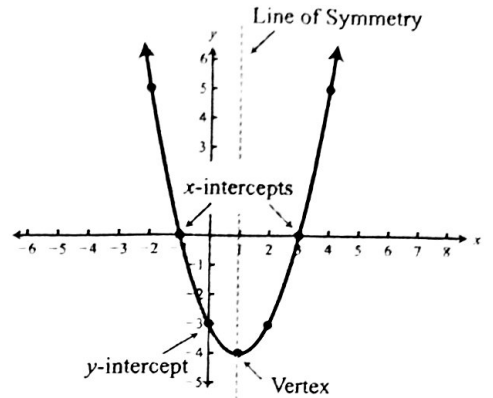




# Unit 5 Notes

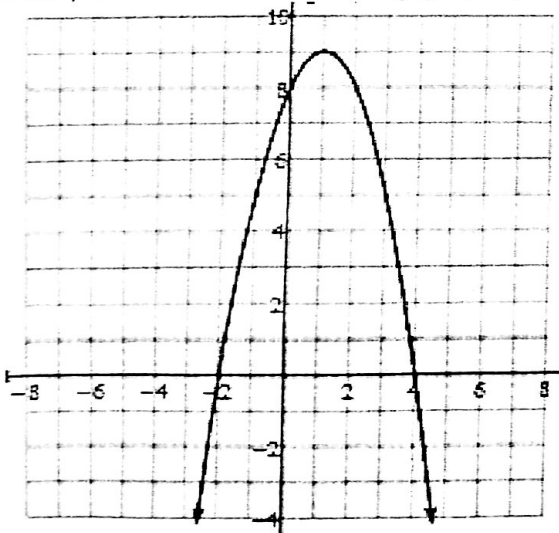
## 5.1: Key Features of Parabolas

### PARABOLA:

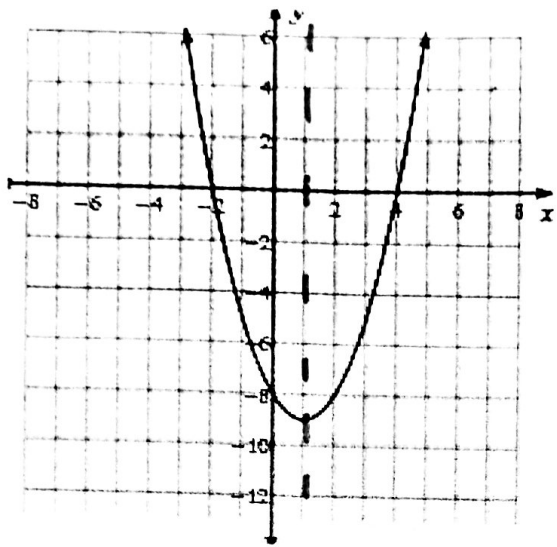


Feature	Definition	Example (above)
y-intercept	Point where graph crosses the y-axis	$(0, -3)$
x-intercept(s)	Point(s) where graph crosses the x-axis	$(-1, 0), (3, 0)$
Axis of Symmetry	Line through middle of parabola, goes through vertex	$x = 1$
Vertex	Turning point of parabola,	$(1, -4)$
Max/Min ( $a$ )	Highest/lowest point (vertex) • Value: y-coordinate	Min Min Value: $-4$

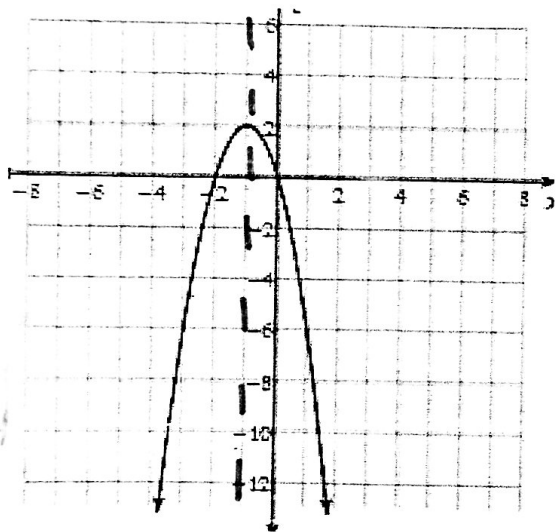
Example 1: Given the following graphs, identify the ...



