Erasmus+
Enriching lives, opening minds.

Funded by the European Union

Graphs under your fingertips

⠛⠗⠁⠏⠓⠎ ⠥⠝⠙⠑⠗ ⠽⠕⠥⠗ ⠋⠊⠝⠛⠑⠗⠞⠊⠏⠎

Getting In Touch With Literacy

November 29 – December 2, 2023
St. Pete Beach, Florida

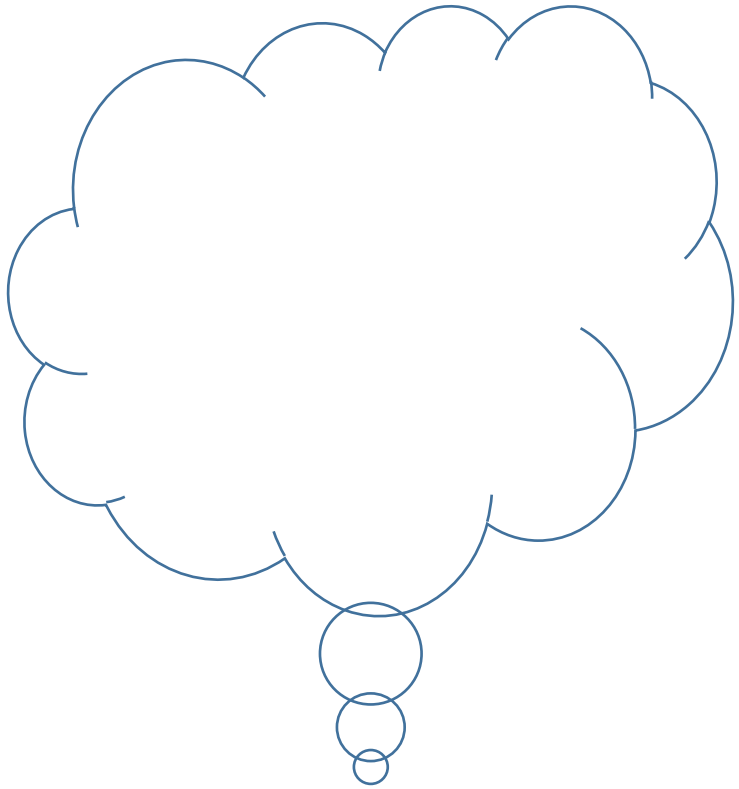
SPSM

Statped

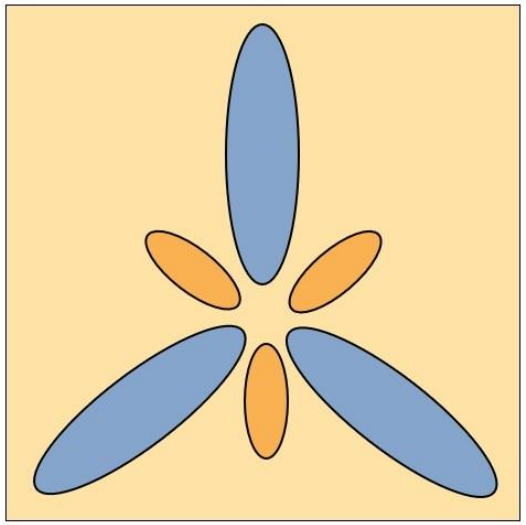
Visio

Participants TouchingMaths+

Experience verbal description

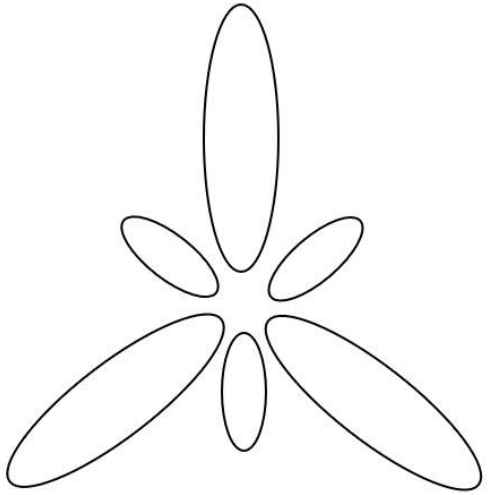


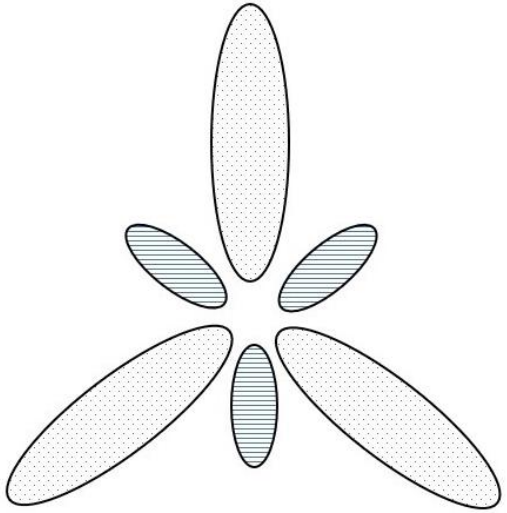
Instructor



3 types of descriptions:

