9

Mathematics

Quarter 1 - Module 5:
Quadratic Inequalities

AIRs - LM

Mathematics 9
Quarter 1 - Module 5: Quadratic Inequalities
Alternative Delivery Mode
Second Edition, 2021

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Printed in the Philippines by: _____

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Mathematics

Quarter 1 - Module 5:
Quadratic Inequalities

DepED
DEPARTMENT OF EDUCATION

Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

Target

Let's start this module by assessing your knowledge of the different mathematics concepts previously studied and your skills in performing mathematical operations. These knowledge and skills will help you in understanding quadratic inequalities. As you go through this lesson, think of this important question: "How are quadratic inequalities used in solving real-life problems and in making decisions?" To find the answer, perform each activity. If you find any difficulty in answering the exercises, seek the assistance of your teacher, peers or refer to the modules you have gone over earlier.

After going through this module, you are expected to attain the following objectives.

Learning Competencies

- Illustrates quadratic inequalities **(M9AL-If-1)**
- Solves quadratic inequalities **(M9AL-If-2)**
- Solves problems involving quadratic inequalities**(M9AL-Ig-1)**

Subtasks

1. Define quadratic inequality.
2. Determine the roots of the corresponding equation of the quadratic inequalities.
3. Find the solution set of quadratic inequalities.
4. Solve problems involving quadratic inequalities.

Before going on, check how much you know about this topic. Answer the pre-assessment on the next page in a separate sheet of paper.

Pre-Assessment

Directions: Find out how much you already know about this module. Choose the letter of the correct answer and write it on a separate sheet of paper.

1. Which of the following is a polynomial of degree 2 that can be written in the form $ax^2 + bx + c < 0$ where a, b, and c are real numbers and $a \neq 0$. Symbols >, ≤ and ≥ may also be used in place of <?
   A. Linear Inequality
   B. Quadratic Inequality
   C. Linear Equation
   D. Quadratic Equation

2. Which of the following symbols does **NOT** illustrate inequality?
   A. $>$
   B. $=$
   C. $\geq$
   D. $<$
3. Given the following expressions, which one is **NOT** a quadratic inequality?
   A. $(x-2)(x+7) > 0$
   B. $2x^3 - x + 1 \leq 0$
   C. $x + 8 \geq 15$
   D. $x^2 + 8x + 12 = 0$

For numbers 4 and 5: **The length of a floor is 5 m more than its width. The area of the floor is greater than 50 m².**

4. How would you represent the length of the floor?
   A. $w + 50$
   B. $w - 50$
   C. $w - 5$
   D. $w + 5$
5. What mathematical sentence would represent the given situation?
   A. $w(w+5) \leq 50$
   B. $w(w+5) < 50$
   C. $w(w+5) \geq 50$
   D. $w(w+5) > 50$
6. Which of the following points does NOT belong to the solution set of the Inequality $x^2 + 7x + 10 > 0$?
   A. -3
   B. -4
   C. -4.5
   D. -6
7. Which of the following coordinates of points belong to the solution set of the inequality $y < 2x^2 + 5x - 1$?
   A. (-3,2)
   B. (-2,9)
   C. (1, 6)
   D. (3,1)
8. Which of the following shows the logical procedure of solving inequality in one variable?

   I. Find the roots of the corresponding equation.
   II. Test a number from each interval against the inequality.
   III. Plot the points corresponding the roots on the number line.

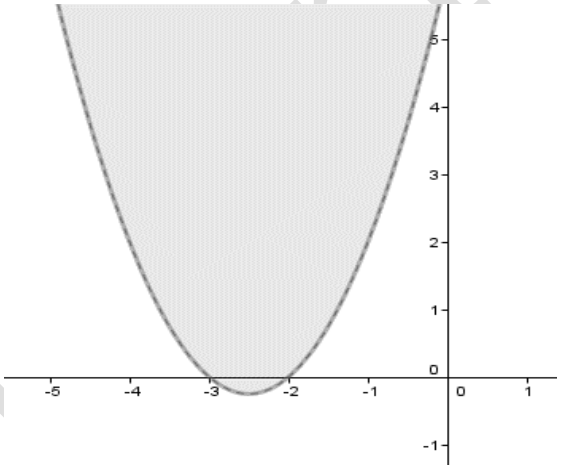
   A. I, II, III
   B. I, III, II
   C. II, III, I
   D. III, II, I

9. Which of the following shows the logical procedure of solving inequality in two variables?

I. Write the inequality to its corresponding equation.
II. Test points from each interval against the inequality.
III. Construct table of values for x and y
IV. Plot the points corresponding on the cartesian plane.

