

Section 2: General equations

Exercise level 1 solutions

1. (i) $x = 3t, y = 4t^2$

$$t = \frac{x}{3}$$

$$y = 4t^2 = 4\left(\frac{x}{3}\right)^2 = \frac{4}{9}x^2$$

(ii) $x = 7t, y = 8t - 5t^2$

$$t = \frac{x}{7}$$

$$y = 8\left(\frac{x}{7}\right) - 5\left(\frac{x}{7}\right)^2 = \frac{8}{7}x - \frac{5}{49}x^2$$

(iii) $x = 5t, y = 3 + 2t - 4t^2$

$$t = \frac{x}{5}$$

$$y = 3 + 2t - 4t^2 = 3 + 2\left(\frac{x}{5}\right) - 4\left(\frac{x}{5}\right)^2 = 3 + \frac{2}{5}x - \frac{4}{25}x^2$$

2. (i) $x = 40t \cos 60^\circ = 20t$

$$y = 40t \sin 60^\circ - \frac{1}{2} \times 10t^2 = 20t\sqrt{3} - 5t^2$$

(ii) $t = \frac{x}{20}$

$$y = 20\left(\frac{x}{20}\right)\sqrt{3} - 5\left(\frac{x}{20}\right)^2$$

$$= x\sqrt{3} - \frac{5}{400}x^2$$

$$= x\sqrt{3} - \frac{1}{80}x^2$$

(iii) When $x = 5, y = 5\sqrt{3} - \frac{1}{80} \times 5^2 = 8.35 \text{ m (3 s.f.)}$

(iv) When $y = 20, 20 = x\sqrt{3} - \frac{1}{80}x^2$

$$x^2 - 80x\sqrt{3} + 1600 = 0$$

Edexcel A level Maths Projectiles 2 Exercise solutions

$$\begin{aligned}x &= \frac{80\sqrt{3} \pm \sqrt{19200 - 4 \times 1600}}{2} \\&= \frac{80\sqrt{3} \pm 80\sqrt{2}}{2} \\&= 40\sqrt{3} \pm 40\sqrt{2} \\&= 12.7 \text{ or } 125.9 \text{ (1 d.p.)}\end{aligned}$$