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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		
<i>x</i> ²	9	4	1	0	1	4	9		
$-x^2$	-9	-4	-1	0	-1	-4	-9		
у	-9	-4	-1	0	-1	-4	-9-		

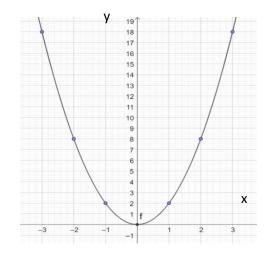
The graph is **a parabola** with a maximum point. The equation of the axis of symmetry is **x=0**. The maximum value of the function is **0**. The coordinates of the turning point are **(0,0)**

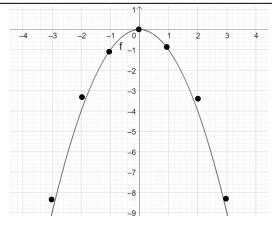
Do the exercise 21.4 in page 32.

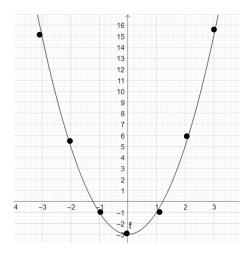
Graph of a function of the form $y = ax^2 + b$

$y = 2x^2 - 3$									
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
<i>x</i> 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
у	-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	maximum value	minimum value	turning point
	axis of symmetry			
$y = x^2$	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.

