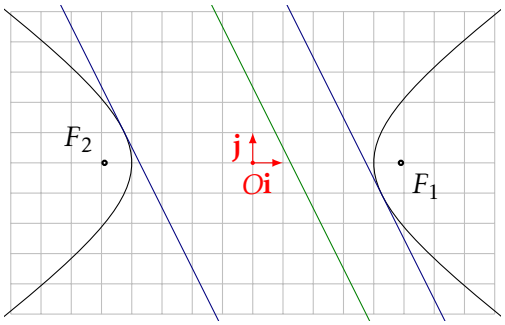
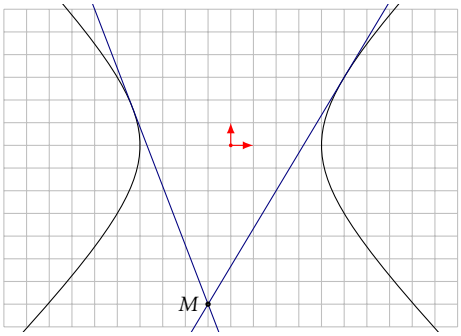
1. Determine the intersection points between the line $\ell : 2x - y - 10 = 0$ and the hyperbola $\mathcal{H} : \frac{x^2}{20} - \frac{y^2}{5} - 1 = 0$.

2. Determine the tangents to the hyperbola $\mathcal{H} : \frac{x^2}{16} - \frac{y^2}{8} - 1 = 0$ which are parallel to the line $\ell : 4x + 2y - 5 = 0$.



3. Determine the tangents to the hyperbola $\mathcal{H} : x^2 - y^2 = 16$ which contain the point $M(-1, 7)$.



4. Find the area of the triangle determined by the asymptotes of the hyperbola $\mathcal{H} : \frac{x^2}{4} - \frac{y^2}{9} - 1 = 0$ and the line $\ell : 9x + 2y - 24 = 0$.

5. Find an equation for the tangent lines to:

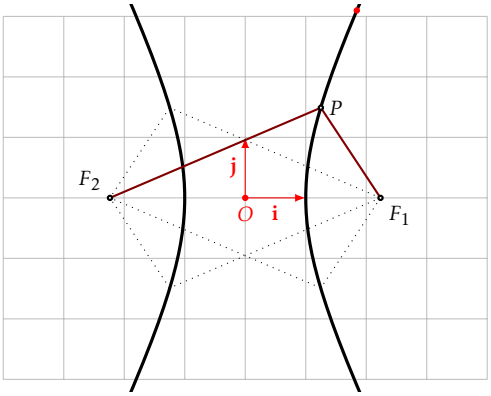
1. the hyperbola $\mathcal{H} : \frac{x^2}{20} - \frac{y^2}{5} - 1 = 0$, orthogonal to the line $\ell : 4x + 3y - 7 = 0$;
2. the parabola $\mathcal{P} : y^2 - 8x = 0$, parallel to $\ell : 2x + 2y - 3 = 0$.

6. Find an equation for the tangent lines to:

1. the hyperbola $\mathcal{H} : \frac{x^2}{3} - \frac{y^2}{5} - 1 = 0$, passing through $P(1, -5)$;
2. the paraola $\mathcal{P} : y^2 - 36x = 0$, passing through $P(2, 9)$.

7. Consider the hyperbola $\mathcal{H}: x^2 - \frac{y^2}{4} - 1 = 0$ with focal points F_1 and F_2. Find the points M situated on the hyperbola such that

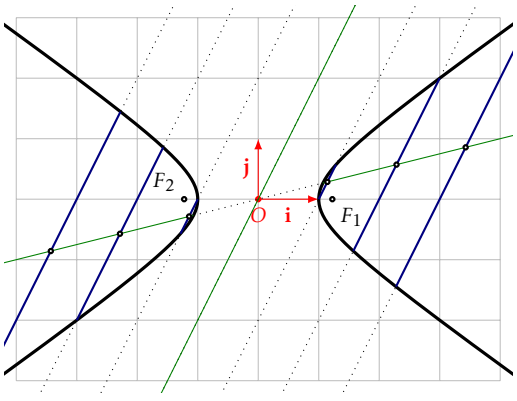
1. The angle $\measuredangle F_1MF_2$ is right;
2. The angle $\measuredangle F_1MF_2$ is $60°$;
3. The angle $\measuredangle F_1MF_2$ is θ.



8. Consider the tangents to the parabola $\mathcal{P}: y^2 - 10x = 0$ passing through the point $P(-3, 12)$. Calculate the distance from the point P to the chord of the parabola which is formed by the two contact points.

9. Using the gradient, prove the reflective properties of the hyperbola and of the parabola.

10. Consider the hyperbola $\mathcal{H}: x^2 - 2y^2 = 1$. Determine the geometric locus described by the midpoints of the chords of $\mathcal{H}$ which are parallel to the line $2x - y = 0$.



11. For which value k is the line $y = kx + 2$ tangent to the parabola $\mathcal{P}: y^2 = 4x$?

12. Consider the parabola $\mathcal{P} : y^2 = 16x$. Determine the tangents to $\mathcal{P}$ which are

1. parallel to the line $\ell : 3x - 2y + 30 = 0$;
2. perpendicular to the line $\ell : 4x + 2y + 7 = 0$.

13. Determine the tangents to the parabola $\mathcal{P} : y^2 = 16x$ which contain the point $P(-2, 2)$.