

Which of the following is a quadratic?

1.)  $x^2 - 8x + 15 = y$   
yes!

2.)  $3x - 6 = y$

No! not quadratic

3.)  $2(x^2 + 5x - 8) - 2x^2 = y$   
 ~~$2x^2 + 10x - 16 - 2x^2 = y$~~   
 $10x - 16$  not quadratic

4.)  $x^3 + 5x^2 - 2x + 12 = y$   
not quadratic

5.)  $(x-3)(x+6) = y$  FOIL  
yes

$x^2 + 6x - 3x - 18$   
 $x^2 + 3x - 18$

Quadratic

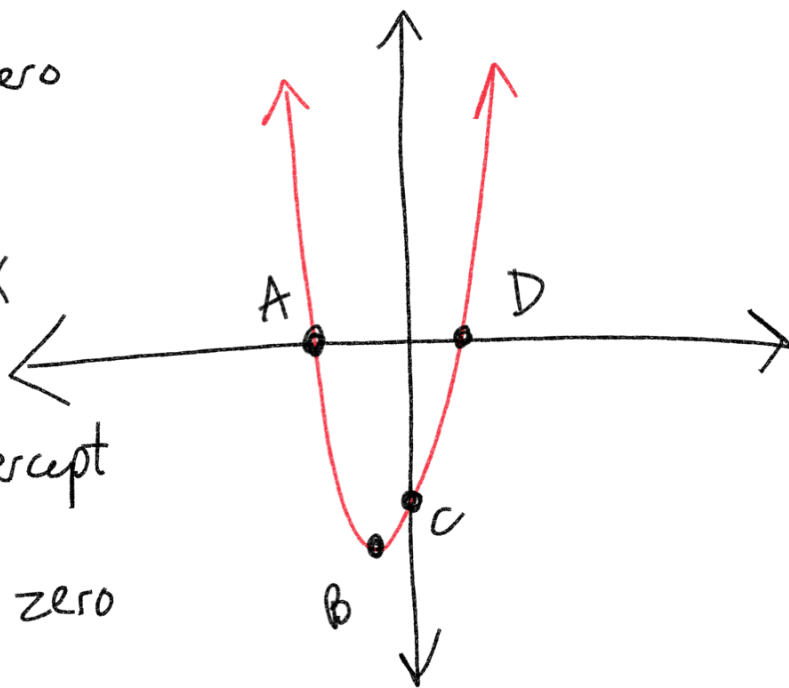
- 1.) Highest degree of  $x$  is  $x^2$
- 2.) Exponents for  $x$  must be whole numbers - no fractions, no negatives

A → root, zero

B → vertex

C → y-intercept

D → root, zero



Find the quadratic equation for the line with the points:  $(-1, 10)$ ,  $(2, 4)$ ,  $(3, -6)$

$y = ax^2 + bx + c$   $a = -2$   $b = 0$   $c = 12$   
 $(-1, 10)$   $y = -2x^2 + 12$   $(2, 4)$

