Pre-Calculus 11 - VLN

Chapter 3: Quadratic Equations

Lesson 8: Extra Practice

Question #1: Positive root of a Parabola

Reference Q.13813

Bailey used the quadratic formula to determine the positive root of the equation $2a^2 - 25a = 80.$ To the nearest tenth, this root is ____.

Question #2: Roots of a Parabola

Reference Q.13814

The roots of the equation $4x^2 + 4x - 5 = 0$ can be written in the form $x = \frac{-1 \pm \sqrt{A}}{2}.$

The value of A is

A. 6
B. 12
C. 24
D. 96

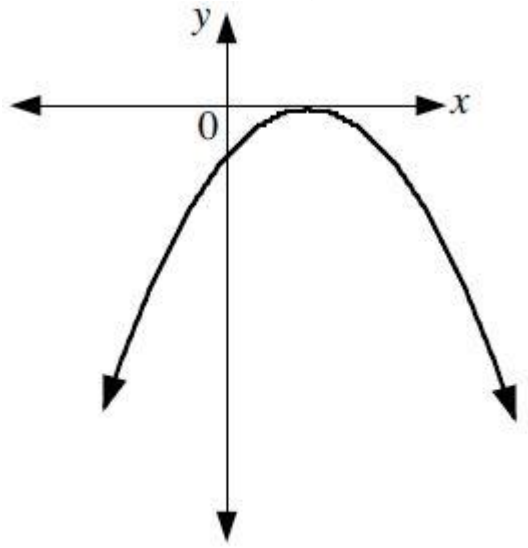
Question #3: Correct Statements about a Parabola

Reference Q.13815

The graph of a quadratic function with equation $y = ax^2 + bx + c$ is shown.
The vertex is on the x-axis.

Five statements have been made about the information from the graph.

Statement 1: The discriminant of $ax^2 + bx + c$ is zero.
Statement 2: The discriminant of $ax^2 + bx + c$ is positive.
Statement 3: The discriminant of $ax^2 + bx + c$ is negative.
Statement 4: The value of a is positive.
Statement 5: The value of a is negative.



Only two of the five statements are correct.
Write the numbers of the correct statement.

Question #4: Finding "q" value of a parabola

Reference Q.13816

When $y = 2x^2 - 7x + 6$ is converted to the form $y = a(x - p)^2 + q,$ the value of q is

A. $-\frac{1}{8}$
B. $-\frac{37}{2}$
C. $\frac{47}{16}$
D. $\frac{97}{8}$

Question #5: Roots of a Parabola

Reference Q.13817

The roots of the equation $2x^2 - 7x - 5 = 0$ are

A. $\frac{7 \pm \sqrt{89}}{2}$
B. $\frac{-7 \pm \sqrt{89}}{4}$
C. $\frac{7 \pm \sqrt{9}}{4}$
D. $\frac{7 \pm \sqrt{89}}{4}$

Question #6: Shortest Side of a Right Angled Triangle

Reference Q.13818

The shortest side of a right angled triangle is $7\ cm$ less than the second shortest side. The sum of the squares of these two sides is equal to $289\ cm^2$. The perimeter of the triangle, in cm, is

