is the sum of the solutions to the given equation?

# Question ID cfff8f8e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: cfff8f8e

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.  $n = (53)^d$
- B.  $n = 53(2)^d$
- C.  $n = 53\left(\frac{1}{2}\right)^d$
- D.  $n = (53)^2 + d$

# Question ID c4259674

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c4259674

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 88867d37

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 88867d37

$$(x + 2)(x - 5)(x + 9) = 0$$

What is a positive solution to the given equation?

- A. 3
- B. 4
- C. 5
- D. 18

## Question ID 88a0c425

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 88a0c425

$$-2x^2 + 20x + c = 0$$

In the given equation,  $c$  is a constant. The equation has exactly one solution. What is the value of  $c$ ?

- A. -68
- B. -50
- C. -32
- D. 0

## Question ID 13e57f0a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 13e57f0a

$$-4x^2 - 7x = -36$$

What is the positive solution to the given equation?

- A.  $\frac{7}{4}$
- B.  $\frac{9}{4}$
- C. 4
- D. 7

# Question ID 02489d55

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 02489d55

Which expression is equivalent to  $19(x^2 - 7)$ ?

- A.  $19x^2 - 133$
- B.  $19x^2 - 26$
- C.  $19x^2 - 7$
- D.  $19x^2 + 12$

## Question ID be0c419e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 40%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.

# Question ID 8462b105

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8462b105

The function  $f$  gives the product of a number,  $x$ , and a number that is 91 more than  $x$ . Which equation defines  $f$ ?

- A.  $f(x) = x^2 + x + 91$
- B.  $f(x) = x^2 + 91$
- C.  $f(x) = x^2 + 91x$
- D.  $f(x) = x^2 + 91x + 91$

# Question ID ce579859

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ce579859

A model estimates that at the end of each year from **2015** to **2020**, the number of squirrels in a population was **150%** more than the number of squirrels in the population at the end of the previous year. The model estimates that at the end of **2016**, there were **180** squirrels in the population. Which of the following equations represents this model, where  **$n$**  is the estimated number of squirrels in the population  **$t$**  years after the end of **2015** and  $t \leq 5$ ?

- A.  $n = 72(1.5)^t$
- B.  $n = 72(2.5)^t$
- C.  $n = 180(1.5)^t$
- D.  $n = 180(2.5)^t$

## Question ID 5355c0ef

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5355c0ef

$$0.36x^2 + 0.63x + 1.17$$

The given expression can be rewritten as  $a(4x^2 + 7x + 13)$ , where  $a$  is a constant. What is the value of  $a$ ?

## Question ID 2f51abc2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 2f51abc2

$$f(x) = |59 - 2x|$$

The function  $f$  is defined by the given equation. For which of the following values of  $k$  does  $f(k) = 3k$ ?

A.  $\frac{59}{5}$

B.  $\frac{59}{2}$

C.  $\frac{177}{5}$

D. 59

## Question ID 17d0e87d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 17d0e87d

$$\frac{14x}{7y} = 2\sqrt{w + 19}$$

The given equation relates the distinct positive real numbers  $w$ ,  $x$ , and  $y$ . Which equation correctly expresses  $w$  in terms of  $x$  and  $y$ ?

- A.  $w = \sqrt{\frac{x}{y}} - 19$
- B.  $w = \sqrt{\frac{28x}{14y}} - 19$
- C.  $w = \left(\frac{x}{y}\right)^2 - 19$
- D.  $w = \left(\frac{28x}{14y}\right)^2 - 19$

## Question ID a1bf1c4e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: a1bf1c4e

$$x^2 + 6x + 4$$

Which of the following is equivalent to the expression above?

- A.  $(x + 3)^2 + 5$
- B.  $(x + 3)^2 - 5$
- C.  $(x - 3)^2 + 5$
- D.  $(x - 3)^2 - 5$

## Question ID c81b6c57

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c81b6c57

In the expression  $3(2x^2 + px + 8) - 16x(p + 4)$ ,  $p$  is a constant. This expression is equivalent to the expression  $6x^2 - 155x + 24$ . What is the value of  $p$ ?

- A. **-3**
- B. **7**
- C. **13**
- D. **155**

## Question ID d139cf4b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: d139cf4b

$$f(t) = 55t - 2t^2$$

The function  $f$  is defined by the given equation. The function  $g$  is defined by  $g(t) = f(t) + 3$ . Which expression represents the maximum value of  $g(t)$ ?

- A.  $3 + \left(\frac{55}{2}\right)^2$
- B.  $3 + 2\left(\frac{55}{4}\right)^2$
- C.  $3 - 2\left(\frac{55}{4}\right)^2$
- D.  $3 - \left(\frac{55}{2}\right)^2$

# Question ID 802549ac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 802549ac

$$(x+2)(x+3) = (x-2)(x-3) + 10$$

Which of the following is a solution to the given equation?

- A. 1
- B. 0
- C. -2
- D. -5

# Question ID 75a32330

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

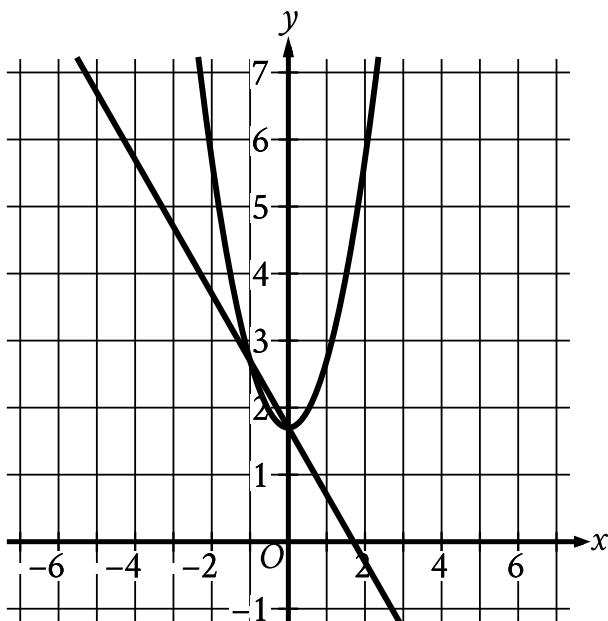
ID: 75a32330

$$y = x^2 + 1.7$$

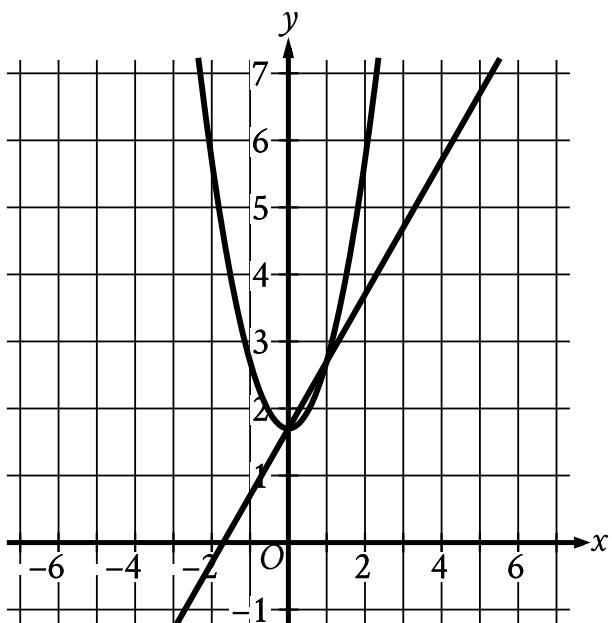
$$y = 1.7 - x$$

Which graph represents the given system of equations?

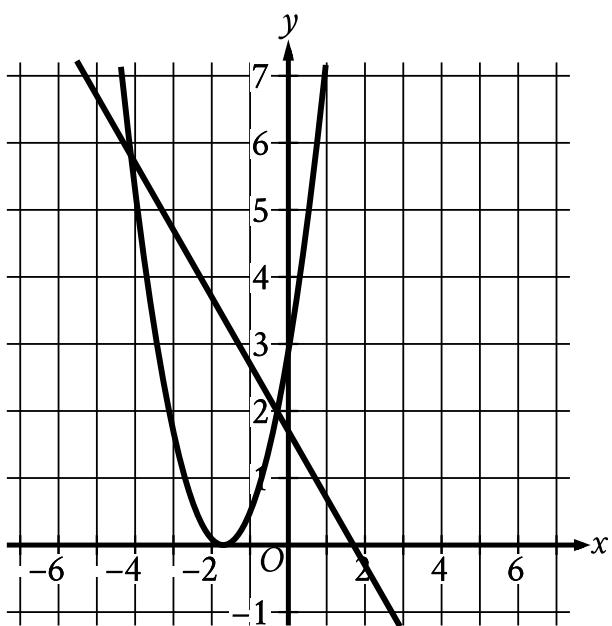
A.



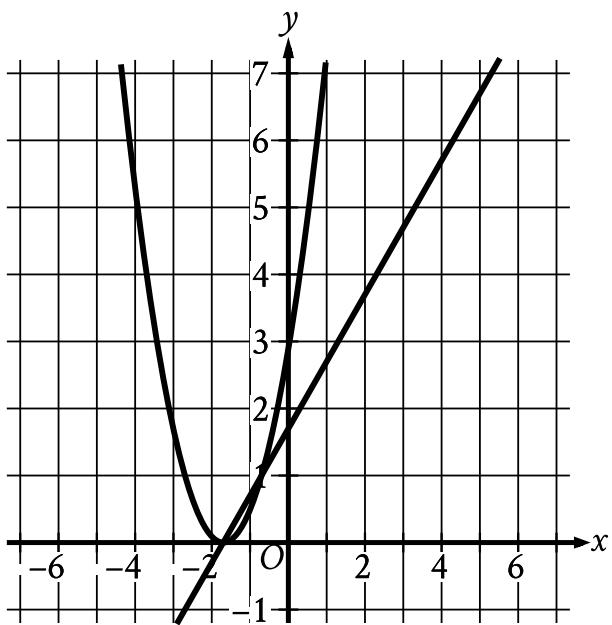
B.



C.



D.



## Question ID a4f61d75

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a4f61d75

$$x^2 - ax + 12 = 0$$

In the equation above,  $a$  is a constant and  $a > 0$ . If the equation has two integer solutions, what is a possible value of  $a$ ?

# Question ID e1f9000d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e1f9000d

$$h(t) = -16t^2 + b$$

The function  $h$  estimates an object's height, in feet, above the ground  $t$  seconds after the object is dropped, where  $b$  is a constant. The function estimates that the object is 3,364 feet above the ground when it is dropped at  $t = 0$ . Approximately how many seconds after being dropped does the function estimate the object will hit the ground?

- A. 7.25
- B. 14.50
- C. 105.13
- D. 210.25

## Question ID a31417d1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.  $C = 600(1.85)^t$

## Question ID 66bce0c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 66bce0c1

$$\sqrt{2x+6} + 4 = x + 3$$

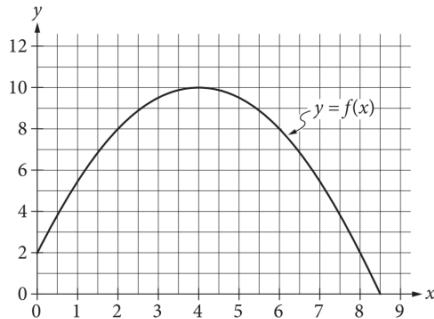
What is the solution set of the equation above?

- A.  $\{-1\}$
- B.  $\{5\}$
- C.  $\{-1, 5\}$
- D.  $\{0, -1, 5\}$

## Question ID 97e50fa2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 97e50fa2



The graph of the function  $f$ , defined by  $f(x) = -\frac{1}{2}(x-4)^2 + 10$ , is shown in the  $xy$ -plane above. If the function  $g$  (not shown) is defined by  $g(x) = -x + 10$ , what is one possible value of  $a$  such that  $f(a) = g(a)$ ?

## Question ID 6d04c89d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6d04c89d

The expression  $\frac{24}{6x+42}$  is equivalent to  $\frac{4}{x+b}$ , where  $b$  is a constant and  $x > 0$ . What is the value of  $b$ ?

- A. 7
- B. 10
- C. 24
- D. 252

## Question ID ebb717ab

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ebb717ab

$$x^2 - 34x + c = 0$$

In the given equation,  $c$  is a constant. The equation has no real solutions if  $c > n$ . What is the least possible value of  $n$ ?

## Question ID e51bf5b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e51bf5b1

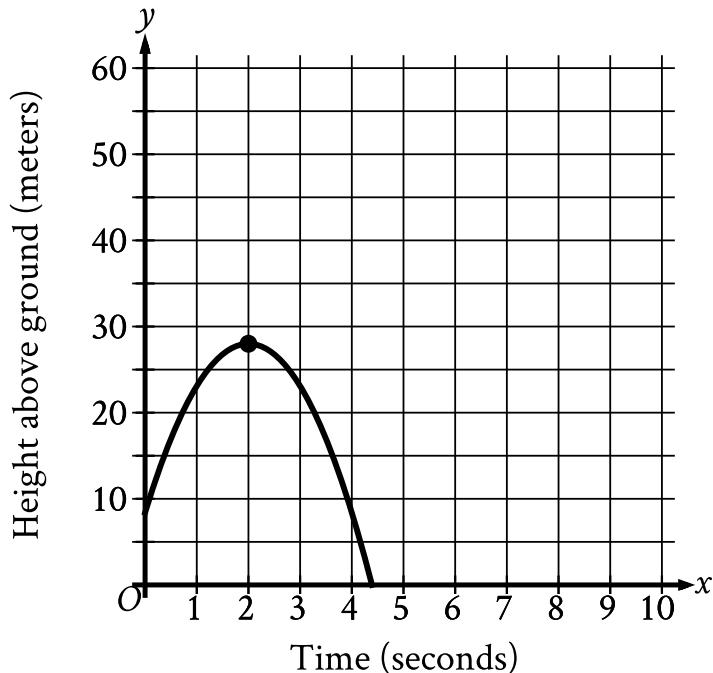
Which of the following expressions has a factor of  $x + 2b$ , where  $b$  is a positive integer constant?

- A.  $3x^2 + 7x + 14b$
- B.  $3x^2 + 28x + 14b$
- C.  $3x^2 + 42x + 14b$
- D.  $3x^2 + 49x + 14b$

# Question ID 197bed38

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 197bed38



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 9afe2370

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 9afe2370

The population  $P$  of a certain city  $y$  years after the last census is modeled by the equation below, where  $r$  is a constant and  $P_0$  is the population when  $y = 0$ .

$$P = P_0(1 + r)^y$$

If during this time the population of the city decreases by a fixed percent each year, which of the following must be true?

- A.  $r < -1$
- B.  $-1 < r < 0$
- C.  $0 < r < 1$
- D.  $r > 1$

## Question ID 60fdb4d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 60fdb4d4

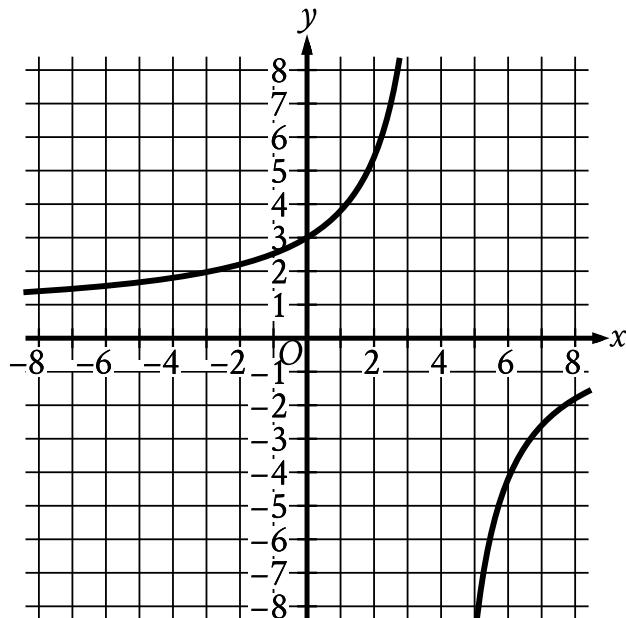
Which expression is equivalent to  $(2x^2 - 4) - (-3x^2 + 2x - 7)$ ?

- A.  $5x^2 - 2x + 3$
- B.  $5x^2 + 2x - 3$
- C.  $-x^2 - 2x - 11$
- D.  $-x^2 + 2x - 11$

# Question ID ad376f1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: ad376f1a



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.  $3$

## Question ID bd4d0e0c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bd4d0e0c

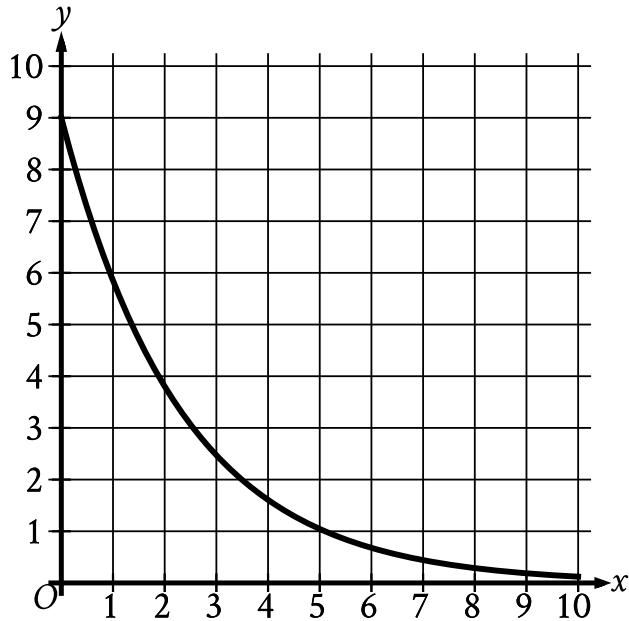
The function  $f$  is defined by  $f(x) = 10x^2 - 32x - 152$ . What is the value of  $f(0)$ ?

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

# Question ID db888cd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: db888cd6



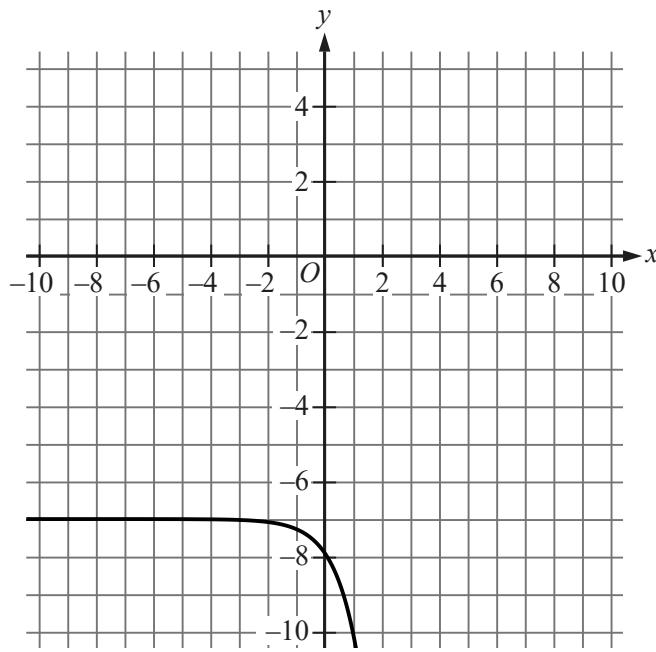
The graph gives the estimated number of catalogs  $y$ , in thousands, a company sent to its customers at the end of each year, where  $x$  represents the number of years since the end of 1992, where  $0 \leq x \leq 10$ . Which statement is the best interpretation of the  $y$ -intercept in this context?

- A. The estimated total number of catalogs the company sent to its customers during the first 10 years was 9,000.
- B. The estimated total number of catalogs the company sent to its customers from the end of 1992 to the end of 2002 was 90.
- C. The estimated number of catalogs the company sent to its customers at the end of 1992 was 9.
- D. The estimated number of catalogs the company sent to its customers at the end of 1992 was 9,000.

# Question ID df71424b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: df71424b



The graph of  $y = f(x)$  is shown, where  $f(x) = ab^x + c$ , and  $a$ ,  $b$ , and  $c$  are constants. For how many values of  $x$  does  $f(x) = 0$ ?

- A. Three
- B. Two
- C. One
- D. Zero

# Question ID 6ecdbcb4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 6ecdbcb4

$$f(x) = (x + 6)(x + 5)(x - 4)$$

The function  $f$  is given. Which table of values represents  $y = f(x) - 3$ ?

A.

$x$	$y$
-6	-9
-5	-8
4	1

B.

$x$	$y$
-6	-3
-5	-3
4	-3

C.

$x$	$y$
-6	-3
-5	-2
4	7

D.

$x$	$y$
-6	3
-5	3
4	3

## Question ID 7cb3a8ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7cb3a8ee

$$|x - 5| = 10$$

What is one possible solution to the given equation?

# Question ID 967ef685

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 967ef685

Which expression is equivalent to  $\frac{42a}{k} + 42ak$ , where  $k > 0$ ?

- A.  $\frac{84a}{k}$
- B.  $\frac{84ak^2}{k}$
- C.  $\frac{42a(k+1)}{k}$
- D.  $\frac{42a(k^2+1)}{k}$

## Question ID 0bcbc08c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0bcbc08c

$$\begin{aligned}x &= 3 \\y &= (15 - x)^2\end{aligned}$$

A solution to the given system of equations is  $(x, y)$ . What is the value of  $xy$ ?

- A. 432
- B. 54
- C. 45
- D. 18

# Question ID c13016f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c13016f9

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

# Question ID 203774bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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**

## Question ID b7c74b73

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b7c74b73

$$f(x) = 5,470(0.64)^{\frac{x}{12}}$$

The function  $f$  gives the value, in dollars, of a certain piece of equipment after  $x$  months of use. If the value of the equipment decreases each year by  $p\%$  of its value the preceding year, what is the value of  $p$ ?

- A. 4
- B. 5
- C. 36
- D. 64

# Question ID c1964c11

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: c1964c11

$$p + 34 = q + r$$

The given equation relates the variables  $p$ ,  $q$ , and  $r$ . Which equation correctly expresses  $p$  in terms of  $q$  and  $r$ ?