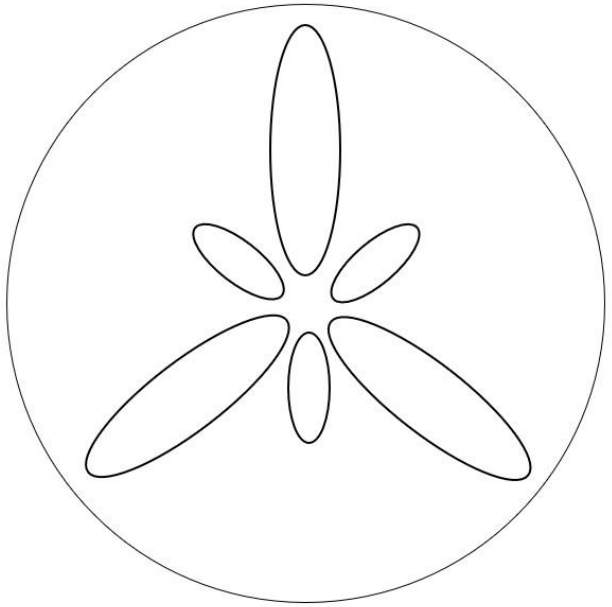
a) Very detailed descriptions that often include unnecessary information





3 types of descriptions:

b) A description that omits redundant information



3 types of descriptions:

c) A description that omits redundant information and uses mathematical language. Sometimes some extra information is even added.

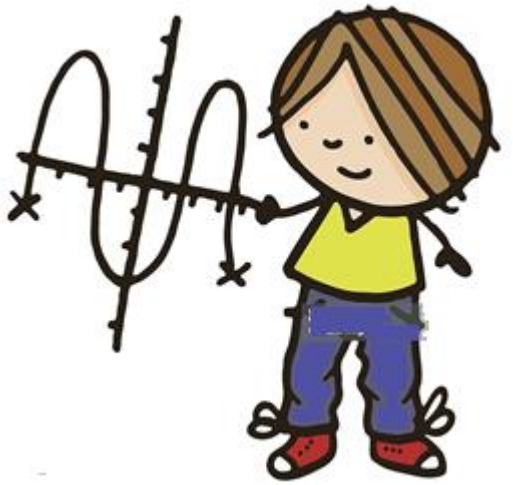
   3 identical small and 3 identical large elliptical figures are placed in a circle in such a way that the figure is rotationally symmetrical with a rotation angle of 120 degrees. The rotation point is the center of the circle.

What characteristics should a description of a tactile drawing or 3D model possess?

This depends on:

- The purpose of the assignment.
- The skills and knowledge of the teacher and student involved.
- The intended purpose of the description.
  - There are essential questions that need to be addressed in this context:
    - ❑ Is the description meant to replace the tactile drawing or 3D model?
    - ❑ Is it intended to complement, reinforce, or reiterate the information presented in the tactile drawing or 3D model?

Relation with our project



As you can see, it is not that easy to *properly describe* a drawing.

That is one of the reasons why we started our project.

We want to support mathematics teachers and other professionals, among other things, to become more skilled in correctly describing graphs, drawings and 3D models *in mathematical language*.

EMCC

The Extended Mathematical Core Curriculum

Our project is about developing an Extended Mathematical Core Curriculum.

EMCC

The Extended Mathematical Core Curriculum

The questions we aim to address are as follows:

- *What* additional knowledge and skills do Braille readers need to acquire, beyond those required by sighted students, in order to meet the learning objectives outlined in the Mathematical Core Curriculum (MCC)?

- *How* can they obtain this additional knowledge and these skills?

EMCC

The Extended Mathematical Core Curriculum

Final products:

Description of EMCC for graphs, equations and computational thinking / programming. This involves:

