

KEY to Converting Polar to Rectangular

1. $r = \tan\theta \sec\theta$

$$r = \tan\theta \cdot \frac{1}{\cos\theta}$$

$$r \cos\theta = \tan\theta$$

$$x = \frac{y}{x}$$

$$y = x^2 \text{ Choice N.}$$

2. $r^2 = \tan\theta \sec^2\theta$

$$r^2 = \tan\theta \cdot \frac{1}{\cos^2\theta}$$

$$(r \cos\theta)^2 = \tan\theta$$

$$x^2 = \frac{y}{x}$$

$$y = x^3 \text{ Choice O.}$$

3. $r^2 = \sec^2\theta (\tan\theta + 1)$

$$r^2 = \frac{1}{\cos^2\theta} (\tan\theta + 1)$$

$$(r \cos\theta)^2 = \tan\theta + 1$$

$$x^2 = \frac{y}{x} + 1$$

Multiply all terms by x

$$x^3 = y + x$$

$$y = x^3 - x \text{ Choice Y.}$$

4. $r^2 = \sec\theta \csc\theta$

$$r^2 = \frac{1}{\cos\theta} \cdot \frac{1}{\sin\theta}$$

$$r \cos\theta r \sin\theta = 1$$

$$x \cdot y = 1$$

$$y = \frac{1}{x} \text{ Choice D.}$$

5. $r^3 = \sec^2\theta \csc\theta$

$$r^3 = \frac{1}{\cos^2\theta} \frac{1}{\sin\theta}$$

$$r^2 \cos^2\theta r \sin\theta = 1$$

$$x^2 y = 1$$

$$y = \frac{1}{x^2} \text{ Choice E.}$$

6. $r = \frac{\sec\theta}{r \cos\theta - \tan\theta}$

$$r = \frac{1}{\cos\theta} \cdot \frac{1}{(r \cos\theta - \tan\theta)}$$

$$r \cos\theta \cdot (r \cos\theta - \tan\theta) = 1$$

$$x \cdot \left(x - \frac{y}{x} \right) = 1$$

$$x^2 - y = 1$$

$$x^2 - 1 = y$$

Choice Q.

7. $r = \sec\theta - \csc\theta$

$$r = \frac{1}{\cos\theta} - \frac{1}{\sin\theta}$$

Multiply all terms by $r \cos\theta \sin\theta$

$$r \cdot (r \cos\theta \sin\theta) = \frac{1}{\cos\theta} (r \cos\theta \sin\theta) - \frac{1}{\sin\theta} (r \cos\theta \sin\theta)$$

$$r \cos\theta r \sin\theta = r \sin\theta - r \cos\theta$$

$$x y = y - x$$

$$x y - y = -x$$

$$y(x-1) = -x$$

$$y = \frac{-x}{x-1} \text{ or } y = \frac{x}{1-x}$$

Choice K.

8. $r = \frac{1}{\cos\theta + \sin\theta}$

$$r (\cos\theta + \sin\theta) = 1$$

$$r \cos\theta + r \sin\theta = 1$$

$$x + y = 1 \Rightarrow y = 1 - x \text{ choice C.}$$

9. $r = \frac{\csc\theta}{\cot\theta - r \cos\theta}$

$$r = \frac{1}{\sin\theta} \cdot \frac{1}{(\cot\theta - r \cos\theta)}$$

$$r \sin\theta \cdot (\cot\theta - r \cos\theta) = 1$$

$$y \cdot \left(\frac{x}{y} - x \right) = 1$$

$$x - x y = 1$$

$$x - 1 = x y$$

$$\frac{x-1}{x} = y$$

$$\text{or } y = 1 - \frac{1}{x} \text{ Choice J.}$$