

## Analytická geometrie

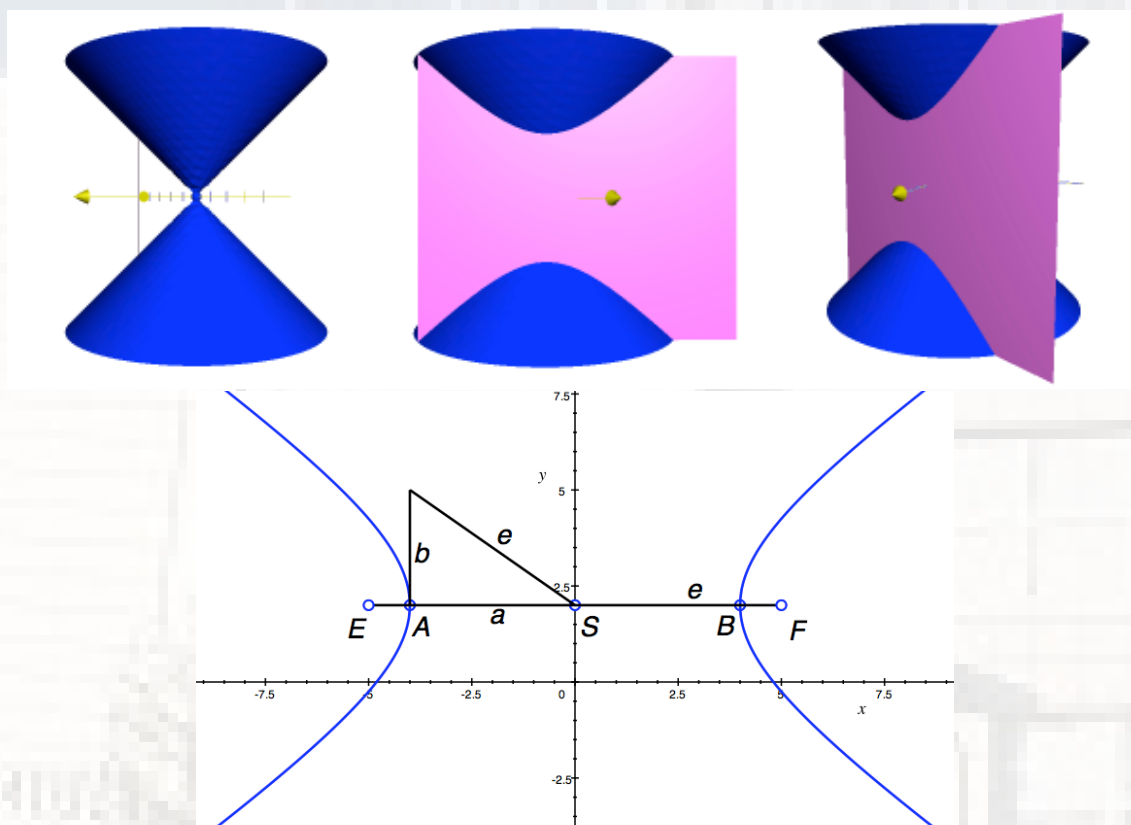
Jaroslav Drobek

[jaroslav.drobek@goa-orlova.cz](mailto:jaroslav.drobek@goa-orlova.cz)

Gymnázium a Obchodní akademie Orlová

## 9. Hyperbola, příklady

**GOA** –  
ORLOVA.CZ

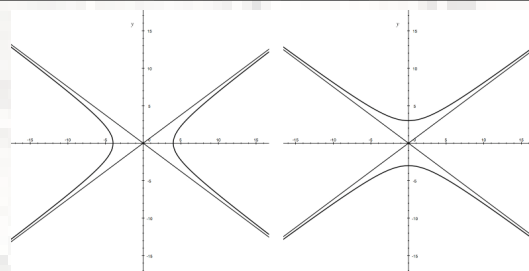


**Příklad 9.1** Najděte rovnice hyperboly a jejích asymptot, je-li  $F = [7; -1]$ ,  $A = [0; -1]$ ,  $B = [4; -1]$ .

**Středová rovnice:**

$$\frac{(x-m)^2}{a^2} - \frac{(y-n)^2}{b^2} = 1, \quad \text{je-li } AB \parallel o_x,$$