- A.  $p = q + r + 34$
- B.  $p = q + r - 34$
- C.  $p = -q - r + 34$
- D.  $p = -q - r - 34$

## Question ID 3d12b1e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3d12b1e0

$$-16x^2 - 8x + c = 0$$

In the given equation,  $c$  is a constant. The equation has exactly one solution. What is the value of  $c$ ?

## Question ID 2c88af4d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c88af4d

$$\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$$

The expression  $\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$ , where  $x > 1$  and  $y > 1$ , is equivalent to which of the following?

- A.  $\frac{\sqrt{y}}{\sqrt[3]{x^2}}$
- B.  $\frac{y\sqrt{y}}{\sqrt[3]{x^2}}$
- C.  $\frac{y\sqrt{y}}{x\sqrt{x}}$
- D.  $\frac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

## Question ID c4cd5bcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 40%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.  $f(3)$

# Question ID dc77e0dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dc77e0dc

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

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 062f86db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 062f86db

$$5x^2 - 37x - 24 = 0$$

What is the positive solution to the given equation?

- A.  $\frac{3}{5}$
- B. 3
- C. 8
- D. 37

## Question ID ffdbcad4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ffdbcad4

The expression  $4x^2 + bx - 45$ , where  $b$  is a constant, can be rewritten as  $(hx + k)(x + j)$ , where  $h$ ,  $k$ , and  $j$  are integer constants. Which of the following must be an integer?

- A.  $\frac{b}{h}$
- B.  $\frac{b}{k}$
- C.  $\frac{45}{h}$
- D.  $\frac{45}{k}$

# Question ID 735a0a00

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 735a0a00

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

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 68607eca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 68607eca

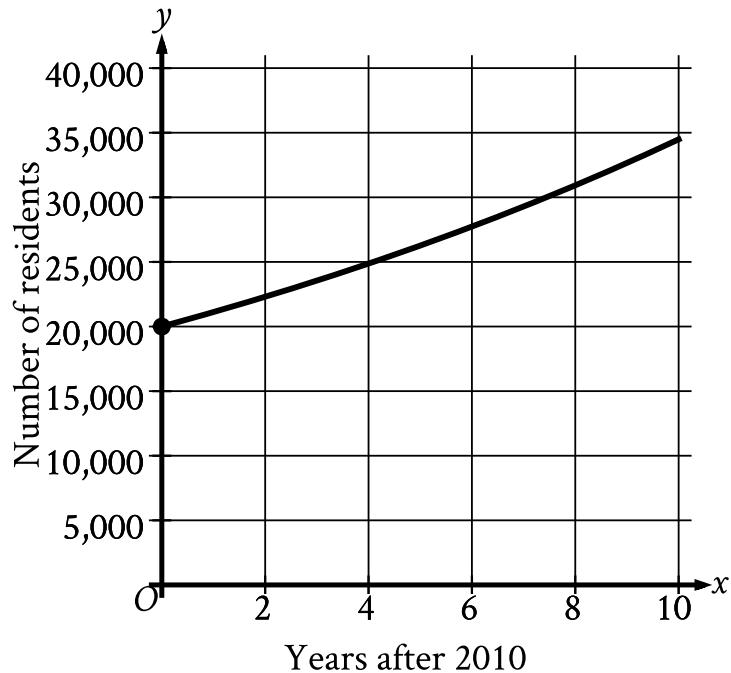
On April 1, there were 233 views of an advertisement posted on a website. Every 2 days after April 1, the number of views of the advertisement had increased by 70% of the number of views 2 days earlier. The function  $f$  gives the predicted number of views  $x$  days after April 1. Which equation defines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

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

# Question ID 2d394c28

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 2d394c28



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

# Question ID 71014fb1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 71014fb1

$$(x - 1)^2 = -4$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

# Question ID 5639dd1a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 5639dd1a

$$x^2 = (22)(22)$$

What is the positive solution to the given equation?

# Question ID 4a5af623

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4a5af623

Which expression is a factor of  $2x^2 + 38x + 10$ ?

- A. 2
- B.  $5x$
- C.  $38x$
- D.  $2x^2$

## Question ID 22fd3e1f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 22fd3e1f

$$f(x) = x^3 - 9x$$

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

Which of the following expressions is

equivalent to  $\frac{f(x)}{g(x)}$ , for  $x > 3$ ?

A.  $\frac{1}{x+1}$

B.  $\frac{x+3}{x+1}$

C.  $\frac{x(x-3)}{x+1}$

D.  $\frac{x(x+3)}{x+1}$

## Question ID 717a1964

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 717a1964

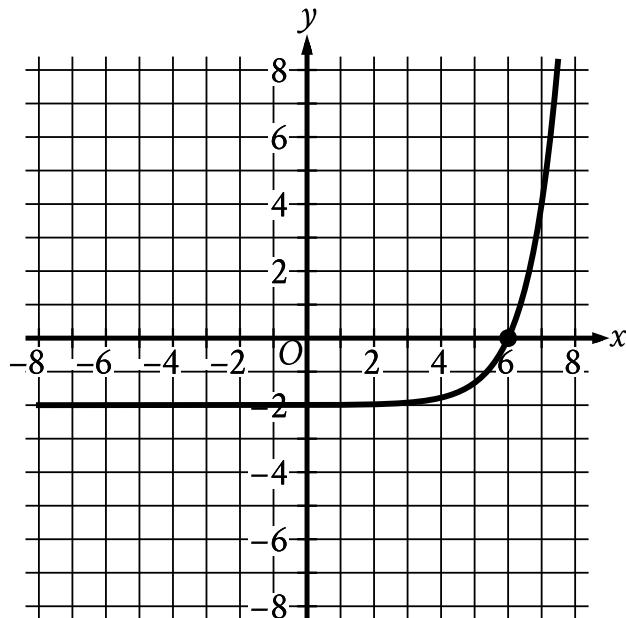
$$z^2 + 10z - 24 = 0$$

What is one of the solutions to the given equation?

# Question ID 2b6c12eb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 2b6c12eb



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

## Question ID 4dc5c6f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%;"><div style="width: 100px; height: 10px; background-color: #0056b3;"></div></div>

ID: 4dc5c6f9

$$\begin{aligned}y &= 18 \\y &= -3(x - 18)^2 + 15\end{aligned}$$

If the given equations are graphed in the  $xy$ -plane, at how many points do the graphs of the equations intersect?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

# Question ID 78d5f91a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID d675744f

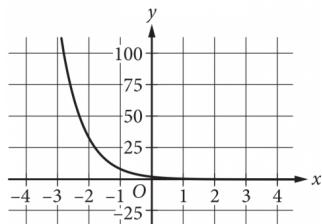
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d675744f

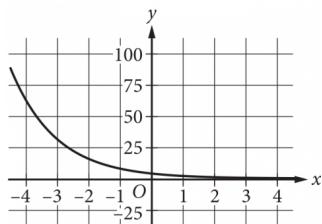
$$y = 4(2^x)$$

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

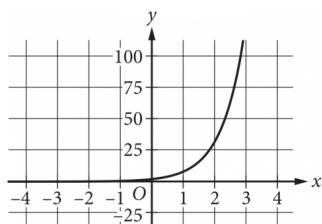
A.



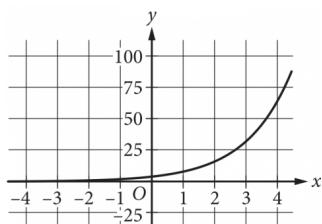
B.



C.



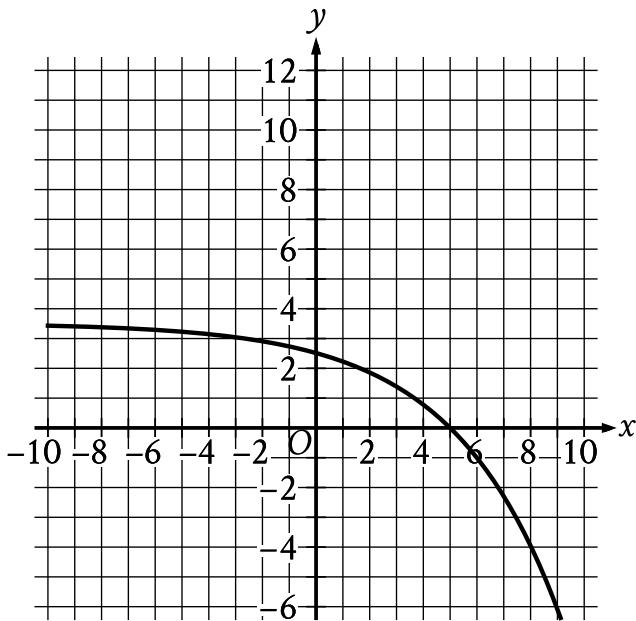
D.



# Question ID 79e6ec70

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 79e6ec70



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

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

## Question ID a0b4103e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a0b4103e

The expression  $\frac{1}{3}x^2 - 2$  can be rewritten as  $\frac{1}{3}(x - k)(x + k)$ , where  $k$  is a positive constant. What is the value of  $k$ ?

- A. 2
- B. 6
- C.  $\sqrt{2}$
- D.  $\sqrt{6}$

# Question ID 5377d9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 5377d9cf

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

what is  $f(-1)$ ?

- A. -5
- B. -2
- C. 2
- D. 5

## Question ID 2cd6b22d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2cd6b22d

$$5x^2 + 10x + 16 = 0$$

How many distinct real solutions does the given equation have?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

## Question ID f2d60b99

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f2d60b99

The function  $f(x) = \frac{1}{9}(x - 7)^2 + 3$  gives a metal ball's height above the ground  $f(x)$ , in inches,  $x$  seconds after it started moving on a track, where  $0 \leq x \leq 10$ . Which of the following is the best interpretation of the vertex of the graph of  $y = f(x)$  in the  $xy$ -plane?

- A. The metal ball's minimum height was 3 inches above the ground.
- B. The metal ball's minimum height was 7 inches above the ground.
- C. The metal ball's height was 3 inches above the ground when it started moving.
- D. The metal ball's height was 7 inches above the ground when it started moving.

# Question ID f880f910

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 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**

# Question ID e9349667

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e9349667

$$y = x^2 + 2x + 1$$

$$x + y + 1 = 0$$

If  $(x_1, y_1)$  and  $(x_2, y_2)$  are the two solutions to the system of equations

above, what is the value of  $y_1 + y_2$ ?

A. -3

B. -2

C. -1

D. 1

# Question ID 67f4b449

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 67f4b449

The function  $f(w) = 6w^2$  gives the area of a rectangle, 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  $\text{ft}^2$ .
- 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  $\text{ft}^2$ .

# Question ID 49efde89

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 49efde89

The expression  $2x^2 + ax$  is equivalent to  $x(2x + 7)$  for some constant  $a$ . What is the value of  $a$ ?

- A. 2
- B. 3
- C. 4
- D. 7

# Question ID 44076c7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 44076c7d

$x$	$f(x)$
-1	10
0	14
1	20

For the quadratic function  $f$ , the table shows three values of  $x$  and their corresponding values of  $f(x)$ . Which equation defines  $f$ ?

- A.  $f(x) = 3x^2 + 3x + 14$
- B.  $f(x) = 5x^2 + x + 14$
- C.  $f(x) = 9x^2 - x + 14$
- D.  $f(x) = x^2 + 5x + 14$

## Question ID 1f353a9e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1f353a9e

$$f(t) = 8,000(0.65)^t$$

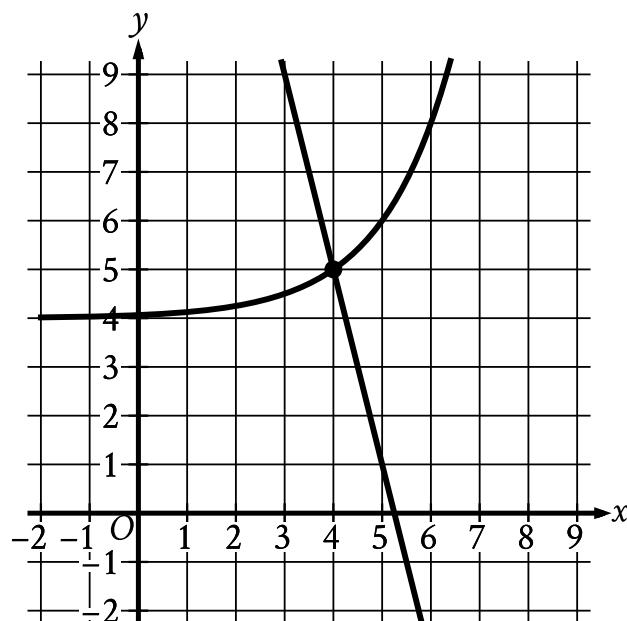
The given function  $f$  models the number of coupons a company sent to their customers at the end of each year, where  $t$  represents the number of years since the end of 1998, and  $0 \leq t \leq 5$ . If  $y = f(t)$  is graphed in the  $ty$ -plane, which of the following is the best interpretation of the  $y$ -intercept of the graph in this context?

- A. The minimum estimated number of coupons the company sent to their customers during the 5 years was 1,428.
- B. The minimum estimated number of coupons the company sent to their customers during the 5 years was 8,000.
- C. The estimated number of coupons the company sent to their customers at the end of 1998 was 1,428.
- D. The estimated number of coupons the company sent to their customers at the end of 1998 was 8,000.

# Question ID 3f8d5876

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3f8d5876



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution  $(x, y)$  to this system?

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

## Question ID b03adde3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b03adde3

If  $\frac{u-3}{t-2} = \frac{6}{u}$ , what is  $t$

in terms of  $u$ ?

A.  $t = \frac{1}{u}$

B.  $t = \frac{2u+9}{u}$

C.  $t = \frac{1}{u-3}$

D.  $t = \frac{2u}{u-3}$

## Question ID 1ce9ffcd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1ce9ffcd

$$-9x^2 + 30x + c = 0$$

In the given equation,  $c$  is a constant. The equation has exactly one solution. What is the value of  $c$ ?

- A. 3
- B. 0
- C. -25
- D. -53

## Question ID 104bff62

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 104bff62

$$\frac{x^2}{\sqrt{x^2-c^2}} = \frac{c^2}{\sqrt{x^2-c^2}} + 39$$

In the given equation,  $c$  is a positive constant. Which of the following is one of the solutions to the given equation?

- A.  $-c$
- B.  $-c^2 - 39^2$
- C.  $-\sqrt{39^2 - c^2}$
- D.  $-\sqrt{c^2 + 39^2}$

# Question ID 270cf326

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 270cf326

Which of the following functions has(have) a minimum value at  $-3$ ?

- I.  $f(x) = -6(3)^x - 3$
- II.  $g(x) = -3(6)^x$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

# Question ID fad2f98c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: fad2f98c

$$3x(x - 4)(x + 5) = 0$$

What is one of the solutions to the given equation?

- A.  $-4$
- B.  $0$
- C.  $3$
- D.  $5$

## Question ID a267bd29

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: a267bd29

$$w^2 + 12w - 40 = 0$$

Which of the following is a solution to the given equation?

- A.  $6 - 2\sqrt{19}$
- B.  $2\sqrt{19}$
- C.  $\sqrt{19}$
- D.  $-6 + 2\sqrt{19}$

# Question ID 75915e3c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: 75915e3c

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

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

- A. 9
- B. 12
- C. 18
- D. 36

## Question ID f44a29a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f44a29a8

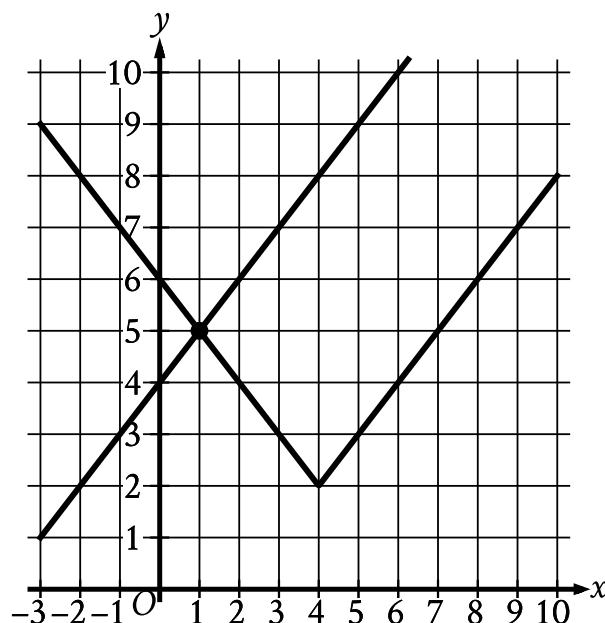
An object's kinetic energy, in joules, is equal to the product of one-half the object's mass, in kilograms, and the square of the object's speed, in meters per second. What is the speed, in meters per second, of an object with a mass of 4 kilograms and kinetic energy of 18 joules?

- A. 3
- B. 6
- C. 9
- D. 36

# Question ID d3f7c429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: d3f7c429



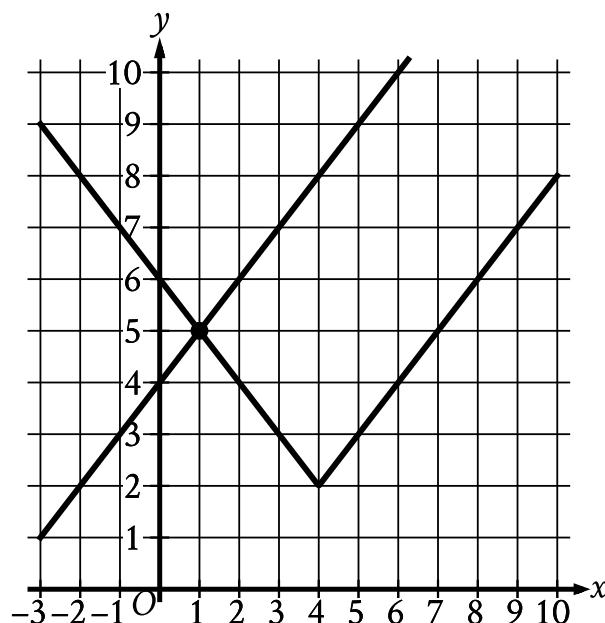
The graph of a system of an absolute value function and a linear function is shown. What is the solution  $(x, y)$  to this system of two equations?

- A.  $(-1, 5)$
- B.  $(0, 4)$
- C.  $(1, 5)$
- D.  $(4, 2)$

# Question ID d3f7c429

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: d3f7c429



The graph of a system of an absolute value function and a linear function is shown. What is the solution  $(x, y)$  to this system of two equations?

- A.  $(-1, 5)$
- B.  $(0, 4)$
- C.  $(1, 5)$
- D.  $(4, 2)$

# Question ID 92f812bb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 92f812bb

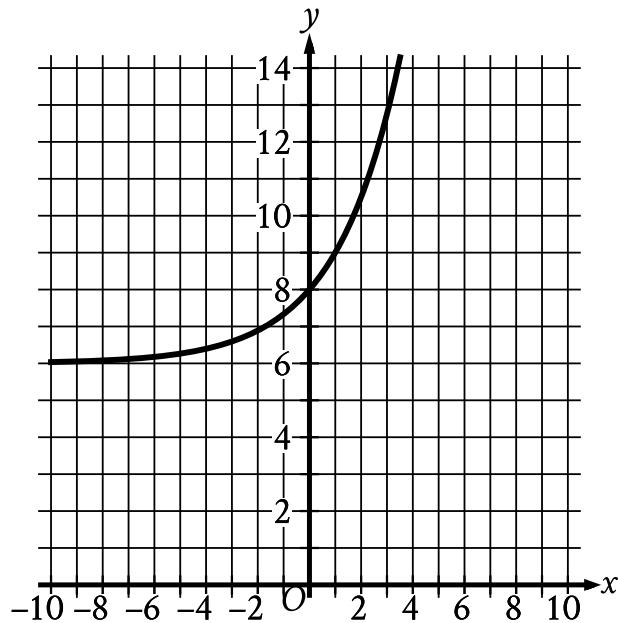
In the  $xy$ -plane, a parabola has vertex  $(9, -14)$  and intersects the  $x$ -axis at two points. If the equation of the parabola is written in the form  $y = ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants, which of the following could be the value of  $a + b + c$ ?

- A.  $-23$
- B.  $-19$
- C.  $-14$
- D.  $-12$

# Question ID f547a8b1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: f547a8b1



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

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

## Question ID b8c4a1cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: b8c4a1cd

$$8j = k + 15m$$

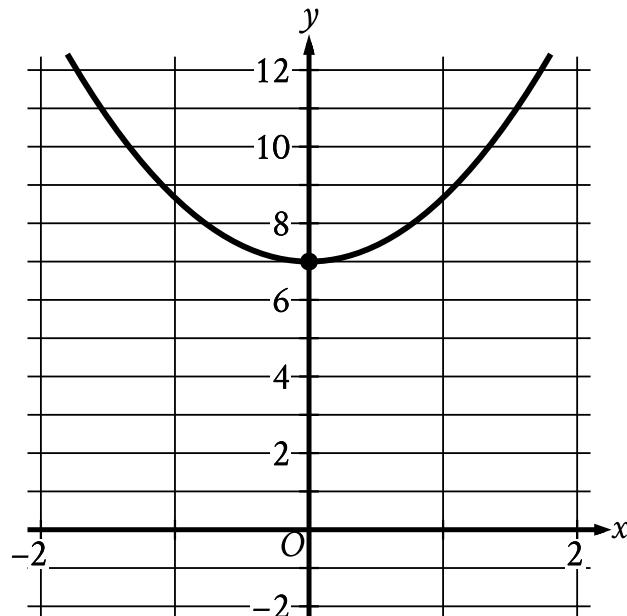
The given equation relates the distinct positive numbers  $j$ ,  $k$ , and  $m$ . Which equation correctly expresses  $j$  in terms of  $k$  and  $m$ ?

- A.  $j = \frac{k}{8} + 15m$
- B.  $j = k + \frac{15m}{8}$
- C.  $j = 8(k + 15m)$
- D.  $j = \frac{k+15m}{8}$

# Question ID 2f4eafcc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 2f4eafcc



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

## Question ID 7dbd46d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7dbd46d9

$$\begin{aligned}8x + y &= -11 \\2x^2 &= y + 341\end{aligned}$$

The graphs of the equations in the given system of equations intersect at the point  $(x, y)$  in the  $xy$ -plane. What is a possible value of  $x$ ?

