# Question ID 2d1e5eff

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 2d1e5eff**

$$y = 2x^2 - 21x + 64$$
$$y = 3x + a$$

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 68298043

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 68298043**

$$y + k = x + 26$$
$$y - k = x^2 - 5x$$

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 65244c8d

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 65244c8d**

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

What is the smallest solution to the given equation?

# Question ID 8217606b

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 8217606b**

$$64x^2 - (16a + 4b)x + ab = 0$$

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 0e4cd7da

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 0e4cd7da**

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 536832c0

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 536832c0**

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 6c28bdc9

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 6c28bdc9**

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

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

# Question ID c9d2651d

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: c9d2651d**

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

# Question ID b40b491b

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: b40b491b**

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

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. $w =$ msup $- 19$

D. $w =$ msup $- 19$

# Question ID d9799723

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: d9799723**

$$x^2 - 40x - 10 = 0$$

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

A. $0$

B. $5$

C. $10$

D. $40$

# Question ID 9298a52e

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 9298a52e**

$$x^2 + y + 7 = 7$$
$$20x + 100 - y = 0$$

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

# Question ID 8e46ba71

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

ID: 8e46ba71

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

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 e1774551

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: e1774551**

$$|-5x + 13| = 73$$

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 cde831b3

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: cde831b3**

$$x^2 - 2x - 9 = 0$$

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 95b69a20

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 95b69a20**

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

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 b939a904

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: b939a904**

$$64x^2 + bx + 25 = 0$$

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 1844a2ab

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 1844a2ab**

$$y = -2.5$$
$$y = x^2 + 8x + k$$

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 98a35f81

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

ID: 98a35f81

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

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 2d8f1f6a

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 2d8f1f6a**

$$8x + y = -11$$
$$2x^2 = y + 341$$

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 962eb92e

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 962eb92e**

$$\frac{12}{n} - \frac{2}{t} = -\frac{2}{w}$$

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 2e655326

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 2e655326**

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

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 edcedac7

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: edcedac7**

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 14fe10e5

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 14fe10e5**

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

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

# Question ID 960aabc0

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 960aabc0**

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 2b7d8635

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

ID: 2b7d8635

$$y = -1.5$$
$$y = x^2 + 8x + a$$

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 59cf1dd3

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 59cf1dd3**

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

How many distinct real solutions does the given equation have?

A. Exactly one

B. Exactly two

C. Infinitely many

D. Zero

# Question ID 33cc7555

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 33cc7555**

$$2|4-x|+3|4-x|=25$$

What is the positive solution to the given equation?

# Question ID a4b12e2f

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: a4b12e2f**

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

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 9f13fad1

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 9f13fad1**

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

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

# Question ID b2e26a55

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: b2e26a55**

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 032caee7

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 032caee7**

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

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 54fecb11

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 54fecb11**

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

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 37cf569f

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 37cf569f**

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

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

# Question ID 14787dca

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 14787dca**

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

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 409b7ab8

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 409b7ab8**

$$y = 18$$
$$y = -3(x - 18)^2 + 15$$

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 e7f2ab9c

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: e7f2ab9c**

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

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 2aaaec85

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 2aaaec85**

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

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 36ca6037

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 36ca6037**

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

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 1aec2be9

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 1aec2be9**

$$y = x + 9$$
$$y = x^2 + 16x + 63$$

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 9a182495

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: 9a182495**

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

How many distinct real solutions does the given equation have?

A. Exactly one

B. Exactly two

C. Infinitely many

D. Zero

# Question ID dba8a697

| Assessment | Test | Domain | Skill | Difficulty |
|---|---|---|---|---|
| SAT | Math | Advanced Math | Nonlinear equations in one variable and systems of equations in two variables | Hard |

**ID: dba8a697**

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

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