$$-\frac{(x-m)^2}{a^2} + \frac{(y-n)^2}{b^2} = 1, \quad \text{je-li } AB \parallel o_y.$$



$$y_A = -1 = y_B \implies AB \parallel o_x$$

**Asymptoty:**

$$\frac{x-m}{a} = \pm \frac{y-n}{b},$$

$$a_1: \frac{x-2}{2} = \frac{y+1}{\sqrt{21}}$$

$$\sqrt{21}(x-2) = 2(y+1)$$

$$\sqrt{21}(x-2) - 2(y+1) = 0$$

$$\sqrt{21}x - 2y - 2\sqrt{21} - 2 = 0$$

$$\sqrt{21}x - 2y - 2(\sqrt{21} + 1) = 0$$

$$a_2: \frac{x-2}{2} = -\frac{y+1}{\sqrt{21}}$$

$$\sqrt{21}(x-2) = -2(y+1)$$

$$\sqrt{21}(x-2) + 2(y+1) = 0$$

$$\sqrt{21}x + 2y - 2\sqrt{21} + 2 = 0$$

$$\sqrt{21}x + 2y - 2(\sqrt{21} - 1) = 0$$

$$S = \frac{1}{2}(A+B) = [2; -1] \implies m=2, n=-1$$

$$a = |AS| = \sqrt{(0-2)^2 + (-1-(-1))^2} = 2$$

$$e = |FS| = \sqrt{(7-2)^2 + (-1-(-1))^2} = 5$$

$$b = \sqrt{e^2 - a^2} = \sqrt{5^2 - 2^2} = \sqrt{21}$$

$$h: \frac{(x-2)^2}{4} - \frac{(y+1)^2}{21} = 1 \quad | \cdot 4 \cdot 21$$

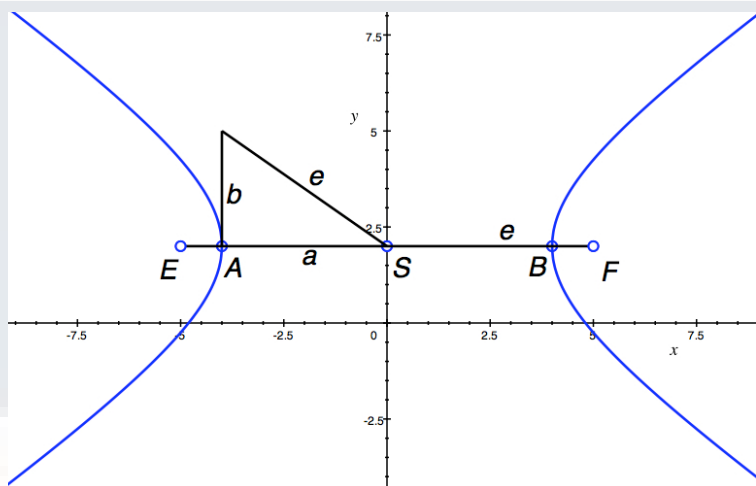
$$21(x^2 - 4x + 4) - 4(y^2 + 2y + 1) = 4 \cdot 21$$

