

TEST REVIEW - Characteristics of Quadratics

1. Are the following quadratic equations in standard, factored, or vertex form?

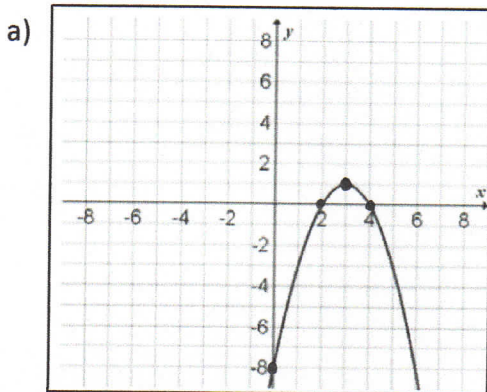
a) $y = 19x^2 + 4x + 1$ Standard

b) $y = 4(x - 2)^2 + 1$ Vertex

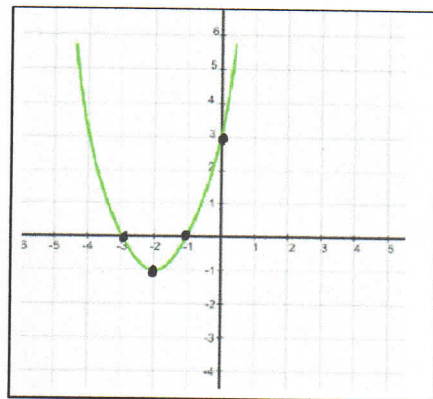
c) $y = (x - 3)(x + 8)$ Factored

d) $y = x^2 + 5x - 92$ Standard

2. For the following parabolas, state the key features:



- a) Vertex $(3, 1)$
- b) Min/max value Max is 1
- c) Axis of symmetry $x = 3$
- d) Zeros 2 and 4
- e) Direction of opening down
- f) y-intercept -8



- a) Vertex $(-2, -1)$
- b) Min/max value min is -1
- c) Axis of symmetry $x = -2$
- d) Zeros -1 and -3
- e) Direction of opening up
- f) y-intercept 3

3. Find the zeros of the following quadratic equations. Factor 1st!

a) $y = x^2 - 8x - 33$

$$0 = (x - 11)(x + 3)$$

\downarrow \downarrow
 $x - 11 = 0$ $x + 3 = 0$
 $x = 11$ $x = -3$

b) $y = 3x^2 - 48$

$$0 = 3(x^2 - 16)$$

$$0 = 3(x - 4)(x + 4)$$

\downarrow \downarrow
 $x - 4 = 0$ $x + 4 = 0$
 $x = 4$ $x = -4$

c) $y = 2x^2 + 6x - 80$

$$0 = 2(x^2 + 3x - 40)$$

$$0 = 2(x + 8)(x - 5)$$

\downarrow \downarrow
 $x + 8 = 0$ $x - 5 = 0$
 $x = -8$ $x = 5$

4. The path of a killer whale in the water can be given by the function $d = t^2 - 8t + 7$. Where d is the depth in metre (y -value) and t is the time in seconds (x -value). Complete the following information below and sketch a graph.

a) y -intercept 7

b) Zeros $d = t^2 - 8t + 7$

Factor $0 = (t-7)(t-1)$
 $\downarrow \quad \downarrow$
Solve for $t-7=0$ $t-1=0$
t $t=7$ $t=1$