A. I, II, III, IV
B. I, III, IV, II
C. II, III, I, IV
D. III, II, IV, I

10. The figure on the right shows the graph of $y \leq x^2 + 3x + 2$. Which of the following is true about the solution set of the inequality?



I. The coordinates of all points on the shaded region belongs to the solution set of the inequality.
II. The coordinates of all points along the parabola as shown by the broken line belongs to the solution set of the inequality.
III. The coordinates of all points along the parabola as shown by the broken line does not belong to the solution set of the inequality.

A. I and II
B. II and III
C. I and III
D. I, II and III

11. A projectile is launched from a point above the ground. The height h from the ground in meters after t seconds is given by the function $h(t) = 14t - t^2$. How many seconds after the launch will the projectile hit the ground?

A. The projectile will hit the ground 8 seconds after launch.
B. The projectile will hit the ground 10 seconds after launch.
C. The projectile will hit the ground 12 seconds after launch.
D. The projectile will hit the ground 14 seconds after launch.

12. What are the dimensions of the largest rectangular field that can be enclosed by a 80 m of fencing wire?

A. 20 meters x 20 meters
B. 30 meters x 45 meters
C. 25 meters x 35 meters
D. 40 meters x 40 meters

13. A garment store sells about 40 t-shirts per week at a price of ₱ 100 each. For each ₱10 decrease in price, the sales lady found out that 5 more t-shirts per week were sold. What price produces the maximum revenue?
    A. ₱65
    B. ₱80
    C. ₱90
    D. ₱100
14. From a 96-foot building, an object is thrown straight up into the air then follows a trajectory. The height S(t) of the ball above the building after t seconds is given by the function $S(t) = 80t - 16t^2$. What is the maximum height will the object reach from the top of the building?
    A. 75 ft
    B. 100 ft
    C. 88 ft
    D. 116 ft
15. A ball is tosses upward from the ground. Its height in feet above the ground after t seconds is given by the function $g(t) = -16t^2 + 22t$. Find the maximum height that the ball will reach.
    A. 7.56 ft
    B. 8.14 ft
    C. 6.62 ft
    D. 5.98 ft

Jumpstart

Activity 1: Which are Not Quadratic Equations?

Directions: Use the mathematical sentences below to answer the questions that follow.

$x^2 + 9x + 20 = 0$	$2t^2 < 21 - 9t$	$r^2 + 10r \leq -16$	$3w^2 + 12w \geq 0$
$2s^2 + 7s + 5 > 0$	$15 - 6n^2 = 10$	$4x^2 - 25 = 0$	$m^2 = 6m - 7$

A. Which of the given mathematical sentences are quadratic equations?

Quadratic Equation	Not Quadratic Equation

B. How do you describe quadratic equation?

_____
_____

C. How would you describe those mathematical sentences which are not quadratic equations?

_____
_____

D. How are they different from those mathematical sentences which are not quadratic equations?

_____
_____

Discover

Quadratic inequalities in one variable are inequalities that contain a polynomial of degree 2 and can be written in any of the following forms:

$$ax^2 + bx + c > 0$$
$$ax^2 + bx + c < 0$$
$$ax^2 + bx + c \geq 0$$
$$ax^2 + bx + c \leq 0$$

where a, b and c are real number and $a \neq 0$

A quadratic inequality uses an inequality symbol instead of an equal sign.

Symbol	***Words***	***Example***
$>$	greater than	$x^2 + 3x > 2$
$<$	less than	$7x^2 < 28$
$\geq$	greater than or equal to	$5 \geq x^2 - x$
$\leq$	less than or equal to	$2y^2 + 1 \leq 7y$

In Activity1, those mathematical sentences which are not quadratic equations are considered quadratic inequalities.