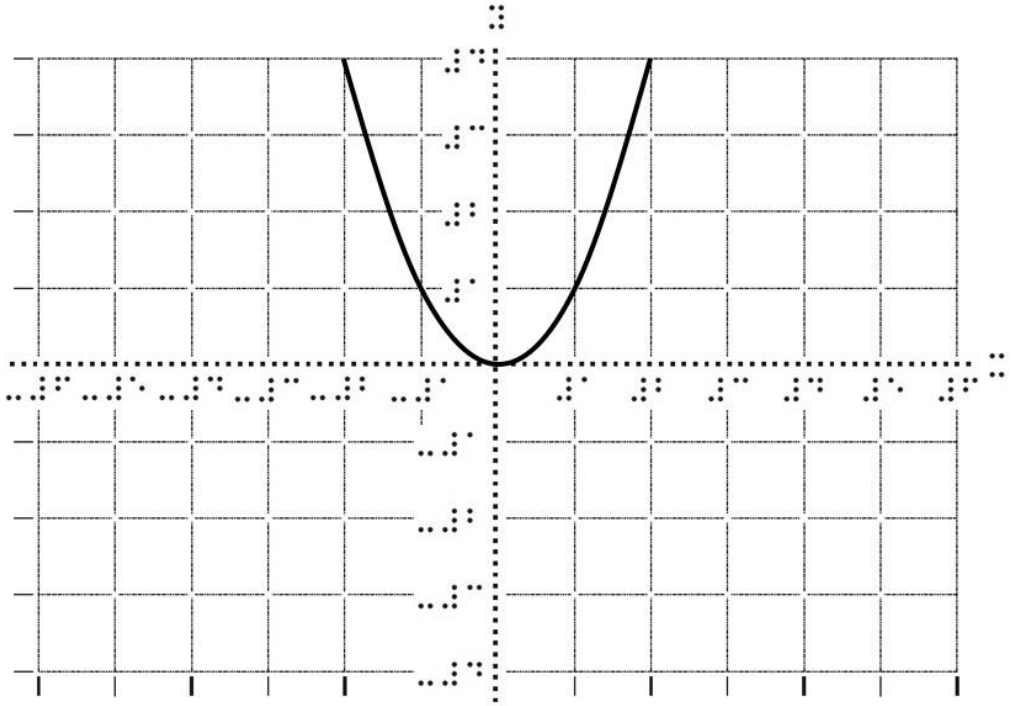
- Instruction guide on braille reading, tactile reading and ICT-skills
- Instruction guide for math teachers
- Learning Resources Document for Braille Readers

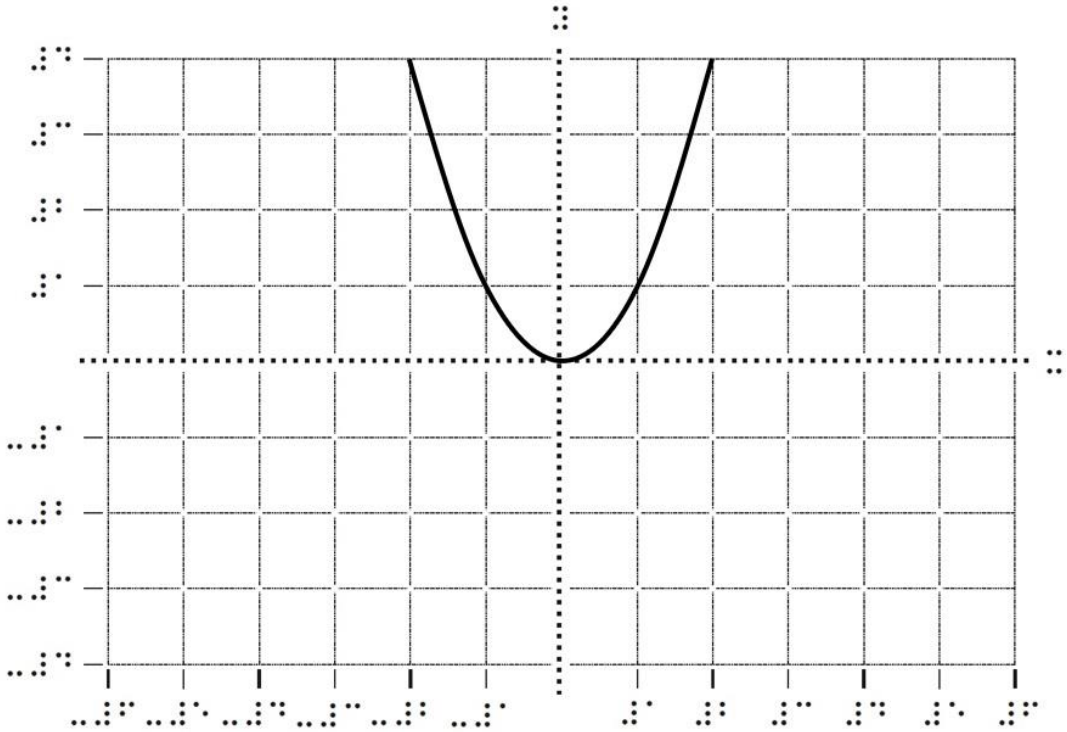
EMCC

The Extended Mathematical Core Curriculum

Today the focus is on the EMCC for graphs.