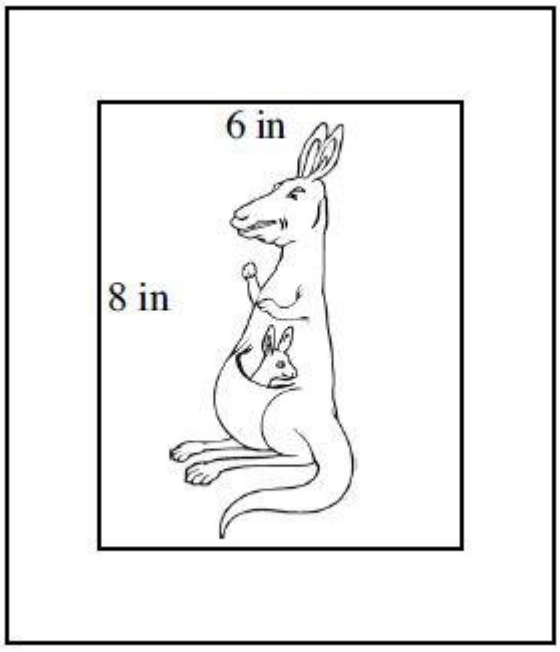
A. 15
B. 23
C. 40
D. none of the above

Question #7: Photograph and Mat

Reference Q.13819

The diagram shows a photograph measuring 8 inches by 6 inches surrrounded by a mat. The mat has the same width on all sides of the photograph.

The photograph and mat are put into a glass photo frame which just covers the outside of the mat.



If the area of the glass surface is 120 square inches, determine the width of the mat to the nearest tenth of an inch.

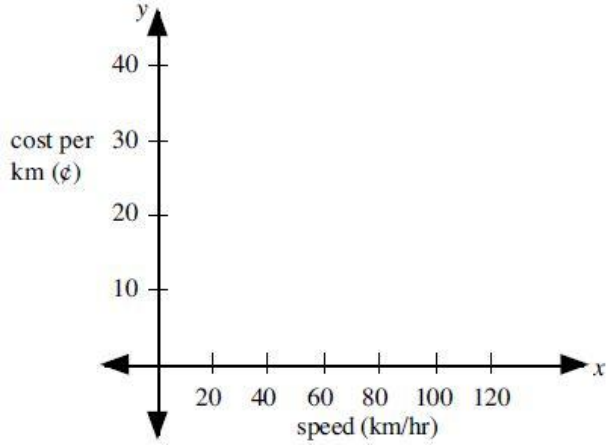
Question #8: Application to Quadratic Equation

Reference Q.13820

Barry, a high school student, found that driving a truck can be a costly venture depending on how fast he drives. He knew from his Mechanics class that if he drives his truck too slowly, the cost per km is high because the engine does not work efficiently. He also knows from Physics class that if he drives his truck too fast, the cost per km is also high because of high wind resistance. He accumulates the following data.

Speed (km/hr)	30	50	65	100	120
Cost per kilometre	27.4¢	19.4¢	16.0¢	16.9¢	22.9¢

a. If x represents the speed in km/h and y represents the cost per km in cents, plot the data on a Cartesian plane and join the points with a smooth curve.



b. Looking at the graph, Barry thought that the data could be modelled by a quadratic function with equation $y = ax^2 + bx + c$.
He used the technique of quadratic regression to determine the equation
$y = 0.005x^2 - 0.801x + 46.928$ as the best model for the data.

Using the model above, determine the cost per km, to the nearest tenth of a cent, at a speed of 70 km/h.

c. Determine the speed, to the nearest km/h, if the cost is 20 cents per km.

d. Which speed, to the nearest km/h, results in the lowest cost per kilometre?
What is this cost to the nearest tenth of a cent?

e. Does it make sense to extend the parabola to the left or right of the data points?

Question #9: Solution to a Linear Inequality

Reference Q.13883

The point which is NOT in the solution region of the inequality $3x - 5y \geq 2$ is

A. $(3, -5)$
B. $(-3, -5)$
C. $(-3, 5)$
D. $(5, -3)$

Question #10: A Point in a Solution Set

Reference Q.13885

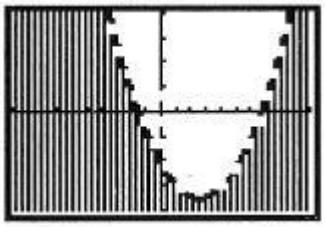
Which of the following points is in the solution regions of both $y > 2x + 8$ and $y \leq x^2 - 3x + 2$?

A. $(0, 10)$
B. $(-1, 6)$
C. $(-2, 4)$
D. $(-3, 20)$

Question #11: Quadratic Inequality

Reference Q.13886

The illustration shown is the screenshot from a graphing calculator.