Other Examples:

1.) $x^2 - x - 6 < 0$	→	quadratic inequality
2.) $t^2 + 4t \leq 10$	→	quadratic inequality
3.) $x^3 + 4 \geq 3x^2 + x$	→	not quadratic inequality (degree 3)
4.) $8 = x^2 - 6x$	→	not quadratic inequality (equal sign)

Quadratic inequalities illustrated in real life;

The city government is planning to construct a new children's playground. They plan to fence a rectangular ground using one of the walls of a building. The length of the new playground is 15 m longer than its width and its area is greater than the old playground with 2,200 m².

.

We can represent the situation into quadratic inequality as;

$$Area\ of\ rectangle = length\ x\ width$$

$$length = width + 15m \quad \text{or} \quad l = w + 15$$

$$\boldsymbol{w(w + 15) \geq 2,200} \quad \text{or} \quad \boldsymbol{w^2 + 15w \geq 2,200}$$

Solving Quadratic Inequalities in One Variable

Solving quadratic inequalities means finding the roots of its corresponding equality. The points corresponding to the roots of the equality, when plotted on the number line, separate the line into two or three intervals. An interval is a part of the solution of the inequality if a number in that interval makes the inequality true.

Illustrative Example 1:

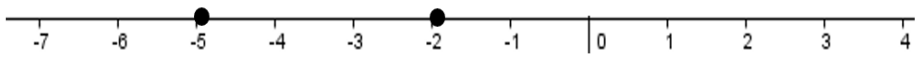
Let us now solve the quadratic inequality $x^2 + 7x + 10 > 0$.

Solution:

a. Solve the corresponding equation of $x^2 + 7x + 10 > 0$, which is $x^2 + 7x + 10 = 0$ by factoring.

$(x + 2)(x + 5) = 0$ *factors of the quadratic equation*
$x = -2$ and $x = -5$ *get the resulting equation*

b. Plot the points corresponding to -2 and -5 on the number line.



c. Determine the three intervals

$x < -5$ $\quad -5 < x < -2$ $\quad x > -2$

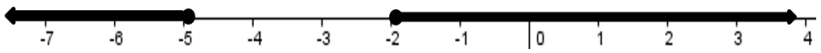
d. Determine the solution set using the three-point test.

For $x < -5$	For $-5 < x < -2$	For $x > -2$
Choose a value of x which is less than -5 Let $x = -6$	Choose a value of x which is less than -2 but greater than -5 Let $x = -4$	Choose a value of x which is greater than -2 Let $x = -1$
$x^2 + 7x + 10 > 0$ $(-6)^2 + 7(-6) + 10 > 0$ $36 - 42 + 10 > 0$ $4 > 0$ True	$x^2 + 7x + 10 > 0$ $(-4)^2 + 7(-4) + 10 > 0$ $16 - 28 + 10 > 0$ $-2 > 0$ False	$x^2 + 7x + 10 > 0$ $(-1)^2 + 7(-1) + 10 > 0$ $1 - 7 + 10 > 0$ $4 > 0$ True

e. Test whether the points $x = -2$ and $x = -5$ satisfy the inequality

$x^2 + 7x + 10 > 0$ $(-2)^2 + 7(-2) + 10 > 0$ $4 - 14 + 10 > 0$ $0 > 0$ False	$x^2 + 7x + 10 > 0$ $(-5)^2 + 7(-5) + 10 > 0$ $25 - 35 + 10 > 0$ $0 > 0$ False

f. Therefore, the quadratic inequality is true for any value of x in the interval $x < -5$ or solution set $x > -2$ and these intervals exclude -2 and -5.



g. The solution set of the inequality is $\{x : \boldsymbol{x < -5}$ *or* $\boldsymbol{x > -2}\}$.

Note that solid circle is used when the roots satisfy the quadratic inequality. If otherwise, use a hollow circle.

Solving Quadratic Inequalities in Two Variables

To determine the solution set of quadratic inequalities in two variables, use the graphical method. First, write the corresponding equation of the given quadratic inequality and then show the graph of the resulting parabola. From the graph, identify the shaded region which will represent the solution of the quadratic inequality.

