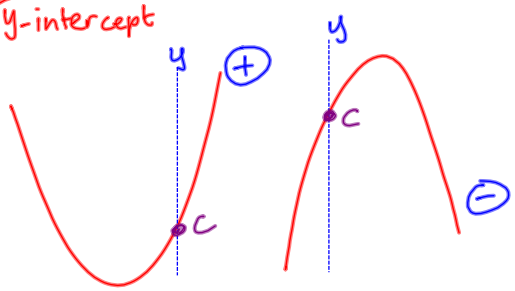
Quadratic Functions

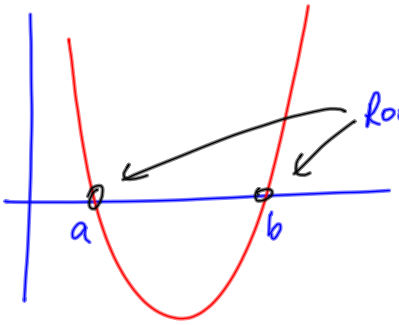
Including the Matching up game

$y = ax^2 + bx + c$

y-intercept

Basic Shape





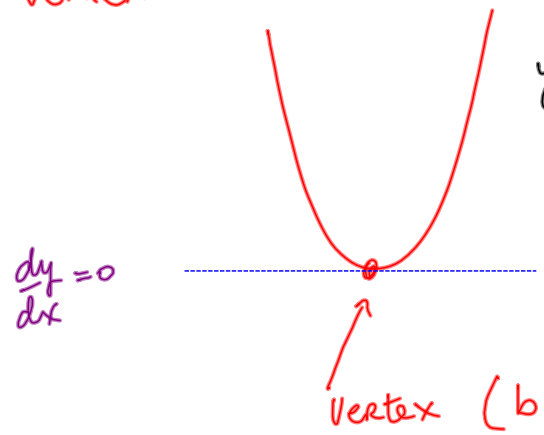
Roots/Solutions

$y=0, x=a, x=b$

in terms of factors

$\Rightarrow y = k(x-a)(x-b)$

max/min
"vertex"



$\frac{dy}{dx} = 0$

Vertex (b, c)

Complete square form

$y = a[x-b]^2 + c$

max/min y-value

Change sign for x max/min value

eg.. What is the minimum point of $f(x) = x^2 - 6x + 3$?

method 1

Complete square form

	x	-3
x	x^2	$-3x$
-3	$-3x$	9

$(x-3)^2 = x^2 - 6x + 9$

$f(x) = x^2 - 6x + 9 - 9 + 3$

$= (x-3)^2 - 6$

$\Rightarrow$ Vertex: $(3, -6)$

method 2

differentiate at vertex $\frac{dy}{dx} = 0$ find x value and sub. into function.

$f(x) = x^2 - 6x + 3$

$f'(x) = 2x - 6$

$\Rightarrow 2x - 6 = 0$

$2x = 6$

$x = 3$

$f(3) = (3)^2 - 6(3) + 3 = -6$

$\Rightarrow$ Vertex $(3, -6)$

Student Activity 4

Project Maths Tionscadal Mata Development Team

Matching cards activity: Match the cards into 7 sets taking one card from each group. Discuss reasoning and be able to explain decisions.

Set A

1. $y=(x-3)(x-3)$	2. $y=(x+2)(x+4)$	3. $y=(x+1)(3-x)$
4. $y=(x-2)(6-x)$	5. $y=(x-4)(x+2)$	6. $y=(x-4)(x-6)$

Set B

7. $y=-x^2+2x+3$	8. $y=x^2+6x+8$	9. $y=x^2-6x+9$
10. $y=x^2-10x+24$	11. $y=x^2-2x-8$	12. $y=-x^2+8x-12$

Set C

13. $y=(x-5)^2-1$	14. $y=-(x-4)^2+4$	15. $y=(x-1)^2-9$
16. $y=-(x-1)^2+4$	17. $y=(x+3)^2-1$	18. $y=(x-3)^2$

