

STEP III, 2003 Q11

- 11 Point B is a distance d due south of point A on a horizontal plane. Particle P is at rest at B at $t = 0$, when it begins to move with constant acceleration a in a straight line with fixed bearing β . Particle Q is projected from point A at $t = 0$ and moves in a straight line with constant speed v . Show that if the direction of projection of Q can be chosen so that Q strikes P , then

$$v^2 \geq ad(1 - \cos \beta) .$$

Show further that if $v^2 > ad(1 - \cos \beta)$ then the direction of projection of Q can be chosen so that Q strikes P before P has moved a distance d .



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