$\Rightarrow \quad u = \frac{u}{\sqrt{17}}\vec{i} + \frac{4u}{\sqrt{17}}\vec{j}$ 1986 Q.3 Ctd

Tld particle strikes plane after 2 seconds $\Rightarrow$

$$T = 2 = \frac{2u\sin\alpha}{g}$$

$$\Rightarrow \quad 2 = \frac{2u\left(\frac{4}{\sqrt{17}}\right)}{g}$$

$$\Rightarrow \quad g = \frac{4u}{\sqrt{17}} \quad \Rightarrow \quad \boxed{u = g\sqrt{17}}$$

Tells you u.

Find $t_1$

$\therefore \vec{u} = g\vec{i} + 4g\vec{j}$.

$\therefore$ $\vec{v}(t_1)$ according to Eqn (1) $\Rightarrow$

THEORY $\Rightarrow$ $\vec{v}(t_1) = g\vec{i} + [4g - gt]\vec{j}$ (*)

Ec

$\vec{v}(t_1) \perp \vec{u}$

$$\Rightarrow \left[g\vec{i} + (4g - gt_1)\vec{j}\right] \cdot \left[g\vec{i} + 4g\vec{j}\right] = 0$$

$$\Rightarrow \quad g^2 + (4g - gt_1)4g = 0$$

$$\Rightarrow \quad g^2 + 16g^2 - 4g^2t_1 = 0$$

$$\Rightarrow \quad 17g^2 - 4g^2t_1 = 0$$

$$\Rightarrow \quad \boxed{\frac{17}{4} = t_1}$$

$\vec{v}(t) \perp \vec{u} \Rightarrow \vec{v}(t) \cdot \vec{u} = 0$ [illegible] $\vec{v}(t) = \dot{x}\vec{i} + \dot{y}\vec{j}$

$\Rightarrow \quad \dot{x} \cdot g + 4g \cdot \dot{y} = 0 \Rightarrow \dot{x}$ is a multiple of $+4$ and $\dot{y}$ is a multiple of $-1$.

$\therefore$ $\vec{v}(t_1)$ [illegible] $\parallel (4, -1)$