Set D

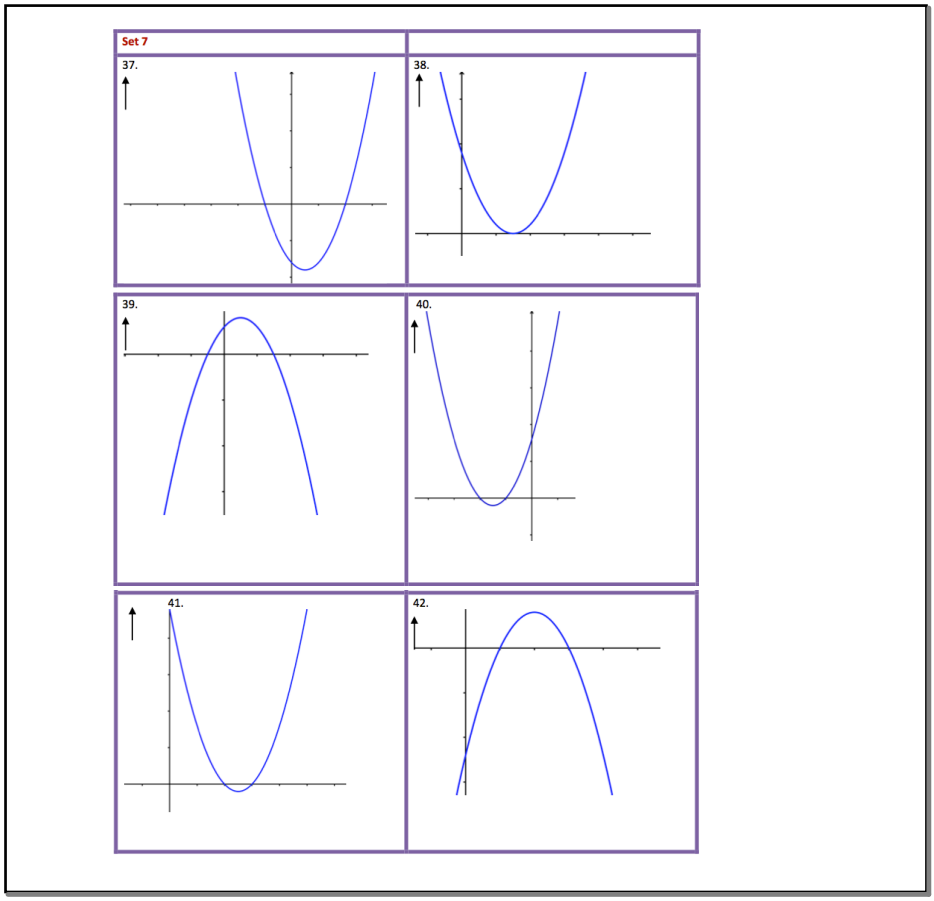
19. $x=0, y=9$	20. $x=0, y=8$	21. $x=0, y=-8$
22. $x=0, y=-12$	23. $x=0, y=3$	24. $x=0, y=24$

Set E

25. $y=0$, $x=-1$ or 3	26. $y=0$, $x=-2$ or $+4$	27. $y=0$, $x=2$ or 6
28. $y=0$, $x=4$ or 6	29. $y=0$, $x=3$	30. $y=0$, $x=-2$ or -4

Set F

31. local maximum at (1,4)	32. local minimum at (5,-1)	33. local minimum at (1,-9)
34. local minimum at (-3,-1)	35. local maximum at (4,4)	36. local minimum at (3,0)



QUADRATIC FUNCTIONS

① FACTORS
$y = (x-3)(x-3)$

㉕ ROOTS
$y=0$, $x=3$

⑱ COMPLETE SQUARE
$y = (x-3)^2 + 0$
$-x$, y

㊱ MIN/MAX
$(3,0)$

⑨ $y = ax^2+bx+c$
$y = x^2 - 6x + 9$

GRAPH