

### 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  $a, b$ :  

$$\frac{(x-m)^2}{a^2} + \frac{(y-n)^2}{b^2} = 1$$
 ev. 
$$\frac{(x-m)^2}{b^2} + \frac{(y-n)^2}{a^2} = 1$$
- Plotting of the given ellipse in the Cartesian plane
- Position of a point relative to the ellipse

**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			
2			
3			
4			
5			
6			

**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		
2		
3		
4		
5		
6		

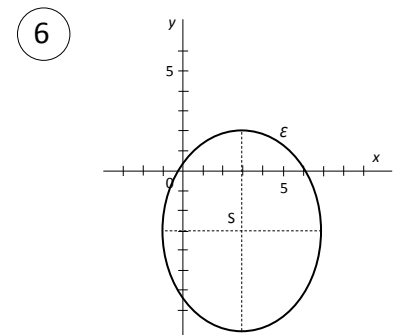
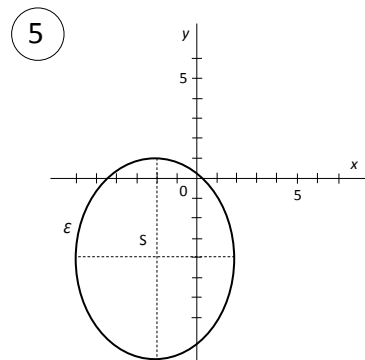
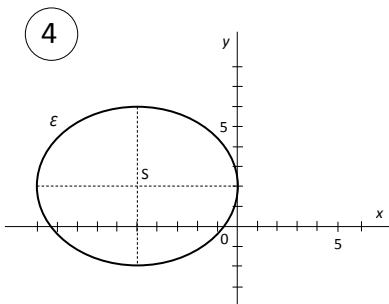
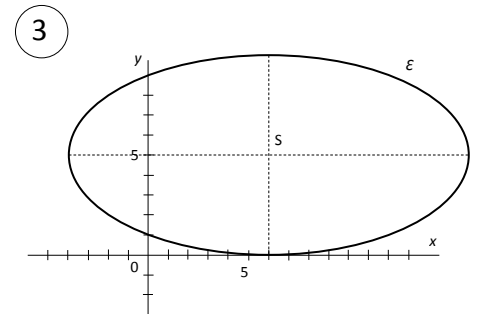
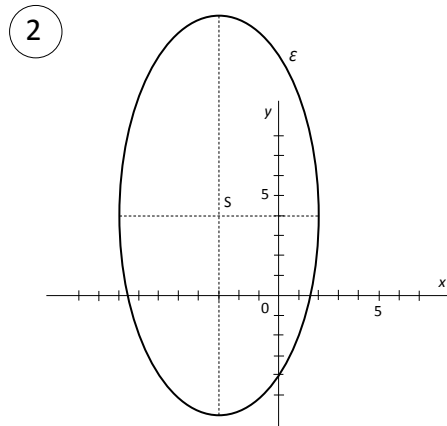
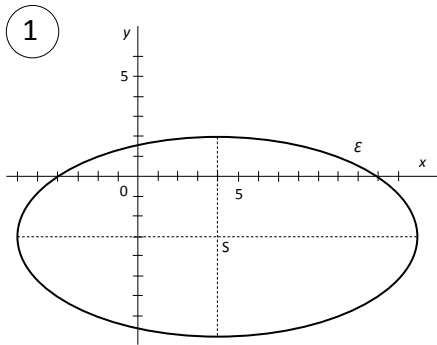
**Task 3:** Find the central equation to the given ellipse in the picture. Then enter this central equation into the frame. Determine the position of points relative to the ellipse (an internal point of the ellipse, a point on the ellipse, external point of the ellipse).

Central equation of the ellipse	
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Point	Position of the point
A	
B	
C	
D	
E	
F	

### ASSIGNMENT

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



A:  $\frac{(x+2)^2}{9} + \frac{(y+4)^2}{25} = 1$

B:  $\frac{(x-5)^2}{25} + \frac{(y+2)^2}{16} = 1$

C:  $\frac{(x-4)^2}{100} + \frac{(y+3)^2}{25} = 1$

D:  $\frac{(x+2)^2}{16} + \frac{(y+4)^2}{25} = 1$

E:  $\frac{(x+5)^2}{25} + \frac{(y-2)^2}{16} = 1$

F:  $\frac{(x+3)^2}{25} + \frac{(y-4)^2}{100} = 1$

G:  $\frac{(x+5)^2}{25} + \frac{(y-2)^2}{9} = 1$

H:  $\frac{(x-2)^2}{25} + \frac{(y-1)^2}{100} = 1$

I:  $\frac{(x-6)^2}{100} + \frac{(y-5)^2}{25} = 1$

J:  $\frac{(x-3)^2}{16} + \frac{(y+3)^2}{25} = 1$

$a = 3 \text{ cm}$     $a = 4 \text{ cm}$     $a = 5 \text{ cm}$     $a = 7 \text{ cm}$     $a = 10 \text{ cm}$

$b = 3 \text{ cm}$     $b = 4 \text{ cm}$     $b = 5 \text{ cm}$     $b = 7 \text{ cm}$     $b = 10 \text{ cm}$

**ASSIGNMENT**

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

1:  $\frac{(x-7)^2}{25} + \frac{(y-2)^2}{100} = 1$

2:  $\frac{(x-2)^2}{100} + \frac{(y-1)^2}{25} = 1$

3:  $\frac{(x+7)^2}{49} + \frac{(y-3)^2}{25} = 1$

4:  $\frac{(x-5)^2}{25} + \frac{(y+2)^2}{49} = 1$

5:  $\frac{(x+1)^2}{100} + \frac{(y-3)^2}{25} = 1$

6:  $\frac{(x-7)^2}{25} + \frac{(y+2)^2}{100} = 1$

U[2; 6]

