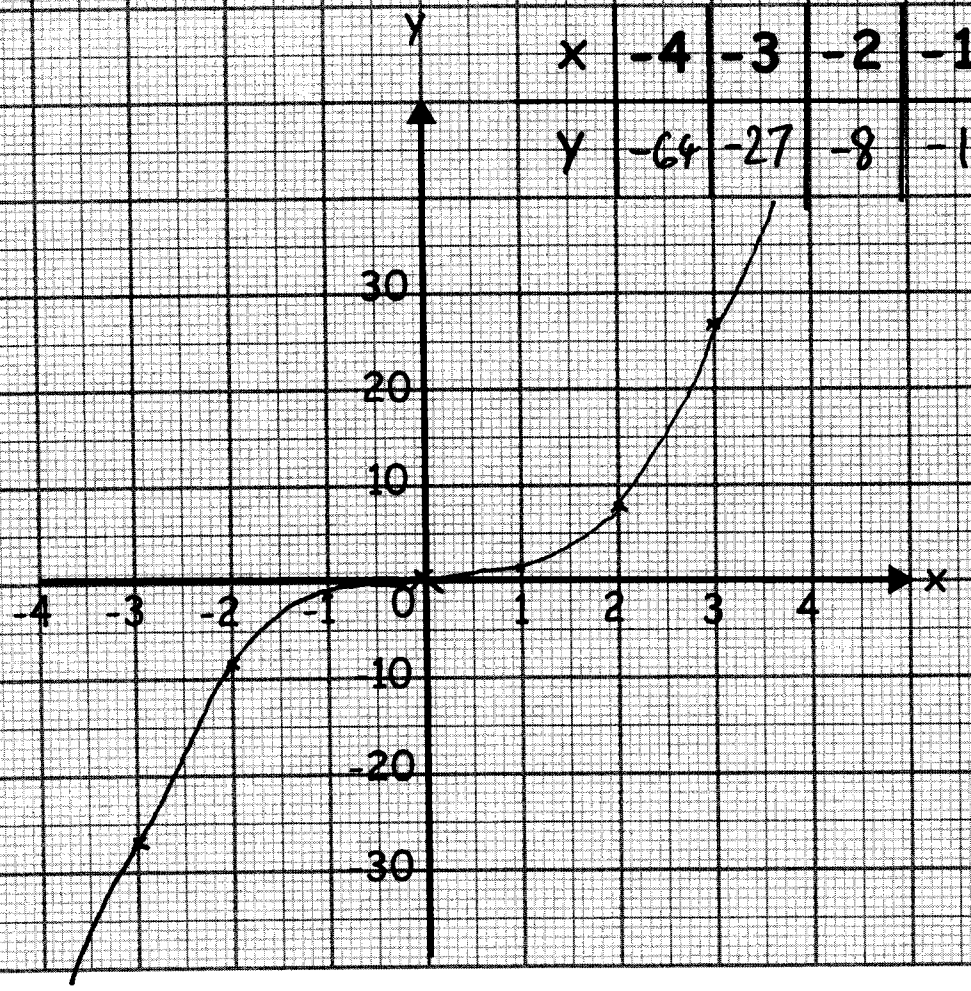
GRAPHS - Other types of Graphs and Transformation of Graphs

Fill in the y values in this table, then plot the cubic graph.

$y = x^3$

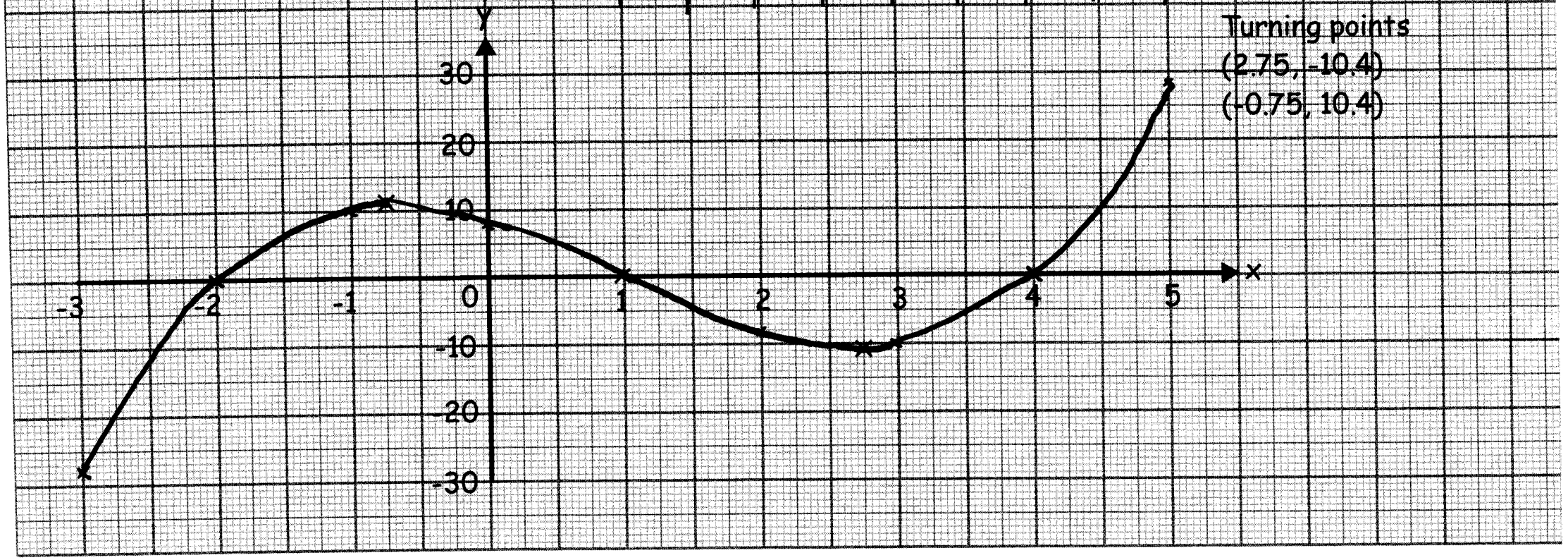
x	-4	-3	-2	-1	0	1	2	3	4
y	-64	-27	-8	-1	0	1	8	27	64