- x-intercept(s):  $(-2, 0), (4, 0)$
- y-intercept:  $(0, 8)$
- axis of symmetry:  $x = 1$
- vertex:  $(1, 9)$
- Max or Min? Max
- Max/Min Value? 9



- x-intercept(s):  $(-2, 0), (4, 0)$
- y-intercept:  $(0, -8)$
- axis of symmetry:  $x = 1$
- vertex:  $(1, -9)$
- Max or Min? *Min*
- Max/Min Value:  $-9$



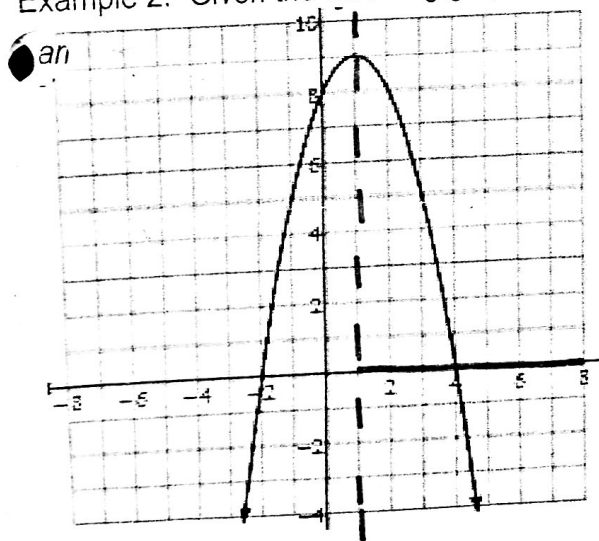
- x-intercept(s):  $(-2, 0), (0, 0)$
- y-intercept:  $(0, 0)$
- axis of symmetry:  $x = -1$
- vertex:  $(-1, 2)$
- Max or Min? *Max*
- Max/Min Value?  $2$

\*Using Example 2 below

Term	Definition	How to write it
Domain	All possible x-values • scan graph from left to right for breaks	$\mathbb{R}$ (all real numbers) $-\infty < x < \infty$ (x is between...) $(-\infty, \infty)$
Range	All possible y-values • scan graph bottom to top * USE $\leq$ or $\geq$ on max/min value	$-\infty < y \leq 9$ $(-\infty, 9]$
Increasing	x-values where graph has a positive slope	$-\infty < x < 1$ $(-\infty, 1)$
Decreasing	x-values where graph has a negative slope	$1 < x < \infty$ $(1, \infty)$
Direction of Opening		Down

\*Note: All intervals (except for range) are done according to the x-values.

Example 2: Given the following graphs, identify the ...



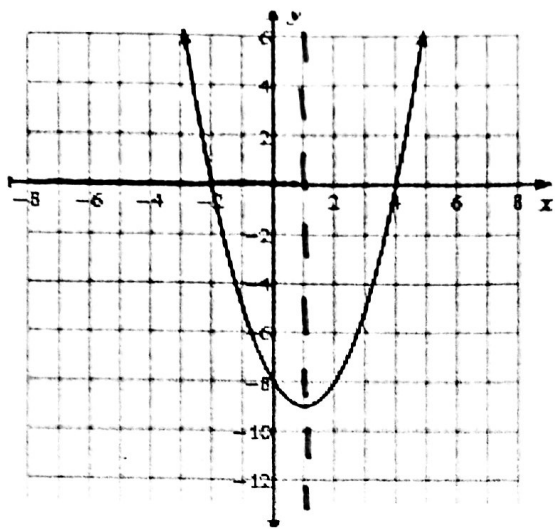
a. Domain:  $(-\infty, \infty)$

b. Range:  $(-\infty, 9]$

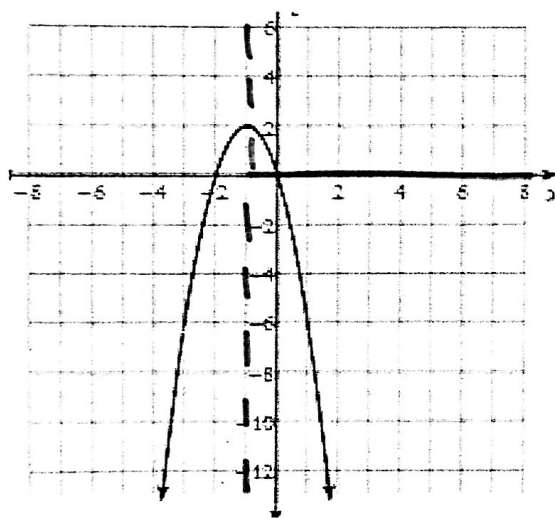
c. Increasing:  $(-\infty, 1)$

d. Decreasing:  $(1, \infty)$

e. Direction of Opening: Down



- Domain:  $(-\infty, \infty)$
- Range:  $[-9, \infty)$
- Increasing:  $(1, \infty)$
- Decreasing:  $(-\infty, 1)$
- Direction of Opening: Up



- Domain:  $-\infty < x < \infty$
- Range:  $-\infty < y \leq 2$
- Increasing:  $-\infty < x < -1$
- Decreasing:  $-1 < x < \infty$
- Direction of Opening: Down