Analytic geometry – Hyperbola

The tasks should be solved using iPad or the correct answers can be transferred to the given hyperbola on an interactive board. The hyperbola 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:

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

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

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

Picture of the hyperbola	Equation of the hyperbola	Major semiaxis of the hyperbola	Minor semiaxis of the hyperbola
1			
2			
3			
4			
5			
6			

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

Equation of the hyperbola	Picture of the hyperbola	Vertices of the hyperbola
1		
2		
3		
4		
5		
6		

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

Central equation of the hyperbola	

Point	Position of the point
A	
B	
C	
D	
E	
F	

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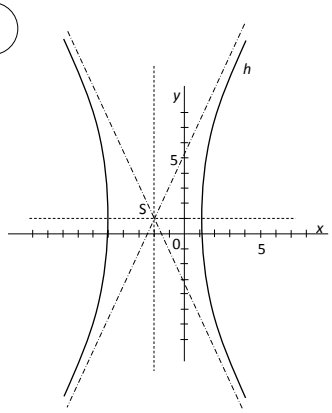
ASSIGNMENT

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

1



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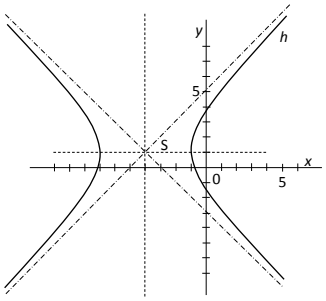

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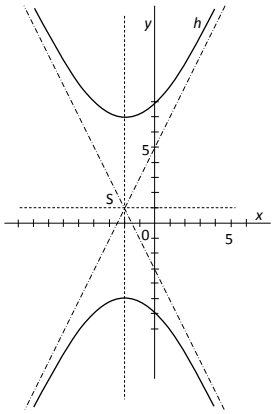

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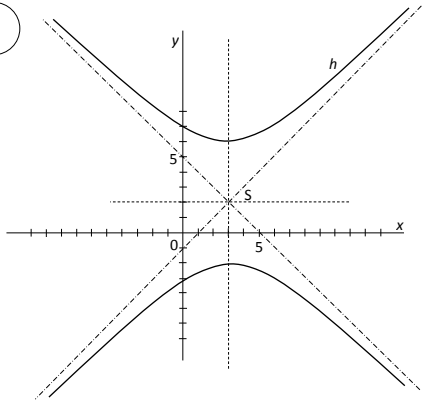

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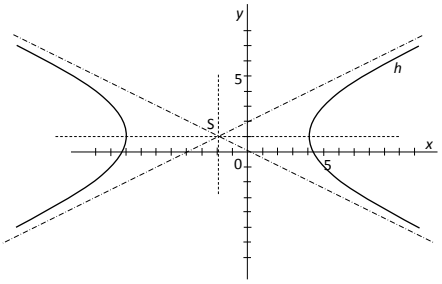
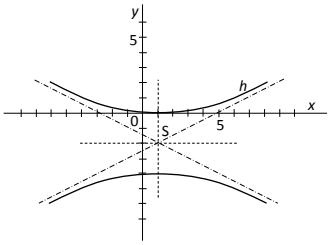


6



A: $\frac{(y-1)^2}{36} - \frac{(x+2)^2}{9} = 1$

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

C: $\frac{(x+2)^2}{9} - \frac{(y-1)^2}{36} = 1$

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

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

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

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

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

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

J: $\frac{(x+2)^2}{36} - \frac{(y-1)^2}{9} = 1$

$a = 2\ cm$ $a = 3\ cm$ $a = 4\ cm$ $a = 5\ cm$ $a = 6\ cm$

$b = 2\ cm$ $b = 3\ cm$ $b = 4\ cm$ $b = 5\ cm$ $b = 6\ cm$

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

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

2: $\frac{(x+5)^2}{9} - \frac{(y+3)^2}{9} = 1$

3: $\frac{(y-2)^2}{16} - \frac{(x-3)^2}{4} = 1$

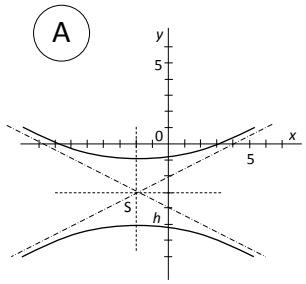
4: $\frac{(x-5)^2}{36} - \frac{(y-2)^2}{9} = 1$

5: $\frac{(y+3)^2}{9} - \frac{(x+5)^2}{9} = 1$

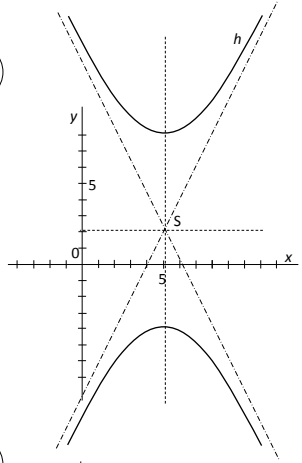
6: $\frac{(y+3)^2}{4} - \frac{(x+2)^2}{16} = 1$

