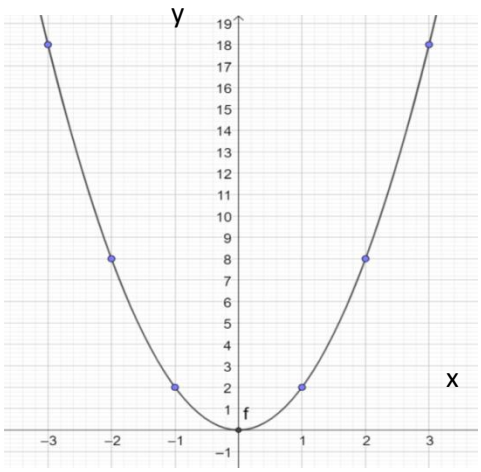
21 Graphs

Graphs of functions of form $y = ax^2$

$y = 2x^2$

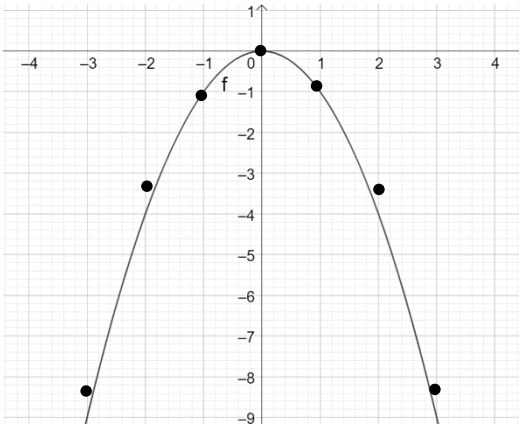
x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$2x^2$	18	8	2	0	2	8	18
y	18	8	2	0	2	8	18



The graph is **a parabola** with a minimum point.
The graph is symmetric about the y – axis.
The equation of the axis of symmetry is **x=0.**
The minimum value of the function is **0.**
The coordinates of the minimum point are **(0,0)**

$y = -x^2$

x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$-x^2$	-9	-4	-1	0	-1	-4	-9
y	-9	-4	-1	0	-1	-4	-9-



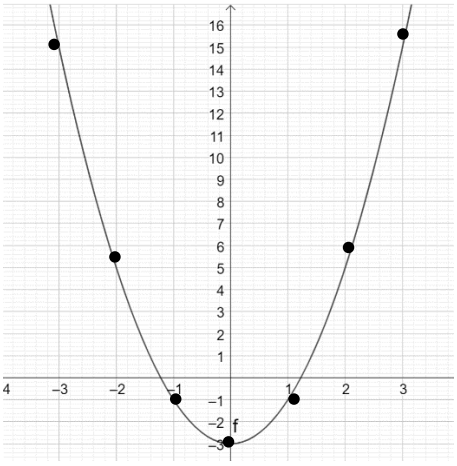
The graph is **a parabola** with a maximum point.
The equation of the axis of symmetry is **x=0.**
The maximum value of the function is **0.**
The coordinates of the turning point are **(0,0)**

Do the exercise 21.4 in page 32.

Graph of a function of the form $y = ax^2 + b$

$y = 2x^2 - 3$

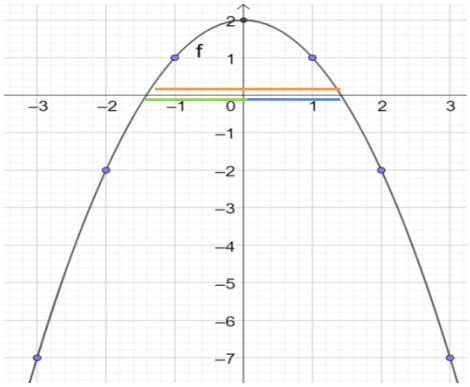
x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$2x^2$	18	8	2	0	2	8	18
-3	-3	-3	-3	-3	-3	-3	-3
y	15	5	-1	-3	-1	5	15



The equation of the axis of symmetry is **x=0.**
The minimum value of the function is **-3.**
The coordinates of the turning point are **(0,-3).**

$y = -x^2 + 2$

x	-3	-2	-1	0	1	2	3
x^2	9	4	1	0	1	4	9
$-x^2$	-9	-4	-1	0	-1	-4	-9
+2	+2	+2	+2	+2	+2	+2	+2
y	-7	-2	1	+2	1	-2	-7



The equation of the axis of symmetry is **x=0.**
The maximum value of the function is **2**.
The coordinate of the turning point is **(0,2).**
The interval of values of x for which the function positive -1.4<x<1.4
The interval of values of x for which the function increases positively -1.4<x<0
The interval of values of x for which the function decreases positively 0<x<1.4

Do the exercise 21.5 in page 36

The graph of a function of form $y = ax^2 + b$,

- Is a parabola with a minimum point when **a** is a positive value.
- Is a parabola with a maximum point when **a** is a negative value.
- the equation of the axis of symmetry is **x=0**.
- the coordinate of the turning point is **(0,b)**
- The maximum or minimum value of the function is **b**.

Function	The equation of the axis of symmetry	maximum value	minimum value	turning point
$y = x^2$	$x = 0$	-	0	$(0, 0)$
$y = 2x^2 - 3$	$x = 0$	-	-3	$(0, -3)$
$y = x^2 + 3$	$x = 0$	-	3	$(0, 3)$
$y = -x^2$	$x = 0$	0	-	$(0, 0)$
$y = -3x^2 + 2$	$x = 0$	2	-	$(0, 2)$
$y = -2x^2 - 4$	$x = 0$	-4	-	$(0, -4)$
$y = 5 - x^2$	$x = 0$	5	-	$(0, 5)$
$y = 3 - 2x^2$	$x = 0$	3	-	$(0, 3)$
$y = \frac{1}{2}x^2 - 3$	$x = 0$	-	-3	$(0, -3)$
$y = \frac{2}{5} - 2x^2$	$x = 0$	$\frac{2}{5}$	-	$(0, \frac{2}{5})$

Do the exercise 21.6 and 21.7 in page 39,40.

If the graph of the function $y = 2x^2 + 5$ moves upwards along the y axis by 2 units , the equation of the graph is $y = 2x^2 + 7$. (add 2 unit to 5)

- **Do the exercise 21.8 in page 42.**