- A.  $-15$
- B.  $-11$
- C.  $2$
- D.  $8$

# Question ID 0121a235

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0121a235

x	$p(x)$
-2	5
-1	0
0	-3
1	-1
2	0

The table above gives selected values of a polynomial function  $p$ . Based on the values in the table, which of the following must be a factor of  $p$ ?

- A.  $(x - 3)$
- B.  $(x + 3)$
- C.  $(x - 1)(x + 2)$
- D.  $(x + 1)(x - 2)$

# Question ID 9da41c80

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9da41c80

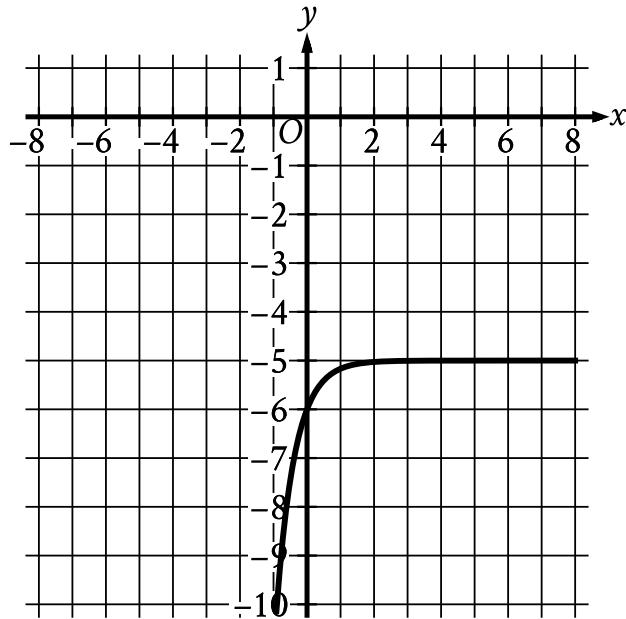
A ball is dropped from an initial height of **22** feet and bounces off the ground repeatedly. The function  $h$  estimates that the maximum height reached after each time the ball hits the ground is **85%** of the maximum height reached after the previous time the ball hit the ground. Which equation 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 7160cbb3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7160cbb3



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

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

# Question ID d71f6dbf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.

## Question ID 630897df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 630897df

The speed of sound in dry air,  $v$ , can be modeled by the formula  $v = 331.3 + 0.606T$ ,

where  $T$  is the temperature in degrees Celsius and  $v$  is measured in meters per second.

Which of the following correctly expresses  $T$  in terms of  $v$ ?

A.  $T = \frac{v + 0.606}{331.3}$

B.  $T = \frac{v - 0.606}{331.3}$

C.  $T = \frac{v + 331.3}{0.606}$

D.  $T = \frac{v - 331.3}{0.606}$

# Question ID 20722644

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 20722644

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

# Question ID 5805e747

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 5805e747

Which expression is equivalent to  $(7x^3 + 7x) - (6x^3 - 3x)$ ?

- A.  $x^3 + 10x$
- B.  $-13x^3 + 10x$
- C.  $-13x^3 + 4x$
- D.  $x^3 + 4x$

# Question ID 158591f0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 158591f0

$$x(x + 1) - 56 = 4x(x - 7)$$

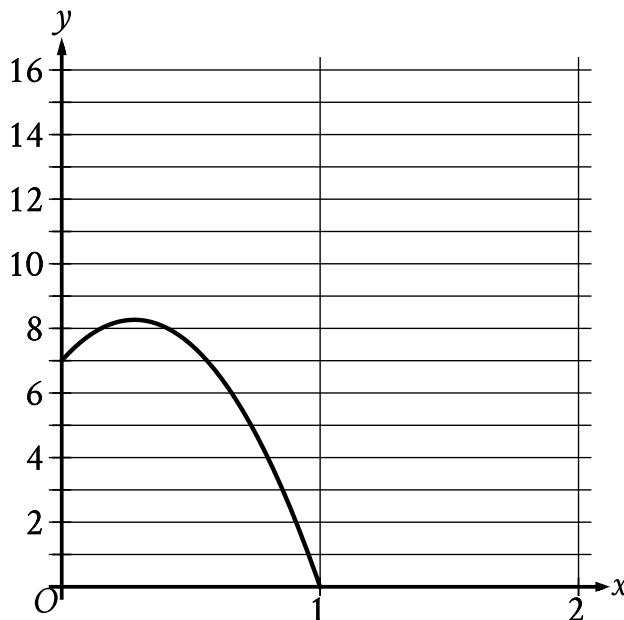
What is the sum of the solutions to the given equation?

# Question ID 7fe7cf26

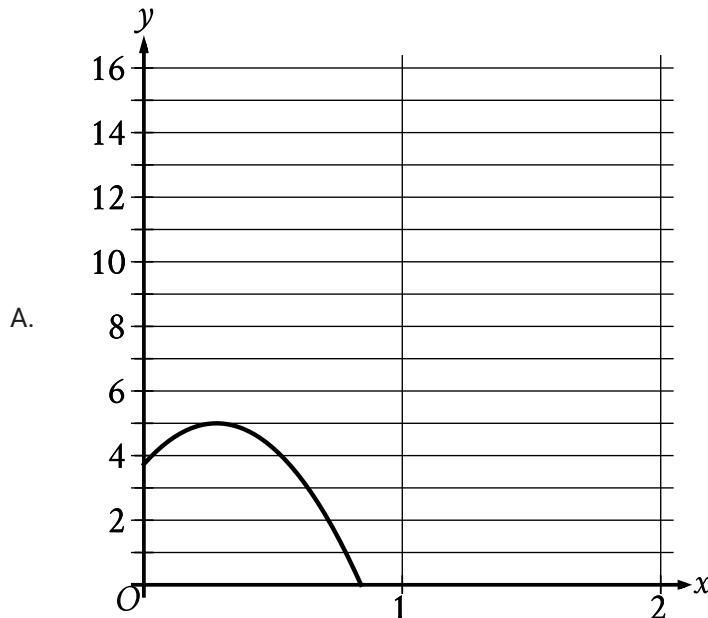
Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 30%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7fe7cf26

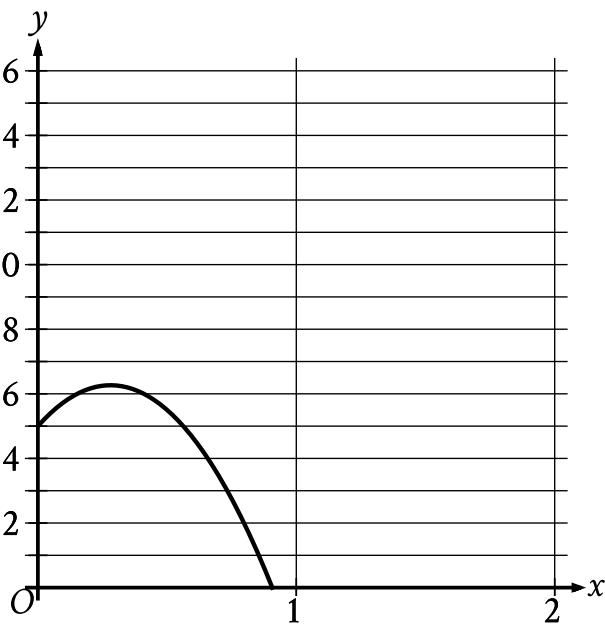
During the first part of an experiment, a ball was launched from a 7-foot-tall platform. The graph shows the height  $y$ , in feet, of the ball  $x$  seconds after it was launched during the first part of the experiment.



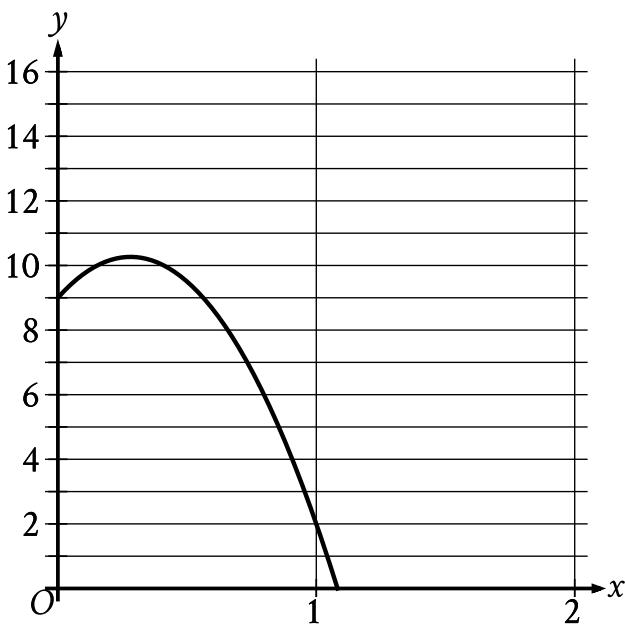
During the second part of the experiment, the ball was launched the same way, but from a platform that is 2 feet shorter than the first platform. Which of the following graphs could represent the height  $y$ , in feet, of the ball  $x$  seconds after it was launched during the second part of the experiment?



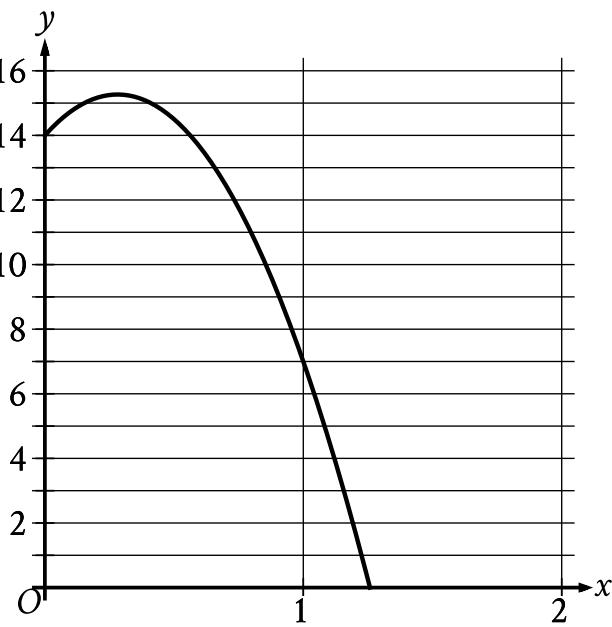
B.



C.



D.



## Question ID bba18ecb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: bba18ecb

When the quadratic function  $f$  is graphed in the  $xy$ -plane, where  $y = f(x)$ , its vertex is  $(-3, 6)$ . One of the  $x$ -intercepts of this graph is  $(-\frac{17}{4}, 0)$ . What is the other  $x$ -intercept of the graph?

- A.  $(-\frac{29}{4}, 0)$
- B.  $(-\frac{7}{4}, 0)$
- C.  $(\frac{5}{4}, 0)$
- D.  $(\frac{17}{4}, 0)$

# Question ID 668f1863

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 668f1863

Function  $f$  is a quadratic function where  $f(-20) = 0$  and  $f(-4) = 0$ . The graph of  $y = f(x)$  in the  $xy$ -plane has a vertex at  $(r, -64)$ . What is the value of  $r$ ?

# Question ID 70753f99

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 70753f99

The function  $f$  is defined by  $f(x) = (x + 3)(x + 1)$ . The graph of  $f$  in the  $xy$ -plane is a parabola. Which of the following intervals contains the  $x$ -coordinate of the vertex of the graph of  $f$ ?

- A.  $-4 < x < -3$
- B.  $-3 < x < 1$
- C.  $1 < x < 3$
- D.  $3 < x < 4$

# Question ID c6e85cd7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c6e85cd7

If  $4^{8c} = \sqrt[3]{4^7}$ , what is the value of  $c$ ?

# Question ID 568aaf27

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 568aaf27

$$x + y = 12$$

$$y = x^2$$

If  $(x, y)$  is a solution to the system of equations above, which of the following is a possible value of  $x$ ?

- A. 0
- B. 1
- C. 2
- D. 3

## Question ID 6aefc52b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6aefc52b

$$\begin{aligned}y &= -2.5 \\y &= x^2 + 8x + k\end{aligned}$$

In the given system of equations,  $k$  is a positive integer constant. The system has no real solutions. What is the least possible value of  $k$ ?

## Question ID 55c5d3c2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

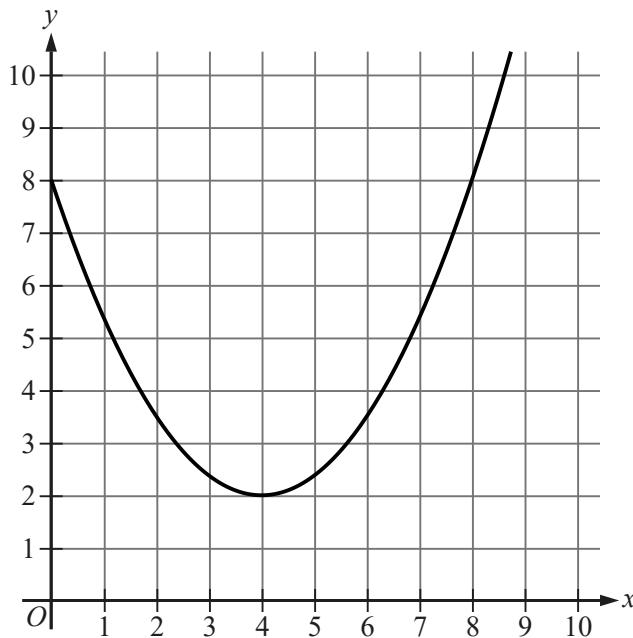
ID: 55c5d3c2

The function  $f$  is defined by  $f(x) = a^x + b$ , where  $a$  and  $b$  are constants and  $a > 0$ . In the  $xy$ -plane, the graph of  $y = f(x)$  has a  $y$ -intercept at  $(0, -25)$  and passes through the point  $(2, 23)$ . What is the value of  $a + b$ ?

# Question ID 5e63b9cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5e63b9cf



The graph shows a marble's height above the ground  $y$ , in inches,  $x$  seconds after it started moving on an elevated track of a marble run. Which of the following is the best interpretation of the  $y$ -intercept of the graph?

- A. The marble's height was 0 inches above the ground 8 seconds after it started moving.
- B. The marble's height was 8 inches above the ground when it started moving.
- C. The marble's minimum height was 0 inches above the ground.
- D. The marble's minimum height was 8 inches above the ground.

# Question ID 6676f055

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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  $\theta$ , in degrees. According to the model, what angle, in degrees, gives the greatest airflow?

- A. -0.28
- B. 0.28
- C. 27
- D. 880

## Question ID 29ed5d39

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 29ed5d39

$$p = 20 + \frac{16}{n}$$

The given equation relates the numbers  $p$  and  $n$ , where  $n$  is not equal to 0 and  $p > 20$ . Which equation correctly expresses  $n$  in terms of  $p$ ?

- A.  $n = \frac{p-20}{16}$
- B.  $n = \frac{p}{16} + 20$
- C.  $n = \frac{p}{16} - 20$
- D.  $n = \frac{16}{p-20}$

# Question ID 90bcaa61

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 90bcaa61

The function  $f(t) = 60,000(2)^{\frac{t}{410}}$  gives the number of bacteria in a population  $t$  minutes after an initial observation. How much time, in minutes, does it take for the number of bacteria in the population to double?

# Question ID 895628b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 895628b5

$$y = (x - 2)(x + 4)$$

$$y = 6x - 12$$

Which ordered pair  $(x, y)$  is the solution to the given system of equations?

- A.  $(0, 2)$
- B.  $(-4, 2)$
- C.  $(2, 0)$
- D.  $(2, -4)$

## Question ID 8f82ad81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8f82ad81

Which expression is equivalent to  $4(x^2 + 6)$ ?

- A.  $4x^2 + 24$
- B.  $4x^2 + 10$
- C.  $4x^2 + 6$
- D.  $4x^2 - 2$

# Question ID 26eb61c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 26eb61c1

Which expression is equivalent to  $6x^8y^2 + 12x^2y^2$ ?

- A.  $6x^2y^2(2x^6)$
- B.  $6x^2y^2(x^4)$
- C.  $6x^2y^2(x^6 + 2)$
- D.  $6x^2y^2(x^4 + 2)$

# Question ID c9417793

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c9417793

$$|x - 9| + 45 = 63$$

What is the sum of the solutions to the given equation?

# Question ID 8f65cddc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 8f65cddc

$$\frac{1}{7b} = \frac{11x}{y}$$

The given equation relates the positive numbers  $b$ ,  $x$ , and  $y$ . Which equation correctly expresses  $x$  in terms of  $b$  and  $y$ ?

- A.  $x = \frac{7by}{11}$
- B.  $x = y - 77b$
- C.  $x = \frac{y}{77b}$
- D.  $x = 77by$

## Question ID 2926cc6d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2926cc6d

$$(5x + 4)(2x - 5) = 0$$

Which of the following is a solution to the given equation?

- A.  $-\frac{5}{2}$
- B.  $-\frac{5}{4}$
- C.  $-\frac{4}{5}$
- D.  $-\frac{2}{5}$

# Question ID dd8ac009

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 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.  $d = (1 + 0.006)^t$
- D.  $d = (1 + 670)^t$

## Question ID 3cce51ea

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 3cce51ea

$$|p| + 61 = 65$$

Which value is a solution to the given equation?

- A.  $\frac{65}{61}$
- B. 4
- C. 126
- D. 130

## Question ID 58dcc59f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58dcc59f

A landscaper is designing a rectangular garden. The length of the garden is to be 5 feet longer than the width. If the area of the garden will be 104 square feet, what will be the length, in feet, of the garden?

## Question ID 2d1614a1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2d1614a1

$$P(t) = 290(1.04)^{(\frac{4}{6})t}$$

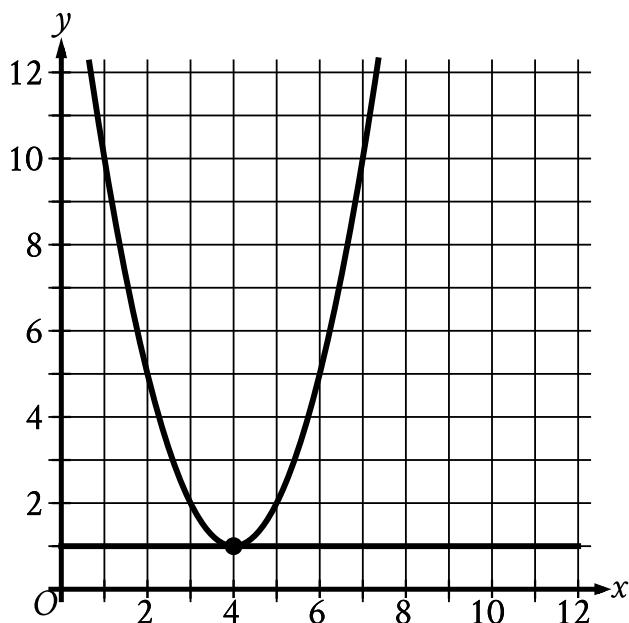
The function  $P$  models the population, in thousands, of a certain city  $t$  years after 2005. According to the model, the population is predicted to increase by  $n\%$  every 18 months. What is the value of  $n$ ?

- A. 0.38
- B. 1.04
- C. 4
- D. 6

# Question ID d0e8e8f5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: d0e8e8f5



The graph of a system of a linear and a quadratic equation is shown. What is the solution  $(x, y)$  to this system?

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

## Question ID 9ed9f54d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ed9f54d

Which of the following is equivalent to

$$2(x^2 - x) + 3(x^2 - x)$$

A.  $5x^2 - 5x$

B.  $5x^2 + 5x$

C.  $5x$

D.  $5x^2$

## Question ID 7a8cb72a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7a8cb72a

$$7m = 2(n + p)$$

The given equation relates the positive numbers  $m$ ,  $n$ , and  $p$ . Which equation correctly gives  $m$  in terms of  $n$  and  $p$ ?

- A.  $m = \frac{2(n+p)}{7}$
- B.  $m = 2(n + p)$
- C.  $m = 2(n + p) - 7$
- D.  $m = 2 - n - p - 7$

# Question ID dbe9b217

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dbe9b217

The function  $f$  is defined by  $f(x) = 8x^3 + 4$ . What is the value of  $f(2)$ ?

## Question ID 18c7c3e0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 18c7c3e0

Which expression is equivalent to  $13x^2 - 7x^2$ ?

- A.  $-91x^2$
- B.  $6x^2$
- C.  $20x^2$
- D.  $40x^2$

# Question ID 30281058

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 30281058

In the  $xy$ -plane, the graph of  $y = x^2 - 9$  intersects line  $p$  at  $(1, a)$  and  $(5, b)$ , where  $a$  and  $b$  are constants. What is the slope of line  $p$ ?

- A. 6
- B. 2
- C. -2
- D. -6

# Question ID 42f19012

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 42f19012

Which expression is equivalent to  $a^{\frac{11}{12}}$ , where  $a > 0$ ?

- A.  $\sqrt[12]{a^{132}}$
- B.  $\sqrt[144]{a^{132}}$
- C.  $\sqrt[121]{a^{132}}$
- D.  $\sqrt[11]{a^{132}}$

## Question ID 294db8ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 294db8ec

Which of the following is equivalent to  $2x^3 + 4$ ?

