

8.5 Notetaking with Vocabulary

- I can identify characteristics of quadratic functions.
- I can find zeros of functions.
- I can graph quadratic and cubic functions using characteristics.
- Write the meaning of each vocabulary term.

intercept form

factored form $y = a(x-p)(x-q)$
 x-int. $(p,0) (q,0)$ $x = \frac{p+q}{2}$

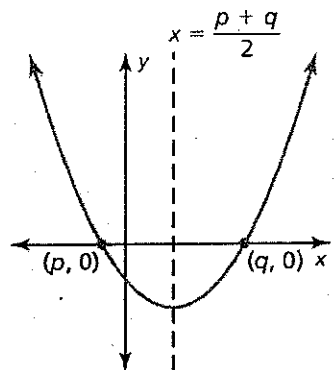
Standard

$y = ax^2 + bx + c$
 y-int. $(0,c)$ $x = -\frac{b}{2a}$
 vertex $y = a(x-h)^2 + k$
 vertex (h,k) $x = h$

Core Concepts

Graphing $f(x) = a(x-p)(x-q)$

- The x-intercepts are p and q .
- The axis of symmetry is halfway between $(p, 0)$ and $(q, 0)$. So, the axis of symmetry is $x = \frac{p+q}{2}$.
- The graph opens up when $a > 0$, and the graph opens down when $a < 0$.



Notes:

Factors and Zeros

For any factor $(x-n)$ of a polynomial, n is a zero of the function defined by the polynomial.

Notes:

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

8.5 Notetaking with Vocabulary (continued)

Practice $f(x) = a(x-p)(x-q)$ $(p,0)(q,0)$ $x = \frac{p+q}{2}$

In Exercises 1 and 2, find the x-intercepts and axis of symmetry of the graph of the function.

1. $y = (x+2)(x-4)$

$(-2,0) (4,0)$

$x = \frac{-2+4}{2} = \frac{2}{2} = 1$ $x=1$

2. $y = -3(x-2)(x-3)$

$(2,0) (3,0)$

$x = \frac{2+3}{2} = \frac{5}{2}$

$x = \frac{5}{2}$

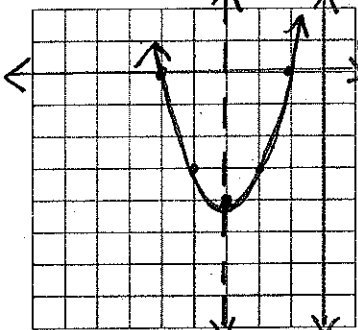
In Exercises 3-6, graph the quadratic function. Label the vertex, axis of symmetry, and x-intercepts. Describe the domain and range of the function.

3. $m(x) = (x+5)(x+1)$

4. $y = -4(x-3)(x-1)$

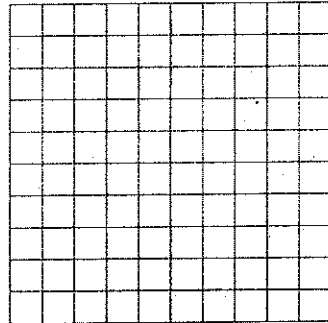
$\uparrow a=1$ $p=-5$ $q=-1$ by $(-5,0)(-1,0)$

$x = \frac{p+q}{2}$
 $x = \frac{-5+(-1)}{2}$
 $= \frac{-6}{2}$
 $x = -3$



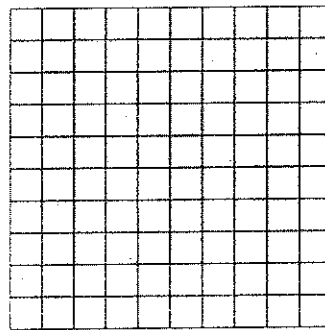
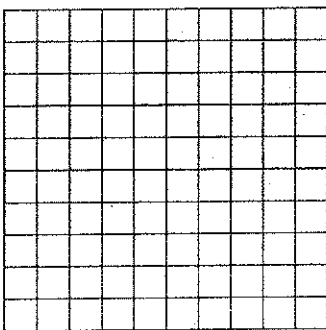
$m(-2) = (-2+5)(-2+1) = (3)(-1) = -3$

$m(-3) = (-3+5)(-3+1)$ Vertex $(-3, -4)$
 $m(-3) = (2)(-2) = -4$



5. $y = x^2 - 4$

6. $f(x) = x^2 + 2x - 15$



8.5 Notetaking with Vocabulary (continued)

① set $y=0$

② factor

③ set factors = 0 & solve

In Exercises 7 and 8, find the zero(s) of the function.

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

$0 = 6x^2 - 6$ $a=1$ $b=0$ $c=-1$

$0 = 6(x^2 - 1)$ $\frac{-1}{-1} \cdot \frac{1}{1} = -1$

$0 = 6(x+1)(x-1)$ $\frac{-1}{-1} + \frac{1}{1} = 0$

$x+1=0$ $x-1=0$
 $x=-1$ $x=1$

	x	-1
x	x^2	$-1x$
1	$x-1$	

8. $y = x^2 + 9x + 20$

$0 = x^2 + 9x + 20$

$0 = (x+5)(x+4)$

$x+5=0$ $x+4=0$

$x=-5$ $x=-4$

$a=1$ $b=9$ $c=20$

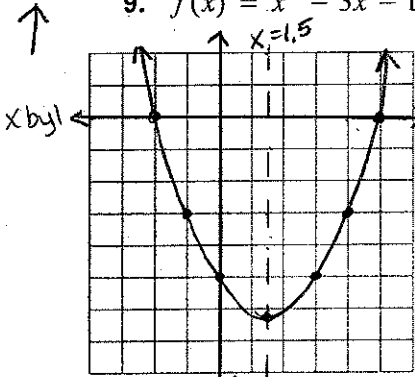
$\frac{5}{5} \cdot \frac{4}{4} = 20$

$\frac{5}{5} + \frac{4}{4} = 9$

In Exercises 9-12, use zeros to graph the function.

9. $f(x) = x^2 - 3x - 10 = (x-5)(x+2)$

10. $f(x) = -2(x+3)(x-1)$



$a=1$ $p=5$ $q=2$
 $(5, 0)$ $(-2, 0)$

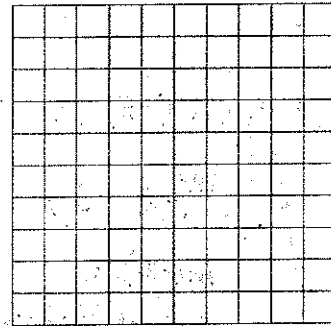
$x = \frac{5+2}{2} = \frac{3}{2}$

$(1.5-5)(1.5+2) = y$

$(-3.5)(3.5)$

$-12.25 = y$

$(1.5, -12.25)$



$f(0) = (0-5)(0+2)$
 $= (-5)(2) = -10$

$(0, -10)$

11. $f(x) = x^3 - 9x$

12. $f(x) = 2x^3 - 12x^2 + 10x$

