

# 8 Algebra CC Zoom #6 – Unit 15 (Quadratic Functions)

1)

a) Graph  $y = x^2 - 2x - 3$ .

b) Determine the coordinates of the vertex.  $(1, -4)$

c) State whether the vertex is a *maximum* or a *minimum* point. min.

d) State the equation of the axis of symmetry  $x = 1$

e) State the **roots** of the parabola.  $x = \{-1, 3\}$

f) State the **y-intercept**.  $-3$

g) State the **domain** of the function.  $(-\infty, \infty)$

h) State the **range** of the function.  $y \geq -4$   $[-4, \infty)$

i) State the **interval** for which the function is **increasing**.  $(1, \infty)$

j) State the **interval** for which the function is **decreasing**.  $(-\infty, 1)$

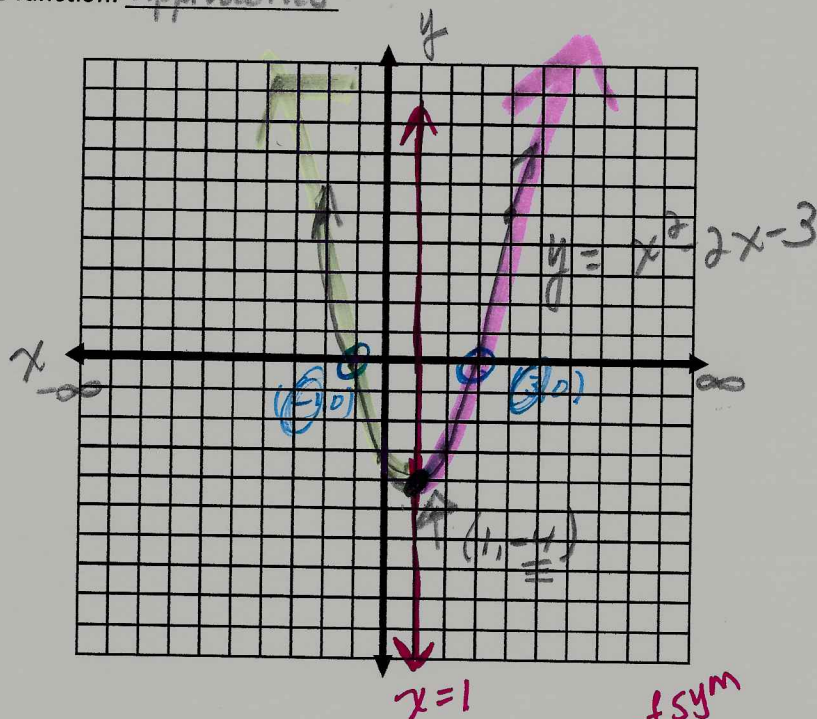
k) Describe the **end behavior** of the function. approaches  $\infty$

$x = \frac{-b}{2a}$      $a=1$      $b=-2$   
 $x = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$      $x=1$

x-values  
y-values

x	y
-2	5
-1	0
0	-3
1	-4
2	-3
3	0
4	5

roots  $\rightarrow$   $x = -1, 3$   
 y intercept  $\rightarrow$   $y = -3$   
 vertex  $\rightarrow$   $(1, -4)$



look at x-values

2) Examine the function pictured below and complete a – d.

a) State the **interval** for which the function is **increasing**.  $(-\infty, -1)$

b) State the **interval** for which the function is **decreasing**.  $(-1, \infty)$

c) State the **range** of the function.  $y \leq 4$

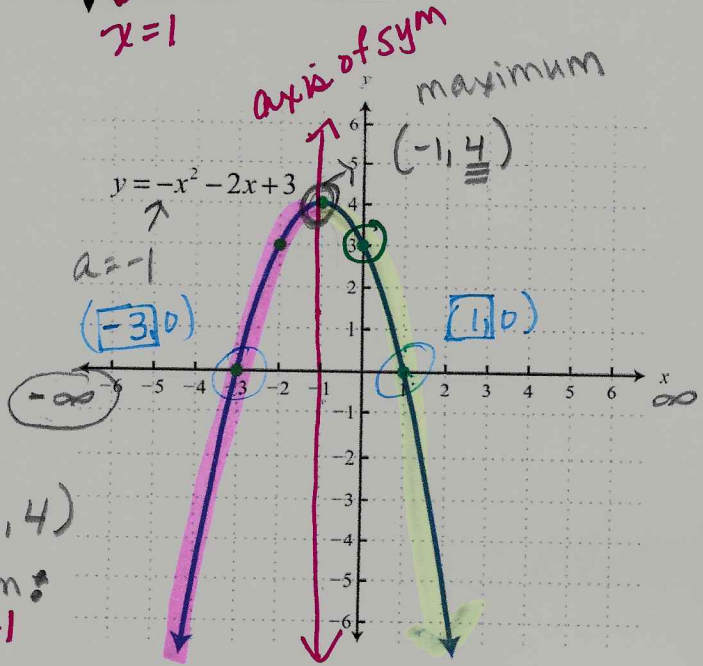
d) State the **y-intercept**.  $3$

e) Roots:  $x = \{-3, 1\}$

f) vertex:  $(-1, 4)$

\* x value of x intercepts

g) axis of Sym:  $x = -1$



**Quadratic Functions can be written in different forms.**

**Standard Form**  
 $y = ax^2 + bx + c$   
 c: y-intercept

**Factored Form**  
 $y = a(x - r_1)(x - r_2)$   
 Roots:  $\{r_1, r_2\}$

**Vertex Form**  
 $y = a(x - h)^2 + k$   
 Vertex:  $(h, k)$



Rewrite the quadratic functions in factored form and in vertex form.  
 State the zeros and the vertex of the function.

$y = x^2 - 2x - 3$	$y = x^2 - 18x - 40$
<p><b>Factored Form</b></p> $y = x^2 - 2x - 3$ $y = (x - 3)(x + 1)$ <p>Zeros: <math>x = \{-1, 3\}</math></p>	<p><b>Factored Form</b></p> $y = x^2 - 18x - 40$ $y = (x - 20)(x + 2)$ <p>Zeros: <math>x = \{-2, 20\}</math></p>
<p><b>Vertex Form</b></p> $y = x^2 - 2x - 3$ $+3 \qquad +3$ <hr/> $y + 3 = x^2 - 2x + 1$ $+1$ $y + 4 = x^2 - 2x + 1$ $y + 4 = (x - 1)^2$ $-4 \qquad -4$ $y = (x - 1)^2 - 4$ <p>Vertex: <math>(1, -4)</math></p>	<p><b>Vertex Form</b></p> $y = x^2 - 18x - 40$ $+40 \qquad +40$ $y + 40 = x^2 - 18x + 81$ $81 \qquad (x - 9)(x - 9)$ $y + 121 = (x - 9)^2$ $-121 \qquad -121$ $y = (x - 9)^2 - 121$ <p>Vertex: <math>(9, -121)</math></p>