Fill in the y values in this table, then plot the cubic graph. The graph has two turning points. These are already plotted.

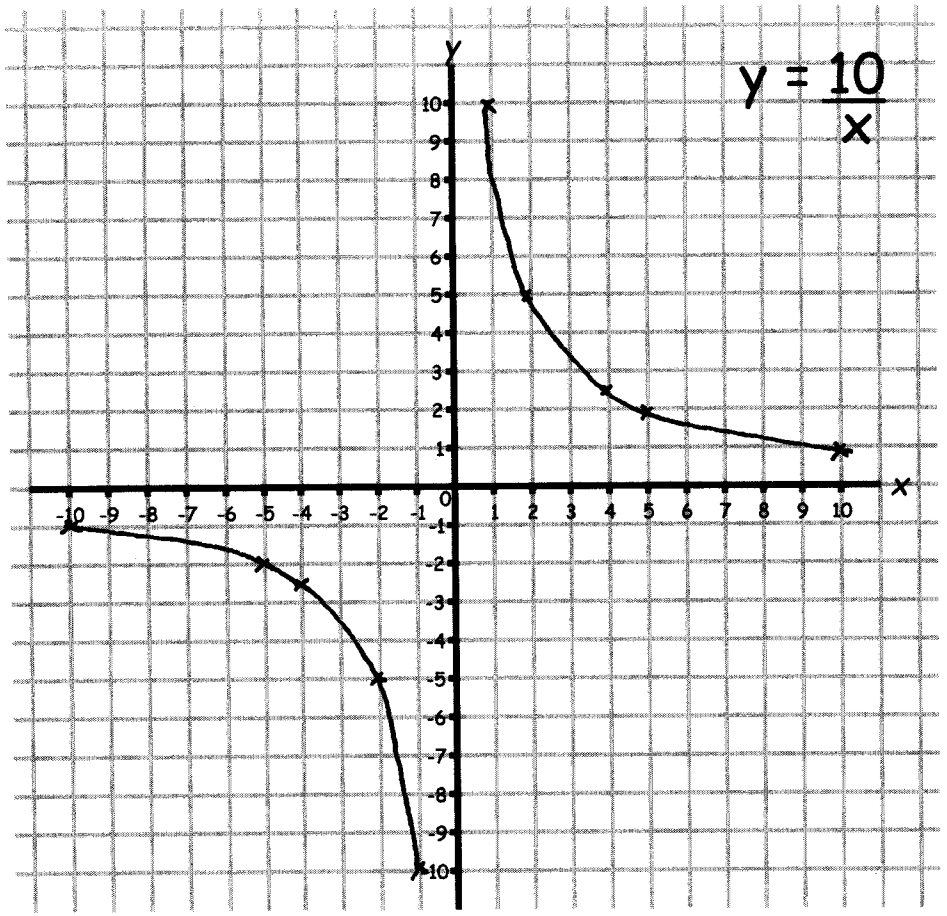
$y = x^3 - 3x^2 - 6x + 8$

x	-3	-2	-1	0	1	2	3	4	5
y	-28	0	10	8	0	-8	-10	0	28

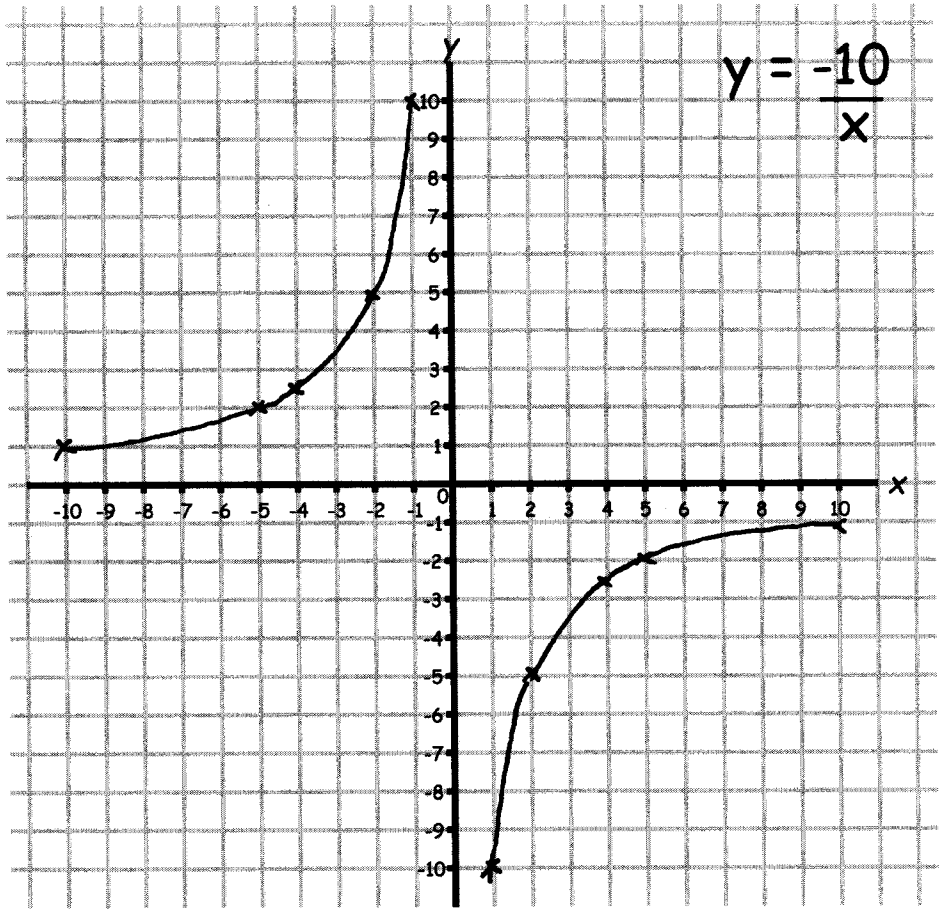


Turning points
(2.75, -10.4)
(-0.75, 10.4)