Example: Find the solution set of $y \leq x^2 + 3x + 2$

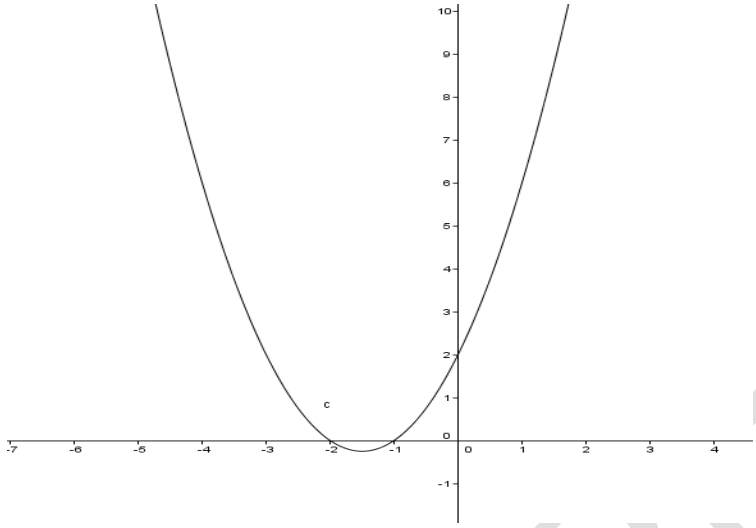
Solution:

1. Write the quadratic inequality to its corresponding quadratic equation.
   $y = x^2 + 3x + 2$

2. Construct table of values.

x	-4	-3	-2	-1	0	1
y	6	2	0	0	2	6

3. Use the table of points, plot the points and show the graph of the quadratic equation.

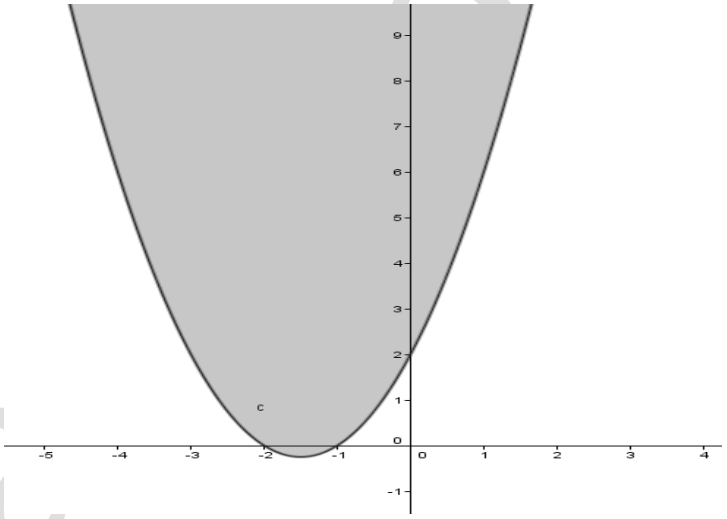


4. Test the points to determine the boundary and the shaded region. Choose at least 2 points along the parabola, within the parabola and outside the parabola.

Use points (-3,2) & (-2,0) along the parabola	**For (-3, 2),** $x = -3 \quad y = 2$ $y \leq x^2 + 3x + 2$ $2 \leq (-3)^2 + 3(-3) + 2$ $2 \leq 9 - 9 + 2$ $2 \leq 2$ True **For (-2, 0),** $x = -2 \quad y = 0$ $y \leq x^2 + 3x + 2$ $0 \leq (-2)^2 + 3(-2) + 2$ $0 \leq 4 - 6 + 2$ $0 \leq 0$ True *Therefore (-3,2) and (-2,0) are part of the solution set. Since the points are along the parabola, use solid line for the parabola.*
Use points (-1,2) and (-2,1) which are inside the parabola	**For (-1, 2),** $x = -1 \quad y = 2$ $y \leq x^2 + 3x + 2$ $2 \leq (-1)^2 + 3(-1) + 2$ $2 \leq 1 - 3 + 2$ $2 \leq 0$ False **For (-2, 1),** $x = -2 \quad y = 1$ $y \leq x^2 + 3x + 2$ $1 \leq (-2)^2 + 3(-2) + 2$ $1 \leq 4 - 6 + 2$ $1 \leq 0$ False

	These points in this region do not satisfy the inequality. Therefore, this region is not part of the solution set of the inequality.
Use points (-3,1) and (1,2) which are outside the parabola	**For (-3, 1),** $x = -3 \quad y = 1$ $y \leq x^2 + 3x + 2$ $1 \leq (-3)^2 + 3(-3) + 2$ $1 \leq 9 - 9 + 2$ $1 \leq 2$ True **For (1, 2),** $x = 1 \quad y = 2$ $2 \leq (1)^2 + 3(1) + 2$ $1 \leq 1 + 3 + 2$ $1 \leq 6$ True *These points in this region satisfy the inequality. Therefore, this region is part of the solution set of the inequality.*

5. The solution set of the inequality is the set of points on the shaded region of the graph. To check, choose any point on the shaded region. If it satisfies the inequality, then it is a solution.