- A.  $4(x^3 + 4)$
- B.  $4(x^3 + 2)$
- C.  $2(x^3 + 4)$
- D.  $2(x^3 + 2)$

# Question ID 84dd43f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

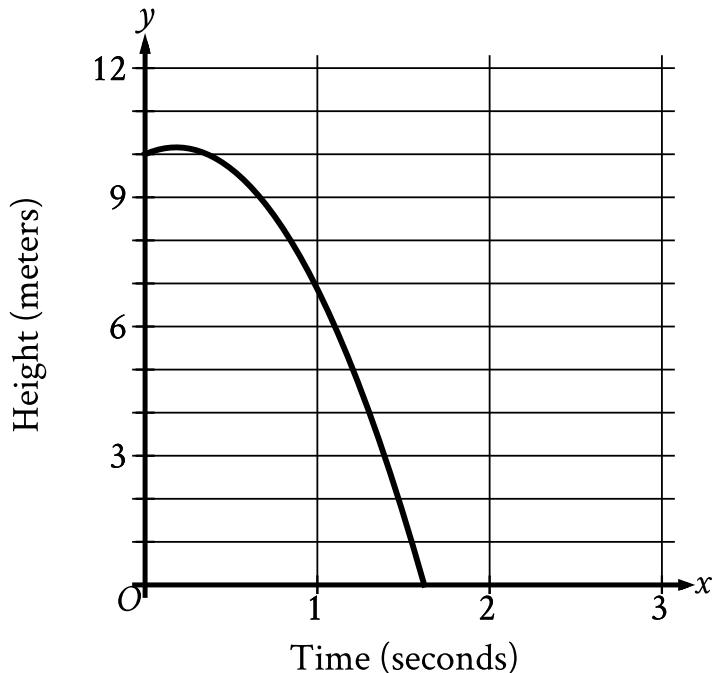
ID: 84dd43f8

For the function  $f$ ,  $f(0) = 86$ , and for each increase in  $x$  by 1, the value of  $f(x)$  decreases by 80%. What is the value of  $f(2)$ ?

# Question ID 9ff88bb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 9ff88bb5



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 94ff3e2d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 94ff3e2d

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

## Question ID 59d1f4b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 59d1f4b5

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

The equation above models the number of members,  $M$ , of a gym  $t$  years after the gym opens. Of the following, which equation models the number of members of the gym  $q$  quarter years after the gym opens?

A.  $M = 1,800(1.02)^{\frac{q}{4}}$

B.  $M = 1,800(1.02)^{4q}$

C.  $M = 1,800(1.005)^{4q}$

D.  $M = 1,800(1.082)^q$

## Question ID 281a4f3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 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.  $f(x) = 3,000(0.98)^x$

## Question ID 4fb8a648

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4fb8a648

$$\begin{aligned}y &= x + 9 \\y &= x^2 + 16x + 63\end{aligned}$$

A solution to the given system of equations is  $(x, y)$ . What is the greatest possible value of  $x$ ?

- A. **-6**
- B. **7**
- C. **9**
- D. **63**

## Question ID 72ae8a87

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 72ae8a87

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

- A. 5 years after the company started selling light bulbs online, its predicted annual revenue is approximately 518,748 dollars.
- B. 5 years after the company started selling light bulbs online, its predicted annual revenue will have increased by a total of approximately 518,748 dollars.
- C. When the company's predicted annual revenue is approximately 518,748 dollars, it is 5 times the predicted annual revenue for the previous year.
- D. When the company's predicted annual revenue is approximately 518,748 dollars, it is 5% greater than the predicted annual revenue for the previous year.

# Question ID 5ae4803e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5ae4803e

$$\frac{(x+9)(x-9)}{x+9} = 7$$

What is the solution to the given equation?

- A. 7
- B. 9
- C. 16
- D. 63

## Question ID 133f3e41

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 133f3e41

$$\frac{20}{p} = \frac{20}{q} - \frac{20}{r} - \frac{20}{s}$$

The given equation relates the positive variables  $p$ ,  $q$ ,  $r$ , and  $s$ . Which of the following is equivalent to  $q$ ?

- A.  $p + r + s$
- B.  $20(p + r + s)$
- C.  $\frac{prs}{pr+ps+rs}$
- D.  $\frac{prs}{20p+20r+20s}$

## Question ID f237ccfc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f237ccfc

The sum of  $-2x^2 + x + 31$  and  $3x^2 + 7x - 8$  can be written in the form  $ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants. What is the value of  $a + b + c$ ?

## Question ID a391ed22

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a391ed22

$$\left(\frac{1}{2}x + \frac{3}{2}\right)\left(\frac{3}{2}x + \frac{1}{2}\right)$$

The expression above is equivalent to  $ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants. What is the value of  $b$ ?

# Question ID 01668cd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 01668cd6

The functions  $f$  and  $g$  are defined by the given equations, where  $x \geq 0$ . Which of the following equations displays, as a constant or coefficient, the maximum value of the function it defines, where  $x \geq 0$ ?

- I.  $f(x) = 33(0.4)^{x+3}$
- II.  $g(x) = 33(0.16)(0.4)^{x-2}$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

## Question ID 95eeeb5b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 95eeeb5b

The function  $f$  is defined by  $f(x) = ax^2 + bx + c$ , where  $a$ ,  $b$ , and  $c$  are constants. The graph of  $y = f(x)$  in the  $xy$ -plane passes through the points  $(7, 0)$  and  $(-3, 0)$ . If  $a$  is an integer greater than 1, which of the following could be the value of  $a + b$ ?

- A. -6
- B. -3
- C. 4
- D. 5

## Question ID c77ef2fb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: c77ef2fb

Blood volume,  $V_B$ , in a human can be determined using the equation  $V_B = \frac{V_P}{1-H}$ , where  $V_P$  is the plasma volume and  $H$  is the hematocrit (the fraction of blood volume that is red blood cells). Which of the following correctly expresses the hematocrit in terms of the blood volume and the plasma volume?

A.  $H = 1 - \frac{V_P}{V_B}$

B.  $H = \frac{V_B}{V_P}$

C.  $H = 1 + \frac{V_B}{V_P}$

D.  $H = V_B - V_P$

## Question ID 7399c3b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 7399c3b0

$$k^2 - 53 = 91$$

What is the positive solution to the given equation?

- A. 144
- B. 72
- C. 38
- D. 12

# Question ID 99c5e794

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.  $p = 0.96(15,000)^x$
- B.  $p = 1.04(15,000)^x$
- C.  $p = 15,000(0.96)^x$
- D.  $p = 15,000(1.04)^x$

# Question ID 99c5e794

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.  $p = 0.96(15,000)^x$
- B.  $p = 1.04(15,000)^x$
- C.  $p = 15,000(0.96)^x$
- D.  $p = 15,000(1.04)^x$

## Question ID 5ae186b4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5ae186b4

$$\frac{-54}{w} = 6$$

What is the solution to the given equation?

## Question ID b76a2815

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: b76a2815

$$P = \frac{W}{t}$$

The power  $P$  produced by a machine is represented by the equation above, where  $W$  is the work performed during an amount of time  $t$ . Which of the following correctly expresses  $W$  in terms of  $P$  and  $t$ ?

- A.  $W = Pt$
- B.  $W = \frac{P}{t}$
- C.  $W = \frac{t}{P}$
- D.  $W = P + t$

## Question ID 364a2d25

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 364a2d25

$$x + y = 17$$

$$xy = 72$$

If one solution to the system of equations above is  $(x, y)$ ,

what is one possible value of  $x$ ?

## Question ID 1be909aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1be909aa

Which expression is equivalent to  $\frac{h^{15}q^7}{h^5q^{21}}$ , where  $h > 0$  and  $q > 0$ ?

- A.  $\frac{h^{10}}{q^{14}}$
- B.  $\frac{h^3}{q^3}$
- C.  $h^{10}q^{14}$
- D.  $h^3q^3$

## Question ID bdb0aa23

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: bdb0aa23

Which expression is equivalent to  $5x^5 - 6x^4 + 8x^3$ ?

- A.  $x^4(5x - 6)$
- B.  $x^3(5x^2 - 6x + 8)$
- C.  $8x^3(5x^2 - 6x + 1)$
- D.  $6x^5(-6x^4 + 8x^3 + 1)$

# Question ID 100030d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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?

# Question ID 09f58996

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 09f58996

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

## Question ID d84a514a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: d84a514a

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.

# Question ID beb86a0c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: beb86a0c

Which expression is equivalent to  $9x^2 + 5x$ ?

- A.  $x(9x + 5)$
- B.  $5x(9x + 1)$
- C.  $9x(x + 5)$
- D.  $x^2(9x + 5)$

## Question ID 5910bfff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5910bfff

$$D = T - \frac{9}{25}(100 - H)$$

The formula above can be used to approximate the dew point  $D$ , in degrees Fahrenheit, given the temperature  $T$ , in degrees Fahrenheit, and the relative humidity of  $H$  percent, where  $H > 50$ . Which of the following expresses the relative humidity in terms of the temperature and the dew point?

A.  $H = \frac{25}{9}(D - T) + 100$

B.  $H = \frac{25}{9}(D - T) - 100$

C.  $H = \frac{25}{9}(D + T) + 100$

D.  $H = \frac{25}{9}(D + T) - 100$

# Question ID 7ba694f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 7ba694f3

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 fbb96bb1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fbb96bb1

$$x - 29 = (x - a)(x - 29)$$

Which of the following are solutions to the given equation, where  $a$  is a constant and  $a > 30$ ?

- I.  $a$
  - II.  $a + 1$
  - III. 29
- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, and III

## Question ID 6e06a0a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 6e06a0a7

Which of the following expressions is equivalent to  $2a^2(a + 3)$ ?

- A.  $5a^3$
- B.  $8a^5$
- C.  $2a^3 + 3$
- D.  $2a^3 + 6a^2$

## Question ID ad038c19

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ad038c19

Which of the following is

equivalent to  $\left(a + \frac{b}{2}\right)^2$ ?

A.  $a^2 + \frac{b^2}{2}$

B.  $a^2 + \frac{b^2}{4}$

C.  $a^2 + \frac{ab}{2} + \frac{b^2}{2}$

D.  $a^2 + ab + \frac{b^2}{4}$

## Question ID c7a187a7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c7a187a7

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

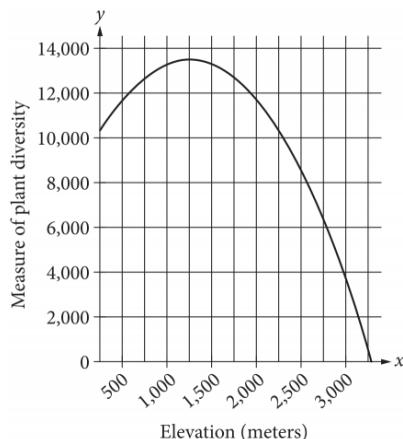
If the given function  $f$  is graphed in the  $xy$ -plane, where  $y = f(x)$ , what is an  $x$ -intercept of the graph?

- A.  $(-12, 0)$
- B.  $(-30, 0)$
- C.  $(-360, 0)$
- D.  $(12, 0)$

# Question ID ebe4bde0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: ebe4bde0



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

- A. 13,500
- B. 3,000
- C. 1,250
- D. 250

# Question ID ef926848

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ef926848

Square P has a side length of  $x$  inches. Square Q has a perimeter that is **176** inches greater than the perimeter of square P. The function  $f$  gives the area of square Q, in square inches. Which of the following defines  $f$ ?

- A.  $f(x) = (x + 44)^2$
- B.  $f(x) = (x + 176)^2$
- C.  $f(x) = (176x + 44)^2$
- D.  $f(x) = (176x + 176)^2$

## Question ID 77c0cced

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 77c0cced

$$y = 2x^2 - 21x + 64$$

$$y = 3x + a$$

In the given system of equations,  $a$  is a constant. The graphs of the equations in the given system intersect at exactly one point,  $(x, y)$ , in the  $xy$ -plane. What is the value of  $x$ ?

- A.  $-8$
- B.  $-6$
- C.  $6$
- D.  $8$

# Question ID 635f54ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 635f54ee

The surface area of a cube is  $6\left(\frac{a}{4}\right)^2$ , where  $a$  is a positive constant. Which of the following gives the perimeter of one face of the cube?

A.  $\frac{a}{4}$

B.  $a$

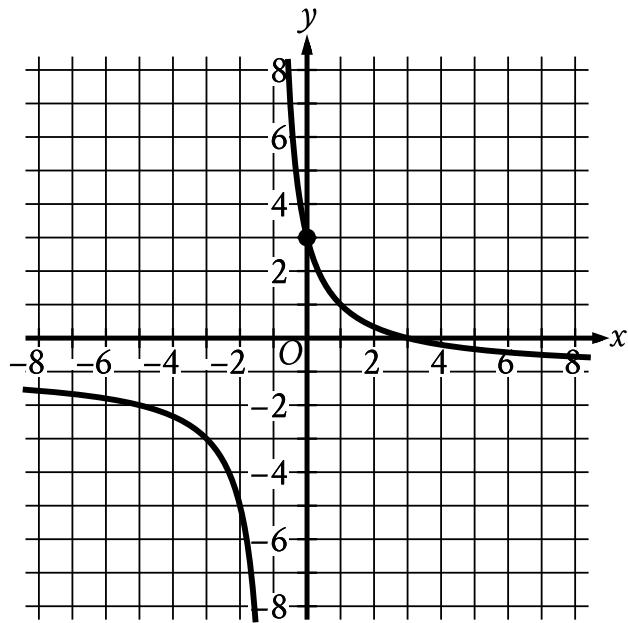
C.  $4a$

D.  $6a$

# Question ID c99d154a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c99d154a



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

## Question ID a26c29f7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a26c29f7

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 99269e03

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 99269e03

$x$	$y$
1	11
2	19
3	$a$

The table shows three values of  $x$  and their corresponding values of  $y$  for the equation  $y = 4(2)^x + 3$ . In the table,  $a$  is a constant. What is the value of  $a$ ?

- A. 67
- B. 35
- C. 32
- D. 27

## Question ID a1262cdb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a1262cdb

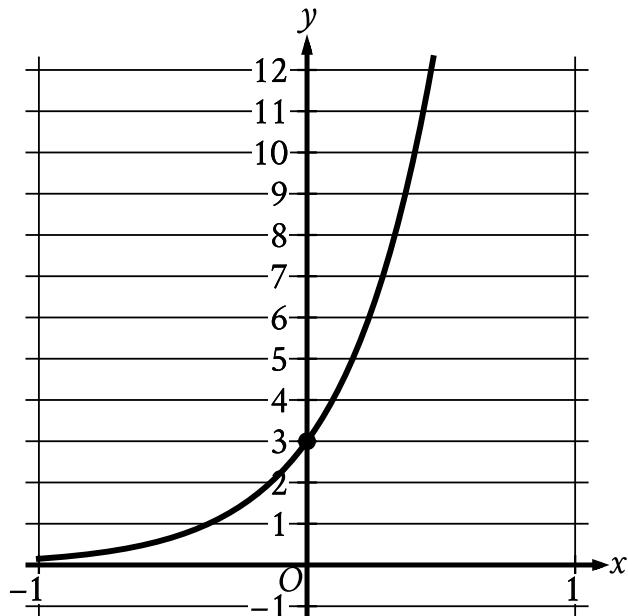
The equation  $12t + b = c$  relates the variables  $t$ ,  $b$ , and  $c$ . Which of the following correctly expresses the value of  $c - b$  in terms of  $t$ ?

- A.  $\frac{t}{12}$
- B.  $t$
- C.  $t + \frac{1}{12}$
- D.  $12t$

# Question ID 893c7519

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #e0e0e0;"></div> <div style="width: 100px; height: 10px; background-color: #e0e0e0;"></div>

ID: 893c7519



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  $y$ ?

# Question ID 0980fcdd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 50%; background-color: #D9D9D9; height: 10px;"></div>

ID: 0980fcdd

$$x^2 = 6x + y$$

$$y = -6x + 36$$

A solution to the given system of equations is  $(x, y)$ . Which of the following is a possible value of  $xy$ ?

- A. 0
- B. 6
- C. 12
- D. 36

## Question ID e1391dd6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

## Question ID 3c600337

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID 3ea87153

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3ea87153

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

## Question ID 290cdc2c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 290cdc2c

Which expression is equivalent to  $(x)^{\frac{1}{14}}$ , where  $x > 0$ ?

- A.  $\frac{1}{14} \cdot x$
- B.  $\sqrt[14]{x}$
- C.  $14 \cdot x$
- D.  $(x)^{14}$

## Question ID 87a3de81

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 87a3de81

$$x^2 + x - 12 = 0$$

If  $a$  is a solution of the equation above and  $a > 0$ , what is the value of  $a$ ?

# Question ID 499cb491

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 499cb491

Which expression is equivalent to  $5x^2 - 50xy^2$ ?

- A.  $5x(x - 10y^2)$
- B.  $5x(x - 50y^2)$
- C.  $5x^2(10xy^2)$
- D.  $5x^2(50xy^2)$

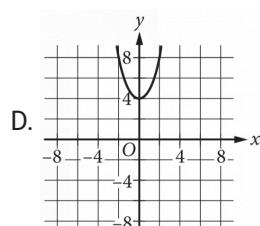
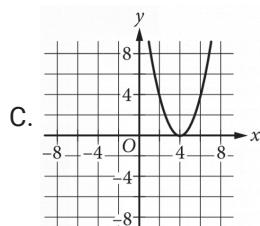
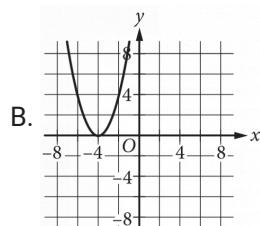
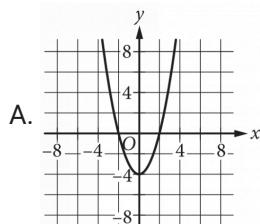
# Question ID d46da42c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: d46da42c

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

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



## Question ID 4209aefe

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4209aefe

The function  $f(x) = 206(1.034)^x$  models the value, in dollars, of a certain bank account by the end of each year from 1957 through 1972, where  $x$  is the number of years after 1957. Which of the following is the best interpretation of " $f(5)$  is approximately equal to 243" in this context?

- A. The value of the bank account is estimated to be approximately 5 dollars greater in 1962 than in 1957.
- B. The value of the bank account is estimated to be approximately 243 dollars in 1962.
- C. The value, in dollars, of the bank account is estimated to be approximately 5 times greater in 1962 than in 1957.
- D. The value of the bank account is estimated to increase by approximately 243 dollars every 5 years between 1957 and 1972.

# Question ID 482a445b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 25%; background-color: #005a9f;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 482a445b

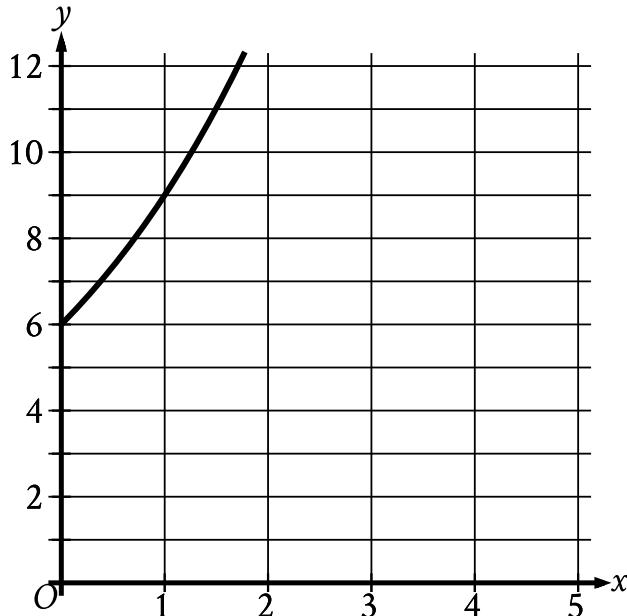
Which expression is equivalent to  $(x^2 + 11)^2 + (x - 5)(x + 5)$ ?

- A.  $x^4 + 23x^2 - 14$
- B.  $x^4 + 23x^2 + 96$
- C.  $x^4 + 12x^2 + 121$
- D.  $x^4 + x^2 + 146$

# Question ID f1fa0821

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #0056b3; height: 10px;"></div> <div style="width: 40%; background-color: #e0e0e0; height: 10px;"></div>

ID: f1fa0821



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 1697ffcf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1697ffcf

In the  $xy$ -plane, the graph of  $y = 3x^2 - 14x$  intersects the graph of  $y = x$  at the points  $(0, 0)$  and  $(a, a)$ . What is the value of  $a$ ?

# Question ID 5bf0f84a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

## Question ID 4b6f0a3f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4b6f0a3f

$$x^2 - 5x - 24 = 0$$

What is the sum of the solutions to the given equation?

# Question ID 70ebd3d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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%.

# Question ID 70fb357b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 70fb357b

$$y = 576^{(2x+2)}$$

The graph of the given equation in the  $xy$ -plane has a  $y$ -intercept of  $(r, s)$ . Which of the following equivalent equations displays the value of  $s$  as a constant, a coefficient, or the base?

- A.  $y = 331,776^{(x+1)}$
- B.  $y = 24^{(4x+4)}$
- C.  $y = \frac{1}{24} (24)^{(4x+5)}$
- D.  $y = \frac{1}{576} (576)^{(2x+3)}$

# Question ID 20291f47

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 20291f47

Which expression is equivalent to  $\frac{y+12}{x-8} + \frac{y(x-8)}{x^2y-8xy}$ ?

A.  $\frac{xy+y+4}{x^3y-16x^2y+64xy}$

B.  $\frac{xy+9y+12}{x^2y-8xy+x-8}$

C.  $\frac{xy^2+13xy-8y}{x^2y-8xy}$

D.  $\frac{xy^2+13xy-8y}{x^3y-16x^2y+64xy}$

## Question ID 42f8e4b4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 42f8e4b4

One of the factors of  $2x^3 + 42x^2 + 208x$  is  $x + b$ , where  $b$  is a positive constant. What is the smallest possible value of  $b$ ?

## Question ID a67a439d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: a67a439d

$$x + 7 = 10$$

$$(x + 7)^2 = y$$

Which ordered pair  $(x, y)$  is a solution to the given system of equations?

- A. (3, 100)
- B. (3, 3)
- C. (3, 10)
- D. (3, 70)

## Question ID de39858a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: de39858a

The function  $h$  is defined by  $h(x) = a^x + b$ , where  $a$  and  $b$  are positive constants. The graph of  $y = h(x)$  in the  $xy$ -plane passes through the points  $(0, 10)$  and  $(-2, \frac{325}{36})$ . What is the value of  $ab$ ?

