3 **(b)** A particle is projected down an inclined plane with initial velocity u m/s.
The line of projection makes an angle of $2\theta°$ with the inclined plane and the plane is inclined at $\theta°$ to the horizontal.
The plane of projection is vertical and contains the line of greatest slope.

The range of the particle on the inclined plane is $\frac{ku^2}{g}\sin\theta$.

Find the value of k.

$r_j = 0$ 5

$0 = u\sin 2\theta.t - \frac{1}{2}g\cos\theta.t^2$ 5

$\Rightarrow \quad t = \frac{2u\sin 2\theta}{g\cos\theta}$ or $\frac{4u\sin\theta}{g}$ 5

Range $= u\cos 2\theta\left\{\frac{4u\sin\theta}{g}\right\} + \frac{1}{2}g\sin\theta.\left\{\frac{4u\sin\theta}{g}\right\}^2$ 5

$= \frac{4u^2}{g}\{\cos 2\theta\sin\theta + 2\sin\theta\sin^2\theta\}$

$= \frac{4u^2}{g}\{(\cos^2\theta - \sin^2\theta)\sin\theta + 2\sin^3\theta\}$

$= \frac{4u^2}{g}\{\cos^2\theta\sin\theta + \sin^3\theta\}$

$= \frac{4u^2}{g}\{\sin\theta(\cos^2\theta + \sin^2\theta)\}$

$= \frac{4u^2\sin\theta}{g}$

$\Rightarrow \quad k = 4$ 5 | 25