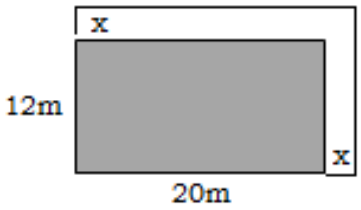
Broken line is used in the graph of the parabola when the points along the parabola do not satisfy the quadratic inequality. If otherwise, solid line is used.

Solving Problems Quadratic Inequalities

Now that you know how to solve quadratic inequalities, you can proceed to applying the concept in real – life problems. There are a lot of situations that can be represented by quadratic inequalities. Consider the situation below.

Mr. Ramon Magsaysay wants to expand his lot for his garden. The lot measures 12m by 20m and he wants to expand the size by adding an equal distance

to two of its side as shown below. However, the new lot with expansion should not exceed 345 m², what ranges of distance in meters can Mr. Magsaysay add in his lot?



Let us analyze.

The phrases "*longer than*", "*smaller than*" , "*should not exceed*", "*less than*", "*more than*", "*range of distance*", "*range of cost*" and the like are indicators of inequalities.

In solving problems involving quadratic inequalities, we need to read through the entire problem. Highlight the important information and key words that we need to solve the problem. And then identify our variables.

Solution:

Let x be the additional constant width to be added to each side;

$(x + 12)\, m$ will be the width of the expanded rectangle

$(x + 20)\, m$ will be the length

If the area should not exceed 345m², then the inequality that will represent the situation will be: $(x + 12)(x + 20) \leq 345$

Solving for the possible value of x,

$(x + 12)(x + 20) \leq 345$

$x^2 + 32x + 240 \leq 345$

$x^2 + 32x + 240 - 345 \leq 0$

$x^2 + 32x - 105 \leq 0$

Then, solve for the roots of the equivalent quadratic equation,

$x^2 + 32x - 105 \leq 0$

$x^2 + 32x - 105 = 0$

$(x + 35)(x - 3) = 0$

$x + 35 = 0$ and $x - 3 = 0$

$x = -35$ $x = 3$

Since the value of x refers to the length of expansion, it cannot be negative. Thus the range of distance that Mr. Ramon Magsaysay can add on both sides is $0m \leq x \leq 3m$ in order not to exceed 345m².

Another Example:

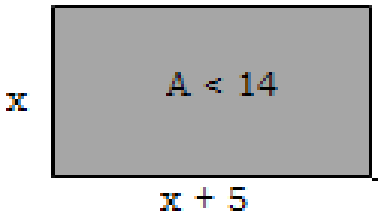
Mang Carding wants to build a rectangular garden enclosed with a fence. He wants the length of the garden to be 5 meters longer than the width. If the area of the garden must be less than 14 square meters, what are the possible dimensions of Mang Carding's garden?

Let the following;

x = the width of the garden

x + 5 = length of the garden

less than 14 → area of the garden



Since Area of a rectangles = lw,

We can substitute

A = lw

(x + 5)(x) < 14

$x^2 + 5x - 14 < 0$

Then, solve for the roots of the equivalent quadratic equation,

$x^2 + 5x - 14 < 0$

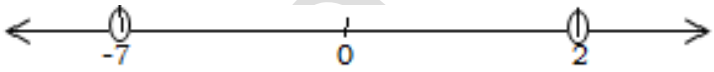
$x^2 + 5x - 14 = 0$

(x + 7)(x – 2) = 0

x + 7 = 0 and x – 2 = 0

x = -7 x = 2

Plot the points



Test the points

For $x < -7$	For $-7 < x < 2$	For $x < 2$
Choose a value of x which is less than -7 Let $x = -8$	Choose a value of x which is less than 2 but greater than -7 Let $x = 0$	Choose a value of x which greater than 2 Let $x = 3$
$x^2 + 5x < 14$ $(-8)^2 + 5(-8) < 14$ $64 - 40 < 14$ $24 < 14$ *False*	$x^2 + 5x < 14$ $(0)^2 + 5(0) < 14$ $0 + 0 < 14$ $0 < 14$ *True*	$x^2 + 5x < 14$ $(3)^2 + 5(3) < 14$ $9 + 15 < 14$ $24 < 14$ *False*

Thus, the solution is $-7 < x < 2$

Since we do not use negative numbers, because there are no such negative measurements. We will be using numbers that are greater than 0 but less than 2.