A.  $\frac{1}{4}$

B.  $\frac{1}{2}$

C. 54

D. 60

## Question ID 2683b5db

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2683b5db

$$T = 0.01(P - 40,000)$$

In a city, the property tax  $T$ , in dollars, is calculated using the formula above, where  $P$  is the value of the property, in dollars. Which of the following expresses the value of the property in terms of the property tax?

- A.  $P = 100T - 400$
- B.  $P = 100T + 400$
- C.  $P = 100T - 40,000$
- D.  $P = 100T + 40,000$

## Question ID d41cf4d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: d41cf4d3

The function  $f$  is defined by  $f(x) = a\sqrt{x+b}$ , where  $a$  and  $b$  are constants. In the  $xy$ -plane, the graph of  $y = f(x)$  passes through the point  $(-24, 0)$ , and  $f(24) < 0$ . Which of the following must be true?

- A.  $f(0) = 24$
- B.  $f(0) = -24$
- C.  $a > b$
- D.  $a < b$

# Question ID 1178f2df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 1178f2df

$x$	$y$
21	-8
23	8
25	-8

The table shows three values of  $x$  and their corresponding values of  $y$ , where  $y = f(x) + 4$  and  $f$  is a quadratic function. What is the  $y$ -coordinate of the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane?

# Question ID ce940f80

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: ce940f80

$$\frac{x^2}{25} = 36$$

What is a solution to the given equation?

- A. 6
- B. 30
- C. 450
- D. 900

# Question ID 45df91ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 45df91ee

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

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)

# Question ID 67e866b5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 67e866b5

Which expression is equivalent to  $9x^2 + 7x^2 + 9x$ ?

- A.  $63x^4 + 9x$
- B.  $9x^2 + 16x$
- C.  $25x^5$
- D.  $16x^2 + 9x$

# Question ID 40f2e601

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 40f2e601

$$P = N(19 - C)$$

The given equation relates the positive numbers  $P$ ,  $N$ , and  $C$ . Which equation correctly expresses  $C$  in terms of  $P$  and  $N$ ?

- A.  $C = \frac{19+P}{N}$
- B.  $C = \frac{19-P}{N}$
- C.  $C = 19 + \frac{P}{N}$
- D.  $C = 19 - \frac{P}{N}$

# Question ID fd65f47f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: fd65f47f

Which expression is equivalent to  $(2x^2 + x - 9) + (x^2 + 6x + 1)$ ?

- A.  $2x^2 + 7x + 10$
- B.  $2x^2 + 6x - 8$
- C.  $3x^2 + 7x - 10$
- D.  $3x^2 + 7x - 8$

# Question ID 7f87deff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7f87deff

What is an  $x$ -coordinate of an  $x$ -intercept of the graph of  $y = 3(x - 14)(x + 5)(x + 4)$  in the  $xy$ -plane?

## Question ID 97158b3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 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.  $w(w + 29)$

## Question ID 84e8cc72

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 84e8cc72

A quadratic function models the height, in feet, of an object above the ground in terms of the time, in seconds, after the object is launched off an elevated surface. The model indicates the object has an initial height of **10** feet above the ground and reaches its maximum height of **1,034** feet above the ground **8** seconds after being launched. Based on the model, what is the height, in feet, of the object above the ground **10** seconds after being launched?

- A. **234**
- B. **778**
- C. **970**
- D. **1,014**

# Question ID 0ad5012e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0ad5012e

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

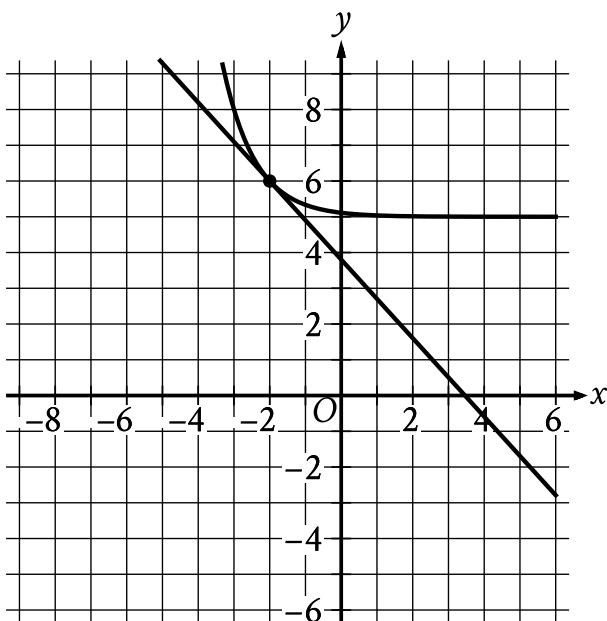
The given equation models a company's scheduled deliveries over 8 months, where  $y$  is the estimated number of scheduled deliveries  $x$  months after the end of May 2012, where  $0 \leq x \leq 8$ . Which statement is the best interpretation of the  $y$ -intercept of the graph of this equation in the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

# Question ID 5c7d5744

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5c7d5744



The graph of a system of a linear equation and a nonlinear equation is shown. What is the solution  $(x, y)$  to this system?

- A.  $(6, 0)$
- B.  $(-2, 6)$
- C.  $(0, -2)$
- D.  $(0, 0)$

## Question ID 12e7faf8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 12e7faf8

$$\frac{x^2+6x-7}{x+7} = ax+d$$

The equation  $\frac{x^2+6x-7}{x+7} = ax+d$  is true for all  $x \neq -7$ , where  $a$  and  $d$  are integers. What is the value of  $a+d$ ?

- A. -6
- B. -1
- C. 0
- D. 1

# Question ID 24016dee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 24016dee

Which expression is equivalent to  $(8x^3 + 8) - (x^3 - 2)$ ?

- A.  $8x^3 + 6$
- B.  $7x^3 + 10$
- C.  $8x^3 + 10$
- D.  $7x^3 + 6$

# Question ID 89fc23af

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 89fc23af

Which of the following expressions is

$$\text{equivalent to } \frac{x^2 - 2x - 5}{x - 3} ?$$

A.  $x - 5 - \frac{20}{x-3}$

B.  $x - 5 - \frac{10}{x-3}$

C.  $x + 1 - \frac{8}{x-3}$

D.  $x + 1 - \frac{2}{x-3}$

## Question ID d8ace155

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d8ace155

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

## Question ID c3a72da5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: c3a72da5

Which of the following is equivalent to the sum of  $3x^4 + 2x^3$  and  $4x^4 + 7x^3$ ?

- A.  $16x^{14}$
- B.  $7x^8 + 9x^6$
- C.  $12x^4 + 14x^3$
- D.  $7x^4 + 9x^3$

# Question ID 5a74f696

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5a74f696

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.  $M(t) = 890(10)^{\frac{t}{2}}$

## Question ID 911c415b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 911c415b

$$(7532 + 100y^2) + 10(10y^2 - 110)$$

The expression above can be written in the form  $ay^2 + b$ , where  $a$  and  $b$  are constants. What is the value of  $a + b$ ?

## Question ID 1863e3be

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1863e3be

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 dba7432e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

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

## Question ID b74f2feb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b74f2feb

The expression  $6\sqrt[5]{3^5x^{45}} \cdot \sqrt[8]{2^8x}$  is equivalent to  $ax^b$ , where  $a$  and  $b$  are positive constants and  $x > 1$ . What is the value of  $a + b$ ?

## Question ID 16de54c7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 16de54c7

$$2x^2 + 5x - 12$$

If the given expression is rewritten in the form  $(2x - 3)(x + k)$ , where  $k$  is a constant, what is the value of  $k$ ?

## Question ID 2f958af9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 2f958af9

$$v^2 = \frac{LT}{m}$$

The formula above expresses the square of the speed  $v$  of a wave moving along a string in terms of tension  $T$ , mass  $m$ , and length  $L$  of the string. What is  $T$  in terms of  $m$ ,  $v$ , and  $L$ ?

A.  $T = \frac{mv^2}{L}$

B.  $T = \frac{m}{v^2 L}$

C.  $T = \frac{mL}{v^2}$

D.  $T = \frac{L}{mv^2}$

## Question ID cbc4c163

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: cbc4c163

The function  $f$  is defined by  $f(x) = 5\left(\frac{1}{4} - x\right)^2 + \frac{11}{4}$ . What is the value of  $f\left(\frac{1}{4}\right)$ ?

## Question ID 5edc8c98

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 5edc8c98

$$64x^2 - (16a + 4b)x + ab = 0$$

In the given equation,  $a$  and  $b$  are positive constants. The sum of the solutions to the given equation is  $k(4a + b)$ , where  $k$  is a constant. What is the value of  $k$ ?

# Question ID c7789423

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: c7789423

$$|x - 2| = 9$$

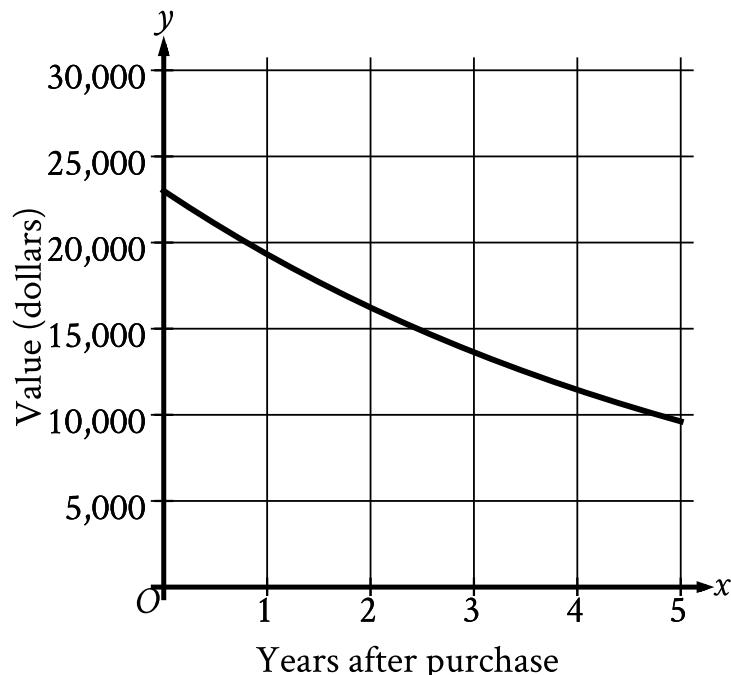
What is one possible solution to the given equation?

# Question ID ca4ee54e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #cccccc;"></div> <div style="width: 25%; background-color: #cccccc;"></div>

ID: ca4ee54e

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

## Question ID d9137a84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d9137a84

Which expression represents the product of  $(x^{-6}y^3z^5)$  and  $(x^4z^5 + y^8z^{-7})$ ?

- A.  $x^{-2}z^{10} + y^{11}z^{-2}$
- B.  $x^{-2}z^{10} + x^{-6}z^{-2}$
- C.  $x^{-2}y^3z^{10} + y^8z^{-7}$
- D.  $x^{-2}y^3z^{10} + x^{-6}y^{11}z^{-2}$

# Question ID 876a731c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 20%; background-color: #003366; height: 10px;"></div> <div style="width: 60%; background-color: #cccccc; height: 10px;"></div>

ID: 876a731c

$$\begin{aligned}y &= x^2 \\2y + 6 &= 2(x + 3)\end{aligned}$$

If  $(x, y)$  is a solution of the system of equations above and  $x > 0$ , what is the value of  $xy$ ?

- A. 1
- B. 2
- C. 3
- D. 9

## Question ID cd358b89

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: cd358b89

Function  $f$  is defined by  $f(x) = (x + 6)(x + 5)(x + 1)$ . Function  $g$  is defined by  $g(x) = f(x - 1)$ . The graph of  $y = g(x)$  in the  $xy$ -plane has  $x$ -intercepts at  $(a, 0)$ ,  $(b, 0)$ , and  $(c, 0)$ , where  $a$ ,  $b$ , and  $c$  are distinct constants. What is the value of  $a + b + c$ ?

- A.  $-15$
- B.  $-9$
- C.  $11$
- D.  $15$

## Question ID f89e1d6f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f89e1d6f

If  $a = c + d$ , which of the following is equivalent to the expression  $x^2 - c^2 - 2cd - d^2$ ?

- A.  $(x + a)^2$
- B.  $(x - a)^2$
- C.  $(x + a)(x - a)$
- D.  $x^2 - ax - a^2$

## Question ID ff2e5c76

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ff2e5c76

$$x^2 - 40x - 10 = 0$$

What is the sum of the solutions to the given equation?

- A. 0
- B. 5
- C. 10
- D. 40

# Question ID c8bf5313

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c8bf5313

$$\begin{aligned}x &= 8 \\y &= x^2 + 8\end{aligned}$$

The graphs of the equations in the given system of equations intersect at the point  $(x, y)$  in the  $xy$ -plane. What is the value of  $y$ ?

- A. 8
- B. 24
- C. 64
- D. 72

# Question ID c1eead73

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: c1eead73

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

## Question ID df0ef054

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: df0ef054

$$(2x^3 + 3x)(x^3 - 2x)$$

Which of the following is equivalent to the expression above?

A.  $x^3 + 5x$

B.  $3x^3 + x$

C.  $2x^6 - x^4 - 6x^2$

D.  $3x^6 - x^4 - 6x^2$

## Question ID f1c81b3b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f1c81b3b

The exponential function  $g$  is defined by  $g(x) = 19 \cdot a^x$ , where  $a$  is a positive constant. If  $g(3) = 2,375$ , what is the value of  $g(4)$ ?

## Question ID bef4b1c6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: bef4b1c6

$$\frac{55}{x+6} = x$$

What is the positive solution to the given equation?

## Question ID c19d1fb0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c19d1fb0

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 3e9cc0c2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3e9cc0c2

Which of the following is equivalent to  $(1-p)(1+p+p^2+p^3+p^4+p^5+p^6)$ ?

- A.  $1-p^8$
- B.  $1-p^7$
- C.  $1-p^6$
- D.  $1-p^5$

## Question ID 2c5c22d0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c5c22d0

$$y = x^2 + 3x - 7$$

$$y - 5x + 8 = 0$$

How many solutions are there to the system of equations above?

- A. There are exactly 4 solutions.
- B. There are exactly 2 solutions.
- C. There is exactly 1 solution.
- D. There are no solutions.

## Question ID f678483b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: f678483b

A submersible device is used for ocean research. The function  $g(x) = -\frac{1}{55}(x + 19)(x - 35)$  gives the depth below the surface of the ocean, in meters, of the submersible device  $x$  minutes after collecting a sample, where  $x > 0$ . How many minutes after collecting the sample did it take for the submersible device to reach the surface of the ocean?

# Question ID 7348f046

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7348f046

$$(2x + 3) - (x - 7)$$

Which of the following is equivalent to the given expression?

- A.  $x - 4$
- B.  $3x - 4$
- C.  $x + 10$
- D.  $2x^2 + 21$

# Question ID 0aaef7aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID 928498f3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 928498f3

$$6x^2 + 5x - 7 = 0$$

What are the solutions to the given equation?

A.  $\frac{-5 \pm \sqrt{25 + 168}}{12}$

B.  $\frac{-6 \pm \sqrt{25 + 168}}{12}$

C.  $\frac{-5 \pm \sqrt{36 - 168}}{12}$

D.  $\frac{-6 \pm \sqrt{36 - 168}}{12}$

# Question ID 26e83bbc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 26e83bbc

$$\begin{aligned}f(x) &= x^2 + bx \\g(x) &= 9x^2 - 27x\end{aligned}$$

Functions  $f$  and  $g$  are given, and in function  $f$ ,  $b$  is a constant. If  $f(x) \cdot g(x) = 9x^4 - 26x^3 - 3x^2$ , what is the value of  $b$ ?

- A.  $-26$
- B.  $-\frac{26}{9}$
- C.  $\frac{1}{9}$
- D.  $9$

# Question ID b7cd6ca6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

# Question ID 04b985e6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 04b985e6

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 b47419f4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: b47419f4

$$\left(\frac{1}{2}x + 3\right) - \left(\frac{2}{3}x - 5\right)$$

Which of the following is equivalent to the expression above?

A.  $-\frac{1}{6}x + 8$

B.  $-\frac{1}{6}x - 2$

C.  $-\frac{1}{3}x^2 + \frac{1}{2}x + 15$

D.  $-\frac{1}{3}x^2 - \frac{9}{2}x - 15$

## Question ID fc3dfa26

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fc3dfa26

$$\frac{4x^2}{x^2-9} - \frac{2x}{x+3} = \frac{1}{x-3}$$

What value of  $x$  satisfies the equation above?

A.  $-3$

B.  $-\frac{1}{2}$

C.  $\frac{1}{2}$

D.  $3$

# Question ID 8838a672

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 8838a672

$$(4x^3 - 5x^2 + 3) - (6x^3 + 2x^2 - x)$$

Which of the following expressions is equivalent to the expression above?

- A.  $-10x^3 - 3x^2 + x + 3$
- B.  $-2x^3 - 7x^2 + x + 3$
- C.  $-2x^3 - 3x^2 + x + 3$
- D.  $10x^3 - 7x^2 - x + 3$

# Question ID eb268057

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: eb268057

$$x^2 = 64$$

Which of the following values of  $x$  satisfies the given equation?

- A. -8
- B. 4
- C. 32
- D. 128

# Question ID f76c1858

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: f76c1858

$$7x^2 - 20x - 32 = 0$$

What is the positive solution to the given equation?

## Question ID 6d9e01a2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6d9e01a2

$$f(x) = 4x^2 - 50x + 126$$

The given equation defines the function  $f$ . For what value of  $x$  does  $f(x)$  reach its minimum?

# Question ID 0af701e7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0af701e7

The function  $f$  is defined by  $f(x) = |x - 4x|$ . What value of  $a$  satisfies  $f(5) - f(a) = -15$ ?

- A. **-20**
- B. **5**
- C. **10**
- D. **45**

# Question ID 9f2ecade

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 9f2ecade

$$h(x) = x^3 + ax^2 + bx + c$$

The function  $h$  is defined above, where  $a$ ,  $b$ , and  $c$  are integer constants. If the zeros of the function are  $-5$ ,  $6$ , and  $7$ , what is the value of  $c$ ?

# Question ID 2cf7f039

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2cf7f039

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 0b3d25c5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0b3d25c5

Which of the following is equivalent to

$$\sqrt[4]{x^2 + 8x + 16}, \text{ where } x > 0?$$

A.  $(x+4)^4$

B.  $(x+4)^2$

C.  $(x+4)$

D.  $(x+4)^{\frac{1}{2}}$

## Question ID 083ef63a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 083ef63a

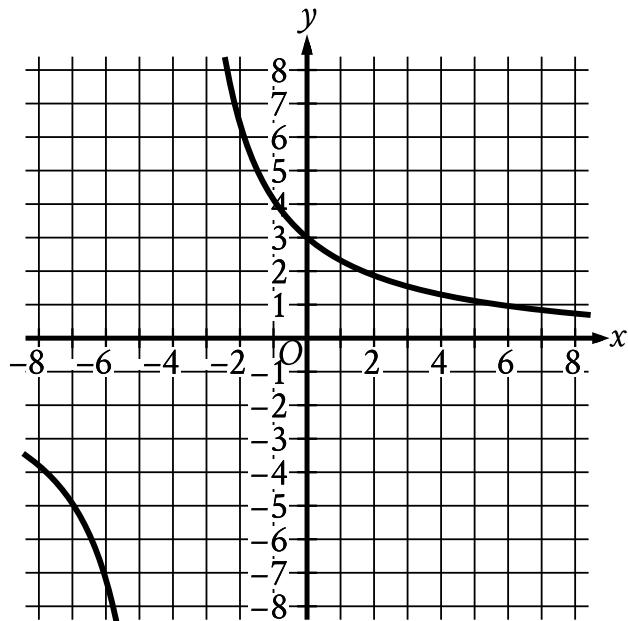
$$f(x) = (x - 2)(x + 15)$$

The function  $f$  is defined by the given equation. For what value of  $x$  does  $f(x)$  reach its minimum?

# Question ID d45572cc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: d45572cc



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  $f(0)$ ?

## Question ID 6011a3f8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6011a3f8

$$64x^2 + bx + 25 = 0$$

In the given equation,  $b$  is a constant. For which of the following values of  $b$  will the equation have more than one real solution?

- A. -91
- B. -80
- C. 5
- D. 40

# Question ID 0e61101e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 0e61101e

$$f(x) = 9(4)^x$$

The function  $f$  is defined by the given equation. If  $g(x) = f(x + 2)$ , which of the following equations defines the function  $g$ ?

- A.  $g(x) = 18(4)^x$
- B.  $g(x) = 144(4)^x$
- C.  $g(x) = 18(8)^x$
- D.  $g(x) = 81(16)^x$

## Question ID e117d3b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: e117d3b8

If  $a$  and  $c$  are positive numbers, which of the following is equivalent to  $\sqrt{(a+c)^3} \cdot \sqrt{a+c}$ ?

- A.  $a+c$
- B.  $a^2+c^2$
- C.  $a^2+2ac+c^2$
- D.  $a^2c^2$

# Question ID f44b4125

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: f44b4125

The functions  $f$  and  $g$  are defined by the given equations, where  $x \geq 0$ . Which of the following equations displays, as a constant or coefficient, the maximum value of the function it defines, where  $x \geq 0$ ?

- I.  $f(x) = 18(1.25)^x + 41$
- II.  $g(x) = 9(0.73)^x$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

## Question ID 7a6d06bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7a6d06bf

A rectangle has an area of **155** square inches. The length of the rectangle is **4** inches less than **7** times the width of the rectangle. What is the width of the rectangle, in inches?

## Question ID 04bbce67

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 04bbce67

$$f(x) = (x + 7)^2 + 4$$

The function  $f$  is defined by the given equation. For what value of  $x$  does  $f(x)$  reach its minimum?

# Question ID 4880eecb

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4880eecb

The product of a positive number  $x$  and the number that is 8 more than  $x$  is 180. What is the value of  $x$ ?

- A. 5
- B. 10
- C. 18
- D. 36

# Question ID e8779461

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: e8779461

$$y = x^2 + 14x + 48$$

$$x + 8 = 11$$

The solution to the given system of equations is  $(x, y)$ . What is the value of  $y$ ?

