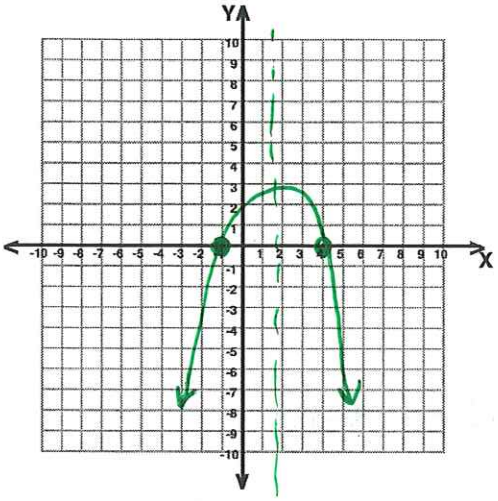
TEST REVIEW Unit 3 Graphing Quadratics Name: O-TT

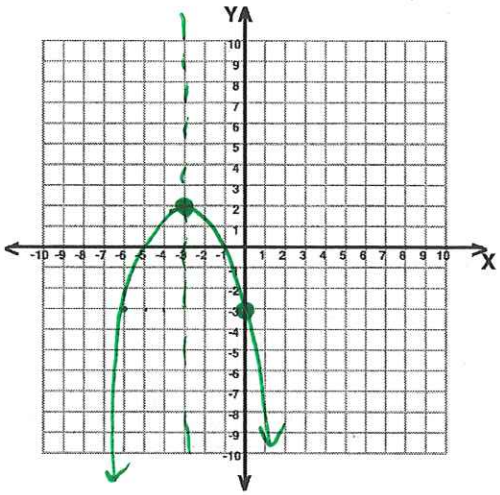
Period: 9 11

(1) **Graph a function that has… (Mark important points)** use AoS to help

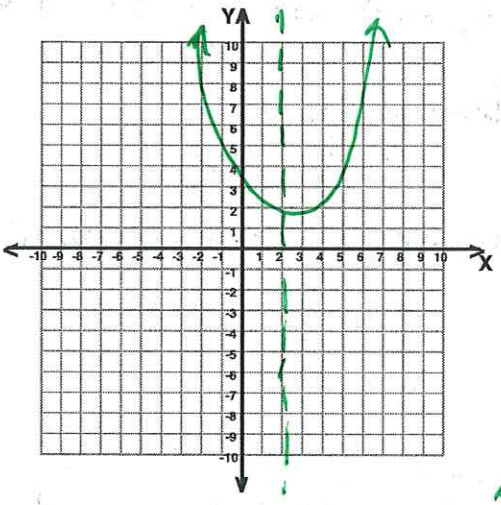
x-intercepts x = -1 and x = 4



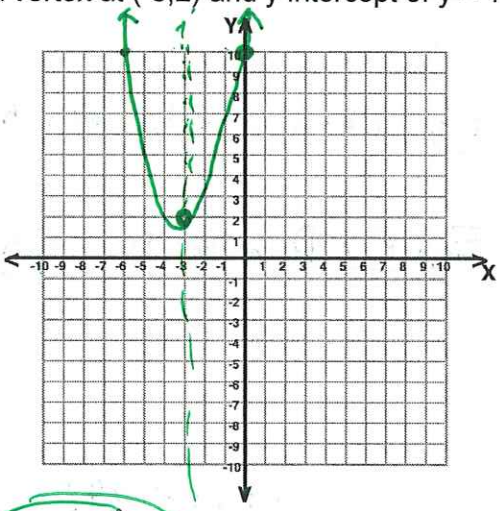
a vertex at (-3,2) and y intercept of y = -3



An axis of symmetry at x = 2



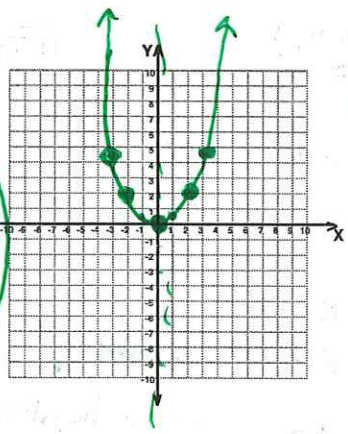
a vertex at (-3,2) and y intercept of y = 10



(2) **Graph the function. (Use a table and 5 points)** at least Draw AOS

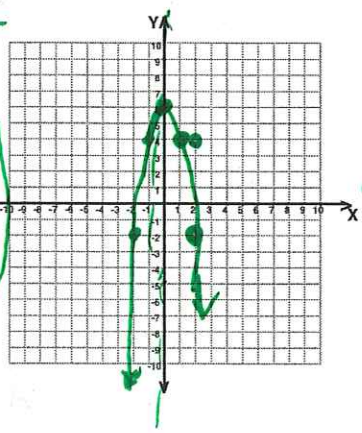
f(x) = ½ x²

x	y
-2	2
-1	.5
0	0
1	.5
2	2
3	4.5



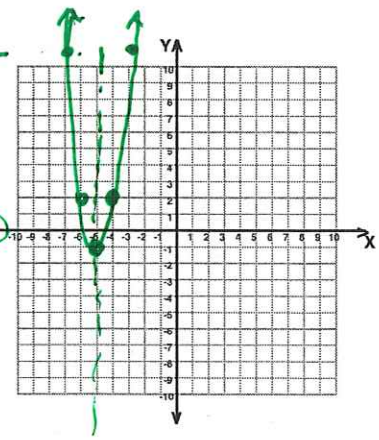
g(x) = -2x² + 6

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



h(x) = 3(x+5)² - 1

x	y
-7	
-6	
-5	-1
-4	2
-3	11



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Match the graph with the function… explain your decision.