If we let the width(x) = 1

(x + 5)(x) < 14

(1 + 5)(1) < 14

(6)(1) < 14

6 < 14, TRUE

Therefore, 6 is the length

If we let the width(x) = 1.5

(x + 5)(x) < 14

(1.5 + 5)(1.5) < 14

(6.5)(1.5) < 14

9.75 < 14, TRUE

Therefore, 6.5 is the length

We can conclude that the possible dimensions of Mang Carding's garden will be 1m by 6m or 1.5m by 6.5m.

Now that you have learned how to solve real – life problems that involves quadratic inequalities, you can proceed to the next activities

Explore

Activity 2: Quadratic Inequality or Not

Direction: Write *quadratic inequality* if the mathematical sentence illustrates quadratic inequality, otherwise write *not quadratic inequality*.

1.) $x^2 - 6x - 16 \leq 0$ → _____
2.) $x^2 + 4 > 0$ → _____
3.) $x^2 - 3x + 2 = 0$ → _____
4.) $6x^2 - 7x + < 0$ → _____
5.) $2(x^2 + 1) \geq 5x$ → _____
6.) $y^2 - 4y > -3$ → _____
7.) $x^3 - x > 12$ → _____
8.) $2x^2 < 9x + 5$ → _____
9.) $-x^2 + 4 < 0$ → _____
10.) $-x^2 + 3x - 2 = 0$ → _____

Activity 3: Fill Me In

Direction: Fill in the table with what is being asked.

Quadratic Inequality		$x^2 + x - 6 > 0$	
Quadratic Equation		_____	
Roots of corresponding equation		$x =$ _____	$x =$ _____
Intervals	$x <$ _____	_____ $< x <$ _____	$x >$ _____
Assigned Value for x	$x =$ _____	$x =$ _____	$x =$ _____
Test the three points	$x^2 + x - 6 > 0$ (___)^2 + (____) − 6 > 0 (____) + (____) − 6 > 0 _____ > 0	$x^2 + x - 6 > 0$ (___)^2 + (____) − 6 > 0 (____) + (____) − 6 > 0 _____ > 0	$x^2 + x - 6 > 0$ (___)^2 + (____) − 6 > 0 (____) + (____) − 6 > 0 _____ > 0
True or False	_____	_____	_____
Solution set	_____		

Activity 4: Am I a Solution?

Direction: Determine whether the following points are solutions of the inequality $y > x^2 + 5x + 6$. Write ***S*** if solution and ***NS*** if otherwise.

1. A (-1, 2)
2. B (-2, 1)
3. C (-5, 2)
4. D (-4, 2)
5. E. (3, 3)
6. F (1, 12)
7. G (0, 1)
8. H (-2, -2)
9. I (-2 5)
10. J (-3, 4)

Deepen

Activity 5: Ready, Solution Set, Go!

Direction: On a separate answer sheet, solve the following quadratic inequalities.

1. $y^2 + y - 2 < 0$
2. $x^2 + 2x - 8 > 0$
3. $s^2 - 9 < 0$
4. $t^2 + 5t + 6 > 0$
5. $x^2 + 2x - 10 < 0$

Activity 6: Graph My Solution!

Direction: On a separate answer sheet, find the solution set of each of the following quadratic inequalities then graph.

1. $y < x^2 - 2x - 8$
2. $y > x^2 - 3x$
4. $y \leq x^2 + 2x$
5. $y > x^2 - 6x + 5$
5. $y > x^2 - 2x - 3$

Activity 7: Let Me Solve It!

Direction: Read and analyze the following problems. Solve by applying the concepts of quadratic inequalities. Write your answer on a separate sheet of paper.