## Question ID 50338a48

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 50338a48

Which expression is equivalent to  $15w^2 + 8w$ ?

- A.  $w(15w + 8)$
- B.  $8w(15w + 1)$
- C.  $15w^2(8w + 1)$
- D.  $23(w^2 + w)$

## Question ID 98f735f2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: 98f735f2

The total revenue from sales of a product can be calculated using the formula  $T = PQ$

, where  $T$  is the total revenue,  $P$  is the price of the product, and  $Q$  is the quantity of the product sold. Which of the following equations gives the quantity of product sold in terms of  $P$  and  $T$ ?

A.  $Q = \frac{P}{T}$

B.  $Q = \frac{T}{P}$

C.  $Q = PT$

D.  $Q = T - P$

## Question ID 79ba511a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 79ba511a

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

- A. 20
- B. 21
- C. 23
- D. 24

# Question ID dcf63c94

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: dcf63c94

$$f(x) = 272(2)^x$$

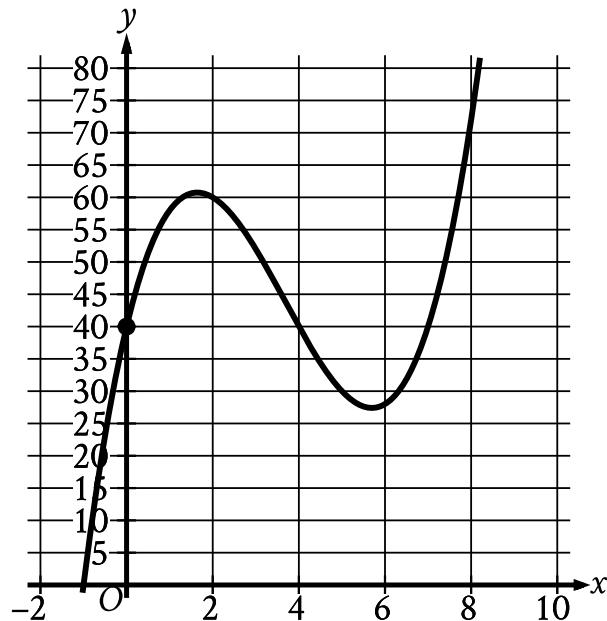
The function  $f$  is defined by the given equation. If  $h(x) = f(x - 4)$ , which of the following equations defines function  $h$ ?

- A.  $h(x) = 17(2)^x$
- B.  $h(x) = 68(2)^x$
- C.  $h(x) = 272(16)^x$
- D.  $h(x) = 272(8)^x$

# Question ID 26f5269a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 25%; background-color: #e0e0e0; height: 10px;"></div>

ID: 26f5269a

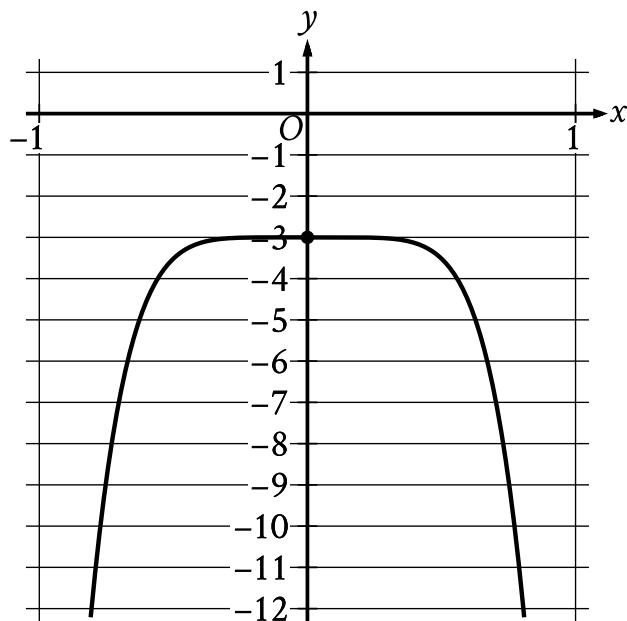


The  $y$ -intercept of the graph shown is  $(x, y)$ . What is the value of  $y$ ?

# Question ID 50418728

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 50418728



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

## Question ID 9cb9beec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 9cb9beec

$$\begin{aligned}y &= -1.5 \\y &= x^2 + 8x + a\end{aligned}$$

In the given system of equations,  $a$  is a positive constant. The system has exactly one distinct real solution. What is the value of  $a$ ?

# Question ID f5e8ccf1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

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

## Question ID 127b2759

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 127b2759

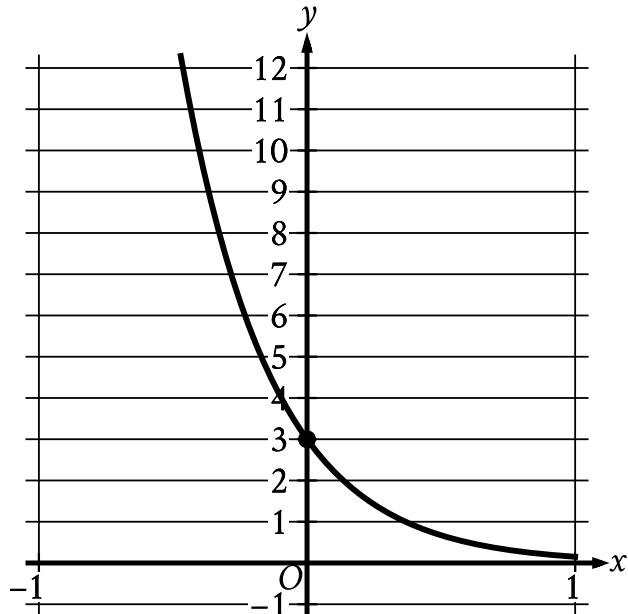
Which expression is equivalent to  $8 + d^2 + 3$ ?

- A.  $d^2 + 24$
- B.  $d^2 + 11$
- C.  $d^2 + 5$
- D.  $d^2 - 11$

# Question ID 02c67921

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #e0e0e0;"></div> <div style="width: 100px; height: 10px; background-color: #e0e0e0;"></div>

ID: 02c67921



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  $y$ ?

## Question ID 2b1a27cd

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div> <div style="width: 30%; background-color: #0056b3; height: 10px;"></div>

ID: 2b1a27cd

The quadratic function  $g$  models the depth, in meters, below the surface of the water of a seal  $t$  minutes after the seal entered the water during a dive. The function estimates that the seal reached its maximum depth of **302.4** meters **6** minutes after it entered the water and then reached the surface of the water **12** minutes after it entered the water. Based on the function, what was the estimated depth, to the nearest meter, of the seal **10** minutes after it entered the water?

## Question ID 1073d70c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1073d70c

At the time that an article was first featured on the home page of a news website, there were 40 comments on the article. An exponential model estimates that at the end of each hour after the article was first featured on the home page, the number of comments on the article had increased by 190% of the number of comments on the article at the end of the previous hour. Which of the following equations best represents this model, where  $C$  is the estimated number of comments on the article  $t$  hours after the article was first featured on the home page and  $t \leq 4$ ?

- A.  $C = 40(1.19)^t$
- B.  $C = 40(1.9)^t$
- C.  $C = 40(19)^t$
- D.  $C = 40(2.9)^t$

## Question ID fb96a5b3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: fb96a5b3

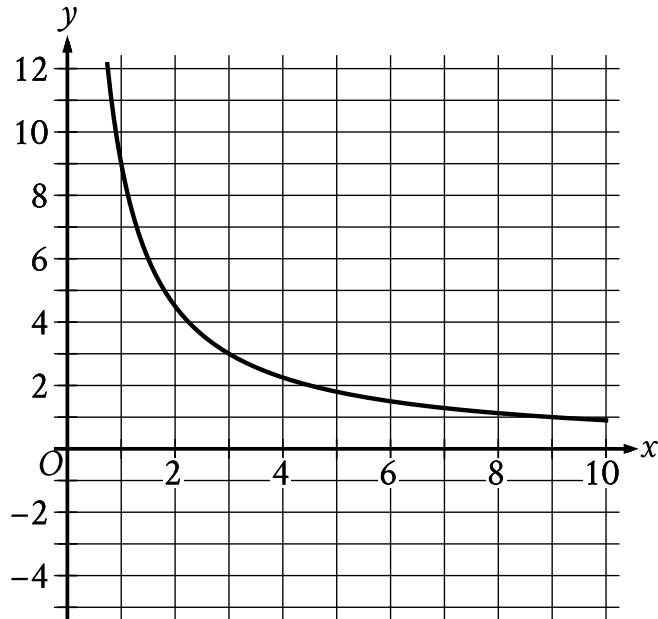
Which of the following expressions is equivalent to  $2(ab - 3) + 2$ ?

- A.  $2ab - 1$
- B.  $2ab - 4$
- C.  $2ab - 5$
- D.  $2ab - 8$

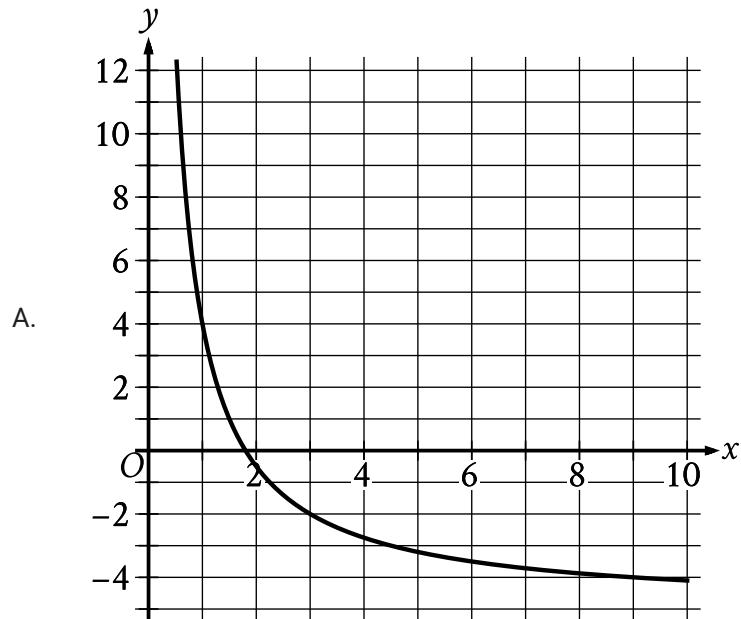
# Question ID aa95fb33

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

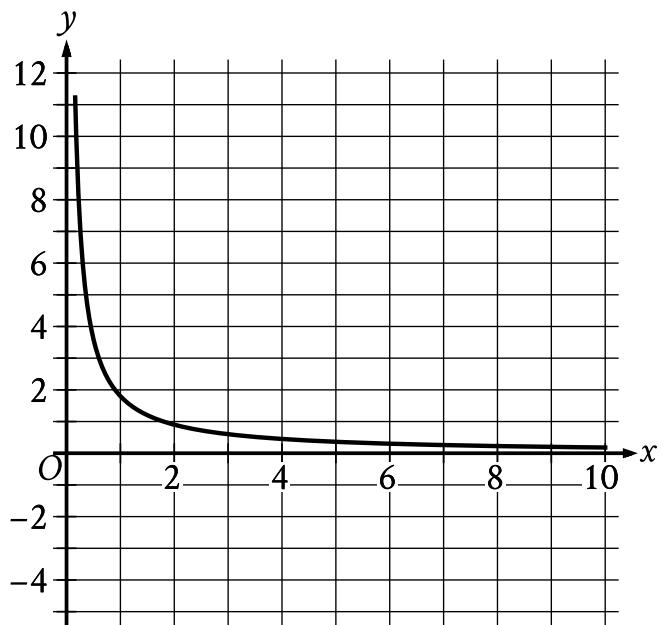
ID: aa95fb33



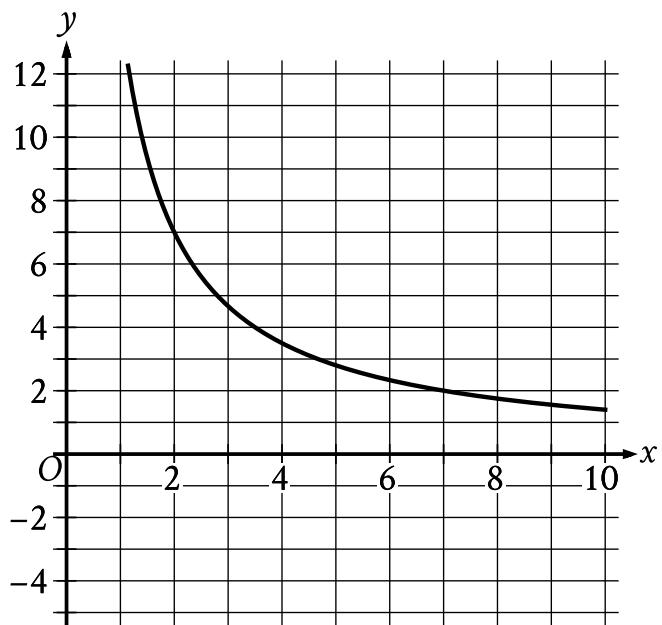
The graph of the rational function  $f$  is shown, where  $y = f(x)$  and  $x \geq 0$ . Which of the following is the graph of  $y = f(x) + 5$ , where  $x \geq 0$ ?



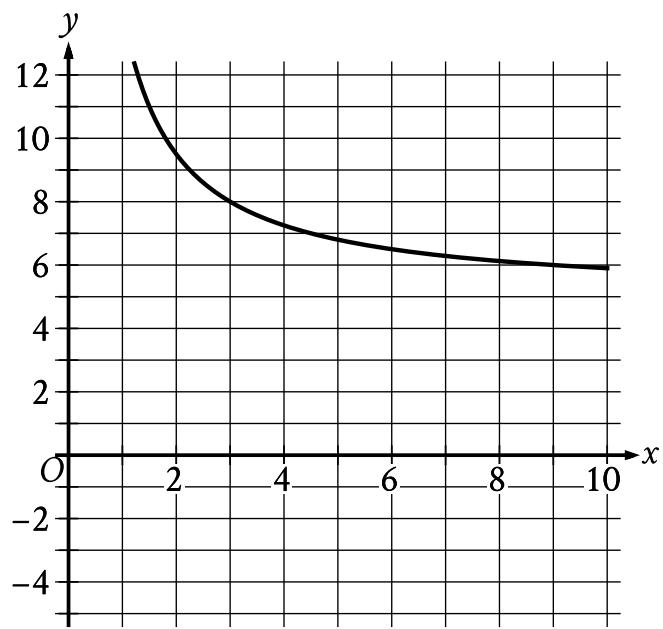
B.



C.



D.



## Question ID 09e5e4d3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 09e5e4d3

If  $\frac{42}{x} = 7x$ , what is the value of  $7x^2$ ?

- A. 6
- B. 7
- C. 42
- D. 294

## Question ID 1fe10d97

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1fe10d97

$$p(t) = 90,000(1.06)^t$$

The given function  $p$  models the population of Lowell  $t$  years after a census. Which of the following functions best models the population of Lowell  $m$  months after the census?

- A.  $r(m) = \frac{90,000}{12}(1.06)^m$
- B.  $r(m) = 90,000\left(\frac{1.06}{12}\right)^m$
- C.  $r(m) = 90,000\left(\frac{1.06}{12}\right)^{\frac{m}{12}}$
- D.  $r(m) = 90,000(1.06)^{\frac{m}{12}}$

## Question ID 6acdcece

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 6acdcece

$$b - 72 = \frac{x}{y}$$

The given equation relates the positive numbers  $b$ ,  $x$ , and  $y$ . Which equation correctly expresses  $x$  in terms of  $b$  and  $y$ ?

- A.  $x = \frac{b-72}{y}$
- B.  $x = by - 72$
- C.  $x = \frac{by-72}{y}$
- D.  $x = by - 72y$

## Question ID 7355b9d9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7355b9d9

If  $k - x$  is a factor of the expression  $-x^2 + \frac{1}{29}nk^2$ , where  $n$  and  $k$  are constants and  $k > 0$ , what is the value of  $n$ ?

- A.  $-29$
- B.  $-\frac{1}{29}$
- C.  $\frac{1}{29}$
- D.  $29$

# Question ID b73ee6cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: b73ee6cf

The population of a town is currently 50,000, and the population is estimated to increase each year by 3% from the previous year. Which of the following equations can be used to estimate the number of years,  $t$ , it will take for the population of the town to reach 60,000?

- A.  $50,000 = 60,000(0.03)^t$
- B.  $50,000 = 60,000(3)^t$
- C.  $60,000 = 50,000(0.03)^t$
- D.  $60,000 = 50,000(1.03)^t$

## Question ID 08d03fe4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 08d03fe4

For the exponential function  $f$ , the value of  $f(1)$  is  $k$ , where  $k$  is a constant. Which of the following equivalent forms of the function  $f$  shows the value of  $k$  as the coefficient or the base?

- A.  $f(x) = 50(2)^{x+1}$
- B.  $f(x) = 80(2)^x$
- C.  $f(x) = 128(2)^{x-1}$
- D.  $f(x) = 205(2)^{x-2}$

# Question ID df747160

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: df747160

Which expression is equivalent to  $17(x^2 - 100y^2)$ ?

- A.  $17(x - 2y)(x - 50y)$
- B.  $17(x - 2y)(x + 50y)$
- C.  $17(x - 10y)(x - 10y)$
- D.  $17(x - 10y)(x + 10y)$

## Question ID 3918e8bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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

## Question ID d964bc26

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: d964bc26

$$y - 57 = px$$

The given equation relates the positive numbers  $p$ ,  $x$ , and  $y$ . Which equation correctly expresses  $y$  in terms of  $p$  and  $x$ ?

- A.  $y = 57x + p$
- B.  $y = px + 57$
- C.  $y = 57px$
- D.  $y = \frac{px}{57}$

# Question ID 1dd13816

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1dd13816

$$(5x^3 - 3) - (-4x^3 + 8)$$

The given expression is equivalent to  $bx^3 - 11$ , where  $b$  is a constant. What is the value of  $b$ ?

## Question ID e597050f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e597050f

Which expression is equivalent to  $9x + 6x + 2y + 3y$ ?

- A.  $3x + 5y$
- B.  $6x + 8y$
- C.  $12x + 8y$
- D.  $15x + 5y$

# Question ID 7eed640d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7eed640d

$$h(x) = -16x^2 + 100x + 10$$

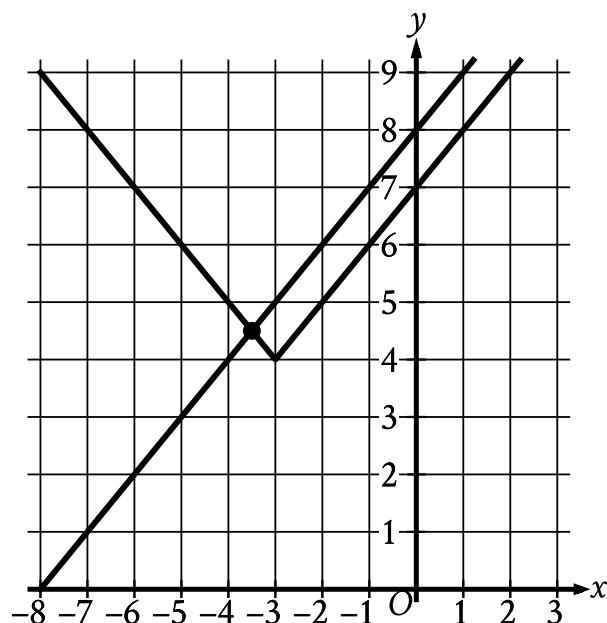
The quadratic function above models the height above the ground  $h$ , in feet, of a projectile  $x$  seconds after it had been launched vertically. If  $y = h(x)$  is graphed in the  $xy$ -plane, which of the following represents the real-life meaning of the positive  $x$ -intercept of the graph?

- A. The initial height of the projectile
- B. The maximum height of the projectile
- C. The time at which the projectile reaches its maximum height
- D. The time at which the projectile hits the ground

# Question ID 494d247d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div> <div style="width: 25%; background-color: #cccccc; height: 10px;"></div>

ID: 494d247d



The graph of a system of an absolute value function and a linear function is shown. What is the solution  $(x, y)$  to this system of two equations?

- A.  $(0, 8)$
- B.  $(\frac{7}{2}, \frac{9}{2})$
- C.  $(-\frac{7}{2}, \frac{9}{2})$
- D.  $(-3, 4)$

## Question ID 30a07668

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 30a07668

$$\begin{aligned}y &= 4x \\y &= x^2 - 12\end{aligned}$$

A solution to the given system of equations is  $(x, y)$ , where  $x > 0$ . What is the value of  $x$ ?

## Question ID 2d2ab76b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 2d2ab76b

$$y = x^2 - 1$$

$$y = 3$$

When the equations above are graphed in the  $xy$ -plane, what are the coordinates  $(x, y)$  of the points of intersection of the two graphs?

- A.  $(2, 3)$

and  $(-2, 3)$

- B.  $(2, 4)$

and  $(-2, 4)$

- C.  $(3, 8)$

and  $(-3, 8)$

- D.  $(\sqrt{2}, 3)$

and  $(-\sqrt{2}, 3)$

# Question ID de362c2f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: de362c2f

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

## Question ID 5dd53f73

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5dd53f73

Which expression is equivalent to  $34x + 34y$ ?

- A.  $34xy$
- B.  $34(x + y)$
- C.  $68y$
- D.  $68x$

# Question ID da602115

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: da602115

If  $|4x - 4| = 112$ , what is the positive value of  $x - 1$ ?

# Question ID 43926bd9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 43926bd9

$x$	$f(x)$
1	$a$
2	$a^5$
3	$a^9$

For the exponential function  $f$ , the table above shows several values of  $x$  and their corresponding values of  $f(x)$ , where  $a$  is a constant greater than 1. If  $k$  is a constant and  $f(k) = a^{29}$ , what is the value of  $k$ ?

# Question ID 1e8d7183

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 1e8d7183

Which expression is equivalent to  $256w^2 - 676$ ?