$y = ax^2 + bx + c$

$\downarrow$   
 $10 = a(-1)^2 + b(-1) + c$

①  $10 = a - b + c$

$y = ax^2 + bx + c$

$4 = a(2)^2 + b(2) + c$

②  $4 = 4a + 2b + c$

$y = ax^2 + bx + c$   $(3, -6)$

$-6 = a(3)^2 + b(3) + c$

③  $-6 = 9a + 3b + c$

①  $10 = a - b + c$

②  $4 = 4a + 2b + c$

③  $-6 = 9a + 3b + c$

①  $10 = a - b + c$

②  $-1(4 = 4a + 2b + c)$

$10 = a - b + c$   
 $-4 = -4a - 2b - c$

$6 = -3a - 3b$   
 $\frac{6}{3} = \frac{-3a}{3} - \frac{3b}{3}$

④  $2 = -a - b$

$2 = -a - b$

$2 = -(-2) - b$

$-2 = 2 - b$   
 $-2 - 2 = -b$   
 $-4 = -b$

②  $4 = 4a + 2b + c$

③  $-6 = 9a + 3b + c$

$4 = 4a + 2b + c$   
 $-6 = -9a - 3b - c$

⑤  $10 = -5a - b$

④  $2 = -a - b$

⑤  $-1(10 = -5a - b)$

$2 = -a - b$

$-10 = 5a + b$   
 $-8 = 4a$

$\frac{-8}{4} = \frac{4a}{4}$

$-2 = a$

$b = 0$

$10 = a - b + c$   
 $\downarrow$

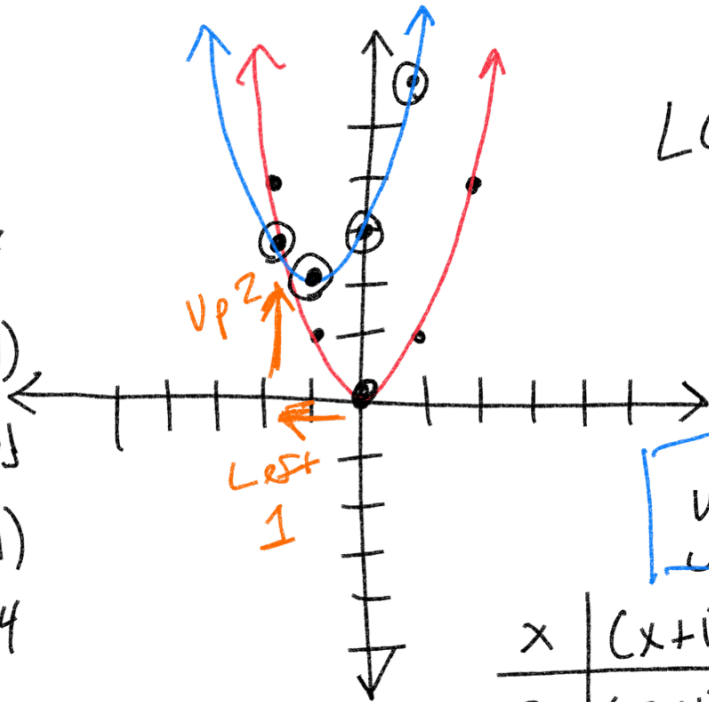
$10 = -2 - 0 + c$

$10 = -2 + c$   
 $+2 +2$

$12 = c$

$$y = x^2$$

x	x <sup>2</sup>	y
-2	(-2) <sup>2</sup>	4 (-2, 4)
-1	(-1) <sup>2</sup>	1 (-1, 1)
0	0 <sup>2</sup>	0 (0, 0)
1	1 <sup>2</sup>	1 (1, 1)
2	2 <sup>2</sup>	4 (2, 4)



parabola  
LOOK AT  
VERTEX

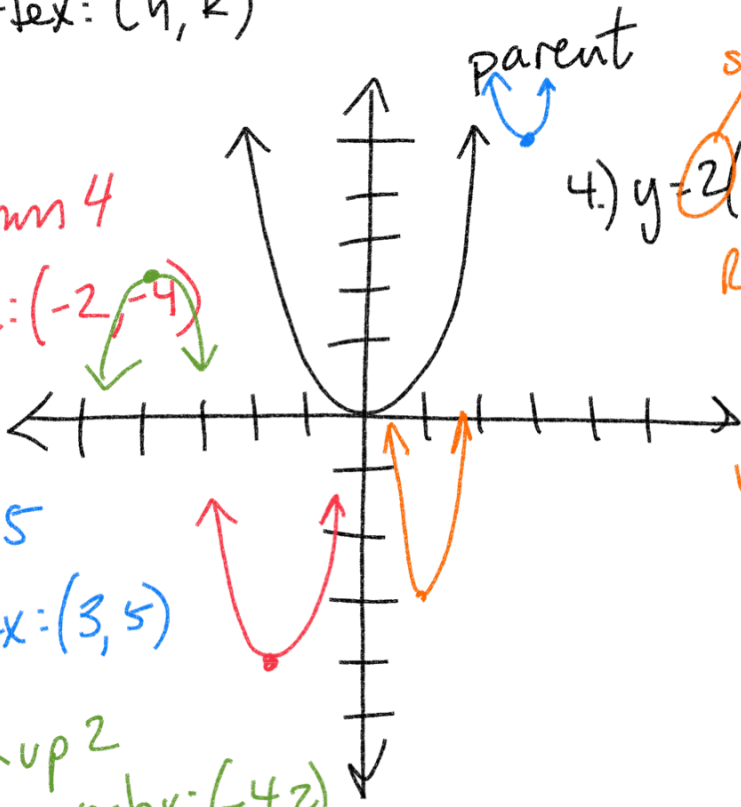
Left 1 up 2

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

x	(x+1) <sup>2</sup> + 2	y
-2	(-2+1) <sup>2</sup> + 2	3 (-2, 3)
-1	(-1+1) <sup>2</sup> + 2	2 (-1, 2)
0	(0+1) <sup>2</sup> + 2	3 (0, 3)
1	(1+1) <sup>2</sup> + 2	6 (1, 6)
2	(2+1) <sup>2</sup> + 2	11 (2, 11)

$y = (x+1)^2 + 2$   
vertex (-1, 2)  
form  $y = (x-h)^2 + k$   
vertex: (h, k)

1.)  $y = (x+2)^2 - 4$   
Left 2 down 4  
vertex: (-2, -4)



4.)  $y = 2(x-1)^2 - 3$   
Right 1 down 3  
vertex: (1, -3)

2.)  $y = (x-3)^2 + 5$   
right up 5  
vertex: (3, 5)

3.)  $y = -(x+4)^2 + 2$   
flip down left 4 up 2  
vertex: (-4, 2)

$$y = x^2 + 8x + 11$$

vertex??

$$y = ax^2 + bx + c$$

$a=1$	$b=8$	$c=11$
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$$h = \frac{-b}{2a} = \frac{-8}{2} = (-4)$$

x value for vertex  
"h"

$$h = \frac{-b}{2a}$$

$(-4, -5)$
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h

k

plug in  $x = -4$

$$y = (-4)^2 + 8(-4) + 11$$

$$16 - 32 + 11$$

$$-16 + 11 = -5$$

vertex form:

$$y = a(x-h)^2 + k$$

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

$$y = x^2 + 8x + 11 =$$

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