(3) Here are 4 equations of quadratic functions and 4 sketches of the graphs of quadratic functions.

A. $y = x^2 - 6x + 8$	B. $y = (x-6)(x+8)$	C. $y = (x-6)^2 + 8$	D. $y = -(x+8)(x-6)$

$\frac{6}{2(1)} = 3$

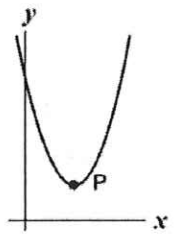
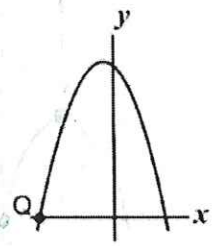
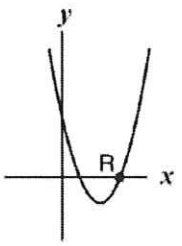
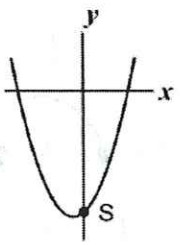
$(3)^2 - 6(3) + 8$

$9 - 18 + 8$

-1

$(3, -1)$

$(x-4)(x-2)$

1.	2.	3.	4.
			

a. Match the equation to its graph and explain your decision.

Equation A ***matches*** Graph 3, because vertex would be (3,-1)

Equation B matches Graph 4 because the x-intercepts are x=6, x=-8 and it is facing up (+)

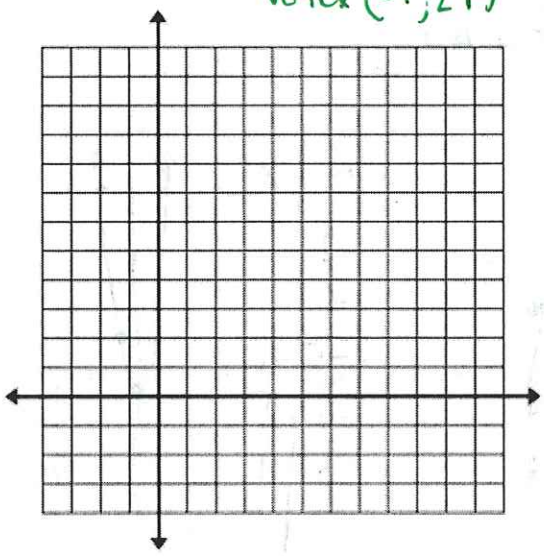
Equation C matches graph 1 because the vertex would be (6,8)

Equation D matches graph 2 because it is facing down (−)

Real World Situation

(4) While playing basketball this weekend Frank shoots an air-ball. The height h in feet of the ball is given by $h(x) = -16(t-1)^2 + 24$ where t is time in seconds.

vertex (-1, 24)



a) How long will it take the ball to hit the ground? $y = 0$

$t = 2.22$ seconds

$0 = -16(t-1)^2 + 24$

$-24 = -16(t-1)^2$

$1.5 = (t-1)^2$

$\sqrt{1.5} = t - 1$

$1.22 = t - 1$

$+1 \quad +1$

$2.22 = t$

b) What is the maximum height of the ball? 24 feet (vertex)

c) What are the domain and range of the function? D: $-\infty$ to ∞

R: $-\infty$ to 24

d) How does the situation restrict the domain and range? Domain & Range must be positive numbers!

* can't have negative time or height

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(5) **Find the vertex, x-intercepts, y-intercepts from standard form and vertex form, then convert it**

a) $y = x^2 - 4x + 3$ $\frac{-b}{2a} = \frac{4}{2(1)} = 2$ $(2)^2 - 4(2) + 3$ $4 - 8 + 3$

Vertex (2, -1) is it a maximum or a minimum? minimum opens up...

y-intercept $y = 3$

x-intercepts $x = 1$, $x = 3$

$(x-3)(x-1)$ (3 and -1 multiply to -3, add to -4)

$x - 3 = 0$ $+3 \quad +3$ $x = 3$

$x - 1 = 0$ $+1 \quad +1$ $x = 1$

Rewrite the equation in vertex form (complete the square)

$\left(\frac{b}{2}\right)^2 = \left(\frac{-4}{2}\right)^2$

$y = x^2 - 4x + 3$

$y = (x^2 - 4x + 4) - 4 + 3$

$y = (x-2)^2 - 1$

b) $y = x^2 + 8x - 20$

Vertex (-4, -36) is it a maximum or a minimum? minimum opens up...

