

**Quadratic Relations Practice Test**

KU: /17 App: /29 I: /14 marks C: /10 = /84

**Part A Knowledge and Understanding /****Modified True/False ( /4 marks)***Indicate whether the statement is true or false. If false, change the identified word or phrase to make the statement true.*

- \_\_\_\_\_ 1.  $y = 4x + 16$  and  $y = 9x$  are examples of quadratic equations, while  $y = x^2$  and  $y = 2x^2 + 1$  are examples of linear equations. \_\_\_\_\_
- \_\_\_\_\_ 2. It is possible for a parabola to have both a negative and a positive  $x$ -intercept at the same time.  
\_\_\_\_\_

**Multiple Choice (13 marks)***Identify the choice that best completes the statement or answers the question.*

- \_\_\_\_\_ 3. Which set of data represents a quadratic relation?

**Table 1**

$x$	$y$
-5	-50
-4	-32
-3	-18
-2	-8
-1	-2

**Table 2**

$x$	$y$
-5	-50
-4	-35
-3	-20
-2	-5
-1	10

**Table 3**

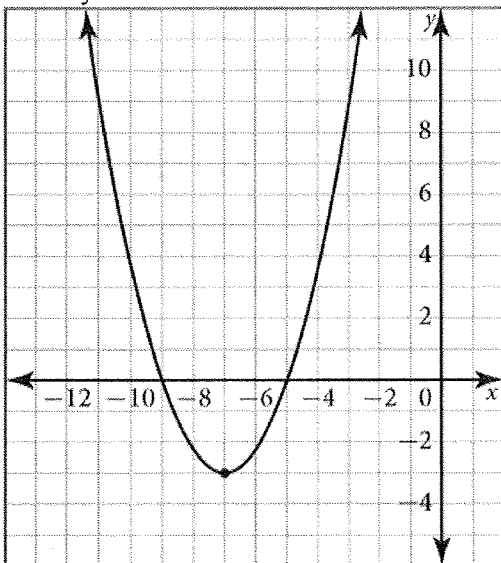
$x$	$y$
-5	-50
-4	-40
-3	-30
-2	-20
-1	-10

- a. Table 1  
b. Table 2  
c. Table 3  
d. all of the above

- \_\_\_\_\_ 4. Which statement is NOT true about quadratic equations?
- A quadratic equation has the form  $y = ax^2 + bx + c$ .
  - $a \neq 0$  in a quadratic equation.
  - The graph of a quadratic relation can be U-shaped.
  - The graph of a quadratic relation can be a straight line.
- \_\_\_\_\_ 5. Identify the equation that represents a quadratic relation.
- $y = 1$
  - $y = x$
  - $y = x^2$
  - $y = x^3$
- \_\_\_\_\_ 6. Which equation does NOT represent a quadratic relation?
- $y = x$
  - $y = x^2 + x$
  - $y = x^2$
  - $y = x^2 + 1$
- \_\_\_\_\_ 7. Use a graphing calculator to find the equation of the curve of best fit for the data in the table of values.

$x$	$y$
1	8
2	23
3	48
4	83

- $y = 6x^2 + 2$
  - $y = 9x^2 - 1$
  - $y = 3x^2 + 5$
  - $y = 5x^2 + 3$
- \_\_\_\_\_ 8. The equation  $y = -4x^2 + 5$  represents a parabola that opens
- horizontally to the left
  - horizontally to the right
  - downward
  - upward
- \_\_\_\_\_ 9. Identify the coordinates of the vertex and whether the point is a minimum or a maximum.



