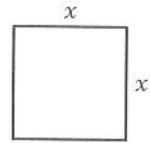


2.4 Quadratic function

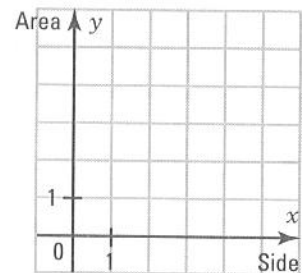
ACTIVITY 1 Area of a square

Consider the square with side length x shown on the right.



- a) What is the rule of the function which associates the side x with the area y of this square? _____
- b) Complete the table of values giving the area y as a function of the side length x .

x	0	0.5	1	1.5	2	3
y						



- c) Represent the function in the Cartesian plane.

- d) Explain why the domain of the function is \mathbb{R}_+ .

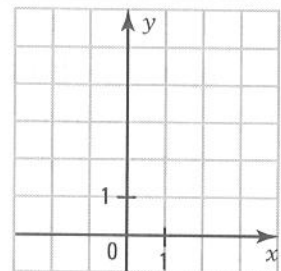
- e) Is the rate of change between any two points on the graph constant?

ACTIVITY 2 Basic quadratic function

Consider the function $f(x) = x^2$.

- a) Complete the table of values below.

x	-2	-1	0	1	2
y					



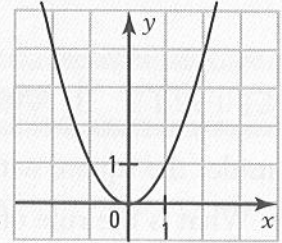
- b) Represent the function in the Cartesian plane.

- c) 1. Explain why $f(-x) = f(x)$, for all x .

2. Therefore, what does the y -axis represent for the curve drawn? _____
- d) Determine
- | | |
|----------------------------|--------------------------------------|
| 1. dom f . _____ | 2. ran f . _____ |
| 3. the zero of f . _____ | 4. the y -intercept of f . _____ |
- e) What is the sign of function f ? _____
- f) Over what interval is function f
- | | |
|----------------------|----------------------|
| 1. decreasing? _____ | 2. increasing? _____ |
|----------------------|----------------------|
- g) What is the minimum of function f ? _____

BASIC QUADRATIC FUNCTION

- The function $f(x) = x^2$ is called the basic quadratic function.
- The Cartesian graph is a parabola with vertex $V(0, 0)$.
 - $\text{dom } f = \mathbb{R}$.
 - $\text{ran } f = \mathbb{R}_+$.
 - The y -intercept of f is 0.
 - The function has only one zero, which is equal to 0. $\forall x \in \mathbb{R}: f(x) \geq 0$.
 - The function is decreasing over $]-\infty, 0]$, increasing over $[0, +\infty[$.
 - The minimum of the function is 0.
 - The rate of change between any two points on the graph is not constant.
 - The y -axis with equation $x = 0$ is an axis of symmetry for the parabola. $\forall x \in \mathbb{R}: f(-x) = f(x)$.



1. Consider the basic quadratic function $f(x) = x^2$.

a) Explain how to deduce the graph of the function $g(x) = -x^2$

b) Draw the graph of function g .

c) Determine

1. $\text{dom } g$. _____ 2. $\text{ran } g$. _____

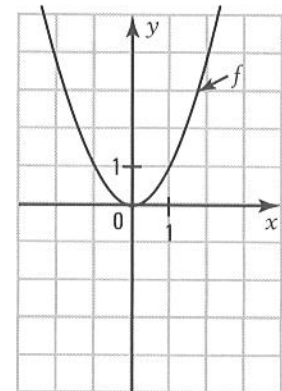
3. the zero of g . _____ 4. the y -intercept of g . _____

d) What is the sign of function g ? _____

e) Over what interval is function g

1. increasing? _____ 2. decreasing? _____

f) What is the maximum of function g ? _____



ACTIVITY 3 Role of parameter a

a) Consider the basic quadratic function $y = x^2$ and the function $f(x) = ax^2$ ($a > 0$).

1. Represent function f when

1) $a = \frac{1}{4}$. 2) $a = \frac{1}{2}$. 3) $a = 2$.

2. As parameter a increases, do you observe a vertical stretch or reduction of the parabola?

