2E Tangents & Normals

- 1. The point *P*, where x = 2, lies on the rectangular hyperbola *H* with equation xy = 8. Find:
- a) The equation of the tangent T.

b) The equation of the normal N to H at the point P, giving your answer in the form ax + by + c = 0.

- 2. The distinct points A and B, where x = 3 lie on the parabola C with equation $y^2 = 27x$.
- a) The line l_1 is the tangent to C at A and the line l_2 is the tangent to C at B. Given that at A, y > 0, find the coordinates of A and B.

b) Draw a sketch showing the parabola C. Indicate A, B, l_1 and l_2 .

c) Find equations for l_1 and l_2 , giving your answer in the form ax + by + c = 0.

3. The point *P* with coordinates (75,30) lies on the parabola *C* with equation $y^2 = 12x$. Find the equation of the tangent to *C* at *P*, giving your answer in the form y = mx + c

- 4. The point P(4,8) lies on the parabola *C* with equation $y^2 = 4ax$. Find:
- a) The value of *a*

b) An equation of the normal to C at P

The normal to C at P cuts the parabola again at the point Q. Find:

c) The coordinates of Q

d) The length PQ, giving your answer as a simplified surd