$x = \frac{-8}{2(1)} = -4$

$y = (-4)^2 + 8(-4) - 20$

$y = 16 + -32 - 20$

$y = -36$

y-intercept $y = -20$

x-intercepts $x = -10$, $x = 2$

Rewrite the equation in vertex form (complete the square)

$\left(\frac{8}{2}\right)^2 = 16$

$y = (x^2 + 8x + 16) - 16 - 20$

$y = (x+4)^2 - 36$

-20: 10×-2, 8

$(x+10)(x-2)$

$x + 10 = 0$ $x = -10$

$x - 2 = 0$ $x = +2$

c) $y = (x-5)^2 - 4$

Vertex (5, -4) is it a maximum or a minimum? minimum

y-intercept $y = 21$ $y = (0-5)^2 - 4$ $y = (-5)^2 - 4$ $y = 25 - 4$

x-intercepts $x = 7$, $x = 3$

Rewrite the equation in standard form

$y = (x-5)(x-5) - 4$

$y = x^2 - 5x - 5x + 25 - 4$

$y = x^2 - 10x + 21$

$0 = (x-5)^2 - 4$

$+4 \quad +4$

$\sqrt{4} = \sqrt{(x-5)^2}$

$\pm 2 = x - 5$

$2 = x - 5$ $+5 \quad +5$ $7 = x$

$-2 = x - 5$ $+5 \quad +5$ $3 = x$

d) $y = (x+1)^2 + 16$

Vertex (-1, 16) is it a maximum or a minimum? minimum

y-intercept $y = 17$ $y = (0+1)^2 + 16$ $y = (1)^2 + 16$ $y = 1 + 16$

x-intercepts None

Rewrite the equation in standard form

$y = (x+1)(x+1) + 16$

$y = x^2 + x + x + 1 + 16$

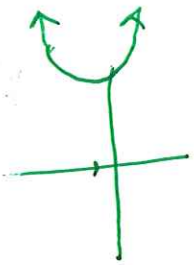
$y = x^2 + 2x + 17$

$0 = (x+1)^2 + 16$

$\sqrt{-16} = \sqrt{(x+1)^2}$

error $= x + 1$

No x-intercepts!!



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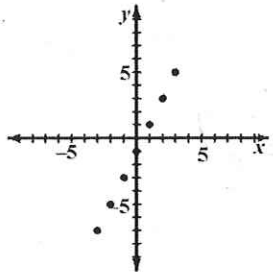
Telling/writing the function from the table… some extra examples and some practice

Example 1

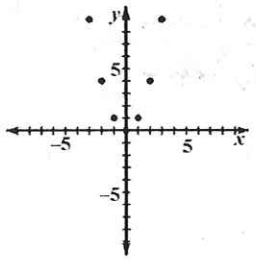
x	–3	–2	–1	0	1	2	3
y	–7	–5	–3	–1	1	3	5
		2	2	2	2	2	2



The difference in y-values is always two, a constant. The graph is linear and is verified at right.

Example 2

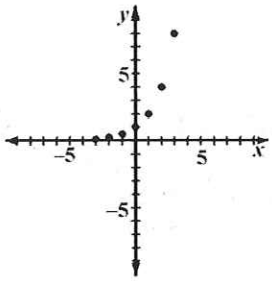
x	–3	–2	–1	0	1	2	3
y	9	4	1	0	1	4	9
		–5	–3	–1	1	3	5
			2	2	2	2	2



The first difference in y-values is not constant but the second difference is. The graph is quadratic and is verified at right.

Example 3

x	–3	–2	–1	0	1	2	3
y	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8
		$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4



The difference in y-values follows a pattern similar to the y-values. The graph is exponential and is verified at right. (In this case, the difference pattern was exactly the same as the y-values. This is not always necessary.)

(6) **Tell whether the table of values represents a function is linear, quadratic or exponential**

Quadratic

x	–3	–2	–1	0	1	2	3
y	0	5	8	9	8	5	0
		5	3	1	–1	–3	–5
			–2	–2	–2	–2	–2

x	–3	–2	–1	0	1	2	3
y	11	9	7	5	3	1	–1
		–2	–2	–2	–2	–2	–2

Linear

x	–3	–2	–1	0	1	2	3
y	4	8	16	32	64	128	256
		4	8	16	32	64	128
			4	8	16	32	64

Exponential

(7) **Write a quadratic equation from the following table**

x	–3	–2	–1	0	1	2	3
y	3	0	–1	0	3	8	15

$y = 1(x+1)^2 - 1$

Find vertex $(-1, -1)$

write in vertex form $y = a(x+1)^2 - 1$

plug in another point $(0, 0)$

$0 = a(0+1)^2 - 1$

$0 = a(1)^2 - 1$

$0 = a \cdot 1 - 1$

$+1 \quad +1$

$1 = a \cdot 1$

$a = 1$

Solve for a