- maximum at  $(-3, -7)$
  - minimum at  $(-3, -7)$
  - maximum at  $(-7, -3)$
  - minimum at  $(-7, -3)$
- \_\_\_\_\_ 10. If a parabola has a maximum at the point  $(0, -2)$ , what does this indicate about the  $x$ -intercept(s)?
- both negative
  - both positive
  - one negative, one positive
  - do not exist

- \_\_\_\_\_ 11. If a parabola has a minimum at  $(-2, 1)$ , this indicates that the  $y$ -intercept is
- a. positive  
b. negative  
c. zero  
d. does not exist
- \_\_\_\_\_ 12. If a parabola has a maximum at the point  $(0, -2)$ , find the equation of the axis of symmetry.
- a.  $y = 0$   
b.  $y = -2$   
c.  $x = 0$   
d.  $x = -2$
- \_\_\_\_\_ 13. If a parabola has a minimum at point  $(-3, 6)$ , which statement is NOT true about the parabola's properties?
- a. The parabola opens upward.  
b. There are no  $x$ -intercepts.  
c. The axis of symmetry is  $x = -3$ .  
d. The  $y$ -intercept is negative.
- \_\_\_\_\_ 14. Find the value of the second differences for the relation.

$x$	$y$
-3	-9
-2	-4
-1	-1
0	0
1	-1
2	-4
3	-9

- a. -5  
b. -3  
c. -2  
d. -1
- \_\_\_\_\_ 15. The stationery department of a store sells poster board in various sizes. The table shows the relationship between the area of the board and the width. Use a graphing calculator and the table of values to find the equation of the curve of best fit.

Width (cm)	Area (cm <sup>2</sup> )
100	11 000
120	15 600
140	21 000
160	27 200

- a.  $y = x^2 + 10x$   
b.  $y = 10x^2 + x$   
c.  $y = 10x^2 + 10x$   
d.  $y = 10x^2 + 100x$

**Part B Application / 29 marks**

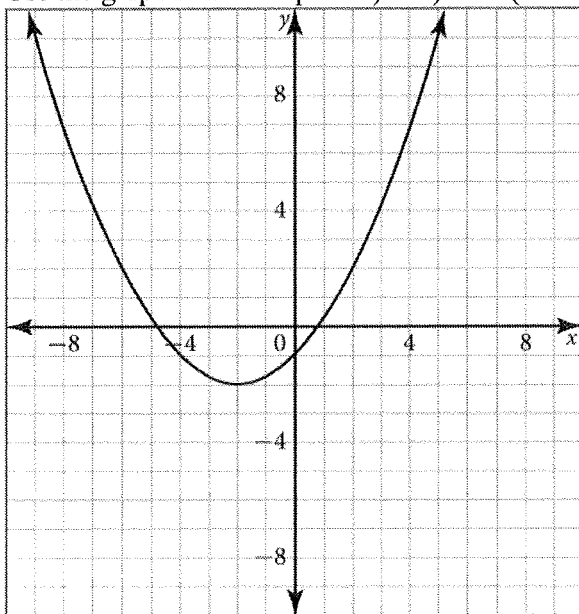
**Completion ( / 5 marks)**

Complete each statement.

16. A quadratic equation has the form \_\_\_\_\_, where  $a \neq$  \_\_\_\_\_.
17. If a parabola opens \_\_\_\_\_, then it has a minimum. If a parabola opens \_\_\_\_\_, then it has a maximum.
18. The \_\_\_\_\_ in quadratic relations are the differences between consecutive first differences.

## Short Answer ( / 24 marks)

19. Use the graph to answer parts a) to e). (2 marks each for 10 marks)



- a) State the coordinates of the vertex.

$$V(\text{____}, \text{____})$$

- b) Find the equation of the axis of symmetry.

$$x = \text{_____}$$

- c) State whether the graph has a maximum or minimum. Find its value.

The parabola has a \_\_\_\_\_, The value of the minimum is \_\_\_\_\_.

- d) What is the y-intercept of the graph?

The y-intercept is \_\_\_\_\_.