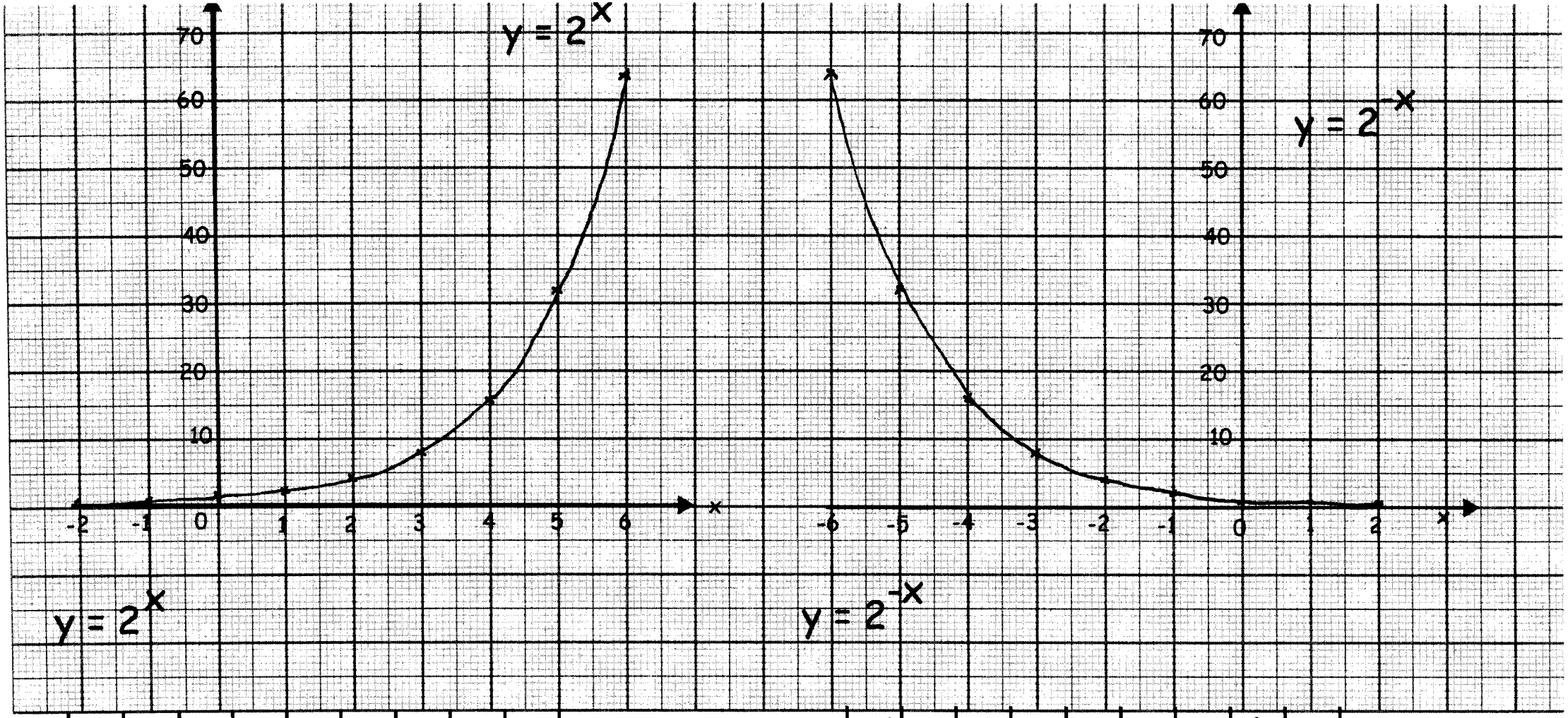
Fill in the tables and plot the graphs



x	-10	-5	-4	-2	-1	0	1	2	4	5	10
y	-1	-2	-2·5	-5	-10	∞	10	5	2·5	2	1



x	-10	-5	-4	-2	-1	0	1	2	4	5	10
y	1	2	2·5	5	+10	∞	-10	-5	-2·5	-2	-1



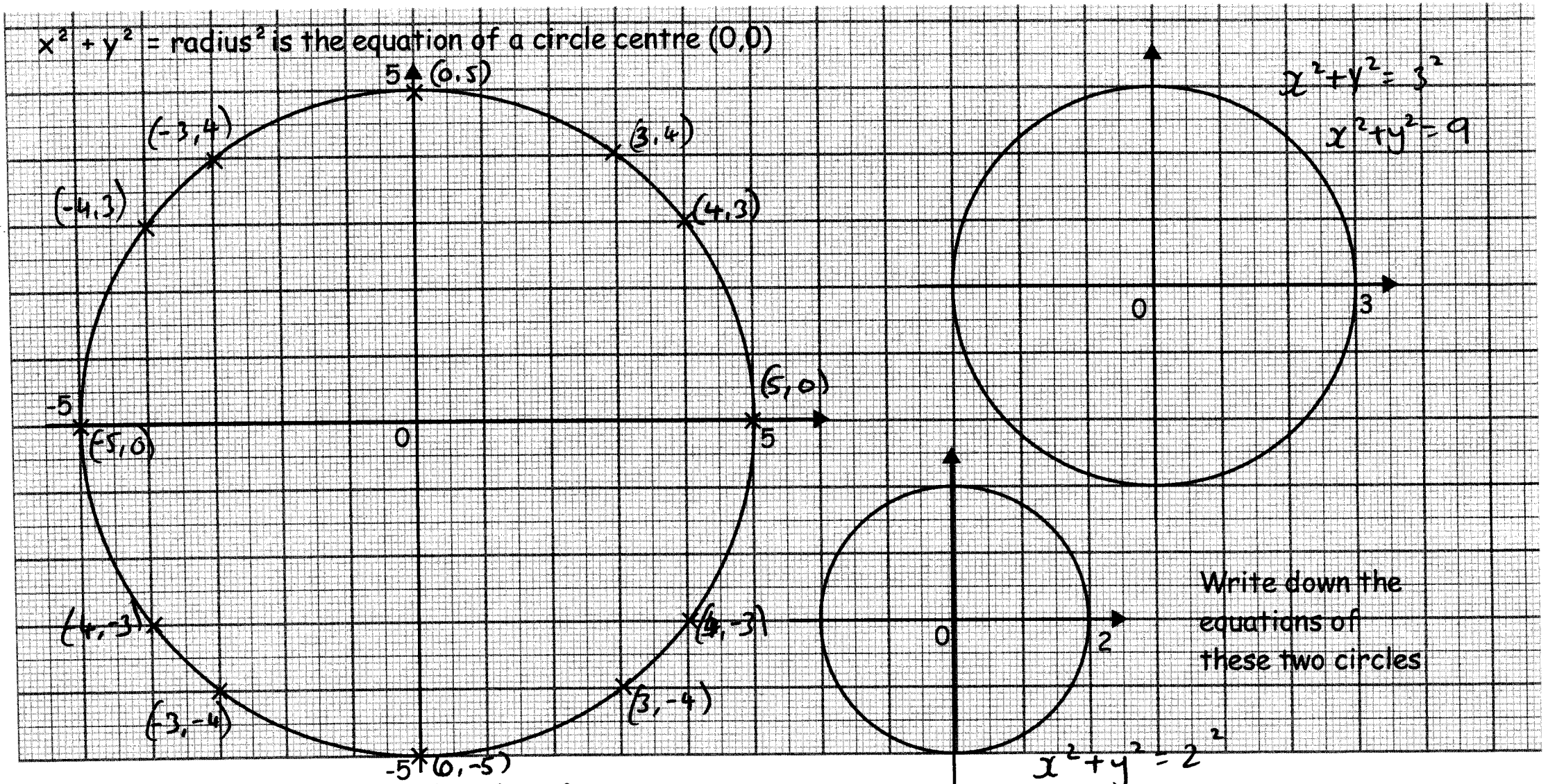
$y = 2^x$

x	-2	-1	0	1	2	3	4	5	6
y	0·25	0·5	1	2	4	8	16	32	64

$y = 2^{-x}$

x	-6	-5	-4	-3	-2	-1	0	1	2
y	64	32	16	8	4	2	1	0·5	0·25

$x^2 + y^2 = \text{radius}^2$ is the equation of a circle centre (0,0)



Write down the equations of these two circles

$x^2+y^2=2^2$

$x^2+y^2=4$

The equation of this circle is $x^2 + y^2 = 5^2$

The centre (0,0) and the radius is 5.