\therefore x -int are 7 and 1

c) Axis of symmetry

$\frac{7+1}{2} = \frac{8}{2} = 4 \therefore x=4$

d) Vertex

$\therefore t=4$

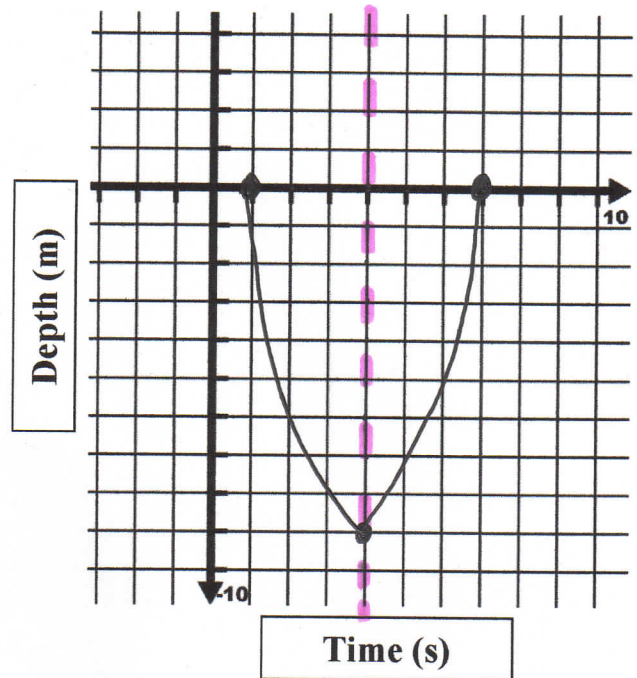
Let $t=4$ to find d .

$d = t^2 - 8t + 7$

$d = (4)^2 - 8(4) + 7$

$d = 16 - 32 + 7$

$d = -9 \therefore$ vertex is $(4, -9)$



e) Draw the graph on the grid provided using the information you have gathered.

f) Direction of opening up

g) What is the maximum/minimum depth the whale reaches? min value is -9 m.

5. Label each equation as either: linear, quadratic or neither.

a) $y = 6x - 1$ Linear

d) $19x - 4y + 1 = 0$ Linear

b) $y = 3x^2 + 10x$ Quadratic

e) $y = 11x^3 + 8$ Neither

c) $y = 9x^2 - 4x + 100$ Quadratic

f) $y = 4x^5 + 6x$ Neither

6. The observations for a kicked football at different times are shown below.

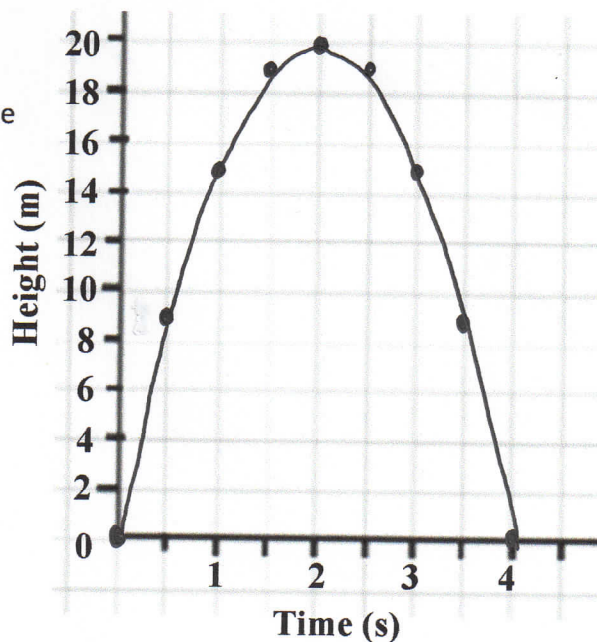
Time (s)	Height (m)	First Differences	Second Differences
0	0		
		$8.75 - 0 = 8.75$	
0.5	8.75		
		$15 - 8.75 = 6.25$	$6.25 - 8.75 = -2.5$
1	15		
		$18.75 - 15 = 3.75$	$3.75 - 6.25 = -2.5$
1.5	18.75		
		$20 - 18.75 = 1.25$	$1.25 - 3.75 = -2.5$
2	20		
		$18.75 - 20 = -1.25$	$-1.25 - 1.25 = -2.5$
2.5	18.75		
		$15 - 18.75 = -3.75$	$-3.75 - (-1.25) = -2.5$
3	15		
		$8.75 - 15 = -6.25$	$-6.25 - (-3.75) = -2.5$
3.5	8.75		
		$0 - 8.75 = -8.75$	$-8.75 - (-6.25) = -2.5$
4	0		

a) Calculate the first and second differences (if necessary) by completing the above table.

b) Is it linear, quadratic, or neither? Quadratic

Explain your reason: Second differences are equal.

c) Use the points from the table and complete the scatter plot on the graph to the right by plotting time(s) on the horizontal axis and height (m) on the vertical axis.



d) How long was the ball in the air for?
4 seconds

e) After how many seconds did the ball reach its maximum height?
2 seconds

f) What was the height of the ball after 3.5 seconds?
8.75 m