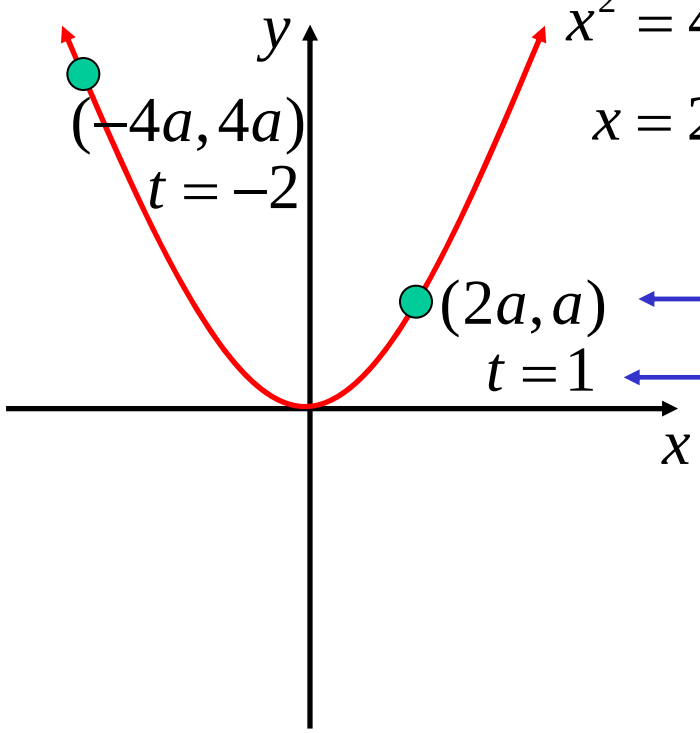
Parametric Coordinates

Cartesian Coordinates: curve is described by one equation and points are described by two numbers.

Parametric Coordinates: curve is described by two equations and points are described by one number ***(parameter)***.



$x^2 = 4ay$ ← Cartesian equation

$x = 2at \quad , \quad y = at^2$ ← Parametric coordinates

$(2a, a)$ ← Cartesian coordinates

$t = 1$ ← parameter

Any point on the parabola $x^2 = 4ay$ has coordinates;

$x = 2at$ $\qquad$ $y = at^2$

where; ***a*** is the focal length

t is any real number

e.g. Eliminate the parameter to find the cartesian equation of;

$$x = \frac{1}{2}t \quad , \quad y = \frac{1}{4}t^2$$

$t = 2x$ $\qquad$ $y = \frac{1}{4}(2x)^2$

$$y = \frac{1}{4}\left(4x^2\right)$$

$$y = x^2$$

(ii) State the coordinates of the focus

$a = \frac{1}{4}$ $\qquad$ $\therefore$ focus $= \left(0, \frac{1}{4}\right)$

(iii) Calculate the parametric coordinates of the curve $y = 8x^2$

$$x^2 = 4ay$$

$$4a = \frac{1}{8}$$

$$a = \frac{1}{32}$$

$\therefore$ the parametric coordinates are $\left(\frac{1}{16}t, \frac{1}{32}t^2\right)$

Exercise 9D; 1, 2 *(not latus rectum)*, 3, 5, 7a