Write down the coordinates of the points marked with x's.

TRANSFORMATION OF GRAPHS

Type 1: add or take a number outside the equation

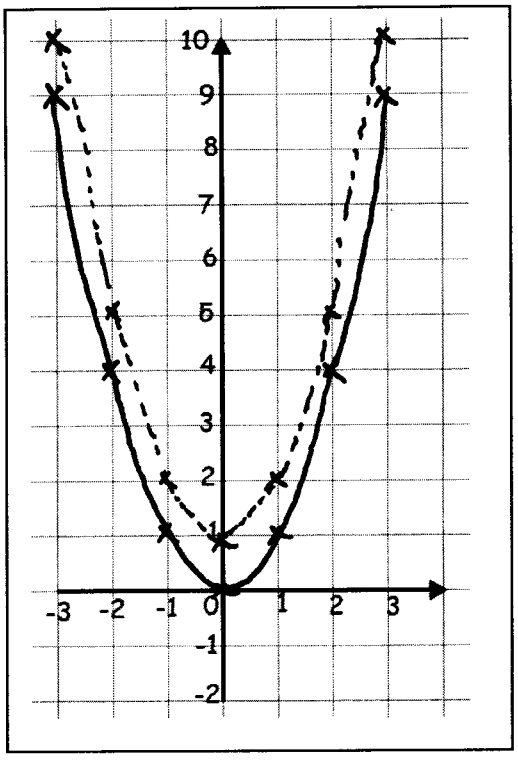
x	-3	-2	-1	0	1	2	3
$y = x^2$	9	4	1	0	1	4	9

x	-3	-2	-1	0	1	2	3
$y = x^2 + 1$	10	5	2	1	2	5	10

dotted line.

$y = x^2$ transformed to $y = x^2 + 1$

translation $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$



x	-3	-2	-1	0	1	2	3
$y = x^2 - 2$	7	2	-1	-2	-1	2	7

$y = x^2$ transformed to $y = x^2 - 2$

translation $\begin{bmatrix} 0 \\ -2 \end{bmatrix}$

Type 2: add or take a number inside the equation

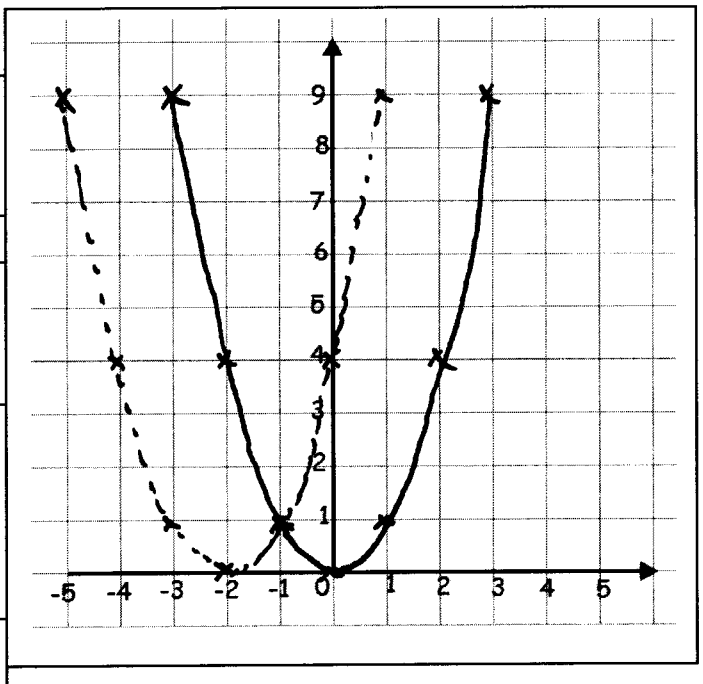
x	-3	-2	-1	0	1	2	3
$y = x^2$	9	4	1	0	1	4	9