- A.  $(16w - 26)(16w - 26)$
- B.  $(8w - 13)(8w + 13)$
- C.  $(8w - 13)(8w - 13)$
- D.  $(16w - 26)(16w + 26)$

# Question ID 044c1cb7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 044c1cb7

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

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 7e5a3640

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7e5a3640

Bacteria are growing in a liquid growth medium. There were **300,000** cells per milliliter during an initial observation. The number of cells per milliliter doubles every **3** hours. How many cells per milliliter will there be **15** hours after the initial observation?

- A. **1,500,000**
- B. **2,400,000**
- C. **4,500,000**
- D. **9,600,000**

## Question ID 0354c7de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 0354c7de

$$5x + 15$$

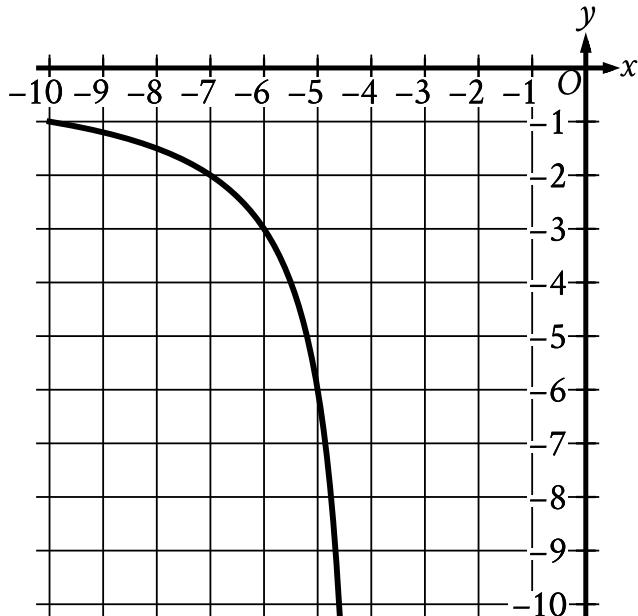
Which of the following is equivalent to the given expression?

- A.  $5(x + 3)$
- B.  $5(x + 10)$
- C.  $5(x + 15)$
- D.  $5(x + 20)$

# Question ID 4d037075

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 4d037075



The rational function  $f$  is defined by an equation in the form  $f(x) = \frac{a}{x+b}$ , where  $a$  and  $b$  are constants. The partial graph of  $y = f(x)$  is shown. If  $g(x) = f(x + 4)$ , which equation could define function  $g$ ?

- A.  $g(x) = \frac{6}{x}$
- B.  $g(x) = \frac{6}{x+4}$
- C.  $g(x) = \frac{6}{x+8}$
- D.  $g(x) = \frac{6(x+4)}{x+4}$

## Question ID 39652e93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 39652e93

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

## Question ID f25a34aa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: f25a34aa

The area of a triangle is equal to  $x^2$  square centimeters. The length of the base of the triangle is  $2x + 22$  centimeters, and the height of the triangle is  $x - 10$  centimeters. What is the value of  $x$ ?

## Question ID 4d7064a6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4d7064a6

$$f(x) = (x - 10)(x + 13)$$

The function  $f$  is defined by the given equation. For what value of  $x$  does  $f(x)$  reach its minimum?

- A.  $-130$
- B.  $-13$
- C.  $-\frac{23}{2}$
- D.  $-\frac{3}{2}$

## Question ID 4eaf0a3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4eaf0a3a

Which expression is equivalent to  $\sqrt[7]{x^9y^9}$ , where  $x$  and  $y$  are positive?

- A.  $(xy)^{\frac{7}{9}}$
- B.  $(xy)^{\frac{9}{7}}$
- C.  $(xy)^{16}$
- D.  $(xy)^{63}$

# Question ID c8e9a011

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c8e9a011

$$\frac{12}{n} - \frac{2}{t} = -\frac{2}{w}$$

The given equation relates the variables  $n$ ,  $t$ , and  $w$ , where  $n > 0$ ,  $t > 0$ , and  $w > t$ . Which expression is equivalent to  $n$ ?

- A.  $12tw$
- B.  $6(t - w)$
- C.  $\frac{w-t}{6tw}$
- D.  $\frac{6tw}{w-t}$

# Question ID 52e589f9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 52e589f9

$$m(t) = -0.0274\left(\frac{t}{7}\right)^2 + 7.3873\left(\frac{t}{7}\right) + 75.032$$

The function  $m$  gives the predicted body mass  $m(t)$ , in kilograms (kg), of a certain animal  $t$  days after it was born in a wildlife reserve, where  $t \leq 390$ . Which of the following is the best interpretation of the statement " $m(330)$  is approximately equal to 362" in this context?

- A. The predicted body mass of the animal was approximately 330 kg 362 days after it was born.
- B. The predicted body mass of the animal was approximately 362 kg 330 days after it was born.
- C. The predicted body mass of the animal was approximately 362 kg  $\frac{330}{7}$  days after it was born.
- D. The predicted body mass of the animal was approximately  $\frac{330}{7}$  kg 362 days after it was born.

# Question ID 7e6ea718

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 7e6ea718

$$y = 2(x - d)(x + d)(x + g)(x - d)$$

In the given equation,  $d$  and  $g$  are unique positive constants. When the equation is graphed in the  $xy$ -plane, how many distinct  $x$ -intercepts does the graph have?

- A. 4
- B. 3
- C. 2
- D. 1

# Question ID a58232b7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a58232b7

The functions  $g$  and  $h$  are defined by the given equations, where  $x \geq 0$ . Which of the following equations displays, as a constant or coefficient, the minimum value of the function it defines, where  $x \geq 0$ ?

- I.  $g(x) = 18(1.16)(1.4)^{x+2}$
- II.  $h(x) = 18(1.4)^{x+4}$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

# Question ID 4993b828

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4993b828

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 508344ac

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 508344ac

Which expression is equivalent to  $16(x + 15)$ ?

- A.  $16x + 31$
- B.  $16x + 240$
- C.  $16x + 1$
- D.  $16x + 15$

# Question ID 1853bb35

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 1853bb35

For the function  $q$ , the value of  $q(x)$  decreases by 45% for every increase in the value of  $x$  by 1. If  $q(0) = 14$ , which equation defines  $q$ ?

- A.  $q(x) = 0.55(14)^x$
- B.  $q(x) = 1.45(14)^x$
- C.  $q(x) = 14(0.55)^x$
- D.  $q(x) = 14(1.45)^x$

## Question ID a54753ca

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a54753ca

In the  $xy$ -plane, the graph of the equation  $y = -x^2 + 9x - 100$  intersects the line  $y = c$  at exactly one point. What is the value of  $c$ ?

- A.  $-\frac{481}{4}$
- B.  $-100$
- C.  $-\frac{319}{4}$
- D.  $-\frac{9}{2}$

## Question ID c602140f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: c602140f

$$(x - 11y)(2x - 3y) - 12y(-2x + 3y)$$

Which of the following is equivalent to the expression above?

- A.  $x - 23y$
- B.  $2x^2 - xy - 3y^2$
- C.  $2x^2 + 24xy + 36y^2$
- D.  $2x^2 - 49xy + 69y^2$

# Question ID fcb78856

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: fcb78856

$$b = 42cf$$

The given equation relates the positive numbers  $b$ ,  $c$ , and  $f$ . Which equation correctly expresses  $c$  in terms of  $b$  and  $f$ ?

- A.  $c = \frac{b}{42f}$
- B.  $c = \frac{b-42}{f}$
- C.  $c = 42bf$
- D.  $c = 42 - b - f$

## Question ID a8ae0d22

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a8ae0d22

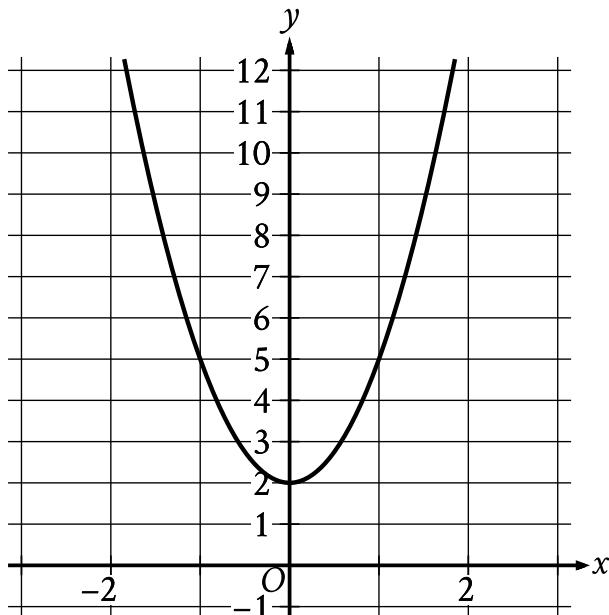
Two variables,  $x$  and  $y$ , are related such that for each increase of 1 in the value of  $x$ , the value of  $y$  increases by a factor of 4. When  $x = 0$ ,  $y = 200$ . Which equation represents this relationship?

- A.  $y = 4(x)^{200}$
- B.  $y = 4(200)^x$
- C.  $y = 200(x)^4$
- D.  $y = 200(4)^x$

# Question ID 782a8a53

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 782a8a53



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.  $(0, 3)$

## Question ID fd4b2aa0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: fd4b2aa0

Which expression is equivalent to  $12x^3 - 5x^3$ ?

- A.  $7x^6$
- B.  $17x^3$
- C.  $7x^3$
- D.  $17x^6$

# Question ID 981aca65

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 981aca65

$$f(x) = \frac{a-19}{x} + 5$$

In the given function  $f$ ,  $a$  is a constant. The graph of function  $f$  in the  $xy$ -plane, where  $y = f(x)$ , is translated 3 units down and 4 units to the right to produce the graph of  $y = g(x)$ . Which equation defines function  $g$ ?

- A.  $g(x) = \frac{a-19}{x+4} + 2$
- B.  $g(x) = \frac{a-19}{x-4} + 2$
- C.  $g(x) = \frac{a-22}{x+4} + 5$
- D.  $g(x) = \frac{a-22}{x-4} + 5$

## Question ID bf704c34

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div> <div style="width: 75%; background-color: #cccccc; height: 10px;"></div>

ID: bf704c34

$$c - 7 = 25p + k$$

The given equation relates the positive numbers  $c$ ,  $p$ , and  $k$ . Which equation correctly expresses  $c$  in terms of  $p$  and  $k$ ?

- A.  $c = 25p + k + 7$
- B.  $c = 25p + k - 7$
- C.  $c = 7(25p + k)$
- D.  $c = \frac{25p+k}{7}$

## Question ID 4236c5a3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4236c5a3

If  $(x + 5)^2 = 4$ , which of the following is a possible value of  $x$ ?

- A. 1
- B. -1
- C. -2
- D. -3

# Question ID 161126cf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 161126cf

$$f(x) = (1.84)^{\frac{x}{4}}$$

The function  $f$  is defined by the given equation. The equation can be rewritten as  $f(x) = \left(1 + \frac{p}{100}\right)^x$ , where  $p$  is a constant. Which of the following is closest to the value of  $p$ ?

- A. 16
- B. 21
- C. 46
- D. 96

# Question ID a7711fe8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a7711fe8

What is the minimum value of the function  $f$  defined by  $f(x) = (x - 2)^2 - 4$ ?

A. -4

B. -2

C. 2

D. 4

# Question ID 7a4475df

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 7a4475df

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 3b4b8831

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3b4b8831

$$38x^2 = 38(9)$$

What is the negative solution to the given equation?

# Question ID f5247e52

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: f5247e52

$$y = ax^2 - c$$

In the equation above,  $a$  and  $c$  are positive constants. How many times does the graph of the equation above intersect the graph of the equation  $y = a + c$  in the  $xy$ -plane?

- A. Zero
- B. One
- C. Two
- D. More than two

## Question ID 1a722d7d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 1a722d7d

$$p(x) = \frac{(x-c)^2 + 160}{2c}$$

Let the function  $p$  be defined as  $p(x) = \frac{(x-c)^2 + 160}{2c}$ , where  $c$  is a constant. If

$p(c) = 10$ , what is the value of  $p(12)$  ?

- A. 10.00
- B. 10.25
- C. 10.75
- D. 11.00

# Question ID be1b8c74

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: be1b8c74

$$x = 8a(b + 9)$$

The given equation relates the positive numbers  $a$ ,  $b$ , and  $x$ . Which equation correctly expresses  $a$  in terms of  $b$  and  $x$ ?

- A.  $a = \frac{x}{8} - (b + 9)$
- B.  $a = \frac{x}{8(b+9)}$
- C.  $a = \frac{8(b+9)}{x}$
- D.  $a = 8x(b + 9)$

## Question ID f11ffa93

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: f11ffa93

$$\sqrt{x+4} = 11$$

What value of  $x$  satisfies the equation above?

## Question ID 3a01a5ee

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3a01a5ee

$$|-5x + 13| = 73$$

What is the sum of the solutions to the given equation?

- A.  $-\frac{146}{5}$
- B. -12
- C. 0
- D.  $\frac{26}{5}$

# Question ID 6e7ae9fc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 6e7ae9fc

The function  $g$  is defined by  $g(x) = x(x - 2)(x + 6)^2$ . The value of  $g(7 - w)$  is 0, where  $w$  is a constant. What is the sum of all possible values of  $w$ ?

## Question ID ee05c84e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: ee05c84e

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

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

- A. 250
- B. 500
- C. 750
- D. 2,000

# Question ID 5d93c782

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 5d93c782

Which expression is equivalent to  $x^2 + 3x - 40$ ?

- A.  $(x - 4)(x + 10)$
- B.  $(x - 5)(x + 8)$
- C.  $(x - 8)(x + 5)$
- D.  $(x - 10)(x + 4)$

## Question ID 5c00c2c1

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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.  $p(t) = (24 \cdot 1.162)^t$

# Question ID 974d33dc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 974d33dc

Which of the following expressions is equivalent to the sum of  $(r^3 + 5r^2 + 7)$  and  $(r^2 + 8r + 12)$ ?

- A.  $r^5 + 13r^3 + 19$
- B.  $2r^3 + 13r^2 + 19$
- C.  $r^3 + 5r^2 + 7r + 12$
- D.  $r^3 + 6r^2 + 8r + 19$

## Question ID d4d513ff

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: d4d513ff

Which expression is equivalent to  $12x + 27$ ?

- A.  $12(9x + 1)$
- B.  $27(12x + 1)$
- C.  $3(4x + 9)$
- D.  $3(9x + 24)$

# Question ID 48f83c34

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 48f83c34

A right rectangular prism has a height of **9** inches. The length of the prism's base is  $x$  inches, which is **7** inches more than the width of the prism's base. Which function  $V$  gives the volume of the prism, in cubic inches, in terms of the length of the prism's base?

- A.  $V(x) = x(x + 9)(x + 7)$
- B.  $V(x) = x(x + 9)(x - 7)$
- C.  $V(x) = 9x(x + 7)$
- D.  $V(x) = 9x(x - 7)$

## Question ID 58b109d4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 58b109d4

$$x^2 + y + 7 = 7$$

$$20x + 100 - y = 0$$

The solution to the given system of equations is  $(x, y)$ . What is the value of  $x$ ?

# Question ID beca03de

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: beca03de

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 4e18fc5d

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 25%; background-color: #003366; height: 10px;"></div> <div style="width: 50%; background-color: #cccccc; height: 10px;"></div>

ID: 4e18fc5d

$$v = -\frac{w}{150x}$$

The given equation relates the distinct positive numbers  $v$ ,  $w$ , and  $x$ . Which equation correctly expresses  $w$  in terms of  $v$  and  $x$ ?

- A.  $w = -150vx$
- B.  $w = -\frac{150v}{x}$
- C.  $w = -\frac{x}{150v}$
- D.  $w = v + 150x$

## Question ID f5c3e3b8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: f5c3e3b8

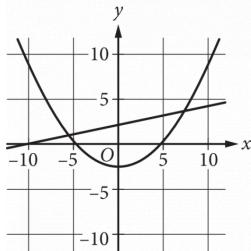
Which expression is equivalent to  $(m^4q^4z^{-1})(mq^5z^3)$ , where  $m$ ,  $q$ , and  $z$  are positive?

- A.  $m^4q^{20}z^{-3}$
- B.  $m^5q^9z^2$
- C.  $m^6q^8z^{-1}$
- D.  $m^{20}q^{12}z^{-2}$

# Question ID a5663025

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a5663025



A system of equations consists of a quadratic equation and a linear equation. The equations in this system are graphed in the  $xy$ -plane above. How many solutions does this system have?

- A. 0
- B. 1
- C. 2
- D. 3

## Question ID 3c95093c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 3c95093c

$$6x - 9y > 12$$

Which of the following inequalities is equivalent to the inequality above?

- A.  $x - y > 2$
- B.  $2x - 3y > 4$
- C.  $3x - 2y > 4$
- D.  $3y - 2x > 2$

# Question ID d0a7871e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: d0a7871e

$$y = x + 1$$

$$y = x^2 + x$$

If  $(x, y)$  is a solution to the system of equations above, which of the following could be the value of  $x$ ?

- A. -1
- B. 0
- C. 2
- D. 3

# Question ID 72ebc024

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 72ebc024

Which expression is equivalent to  $16x^3y^2 + 14xy$ ?

- A.  $2xy(8xy + 7)$
- B.  $2xy(8x^2y + 7)$
- C.  $14xy(2x^2y + 1)$
- D.  $14xy(8x^2y + 1)$

## Question ID dd4ab4c4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: dd4ab4c4

$$4a^2 + 20ab + 25b^2$$

Which of the following is a factor of the polynomial above?

- A.  $a + b$
- B.  $2a + 5b$
- C.  $4a + 5b$
- D.  $4a + 25b$

## Question ID b8caaf84

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: b8caaf84

If  $p = 3x + 4$  and  $v = x + 5$ , which of the following is equivalent to  $pv - 2p + v$ ?

- A.  $3x^2 + 12x + 7$
- B.  $3x^2 + 14x + 17$
- C.  $3x^2 + 19x + 20$
- D.  $3x^2 + 26x + 33$

# Question ID 7f81d0c3

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7f81d0c3

$$x^2 - x - 1 = 0$$

What values satisfy the equation above?

A.  $x = 1$  and  $x = 2$

B.  $x = -\frac{1}{2}$  and  $x = \frac{3}{2}$

C.  $x = \frac{1+\sqrt{5}}{2}$  and  $x = \frac{1-\sqrt{5}}{2}$

D.  $x = \frac{-1+\sqrt{5}}{2}$  and  $x = \frac{-1-\sqrt{5}}{2}$

## Question ID 332cd67b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 332cd67b

$$3x^2 - 15x + 18 = 0$$

How many distinct real solutions are there to the given equation?

- A. Exactly one
- B. Exactly two
- C. Infinitely many
- D. Zero

# Question ID 301faf80

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 301faf80

The product of two positive integers is 462. If the first integer is 5 greater than twice the second integer, what is the smaller of the two integers?

## Question ID 128c75e2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

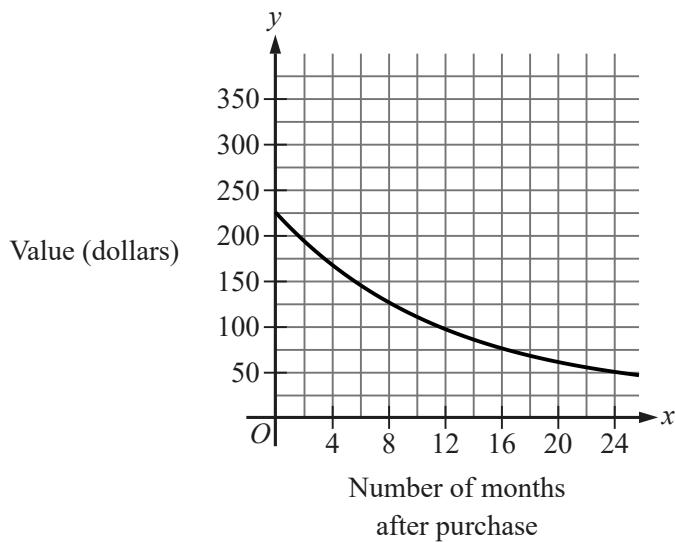
ID: 128c75e2

The function  $g$  is defined by  $g(x) = \frac{|x|}{a} - 14$ , where  $a < 0$ . What is the product of  $g(15a)$  and  $g(7a)$ ?

# Question ID 7f2524bf

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 7f2524bf



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.

# Question ID e312081b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: e312081b

$$(x + 5) + (2x - 3)$$

Which of the following is equivalent to the given expression?

- A.  $3x - 2$
- B.  $3x + 2$
- C.  $3x - 8$
- D.  $3x + 8$

# Question ID 02060533

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div> <div style="width: 100px; height: 10px; background-color: #0056b3;"></div>

ID: 02060533

$x$	$g(x)$
-27	3
-9	0
21	5

The table shows three values of  $x$  and their corresponding values of  $g(x)$ , where  $g(x) = \frac{f(x)}{x+3}$  and  $f$  is a linear function. What is the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane?

- A. (0, 36)
- B. (0, 12)
- C. (0, 4)
- D. (0, -9)

# Question ID 52931bfa

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: 52931bfa

Which expression is equivalent to  $\frac{8x(x-7)-3(x-7)}{2x-14}$ , where  $x > 7$ ?

- A.  $\frac{x-7}{5}$
- B.  $\frac{8x-3}{2}$
- C.  $\frac{8x^2-3x-14}{2x-14}$
- D.  $\frac{8x^2-3x-77}{2x-14}$

# Question ID 1e003284

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #002B36; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div> <div style="width: 75%; background-color: #D9D9D9; height: 10px;"></div>

ID: 1e003284

$$\begin{aligned}x &= 49 \\y &= \sqrt{x} + 9\end{aligned}$$

The graphs of the given equations intersect at the point  $(x, y)$  in the  $xy$ -plane. What is the value of  $y$ ?