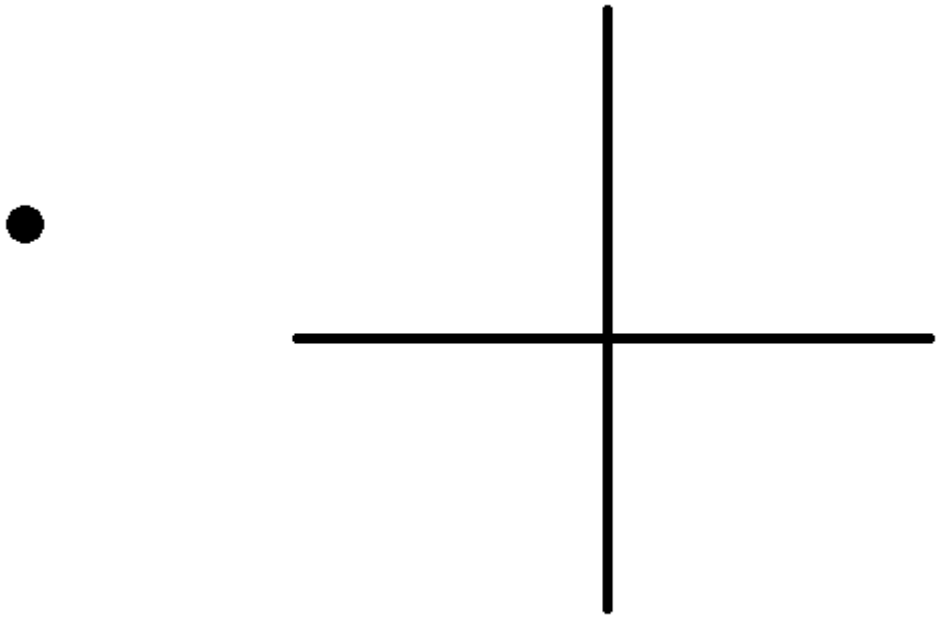
Instruction on braille reading and tactile reading





Special materials

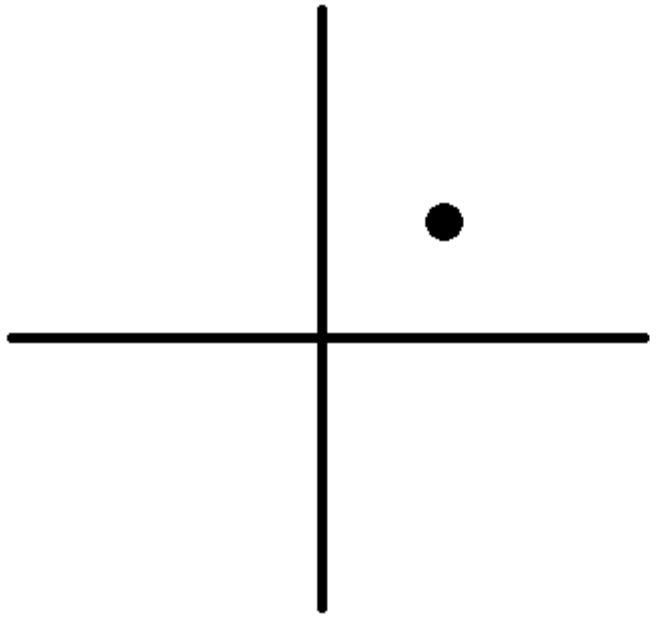
movable axes



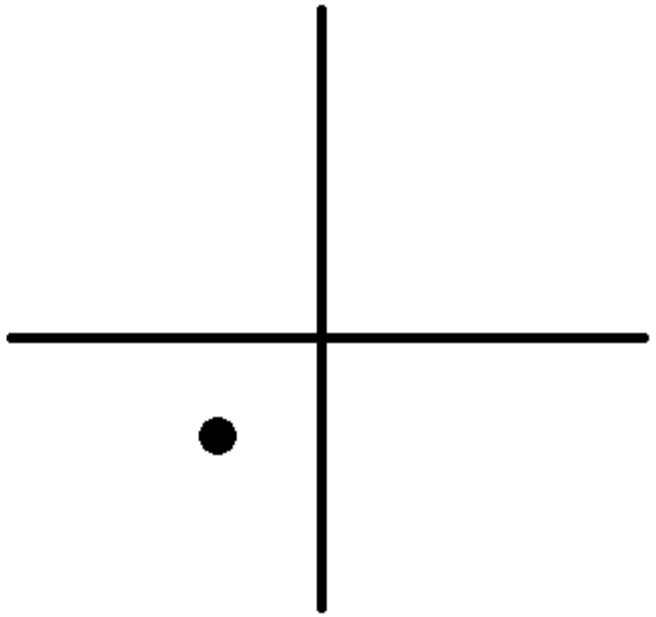
The figure shows a (tangible) point A and a coordinate system with movable axes.