x	-5	-4	-3	-2	-1	0	1
$y = (x + 2)^2$	9	4	1	0	1	4	9

dotted line

$y = x^2$ transformed to $y = (x + 2)^2$

translation $\begin{bmatrix} -2 \\ 0 \end{bmatrix}$



x	-2	-1	0	1	2	3	4
$y = (x - 1)^2$	9	4	1	0	1	4	9

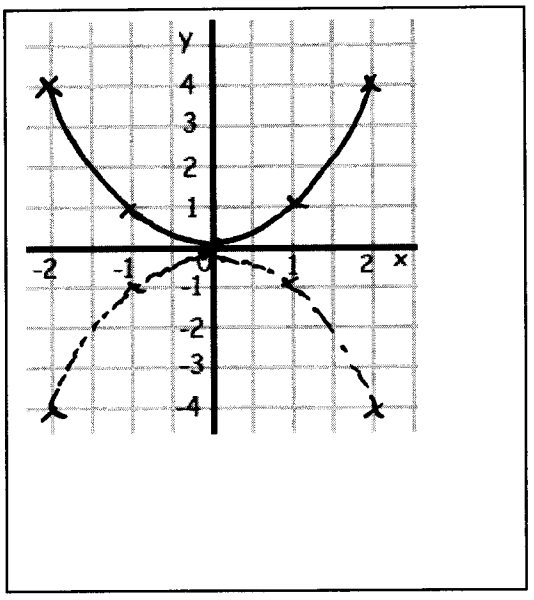
$y = x^2$ transformed to $y = (x - 1)^2$

translation $\begin{bmatrix} 1 \\ 0 \end{bmatrix}$

Type 3: A minus sign outside the equation

x	-2	-1	0	1	2
$y = x^2$	4	1	0	1	4

x	-2	-1	0	1	2
$y = -x^2$	-4	-1	0	-1	-4



$y = x^2$ transformed to $y = -x^2$ dotted line.

