

## STEP II, 2017, Q11

11 Two thin vertical parallel walls, each of height  $2a$ , stand a distance  $a$  apart on horizontal ground. The projectiles in this question move in a plane perpendicular to the walls.

- (i) A particle is projected with speed  $\sqrt{5ag}$  towards the two walls from a point  $A$  at ground level. It just clears the first wall. By considering the energy of the particle, find its speed when it passes over the first wall.

Given that it just clears the second wall, show that the angle its trajectory makes with the horizontal when it passes over the first wall is  $45^\circ$ .

Find the distance of  $A$  from the foot of the first wall.

- (ii) A second particle is projected with speed  $\sqrt{5ag}$  from a point  $B$  at ground level towards the two walls. It passes a distance  $h$  above the first wall, where  $h > 0$ . Show that it does not clear the second wall.



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