Special materials

movable axes



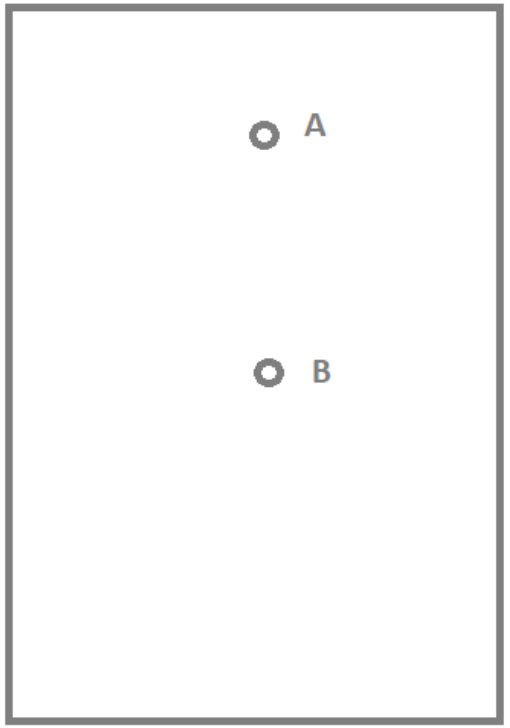
A = (1; 1)



A = (-1; -1)

Exercise

- Draw points A and B on a piece of paper so that point A is directly below point B.

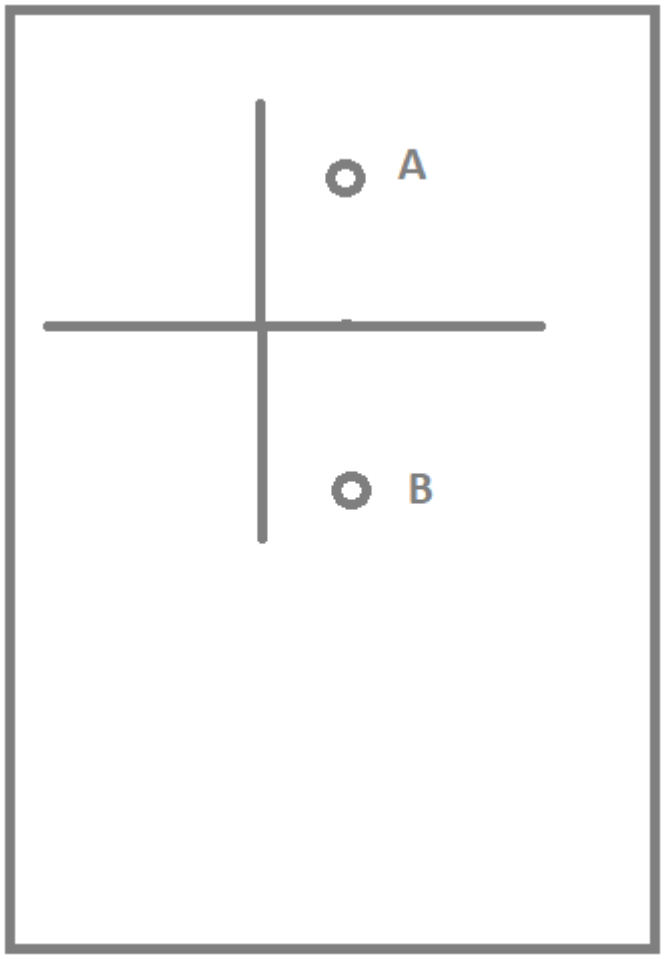


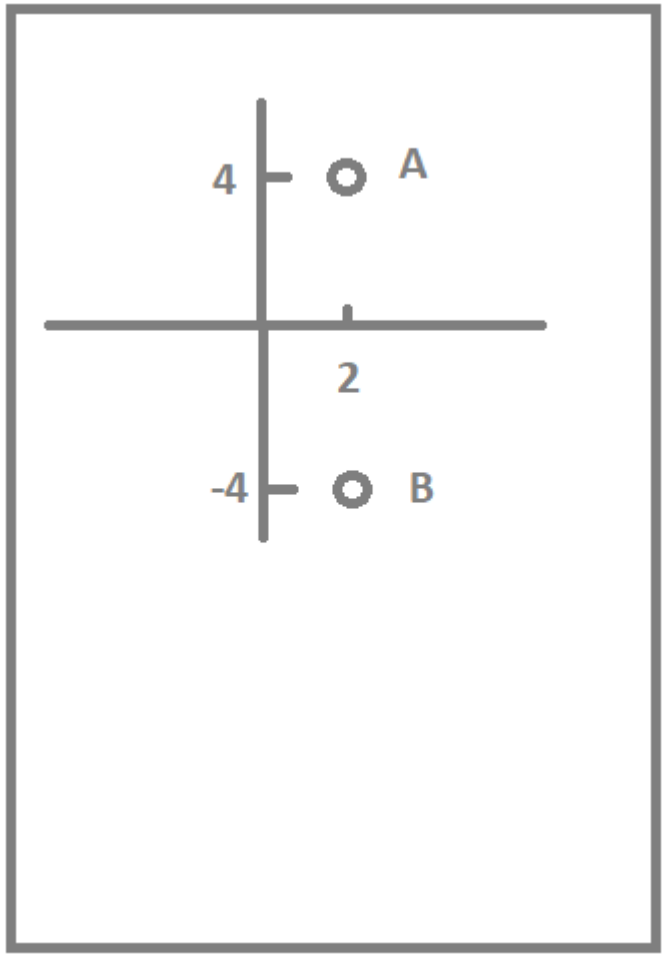
Exercise

Draw a coordinate system on a sheet of paper such that

A = (2, 4) and B = (2, -4).

