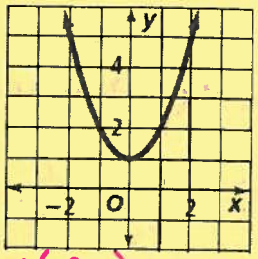
# Practice 5-1

## Modeling Data with Quadratic Functions

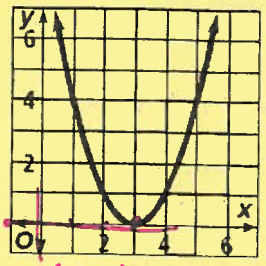
Key

**Identify the vertex and the axis of symmetry of each parabola.**

1. 

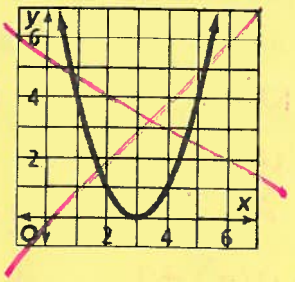
V(0,1)

AOS: x = 0

2. 

V(3,0)

AOS: x = 3

3. 

**Determine whether each function is linear or quadratic. Identify the quadratic, linear, and constant terms.**

3. $y = (x-2)(x+4)$ → Quadratic

$x^2+4x-2x-8$

$x^2+2x-8$

Q L C

4. $y = 5x(x-5)-5x^2$ → Linear

$5x^2-25x-5x^2$

$y = -25x$

L

Q: none

C: none

5. $f(x) = 7(x-2)+5(3x)$ → Linear

$f(x) = 7x-14+15x$

$f(x) = 22x-14$

Q: none

L: 22x

C: -14

6. $y = 3x(x-1)-(3x+7)$ → Quadratic

$y = 3x^2-3x-3x-7$

$y = 3x^2-6x-7$

Q: $3x^2$

L: $-6x$

C: $-7$

7. $y = 3x^2-12$ → Quadratic

Q: $3x^2$

L: none

C: $-12$

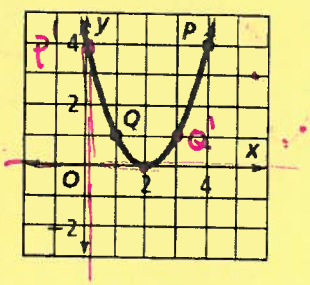
8. $y = 3x-5$ → Linear

Q: none

L: 2x

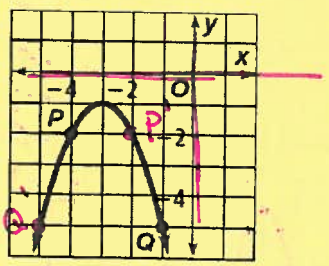
C: -5

**For each parabola, identify points corresponding to *P* and *Q*.**

9. 

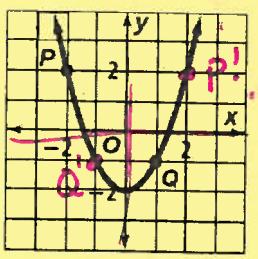
P' = (0,4)

Q' = (3,1)

10. 

P' = (-2,-2)

Q' = (-5,5)

11. 

P' = (2,2)

Q' = (-1,-1)

# Practice 5-2

**Properties of Parabolas**

**Graph each function. Label the vertex and the axis of symmetry. If a > 0, find the minimum value. If a < 0, find the maximum value.**

