

What is on the Unit 1 Test? Review Problems

You should be able to: recognize situations in which variables are related by quadratic functions, use data tables and graphs to display patterns in those relationships, use symbolic expressions to describe and reason about the patterns, and use a graphing calculator to answer questions involving quadratic functions.

Study: Quiz 1, Review Packet for Quiz 1, Homework Packets 1-4, Investigations 1-6 (emphasis on Inv. 4-6). This review packet does not cover a lot of material that was on Quiz 1, but you are still expected to know it!

1. What is the general form of a quadratic function? $ax^2 + bx + c$

2. Write the function that gives the height of an object dropped or launched after t seconds: $h(t) = h_0 + v_0 t - 16t^2$

3. In the general form of a quadratic function
 What does the value of "a" tell you? opens up/down, skinny/wide
 What does the value of "c" tell you? y-intercept
 What does the value of "b" tell you? if it moves left or right (off of y-axis)

4. Identify the "a" "b" and "c" values in the following equations.

a.) $y = x^2 + 3x - 9$	a = <u>1</u> b = <u>3</u> c = <u>-9</u>
b.) $h(t) = 12 + 24t - 16t^2$	a = <u>-16</u> b = <u>24</u> c = <u>12</u>
c.) $f(x) = -18 + 3x^2$	a = <u>3</u> b = <u>0</u> c = <u>-18</u>

5. A young baseball player swung his bat 3 feet above the ground and hit a baseball. After 1.2 seconds the ball has is 15.96 feet above the ground. Find the initial upward velocity of the baseball.

$$h(t) = 3 + v_0 t - 16t^2$$

$$15.96 = 3 + v_0(1.2) - 16(1.2)^2$$

$$\begin{array}{r} 15.96 \\ -3 \\ \hline 12.96 \end{array} = \begin{array}{r} 3 \\ -3 \\ \hline 1.2v_0 \end{array} - 23.04$$

$$12.96 = 1.2v_0 - 23.04$$

$$\begin{array}{r} 12.96 = 1.2v_0 - 23.04 \\ +23.04 \quad \quad +23.04 \\ \hline 36 = 1.2v_0 \\ \hline \frac{36}{1.2} = \frac{1.2v_0}{1.2} \\ \boxed{v_0 = 30 \text{ ft/sec}} \end{array}$$

6. Larry and Sherry want to open a water park, and want to charge customers to use their "Water Slide of Death." Sherry asked a market research company to survey how the number of customers would depend on the admission price.

Here is what the survey said:

- The data suggested that daily number of customers n would be related to admission price x by $n = 500 - 10x$.
- The cost of operating the water slide attraction is \$450 a day.
- The insurance cost is \$4 per customer (after all, it IS called the Water Slide of Death...)

- a.) Write an equation that would help you find income.

$$I = xn \text{ or } I = x(500 - 10x)$$

- b.) Fill in the table below.

	Ticket Price (in \$)					
	0	9	18	27	36	49
$n = 500 - 10x$ → Number of Tickets Sold	500	410	320	230	140	10
Income (in \$)	0	3690	5760	6210	5040	490
Operating Cost	450	450	450	450	450	450
$4n$ → Insurance Cost	2000	1640	1280	920	560	40
Profit (\$)	-2,450	1600	4030	4840	4030	0

- c.) Write an equation for profit, but write it two ways—the first should show the breakdown of each item and the second should be a simplified version (Recall: Profit = Income - Costs).

$$P = x(500 - 10x) - 450 - 4(500 - 10x) \quad \text{OR}$$

$$P = -10x^2 + 540x - 2450$$

- d.) What ticket price leads to a maximum profit? What is the max profit?

$$x = 27 \quad \text{profit is } \$4840$$

- e.) Between what two ticket prices is the profit positive? Write answer as an inequality.

$$5 < x < 49$$

window: $x_{\min} = 0$
 $x_{\max} = 60$
 $x_{\text{sc1}} = 10$
 $y_{\min} = -1000$
 $y_{\max} = 5500$
 $y_{\text{sc1}} = 500$

only use
x variable
please

7. Rewrite each of the following expressions in equivalent form after factoring:

a.) $8x^2 + 5x$

$x(8x+5)$

b.) $x^2 - 10x$

$x(x-10)$

c.) $x - 4x^2$

$x(1-4x)$

8. Rewrite each expression in equivalent standard form ax^2+bx+c .

a.) $(x+3)(x+5)$

$x^2+8x+15$

b.) $(x-4)(x+7)$

$x^2+3x-28$

c.) $(x-5)(x+5)$

x^2-25

d.) $(x+8)^2$

$x^2+16x+64$

e.) $6x(9-3x) =$

$54x-18x^2$

$= -18x^2+54x$

f.) $4(2x+5)+2x(x-1) = 8x+20+2x^2-2x$

$= 2x^2-6x+20$

9. Solve each equation using algebra.

a.) $x^2 = 18$ $x = \pm\sqrt{18}$

or ± 4.24

b.) $8x + 6x^2 = 0$ $x = 0$ and $x = -\frac{4}{3}$

c.) $4x^2 - 2x = 0$ $x = 0$ and

$x = \frac{1}{2}$

d.) $5x^2 - 30 = 95$ $x = \pm 5$

e.) ~~$9x - 2x^2 = 5$~~

~~$x =$~~

f.) $20 + 8x^2 = 5$ No solution

10. Consider the equation $y = x^2 - 8x$

a.) What are the x-intercepts of the graph of this function?

$y = x(x-8)$

$x = 0$ and $x = 8$

b.) Find the coordinates of the minimum point using the x-intercepts and what you know about the symmetry of parabolas. Do NOT use the graphing part of your calculator.

$x = \frac{0+8}{2} = 4$

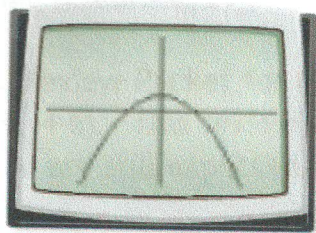
$(4, -16)$

$y = 4^2 - 8(4) = -16$

11. Match each equation to the appropriate graph using information from the "a" "b" and "c" values. Each graph has the same x- and y-scale.

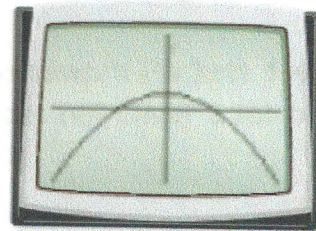
Rule I $y = x^2 + 2$	Rule II $y = x^2 - 5x + 2$
Rule III $y = -x^2 + 2$	Rule IV $y = -0.5x^2 + 2$
Rule V $y = x^2 + 5x + 2$	

A



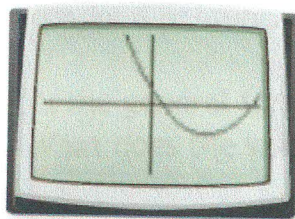
Rule III

B



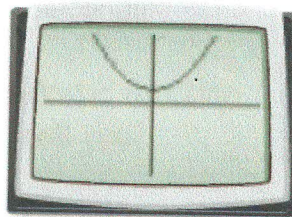
Rule IV

C



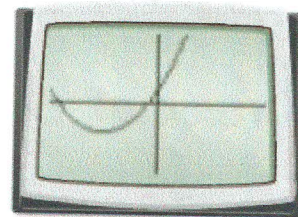
Rule II

D



Rule I

E



Rule V