Exercise





A = (2; 4) and B = (2; -4)

Instruction guide for math teachers

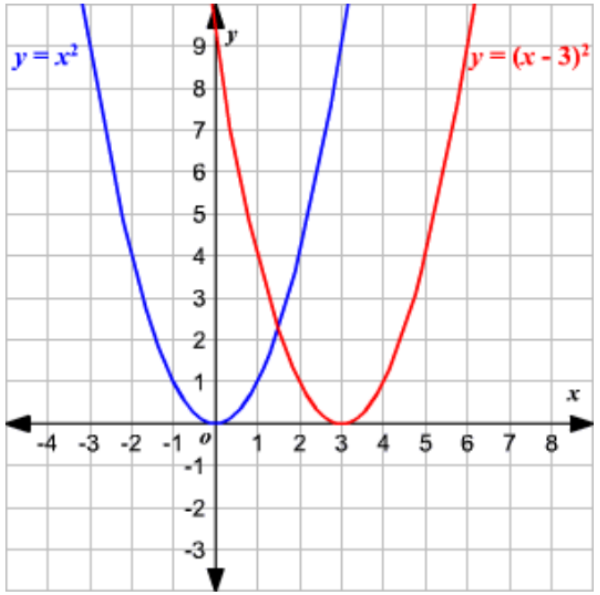
The math teacher:

1) needs to understand how the use of the devices of the Braille reader influences the teaching and learning and must anticipate that.

2) is primarily responsible for the math education of the Braille reader.

Much attention for transformations

Much attention for inclusion



Instruction guide for math teachers

Adapted instructional materials

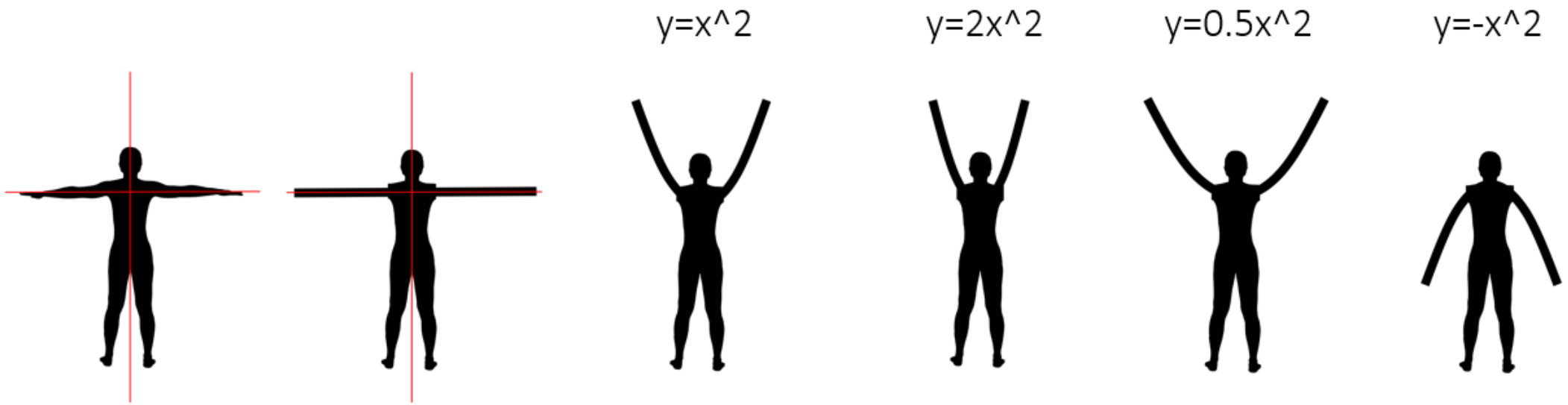
We developed instructional materials tailored for mathematics teachers who instruct Braille readers.