$U[-1;\ 2]$ $V[-2;-1]$ $W[3;-4]$ $X[-5;0]$ $Y[3;\ -2]$ $Z[-2;-3]$

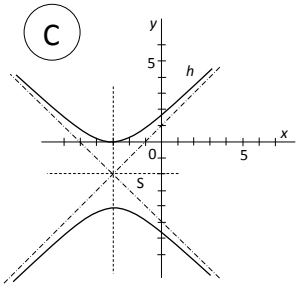
A



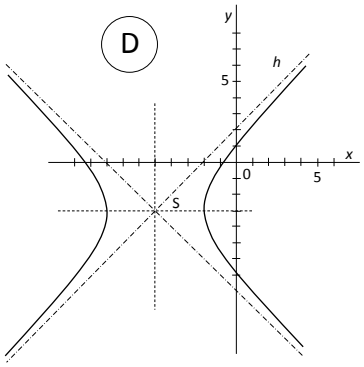
B



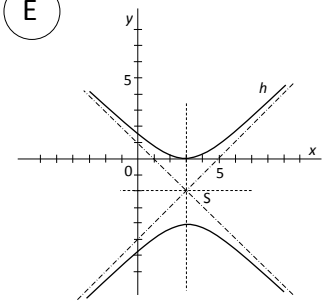
C



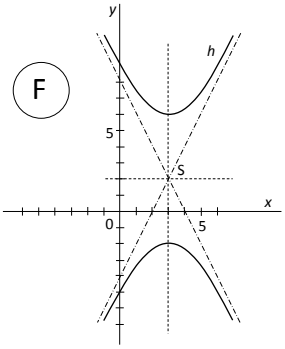
D



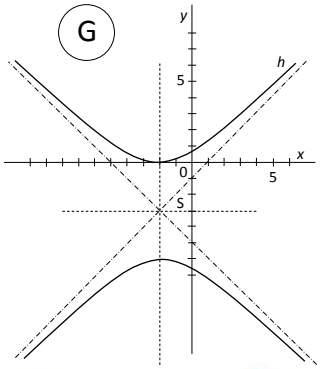
E



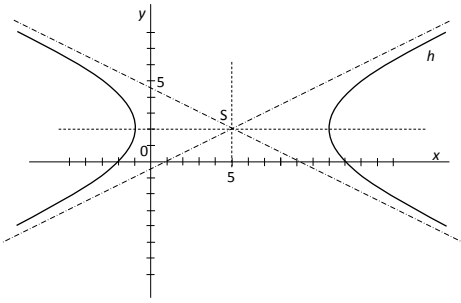
F



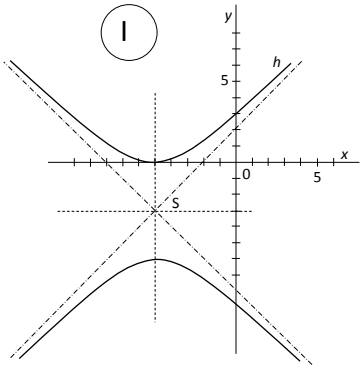
G



H



I



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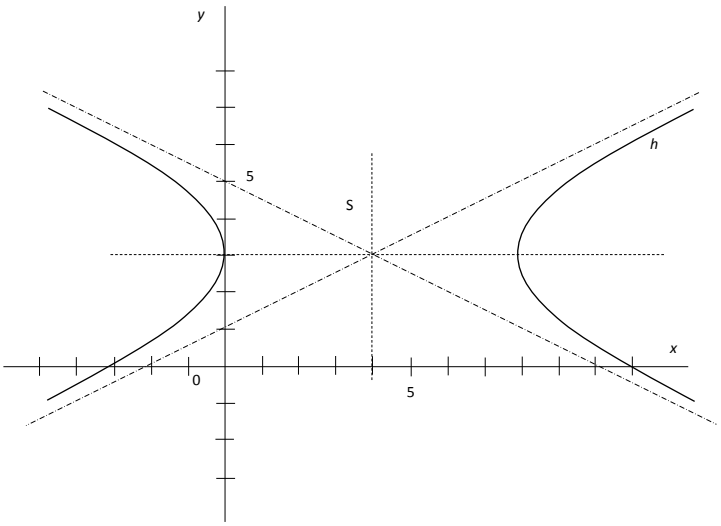
ASSIGNMENT

Task 3: Find the central equation to the given hyperbola in the picture. Then enter this central equation into the frame. Determine the position of points relative to the hyperbola.

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



$A[8;\ 3]$ $B[-2;2]$ $C[6;-3]$ $D[-3;0]$ $E[10;\ 5]$ $F[-1;5]$