1. The area of a rectangle is 20 square inches. The length is 4 more than three times the width. Find the length and the width of the rectangle.

2. A rectangular box is completely filled with dice. Each die has a volume of 1 cm^3. The length of the box is 3 cm greater than ots width and its height is 5 cm. suppose the box holds at most 140 dice. What are the possible dimensions of the box?

Gauge

Post – Assessment

Directions: Read each item carefully and pick out your answer from the choices given. Write the letter of your chosen answer on your answer sheet.

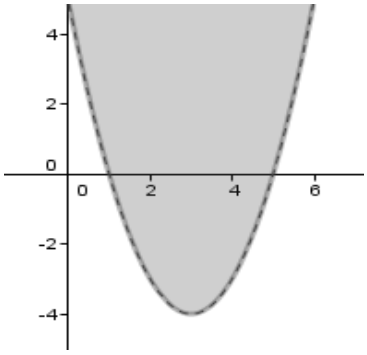
1. Which of the following is a polynomial of degree 2 that can be written in the form $ax^2 + bx + c < 0$ where a, b, and c are real numbers and $a \neq 0$?
   A. Linear Inequality
   B. Quadratic Inequality
   C. Linear Equation
   D. Quadratic Equation
2. How does "$3x^2 + 5x$ is less than or equal to 7" translated into mathematical sentence?
   A. $3x^2 + 5x > 7$
   B. $3x^2 + 5x < 7$
   C. $3x^2 + 5x \leq 7$
   D. $3x^2 + 5x \geq 7$
3. Given the following expressions, which one is **NOT** a quadratic inequality?
   A. $(x + 3)(x - 4) > 0$
   B. $x^3 + 3x + 4 \leq 0$
   C. $2x + 8 \geq 12$
   D. $2x^2 - 5x + 10 = 0$

For numbers 4 and 5: **The length of a wall is 17 m more than its width. The area of the wall is less than 60 m².**

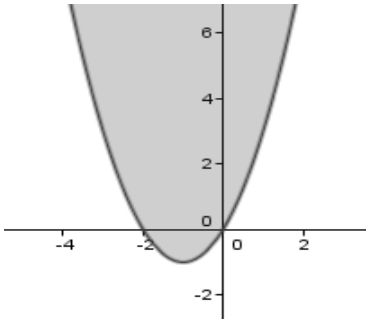
4. How would you represent the length of the wall?
   A. $w + 17$
   B. $w - 17$
   C. $w + 60$
   D. $w - 60$
5. What mathematical sentence would represent the given situation?
   A. $w(w + 17) > 60$
   B. $w(w + 17) \geq 60$
   C. $w(w + 17) < 60$
   D. $w(w + 17) \leq 60$
6. Which of the following mathematical statements is a quadratic inequality?
   A. $2x^2 + 7x + 3 \geq 0$
   B. $2y + 10 > 0$
   C. $y - 49 = 0$
   D. $x^2 + 10x + 25 = 0$

7. Which of the following described the graph of the inequality $y > x^2 - 6x + 5$

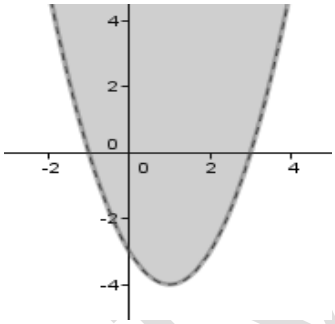
A.



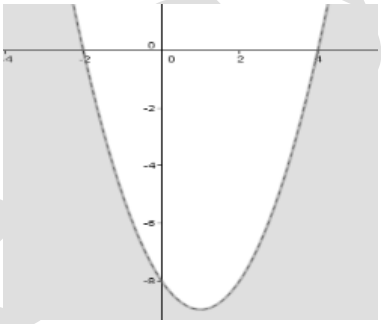
B.



C.



D.

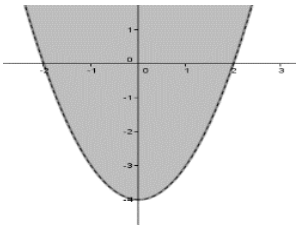


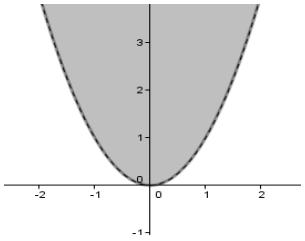
8. Which shows the logical order of solving the inequality $y > x^2 - 4$?

