

IM2 Problem Set 6.6 - Working with Quadratic Functions

BIG PICTURE
of this UNIT:

- How do we analyze and then work with a data set that shows both increase and decrease
- What is a parabola and what key features do they have that makes them useful in modeling applications
- How do I use graphs, data tables and algebra to analyze quadratic functions?
- How can I use graphs and equations of quadratic relations to make predictions from data sets & their models

- (CA) For each relation, state the (i) x -intercepts; (ii) the equation of the axis of symmetry; (iii) the vertex; (iv) the y -intercept and then sketch each parabola and label the key points.
 - $g(x) = (x + 4)(x + 2)$
 - $h(x) = 2(x - 3)(2 - x)$
 - $k(x) = -3(x + 3)(x - 4)$
- (CA) Factor the following quadratic expressions:
 - (i) $3x^2 - 21x - 54$
 - (ii) $2x^2 - 2x - 60$
 - (iii) $6x^2 + 24x - 30$
 - (i) $3x^2 + 11x + 6$
 - (ii) $4x^2 - 8x - 5$
 - (iii) $3x^2 - 11x - 4$
- (CA) A projectile is fired from a cliff 200 feet above the water at an inclination of 45° to the horizontal, with a muzzle velocity of 50 feet per second. The height, h , of the projectile above the water is given by $h(x) = -\frac{32}{50}x^2 + x + 200$ where x is the horizontal distance of the projectile from the face of the cliff.
 - State the window settings you used to see the parabola.
 - At what horizontal distance from the cliff is the height of the projectile a maximum?
 - Find the maximum height of the projectile.
 - At what horizontal distance from the cliff will the projectile strike the water?
 - When the height of the projectile is 100 feet above the water, how far is it from the cliff?
 - State a domain and range for the model, given the context of the problem.
- (CA) You are given the function $f(x) = 2x^2 - 7x - 28$ Explain how you can use a graph to “factor” this equation. Hence, write the equation of $f(x)$ in factored form, rounded to three decimal places
- (CA) Here are two “area of rectangle” questions:
 - One side of a rectangle is 3 m shorter than twice the other side. Find the sides if the perimeter is 24 m.
 - One side of a rectangle is 3 m shorter than twice the other side. Find the sides if the area is 209 m^2 .

6. (CA) Factoring “Special Quadratics.” for all the of the quadratic equations presented, graph them on the calculator and then using the graph, write the equation of each quadratic in factored form. Finally, explain any observations that you make in terms of why these quadratics are “special”.

- a. (i) $x^2 - 64$ (ii) $x^2 - 25$ (iii) $x^2 - 36$ (iv) $2x^2 - 98$
 b. (i) $x^2 + 10x + 25$ (ii) $x^2 - 4x + 4$ (iii) $x^2 + 8x + 16$ (iv) $x^2 - 12x + 36$

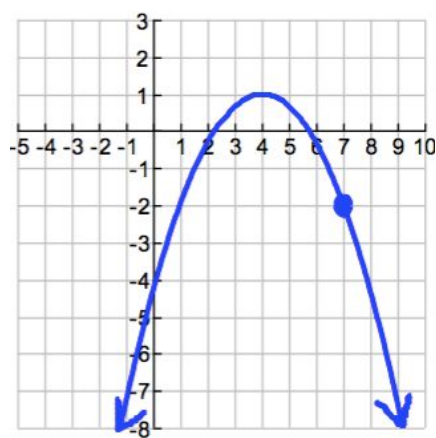
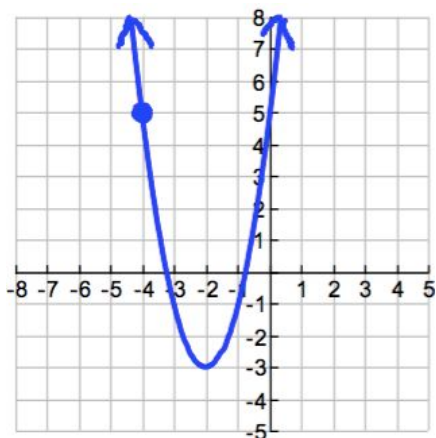
7. (CA) For the following data sets,

- a. Determine whether the data set is linear, quadratic or exponential?
 b. What are the **next** three terms of each sequence?
 c. What are the 3 terms that **preceded** the first term of each sequence?

a)	<table border="1"><tr><td>x</td><td>10</td><td>20</td><td>30</td><td>40</td></tr><tr><td>y</td><td>21</td><td>41</td><td>61</td><td>81</td></tr></table>	x	10	20	30	40	y	21	41	61	81	d)	<table border="1"><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>1</td><td>-1</td><td>7</td><td>-11</td></tr></table>	x	0	1	2	3	y	1	-1	7	-11		
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c)	<table border="1"><tr><td>x</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>y</td><td>-2</td><td>-3</td><td>-5</td><td>-8</td></tr></table>	x	5	6	7	8	y	-2	-3	-5	-8	f)	<table border="1"><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td>1</td><td>2</td><td>4</td><td>8</td><td>16</td></tr></table>	x	0	1	2	3	4	y	1	2	4	8	16
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8. (CA) Nancy walks 15 m diagonally across a rectangular field. She then returns to her starting position along the outside of the field. The total distance she walks is 36 m. What are the dimensions of the field?

9. (CA) Determine the equation of each parabola. Express your FINAL answers in standard form.



EXTENSION PROBLEMS

10. A rectangular garden measures 5 feet by 4 feet. The length and the width are both increased by the same amount and the new area is 56 square feet. What are the new dimensions of the garden?
11. A brick path of uniform width is constructed around the outside of a 6 m by 10 m rectangular garden. Find how wide the path should be if there is enough brick to cover 132 square meters.

https://npc.gvsd.ca/web/mdyck/NPC%20Website/PCM30S/Pre-Calc%2030S%20Material/Quadratic_Word_Problems_Examples.pdf