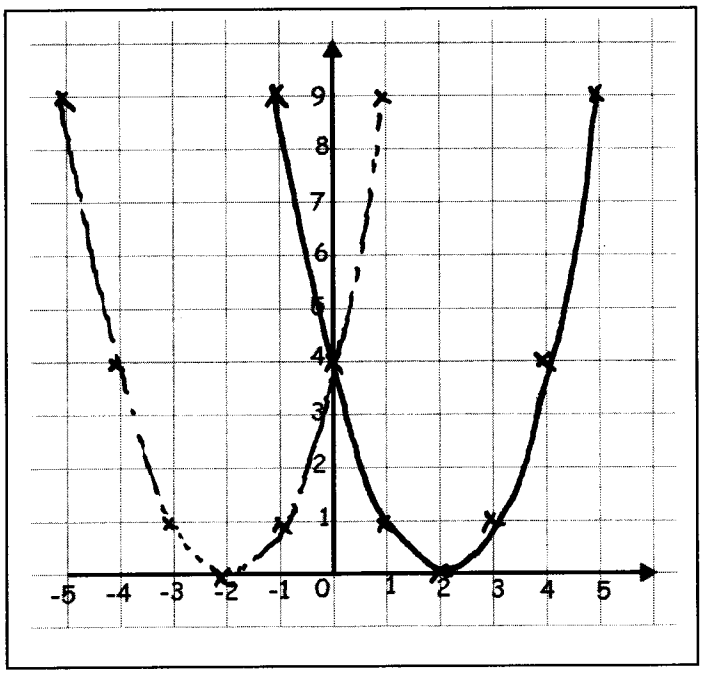
reflection in the x-axis

Type 4: A minus sign inside the equation

x	-1	0	1	2	3	4	5
$y = (x - 2)^2$	9	4	1	0	1	4	9

x	-5	-4	-3	-2	-1	0	1
$y = ((-x) - 2)^2$	9	4	1	0	1	4	9

dotted line



Examples

If x = -5

$Y = ((- - 5) - 2)^2$

$Y = (5 - 2)^2$

$Y = 3^2$

Y = 9

If x = 1

$Y = ((- 1) - 2)^2$

$Y = (-1 - 2)^2$

$Y = (- 3)^2$

Y = 9

$y = (x - 2)^2$ transformed to $y = ((-x) - 2)^2$ reflection in the y-axis

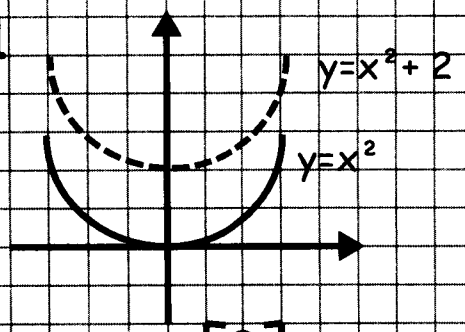
Transformation of Graphs

solid line = original graph

broken line = transformed graph

e.g. $y = x^2$ to $y = x^2 + 2$

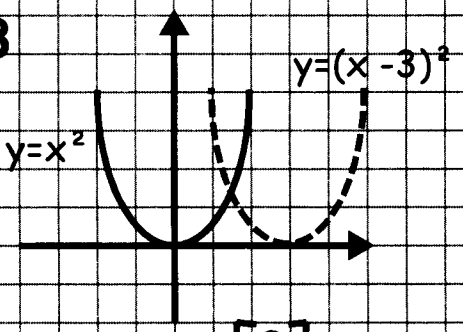
1



translation $\begin{bmatrix} 0 \\ 2 \end{bmatrix}$

e.g. $y = x^2$ to $y = (x - 3)^2$

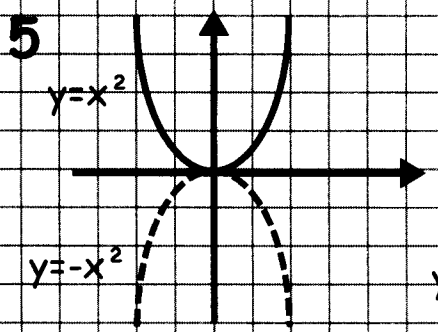
3



translation $\begin{bmatrix} 3 \\ 0 \end{bmatrix}$

e.g. $y = x^2$ to $y = -x^2$

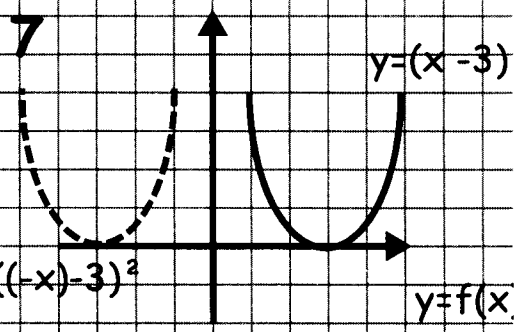
5