**1.** $y = x^2 - 4x + 1$

open up → min

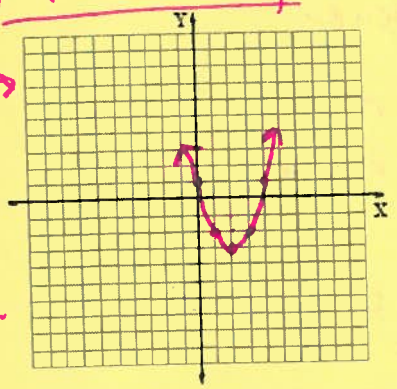
$x = \frac{4}{2(1)} = \frac{4}{2} = 2$

$y = (2)^2 - 4(2) + 1$

$4 - 8 + 1 = -4 + 1 = -3$

AOS: $x = 2$

V $(2, -3)$



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

**2.** $y = -x^2 + 2x + 3$

open down → max

$a = -1$

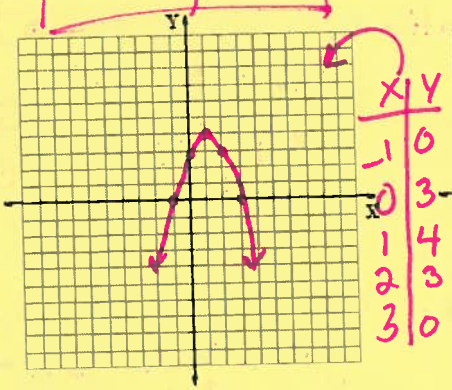
$b = 2$

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

$-(1)^2 + 2(1) + 3 = 4$

AOS: $x = 1$

V $(1, 4)$



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

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

open up → min

$a = 2$

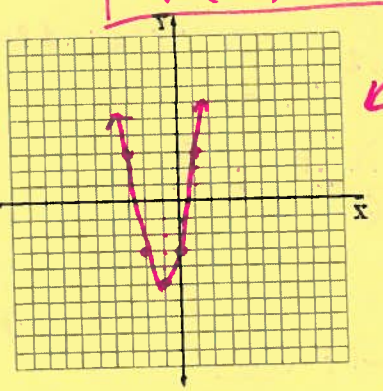
$b = 4$

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

$y = 2(-1)^2 + 4(-1) - 3 = -5$

AOS: $x = -1$

V $(-1, -5)$



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

**4.** $y = x^2 + 3$

open up → min

$a = 1$

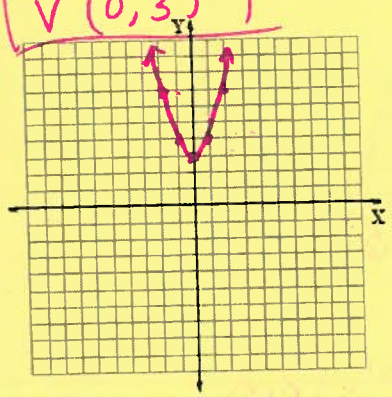
$b = 0$

$x = \frac{-0}{2(1)} = 0$

$y = 0^2 + 3 = 3$

AOS: $x = 0$

V $(0, 3)$



| x | y |
|---|---|
| -2 | 7 |
| -1 | 4 |
| 0 | 3 |
| 1 | 4 |
| 2 | 7 |

**5.** $y = -x^2 - 4$

open down → max

$a = -1$

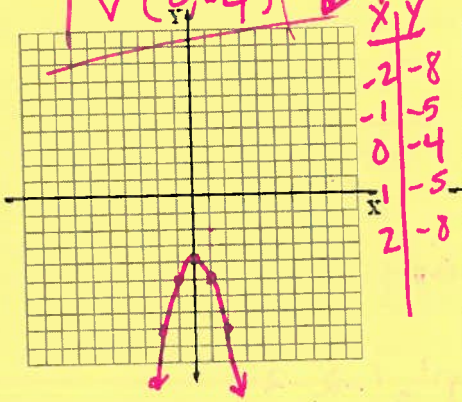
$b = 0$

$x = \frac{-0}{2(-1)} = 0$

$y = -(0)^2 - 4 = -4$

AOS: $x = 0$

V $(0, -4)$



| x | y |
|---|---|
| -2 | -8 |
| -1 | -5 |
| 0 | -4 |
| 1 | -5 |
| 2 | -8 |

**6.** $y = x^2 + 2x + 1$

open up → min

$a = 1$

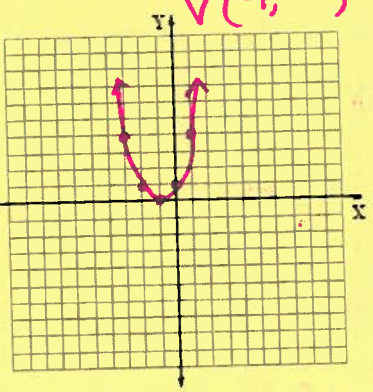
$b = 2$

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

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

AOS: $x = -1$

V $(-1, \quad)$



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