V[0; 3]

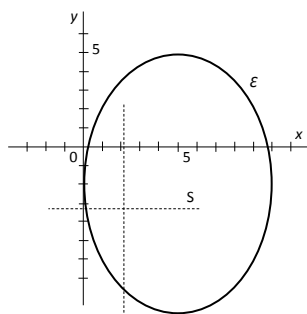
W[7; 8]

X[7; -8]

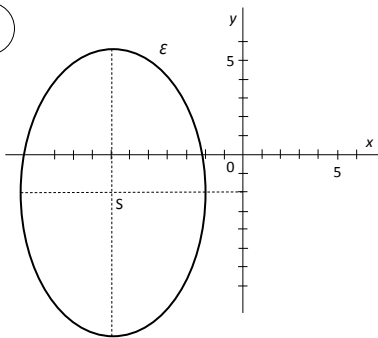
Y[-1; 8]

Z[5; 5]

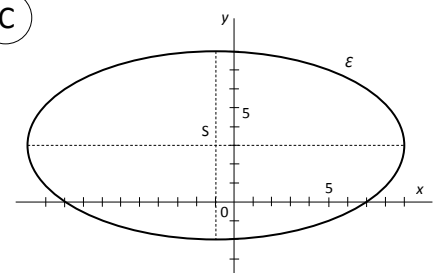
(A)



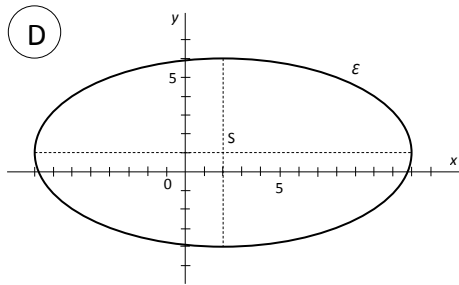
(B)



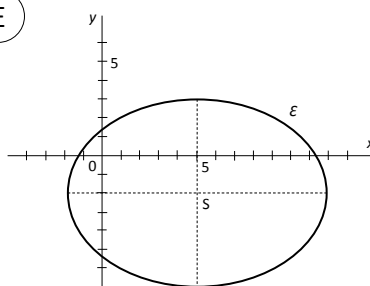
(C)



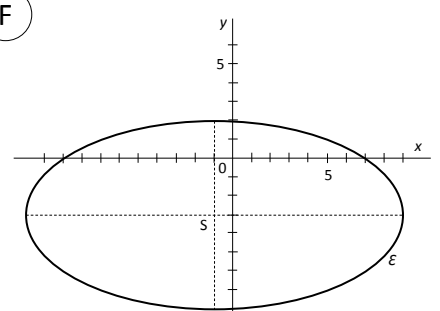
(D)



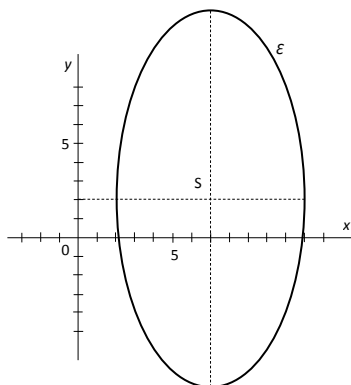
(E)



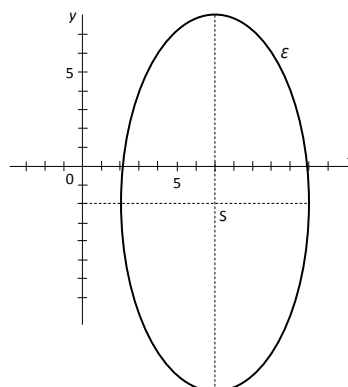
(F)



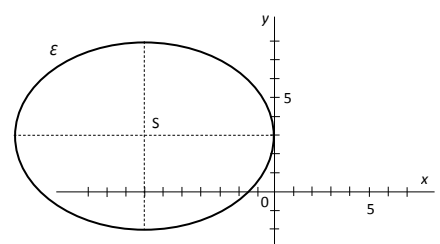
(G)



(H)



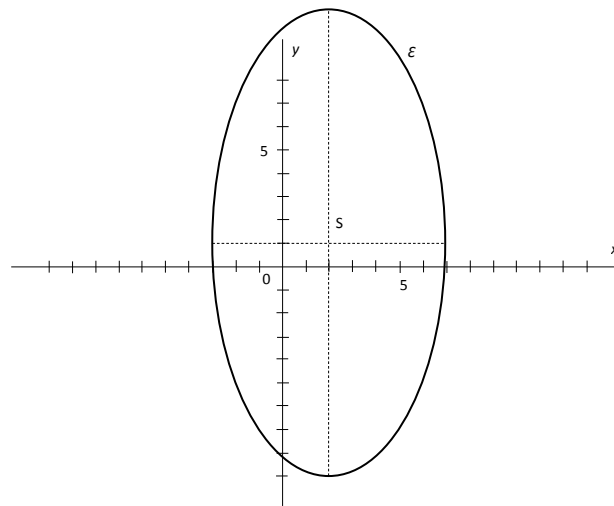
(I)



ASSIGNMENT

**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.

(Select from the options: an internal point of the ellipse, a point on the ellipse, external point of the ellipse.)



A[5; 10]

B[6; 7]

C[-4; 6]

D[-2; -9]

E[-2; -5]

F[1; 9]