A reflection in the x-axis

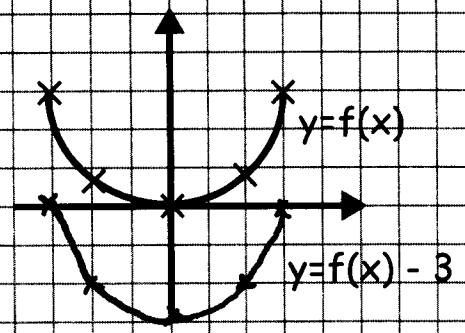
e.g. $y = (x-3)^2$ to $y = ((+x)-3)^2$

7



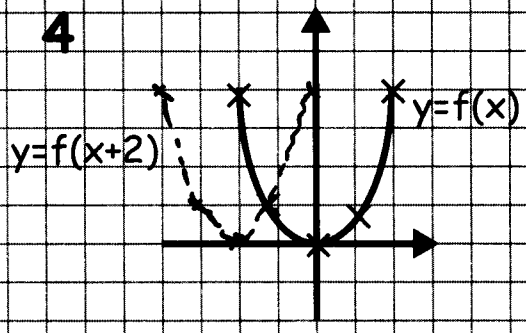
A reflection in the y-axis

2



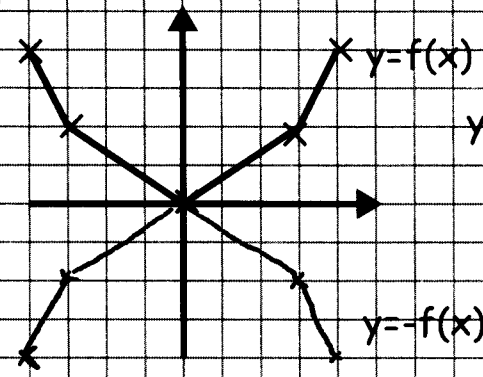
translation $\begin{bmatrix} 0 \\ -3 \end{bmatrix}$

4



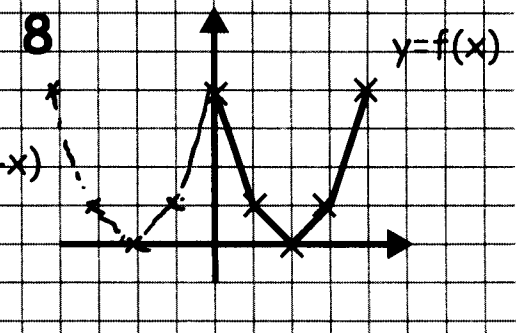
translation $\begin{bmatrix} -2 \\ 0 \end{bmatrix}$

6



A reflection in the x-axis

8



A reflection in the y-axis

$y=f(x)$ to $y=f(x) + a$

translation $\begin{bmatrix} 0 \\ a \end{bmatrix}$

$y=f(x)$ to $y=f(x+a)$

translation $\begin{bmatrix} -a \\ 0 \end{bmatrix}$

$y=f(x)$ to $y=-f(x)$

A reflection in the x-axis

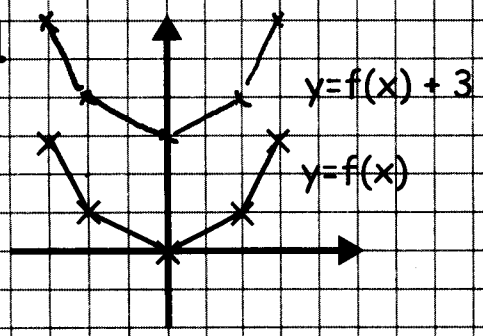
$y=f(x)$ to $y=f(-x)$

A reflection in the y-axis

Transformation of Graphs

In each question you are given an unspecified graph f(x). Draw in the transformation using the five points (marked with a x) to help you. Describe the transformation