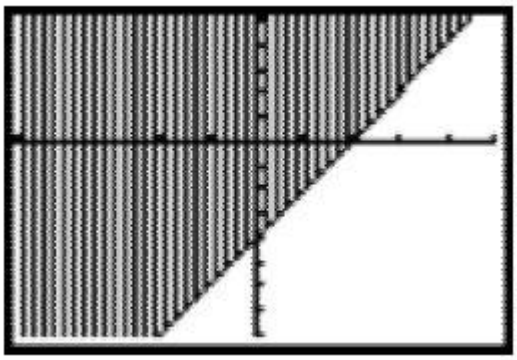
The parabola on the screenshot has the equation $y = x^2 - 5x - 11.$
The shaded region represents the solution to the inequality

A. $y < x^2 - 5x - 11$
B. $y > x^2 - 5x - 11$
C. $y \leq x^2 - 5x - 11$
D. $y \geq x^2 - 5x - 11$

Question #12: Linear Inequality

Reference Q.13887

Stephane graphed an inequality on his calculator.



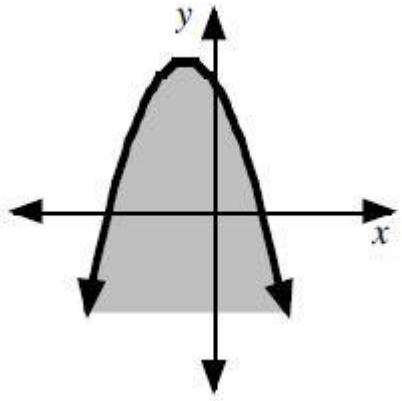
The x- and y-intercepts of the straight line are 2 and -4 respectively.

The graph shows the solution to the inequality

A. $2x - y \geq 4$
B. $2x - y \leq 4$
C. $x - 2y \leq 8$
D. $x - 2y \geq 8$

Question #13: Two-Variable Inequality

Reference Q.13888



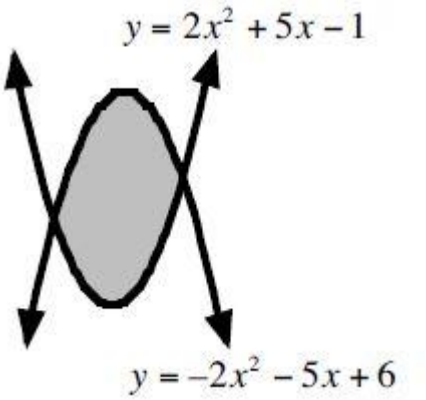
The shaded area shows the solution region to a two-variable inequality. The x-intercepts of the parabola are -5 and $2,$ and the y-intercept is 30.

The two-variable inequality is

A. $y \leq -x^2 - 3x + 10$
B. $y \geq 3x^2 + 9x - 30$
C. $y \geq -3x^2 - 9x + 30$
D. none of the above

Question #14: System of Quadratic Inequality

Reference Q.13889



The shaded area represents the solution region to the inequalities

A. $y \leq 2x^2 + 5x - 1$ and $y \leq -2x^2 - 5x + 6$
B. $y \leq 2x^2 + 5x - 1$ and $y \geq -2x^2 - 5x + 6$
C. $y \geq 2x^2 + 5x - 1$ and $y \leq -2x^2 - 5x + 6$
D. $y \geq 2x^2 + 5x - 1$ and $y \geq -2x^2 - 5x + 6$

Question #15: Application to Quadratic System

Reference Q.13890

A dinner theatre is putting on a new show with a maximum capacity of 125 guests. Each guest will pay $75 to attend the show. The expenses each night can be related to the number of guests, n, by the formula $E = 1800 + 39n - 0.15n^2$.

The number of guests that must attend the show on any particular night in order for a profit to be made can be written as $k \leq n \leq 125$. The value of k is _____.