Crucial point of attention

Inclusive education

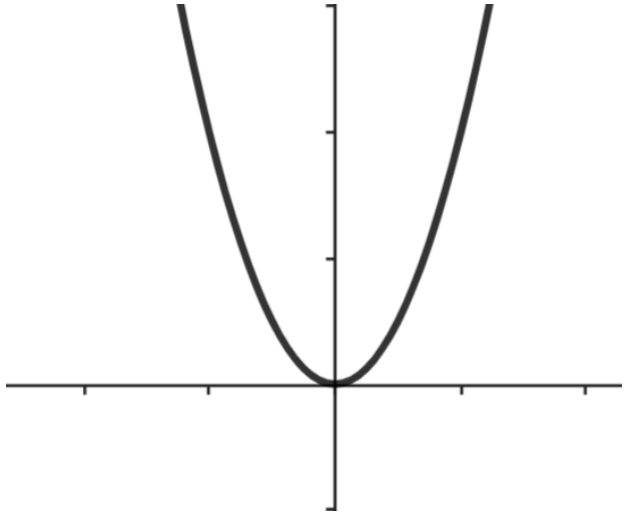
Example: coordinate systems with moving axes.

Body-graphs



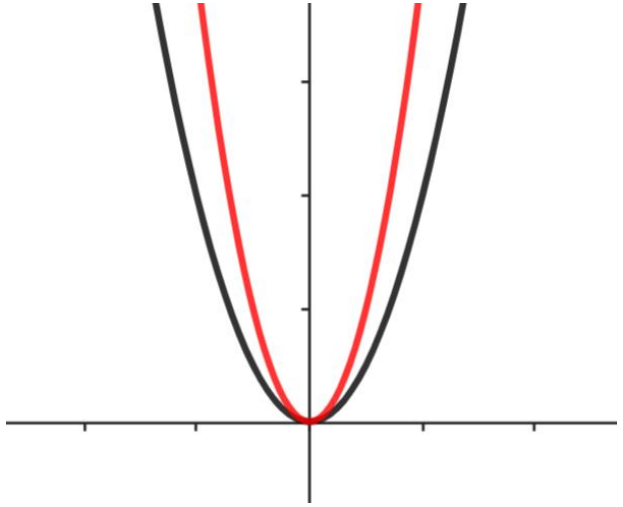
x-axis is on chest height, y -axis is a vertical line from your head to your feat.

