TIME
Technologies in Modern Education

Analytic geometry – Ellipse

The tasks should be solved using iPad or the correct answers can be transferred to the given ellipse on an interactive board. The ellipse will be shown by a picture or a central equation. Enter the correct answers into the worksheet tables.

(In case you do not have any ICT available, the assignment can also be found in the attachment to the worksheet.)

For the pictures, it is true that a unit on the Cartesian plane axes equals 1 cm.

Information needed to solve the tasks:

- The central equation of an ellipse centered at $S = [m;\ n]$ with semiaxis a, b:

$$\frac{(x-m)^2}{a^2} + \frac{(y-n)^2}{b^2} = 1 \qquad \text{ev.} \qquad \frac{(x-m)^2}{b^2} + \frac{(y-n)^2}{a^2} = 1$$

- Plotting of the given ellipse in the Cartesian plane
- Position of a point relative to the ellipse

SOLUTION

Task 1: Match the correct equation and the length of a major or minor semiaxis with the given ellipse in the picture.

Picture of the ellipse	Equation of the ellipse	Major semiaxis of the ellipse	Minor semiaxis of the ellipse
1	C	10 cm	5 cm
2	F	10 cm	5 cm
3	I	10 cm	5 cm
4	E	5 cm	4 cm
5	D	5 cm	4 cm
6	J	5 cm	4 cm

SOLUTION

Task 2:   Match the given ellipse with the correct picture and one of the vertices.

Equation of the ellipse	Picture of the ellipse	Vertices of the ellipse
1	G	X
2	D	U
3	I	V
4	A	Z
5	C	Y
6	H	W

Task 3:   Find the central equation to the given ellipse in the picture. Then enter this central equation into the frame. Determine the position of points relative to the ellipse (an internal point of the ellipse, a point on the ellipse, external point of the ellipse).

Central equation of the ellipse	$\dfrac{(x-2)^2}{25} + \dfrac{(y-1)^2}{100} = 1$

Point	Position of the point
A	external point of the ellipse
B	point on the ellipse
C	external point of the ellipse
D	external point of the ellipse
E	point on the ellipse
F	internal point of the ellipse

- Prerequisites for the worksheet are as follows: the thorough practice and review of elementary analytic geometry concerning an ellipse:
  - :   Definition of an ellipse, center and semiaxes of an ellipse
  - :   Central equation of an ellipse
  - :   Points on the conic sections

- It is important to emphasize to the students that a unit on the axes of Cartesian system equals 1 cm

- Students should be reminded that not everything can be matched (There are some odd pictures or equations.)

- For the task 2, you can remind the students that the vertices of an ellipse always have one coordinate identical with a coordinate of the center of the ellipse (Thus, in the central equation of an ellipse after substitution of vertex coordinates one of the fraction will equal 0 and one will equal 1.)