**6D Deriving Formulae**

1. A particle is projected from a point on a horizontal plane with an initial velocity $U$ at an angle $θ$ above the horizontal, and moves freely under gravity until it hits the plane at point B. Given that the acceleration due to gravity is $g$, find expressions for:
2. The time of flight, $T$
3. The range, $R$, on the horizontal plane
4. A particle is projected from a point with speed $u$ and an angle of elevation $θ$, and moves freely under gravity. When the particle has moved a horizontal distance $x$, its height above the point of projection is $y$.

Show that:

$$y=xtanθ-\frac{gx^{2}}{2u^{2}}(1+tan^{2}θ)$$

1. A particle is projected from a point A on a horizontal plane, with initial speed 28ms-1 and an angle of elevation θ. The particle passes through a point B, which is 8m above the plane and a horizontal distance of 32m from A

Find the two possible values of θ, giving your answers to the nearest degree.

(Use the formula we have just calculated)