$$y = x^2$$



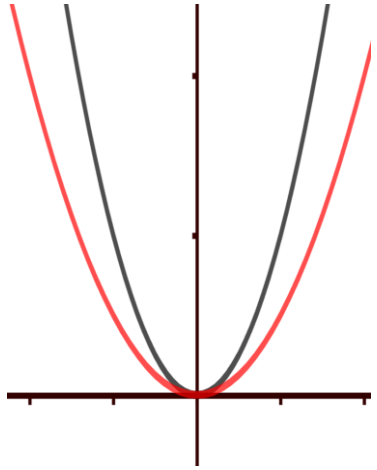
Standard

$$y = x^2$$



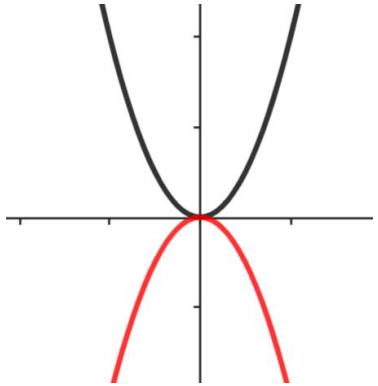
Smaller

$$y = 2x^2$$



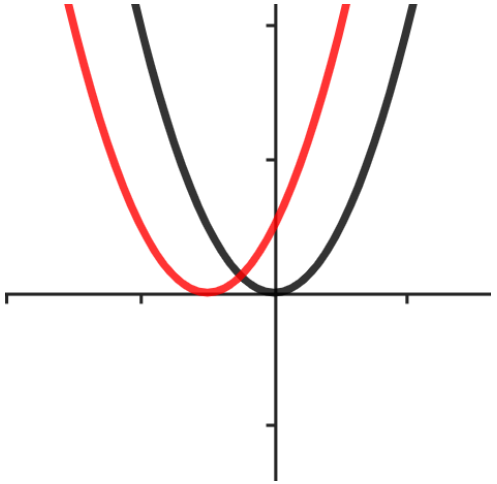
Wider

$$y = 0.5\,x^2$$



Valley, standard

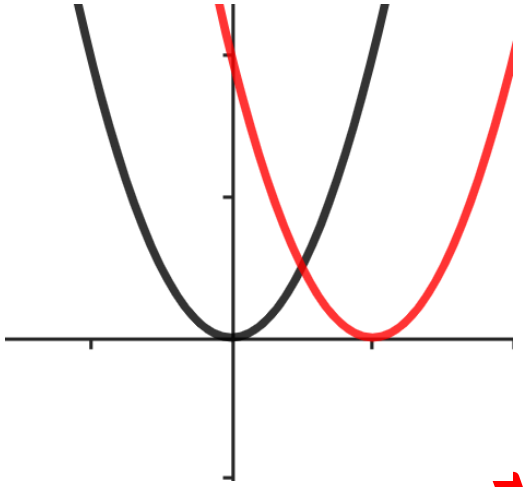
$$y = -x^2$$



Standard

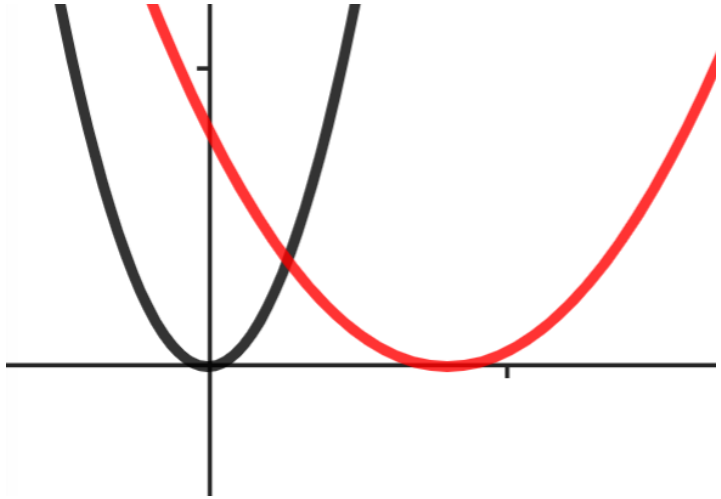
⬅ Left

$$y = (x + 1)^2$$



Standard
Right

$$y = (x - 2)^2$$



Wider
Right

$$y = (0.5x - 2)^2$$

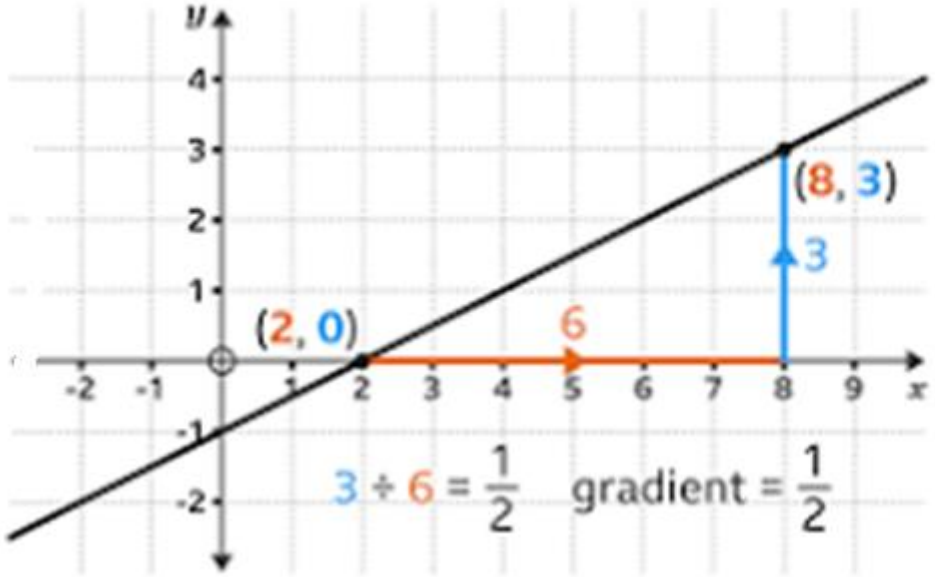
Finally

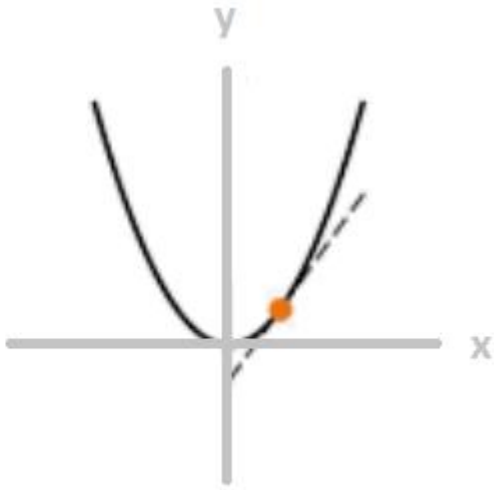
$y = 0.2\ x^2$ → $y = 0.4\ x^2$ → $y = 0.6\ x^2$ → $y = 0.8\ x^2$ → $y = 1\ x^2$
→ $y = 2\ x^2$ → $y = 4\ x^2$ → $y = 6\ x^2$ → $y = 8\ x^2$ → 10 x^2

Applause for yourself

Start Body Graph Dancing

Gradient





Melody: row row row the boat

Annemiek: I don’t hear anything?????

The gradient

Gradient of a line is easy to define

Gradient is the measure of the steepness of a line

Gradient of a line is simple to be found

Change in y over change in x and that’s the gradient

Website Tjorborn (think about a good transition)