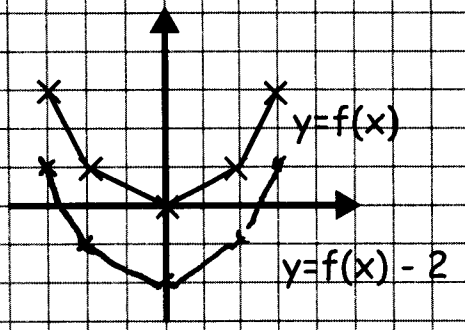
1



Description

translation $\begin{bmatrix} 0 \\ 3 \end{bmatrix}$

2

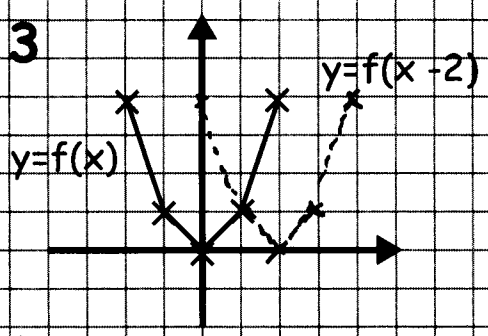


Description

translation

$\begin{bmatrix} 0 \\ -2 \end{bmatrix}$

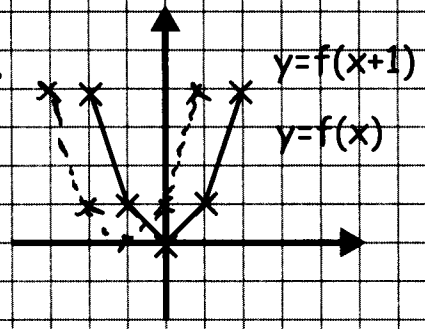
3



Description

translation $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$

4

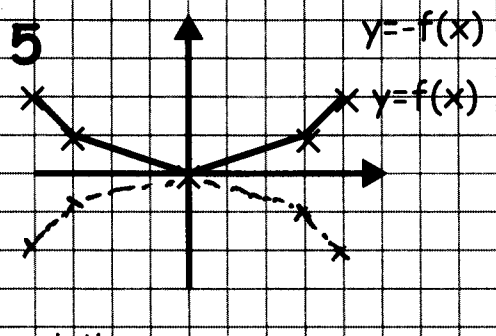


Description

translation

$\begin{bmatrix} -1 \\ 0 \end{bmatrix}$

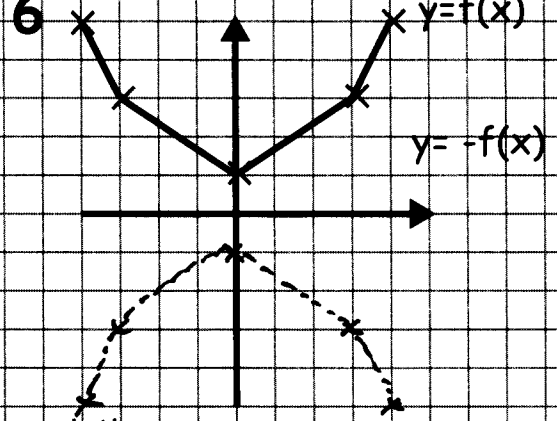
5



Description

Reflection in the x-axis

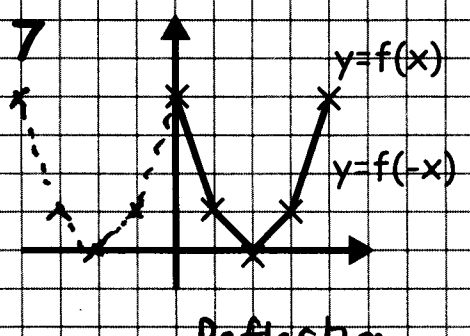
6



Description

reflection in the x-axis

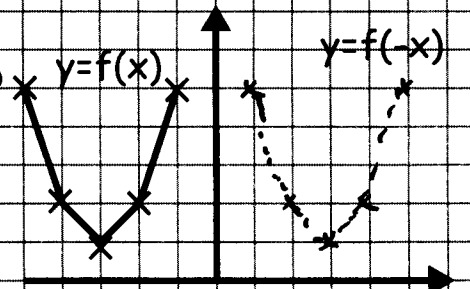
7



Description

Reflection in the y-axis

8



Description

Reflection in the y-axis.