$$h: 21x^2 - 4y^2 - 84x - 8y - 4 = 0$$

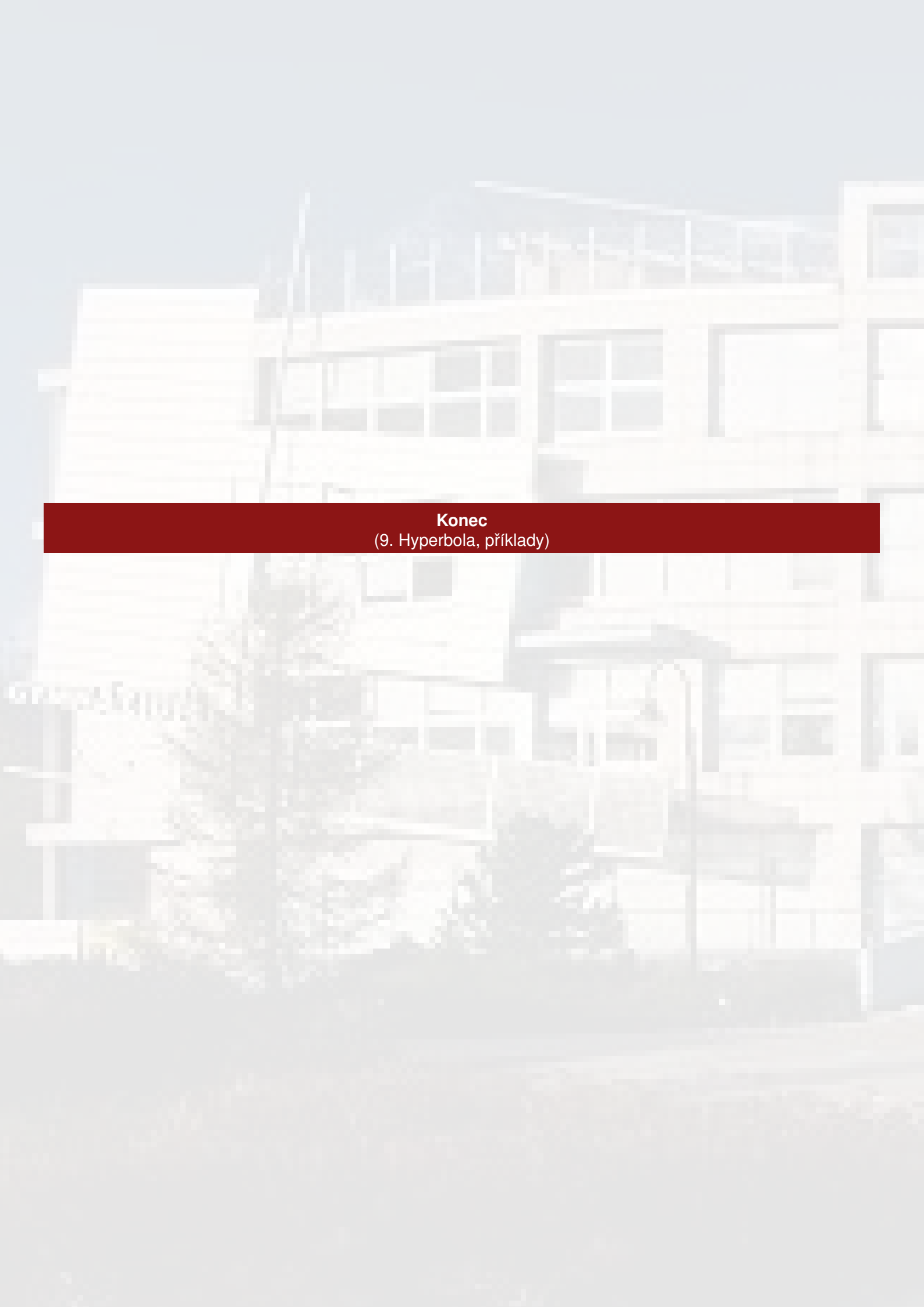
$$px^2 + qy^2 + 2rx + 2sy + t = 0$$

**Domácí úkol** (zdroj: [Hledání hyperbol na realisticky.cz](https://realisticky.cz))

Najděte rovnici hyperboly a jejích asymptot, má-li ohniska  $E = [-5; 3]$ ,  $F = [7; 3]$  a hlavní poloosu  $a = 5$ .



**Příklad 9.2** Najděte střed, ohniska, vrcholy a asymptoty hyperboly  $4x^2 - 25y^2 + 32x + 150y - 261 = 0$ .



**Konec**  
(9. Hyperbola, příklady)