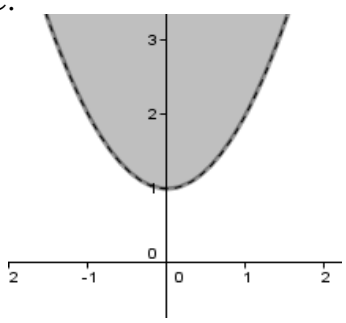
I. Plot the points corresponding on the cartesian plane.
II. Construct table of values for x and y
III. Test points from each interval against the inequality.
IV. Write the inequality to its corresponding equation.

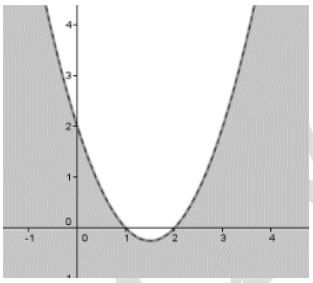
A. I, II, III,IV
B. II, III, I,IV
C. I, III, IV,II
D. IV, II, I,III

9. Which of the following describes the graph of quadratic inequality $y > x^2 - 4$

A. 

B. 

C. 

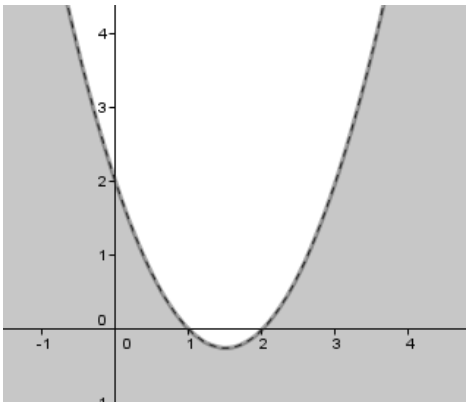
D. 

10. Which of the following is true about the solution set of the inequality $y < x^2 - 3x + 2$?

I. The coordinates of all points on the shaded region belongs to the solution set of the inequality.

II. The coordinates of all points along the parabola as shown by the broken line belongs to the solution set of the inequality.

III. The coordinates of all points along the parabola as shown by the broken line does not belong to the solution set of the inequality.



A. I and II
B. II and III
C. I and III
D. I, II and III

11. A 5cm by 5cm square piece of cardboard was cut from a bigger square cardboard. The area of the remaining cardboard was 60cm^2. If s represents the length of the bigger cardboard, which of the following expressions gives the area of the remaining piece?
    A. s – 25
    B. s^2 – 25
    C. s^2 + 25
    D. s2 + 60
12. The length of the garden is 5m longer than its width and the area is 36m^2. How long is the garden?
    A. 4m
    B. 5m
    C. 9m
    D. 13m
13. An open box is to be formed out of a rectangular piece of cardboard whose length is 16cm longer than its width. To form the box, a square of side 5cm will be removed from each corner of the cardboard. Then the edges of the remaining cardboard will be turned up. If the box is to hold at most 2,100cm^3, what mathematical statement would represent the given solution?
    A. $w^2 + 4w \leq 480$
    B. $w^2 + 4w \geq 420$
    C. $w^2 - 4w \leq 420$
    D. $w^2 - 4w \leq 480$

For item 14 – 15

Rosalia own a chocolate vending machine, which is a machine that picks a chocolate out of an assortment in a random fashion. Rosalia controls the probability in which each chocolate is picked.

She is running out of "Choco Hany" a type of chocolate candy so she wants to program its probability of getting a different candy twice in a row greater than 2 ¼ times the probability of getting "Choco Hany" in one try. (Remember that a probability must be a number from 0 and 1)

14. Using p to represent the probability of getting "Choco Hany" in one try, the inequality that models the problem is _____.
    A. $(1 - p)^2 > 2\frac{1}{4}p$
    B. $2 - 2p + p^2 < 2\frac{1}{4}p$
    C. $p^2 - 1 > 2\frac{1}{4}p$
    D. $(1 - p)^2 \geq 2\frac{1}{4}p$
15. The probability of getting Choco Hany in one try must be less than ____.
    A. 0.25
    B. 0.5
    C. 1
    D. 4

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