LOCUS PROBLEMS – STPM – M

Exercise 5.3

1. Find the locus of points whose distance from the origin is twice their distance from the point (0, 2).
2. Find the locus of points whose distance from the point $(3a, 0)$ is equal to their distance from the y-axis.
3. Find the locus of points such that their distance from the point (0, 2) is twice their distance from the point (0, –1).
4. Find the locus of points which are equidistant from the points (4, 4) and (–4, –1). Show that it represents the equation of the perpendicular bisector of the line joining the points.
5. Find the locus of points $P(x, y)$ such that the triangle with the points $P(x, y)$, $A(5, 0)$ and the origin, O, as vertices is right-angled at P.

3U – 6. Find the Cartesian equations of the locus of points with the following parametric equations:

Ext I

(a) $x = t^2 - 1,\ y = 3 + t$

(c) $x = 3t + 1,\ y = \dfrac{3}{t-1}$

(e) $x = 6t,\ y = 3t^2 + 1$

(g) $x = 1 + 2t,\ y = \dfrac{2}{t^2}$

Ext I

(b) $x = 3t^2,\ y = 2t^3$

(d) $x = \dfrac{1+t}{t},\ y = \dfrac{1-t}{t^2}$

(f) $x = t^2 - 1,\ y = t^3 + 1$

(h) $x = 4t,\ y = \dfrac{4}{t^2} - 1$

Exercise 5.3

1. $3x^2 + 3y^2 - 16y + 16 = 0$
2. $y^2 = 3a(2x - 3a)$
3. $x^2 + y^2 + 4y = 0$
4. $16x + 10y - 15 = 0$
5. $x^2 + y^2 - 5x = 0$
6. (a) $(y - 3)^2 = x + 1$ (b) $27y^2 = 4x^3$
   (c) $(x - 4)y = 9$ (d) $y = (x - 1)(x - 2)$
   (e) $x^2 = 12(y - 1)$ (f) $(y - 1)^2 = (x + 1)^3$
   (g) $y(x - 1)^2 = 8$ (h) $x^2(y + 1) = 64$