Question #16: Solution to an Inequality

Reference Q.13891

The solution to the inequality $x^2 - x - 90 \geq 0$ is

A. $-9 \leq x \leq 10$
B. $-10 \leq x \leq 9$
C. $x \leq -9$ or $x \geq 10$
D. $x \leq -10$ or $x \geq 9$

Question #17: Number Line

Reference Q.13892

Consider the number line shown.

The inequality which is represented by the number line is

A. $(x - 5)(x - 2) < 0$
B. $(x - 5)(x - 2) > 0$
C. $(x + 5)(x + 2) < 0$
D. $(x + 5)(x + 2) > 0$

Question #18: Solving Quadratic System

Reference Q.13893

Hanif is algebraically solving the inequality $18 - 21x + 3x^2 \leq 0$. His teacher tells him he can only evaluate $18 - 21x + 3x^2$ for three values of x.

Which of the following values of x should allow him to determine the correct solution to the inequality?

A. $-9, -3, 0$
B. $0, 3, 9$
C. $2, 3, 4$
D. $-2, 3, 5$

Question #19: True Statements

Reference Q.13894

Corey is solving the quadratic inequality $-5x^2 - 5x + 30 > 0$ using a sign chart.

x	←	P	↔	Q	→
-5					
$x + 3$					
$x - 2$			R		
Product					

The outline of her sign chart is shown.

Which of the following statements about $P, Q,$ and R is true?

A. $P = -2,\ Q = 3,\ R = -$
B. $P = -2,\ Q = 3,\ R = +$
C. $P = -3,\ Q = 2,\ R = -$
D. $P = -3,\ Q = 2,\ R = +$

Question #20: Solution to a Quadratic Inequality

Reference Q.13895

Corey is solving the quadratic inequality $-5x^2 - 5x + 30 > 0$ using a sign chart.

x	$\leftarrow$	P	$\leftrightarrow$	Q	$\rightarrow$
-5					
$x+3$					
$x-2$			R		
Product					

The outline of her sign chart is shown.

The solution to the inequality $-5x^2 - 5x + 30 > 0$ is

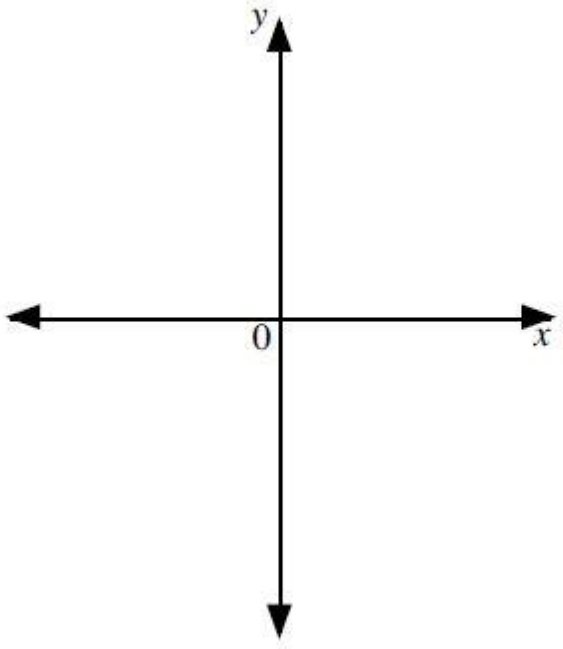
A. $-2 < x < 3$
B. $x < -2$ or $x > 3$
C. $-3 < x < 2$
D. $x < -3$ or $x > 2$

Question #21: Quadratic Systems

Reference Q.13896

a. Describe a method, which does not use technology, for determining the solution region to an inequality of the form $y > ax^2 + bx + c$.

b. Use your method to sketch the solution region to the inequality $y > 6x^2 + 17x - 45$ on the grid provided.



c. Explain how to use the graph in the bullet above to determine the solution to the inequality $6x^2 + 17x - 45 < 0$, and state the solution.