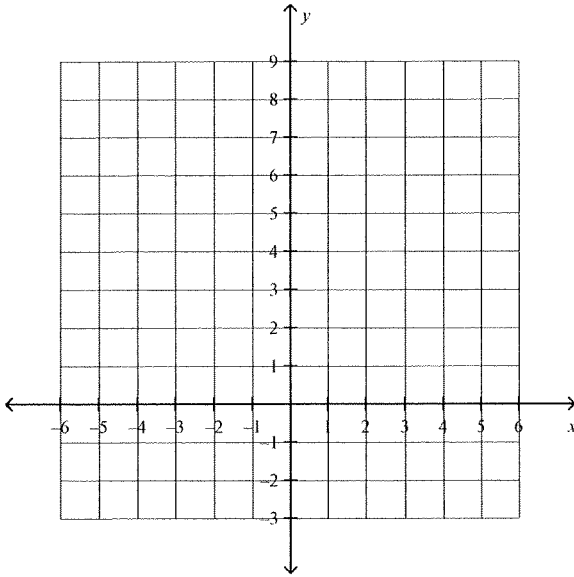
- e) State the x-intercept(s) of the graph.

The x intercepts are \_\_\_\_\_, and \_\_\_\_\_.

20. Use the table of values to answer parts a) to e). (14 marks)

$x$	$y$
-3	7
-2	2
-1	-1
0	-2
1	-1
2	2
3	7

a) Plot the points and join them with a smooth curve. (5 marks)



b) Is the relation linear or quadratic? (1 mark)

c) Use your graphing calculator to find the equation of the curve of best fit. (2 decimal places and 2 marks)

d) Find the first differences for  $x = -3$  to  $x = 3$ . Record them on the table of values above - create new columns as needed. (2 marks)

e) Find the second differences for  $x = -3$  to  $x = 3$ . Record them on the table of values above - create new columns as needed. (2 marks)

e) How do your answers to part c) and d) verify your answer to question b)? (2 marks)

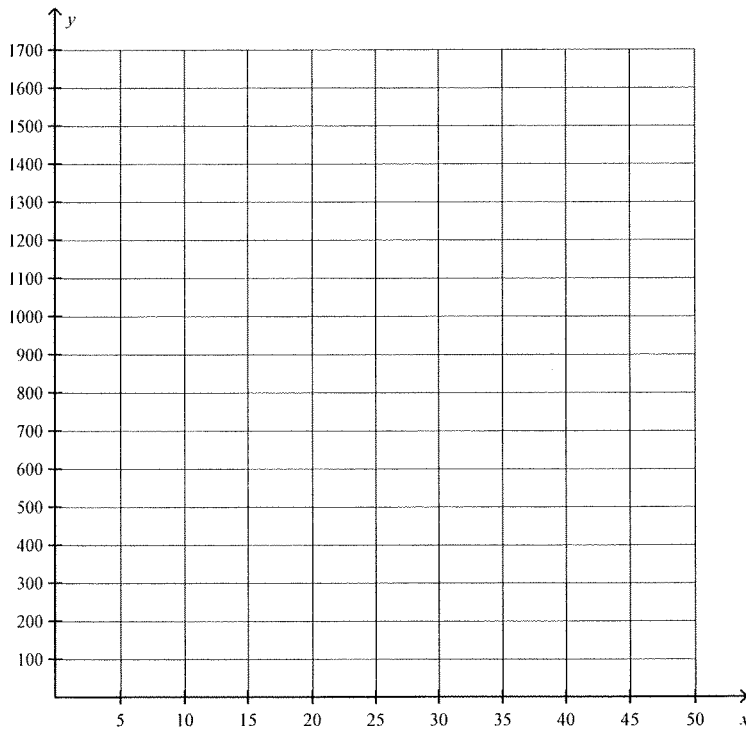
**Part C Inquiry 14 marks****Problem ( / 14 marks)**

21. Marc wants to tile his bathroom floor with square tiles. The hardware store sells 6 different sizes.

a) Complete the table by determining the area of one tile for each size. (5 marks)

Length of One Side (cm)	Area (cm <sup>2</sup> )
15	$15^2 =$ _____
20	_____
25	_____
30	_____
35	_____
40	_____

b) Graph the relation with length on the horizontal axis and area on the vertical axis. (5 marks)



c) Suppose the store can cut the tile to any size that Marc wants. Using the graph, estimate the length of a tile with area 730 cm<sup>2</sup>. (2 marks)

d) Using the graph, estimate the length of a tile with area 1370 cm<sup>2</sup>. (2 marks)