- A. 16
- B. 40
- C. 81
- D. 130

# Question ID 91e7ea5e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 91e7ea5e

$$h(x) = 2(x - 4)^2 - 32$$

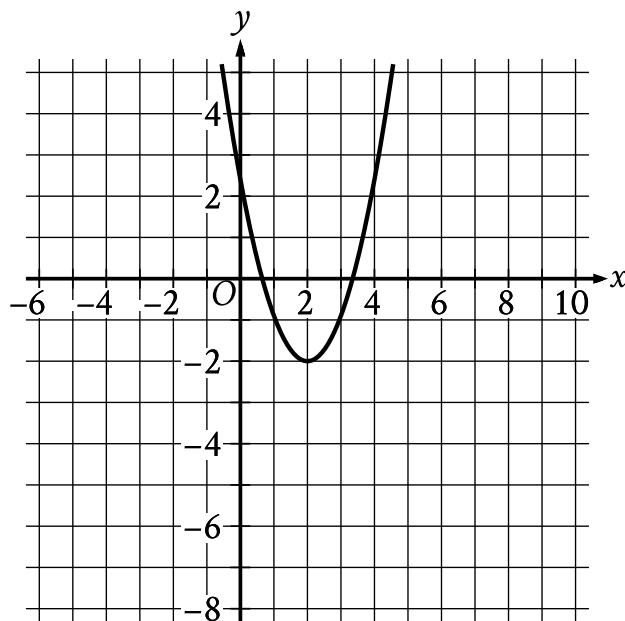
The quadratic function  $h$  is defined as shown. In the  $xy$ -plane, the graph of  $y = h(x)$  intersects the  $x$ -axis at the points  $(0, 0)$  and  $(t, 0)$ , where  $t$  is a constant. What is the value of  $t$ ?

- A. 1
- B. 2
- C. 4
- D. 8

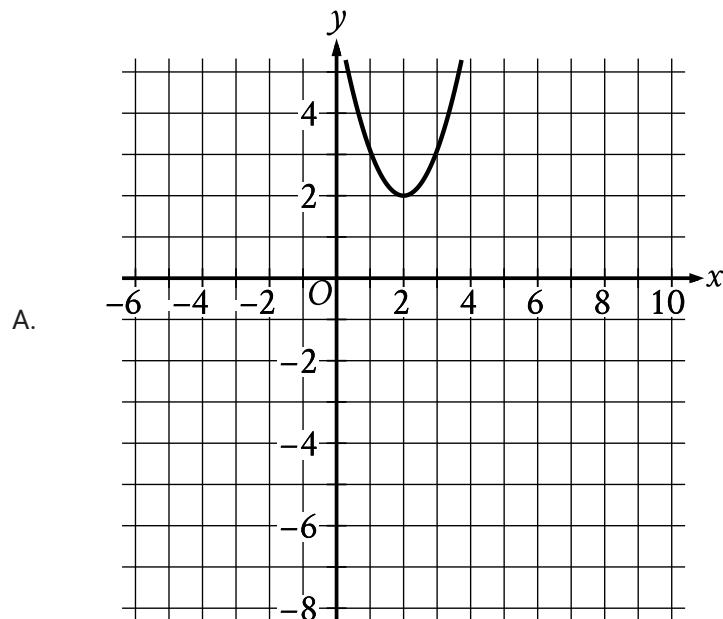
# Question ID e9aed539

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

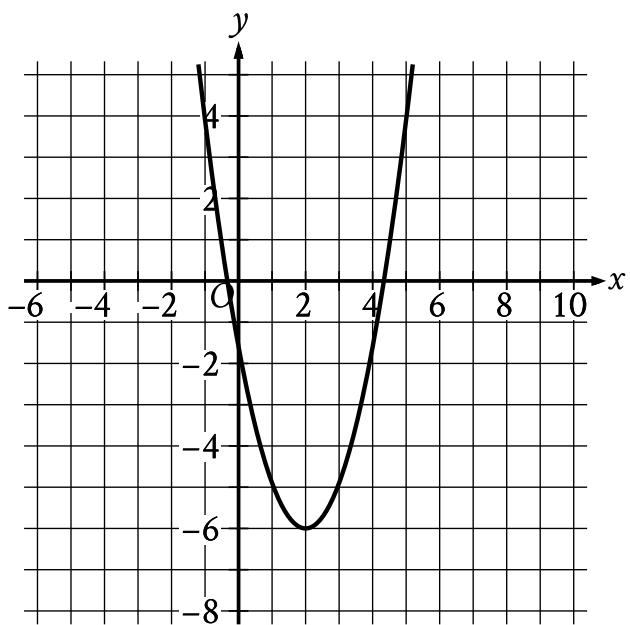
ID: e9aed539



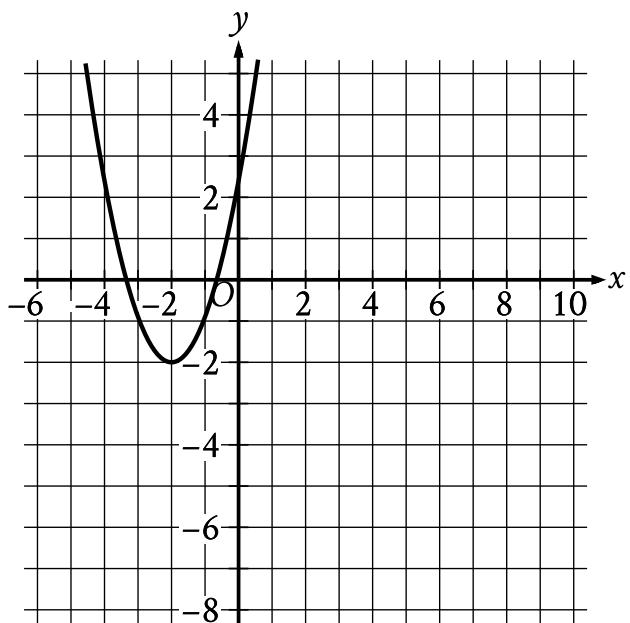
The graph shown will be translated up 4 units. Which of the following will be the resulting graph?

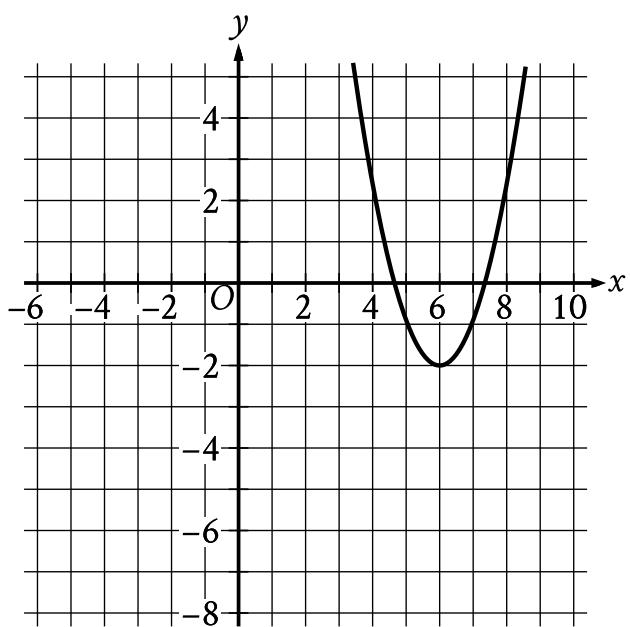


B.



C.





## Question ID 358f18bc

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: 358f18bc

$$f(x) = x^2 - 48x + 2,304$$

What is the minimum value of the given function?

## Question ID 3a9d60b2

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 3a9d60b2

$$2|4 - x| + 3|4 - x| = 25$$

What is the positive solution to the given equation?

# Question ID 8490cc45

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8490cc45

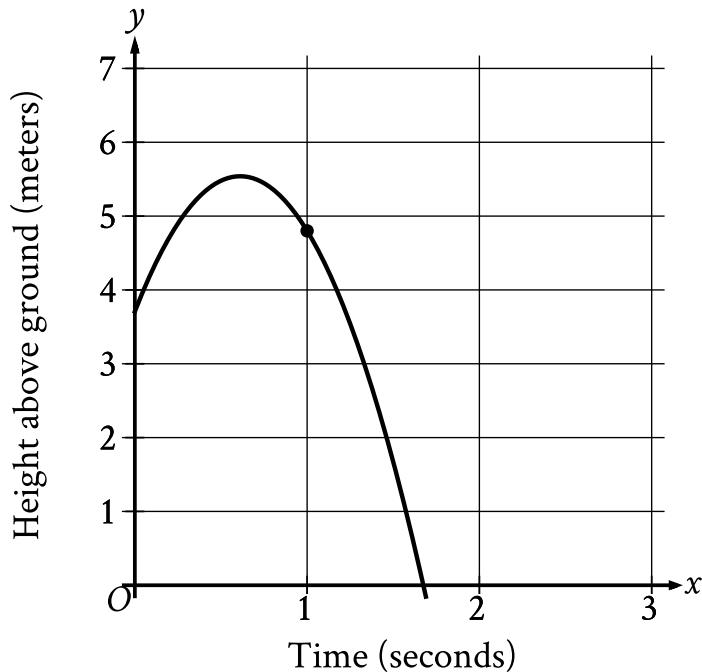
The function  $f$  is defined by  $f(x) = (-8)(2)^x + 22$ . What is the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane?

- A.  $(0, 14)$
- B.  $(0, 2)$
- C.  $(0, 22)$
- D.  $(0, -8)$

# Question ID 4fbffc0a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 4fbffc0a



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 ebed7dc6

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ebed7dc6

An auditorium has seats for 1,800 people. Tickets to attend a show at the auditorium currently cost \$4.00. For each \$1.00 increase to the ticket price, 100 fewer tickets will be sold. This situation can be modeled by the equation

$y = -100x^2 + 1,400x + 7,200$ , where  $x$  represents the increase in ticket price, in dollars, and  $y$  represents the revenue, in dollars, from ticket sales. If this equation is graphed in the  $xy$ -plane, at what value of  $x$  is the maximum of the graph?

- A. 4
- B. 7
- C. 14
- D. 18

## Question ID ba0edc30

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: ba0edc30

$$x^2 - 2x - 9 = 0$$

One solution to the given equation can be written as  $1 + \sqrt{k}$ , where  $k$  is a constant. What is the value of  $k$ ?

- A. 8
- B. 10
- C. 20
- D. 40

# Question ID 39714777

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 39714777

$$p(x) + 57 = x^2$$

The given equation relates the value of  $x$  and its corresponding value of  $p(x)$  for the function  $p$ . What is the minimum value of the function  $p$ ?

- A. -3,249
- B. -57
- C. 57
- D. 3,249

## Question ID fc3d783a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: fc3d783a

In the  $xy$ -plane, a line with equation  $2y = 4.5$  intersects a parabola at exactly one point. If the parabola has equation  $y = -4x^2 + bx$ , where  $b$  is a positive constant, what is the value of  $b$ ?

## Question ID a9084ca4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: a9084ca4

$$f(x) = 9,000(0.66)^x$$

The given function  $f$  models the number of advertisements a company sent to its clients each year, where  $x$  represents the number of years since 1997, and  $0 \leq x \leq 5$ . If  $y = f(x)$  is graphed in the  $xy$ -plane, which of the following is the best interpretation of the  $y$ -intercept of the graph in this context?

- A. The minimum estimated number of advertisements the company sent to its clients during the 5 years was 1,708.
- B. The minimum estimated number of advertisements the company sent to its clients during the 5 years was 9,000.
- C. The estimated number of advertisements the company sent to its clients in 1997 was 1,708.
- D. The estimated number of advertisements the company sent to its clients in 1997 was 9,000.

## Question ID 075b29b0

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div> <div style="width: 75%; background-color: #e0e0e0; height: 10px;"></div>

ID: 075b29b0

Which expression is equivalent to  $(9x^3 + 5x + 7) + (6x^3 + 5x^2 - 5)$ ?

- A.  $15x^6 + 5x^2 - 5x - 35$
- B.  $15x^3 + 10x^2 + 2$
- C.  $15x^6 + 5x^2 + 5x + 2$
- D.  $15x^3 + 5x^2 + 5x + 2$

## Question ID 2c6f214f

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 2c6f214f

The first term of a sequence is 9. Each term after the first is 4 times the preceding term. If  $w$  represents the  $n$ th term of the sequence, which equation gives  $w$  in terms of  $n$ ?

- A.  $w = 4(9^n)$
- B.  $w = 4(9^{n-1})$
- C.  $w = 9(4^n)$
- D.  $w = 9(4^{n-1})$

# Question ID 781c2f6e

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 781c2f6e

The function  $f$  is defined by  $f(x) = a(2.2^x + 2.2^b)$ , where  $a$  and  $b$  are integer constants and  $0 < a < b$ . The functions  $g$  and  $h$  are equivalent to function  $f$ , where  $k$  and  $m$  are constants. Which of the following equations displays the  $y$ -coordinate of the  $y$ -intercept of the graph of  $y = f(x)$  in the  $xy$ -plane as a constant or coefficient?

- I.  $g(x) = a(2.2^x + k)$
- II.  $h(x) = a(2.2)^x + m$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

# Question ID cb29c54c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: cb29c54c

A physics class is planning an experiment about a toy rocket. The equation  $y = -16(x - 5.6)^2 + 502$  gives the estimated height  $y$ , in feet, of the toy rocket  $x$  seconds after it is launched into the air. Which of the following is the best interpretation of the vertex of the graph of the equation in the  $xy$ -plane?

- A. This toy rocket reaches an estimated maximum height of **502** feet **16** seconds after it is launched into the air.
- B. This toy rocket reaches an estimated maximum height of **502** feet **5.6** seconds after it is launched into the air.
- C. This toy rocket reaches an estimated maximum height of **16** feet **502** seconds after it is launched into the air.
- D. This toy rocket reaches an estimated maximum height of **5.6** feet **502** seconds after it is launched into the air.

## Question ID 4661e2a9

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 4661e2a9

$$x - y = 1$$

$$x + y = x^2 - 3$$

Which ordered pair is a solution to the system of equations above?

A.  $(1 + \sqrt{3}, \sqrt{3})$

B.  $(\sqrt{3}, -\sqrt{3})$

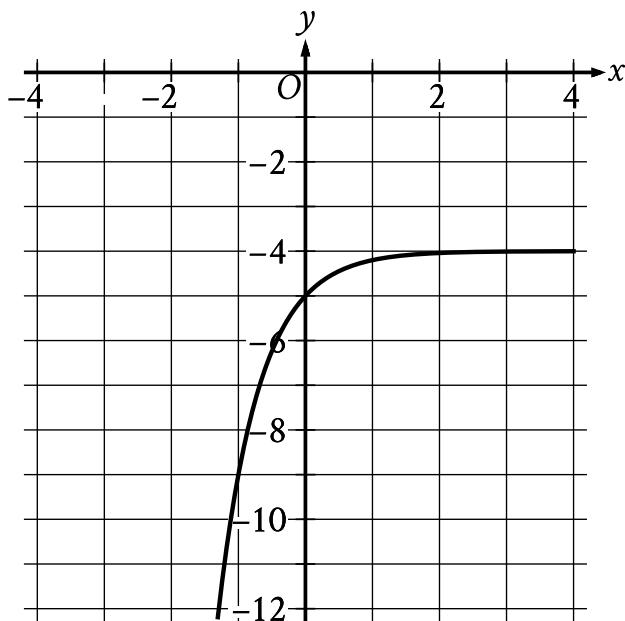
C.  $(1 + \sqrt{5}, \sqrt{5})$

D.  $(\sqrt{5}, -1 + \sqrt{5})$

# Question ID 6abec9a8

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 6abec9a8



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

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

# Question ID ad2ec615

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 20%; background-color: #0056b3; height: 10px;"></div> <div style="width: 60%; background-color: #e0e0e0; height: 10px;"></div>

ID: ad2ec615

Which of the following is equivalent to the expression  $x^4 - x^2 - 6$ ?

- A.  $(x^2 + 1)(x^2 - 6)$
- B.  $(x^2 + 2)(x^2 - 3)$
- C.  $(x^2 + 3)(x^2 - 2)$
- D.  $(x^2 + 6)(x^2 - 1)$

## Question ID 42c71eb5

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 42c71eb5

$$(2x + 5)^2 - (x - 2) + 2(x + 3)$$

Which of the following is equivalent to the expression above?

- A.  $4x^2 + 21x + 33$
- B.  $4x^2 + 21x + 29$
- C.  $4x^2 + x + 29$
- D.  $4x^2 + x + 33$

# Question ID 52b1700c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: 52b1700c

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 371cbf6b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 371cbf6b

$$(ax + 3)(5x^2 - bx + 4) = 20x^3 - 9x^2 - 2x + 12$$

The equation above is true for all  $x$ , where  $a$  and  $b$  are constants. What is the value of  $ab$ ?

- A. 18
- B. 20
- C. 24
- D. 40

## Question ID b4acba95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear equations in one variable and systems of equations in two variables	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: b4acba95

$$x^2 - 12x + 27 = 0$$

How many distinct real solutions does the given equation have?

- A. Exactly two
- B. Exactly one
- C. Zero
- D. Infinitely many

# Question ID ff8c5844

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ff8c5844

$x$	$g(x)$
-1	25
0	1
1	$\frac{1}{25}$
2	$\frac{1}{625}$

For the exponential function  $g$ , the table shows four values of  $x$  and their corresponding values of  $g(x)$ . Which equation defines  $g$ ?

- A.  $g(x) = -25^x$
- B.  $g(x) = -\left(\frac{1}{25}\right)^x$
- C.  $g(x) = 25^x$
- D.  $g(x) = \left(\frac{1}{25}\right)^x$

## Question ID a05bd3a4

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: a05bd3a4

Which of the following expressions is equivalent to  $x^2 - 5$ ?

A.  $(x + \sqrt{5})^2$

B.  $(x - \sqrt{5})^2$

C.  $(x + \sqrt{5})(x - \sqrt{5})$

D.  $(x + 5)(x - 1)$

## Question ID c3b116d7

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: c3b116d7

Which of the following expressions is(are) a factor of  $3x^2 + 20x - 63$ ?

- I.  $x - 9$
- II.  $3x - 7$

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

## Question ID 40c09d66

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Equivalent expressions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 40c09d66

$$\text{If } \frac{\sqrt{x^5}}{\sqrt[3]{x^4}} = x^{\frac{a}{b}} \text{ for all positive values of } x,$$

what is the value of  $\frac{a}{b}$ ?

# Question ID f423771c

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: f423771c

$x$	$h(x)$
0	1.23
2	1.54
4	1.94

The table shows the exponential relationship between the number of years,  $x$ , since Hana started training in pole vault, and the estimated height  $h(x)$ , in meters, of her best pole vault for that year. Which of the following functions best represents this relationship, where  $x \leq 4$ ?

- A.  $h(x) = 1.12(0.23)^x$
- B.  $h(x) = 1.12(1.23)^x$
- C.  $h(x) = 1.23(0.12)^x$
- D.  $h(x) = 1.23(1.12)^x$

## Question ID b8f13a3a

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 60%; background-color: #0056b3; height: 10px;"></div>

ID: b8f13a3a

Function  $f$  is defined by  $f(x) = -a^x + b$ , where  $a$  and  $b$  are constants. In the  $xy$ -plane, the graph of  $y = f(x) - 12$  has a  $y$ -intercept at  $(0, -\frac{75}{7})$ . The product of  $a$  and  $b$  is  $\frac{320}{7}$ . What is the value of  $a$ ?

## Question ID 8e1da169

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 75%; background-color: #0056b3; height: 10px;"></div>

ID: 8e1da169

$$f(x) = (x - 44)(x - 46)$$

The function  $f$  is defined by the given equation. For what value of  $x$  does  $f(x)$  reach its minimum?

- A. 46
- B. 45
- C. 44
- D. -1

# Question ID 1d3c5c95

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 25%; background-color: #0056b3; height: 10px;"></div> <div style="width: 50%; background-color: #e0e0e0; height: 10px;"></div>

ID: 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**

## Question ID ae05d37b

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 50%; background-color: #e0e0e0;"></div>

ID: ae05d37b

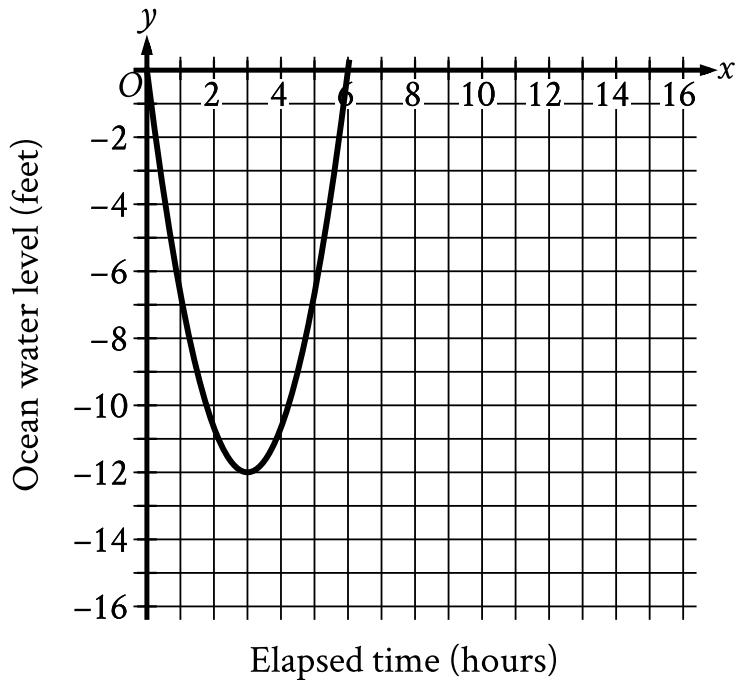
The function  $f(t) = 40,000(2)^{\frac{t}{790}}$  gives the number of bacteria in a population  $t$  minutes after an initial observation. How much time, in minutes, does it take for the number of bacteria in the population to double?

- A. 2
- B. 790
- C. 1,580
- D. 40,000

# Question ID 1ee962ec

Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Advanced Math	Nonlinear functions	<div style="width: 25%; background-color: #0056b3;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div> <div style="width: 25%; background-color: #e0e0e0;"></div>

ID: 1ee962ec



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

A.

$x$	$y$
0	-12
0	3
3	6

B.

$x$	$y$
0	0
3	12
0	-6

C.

$x$	$y$
0	0
3	-12
6	0

D.

$x$	$y$
0	0
12	3
-6	0