

Challenge Problem 3

The acceleration due to gravity g can be measured by projecting a body upward and measuring the time that it takes to pass two given points in both directions.

Show that if the time the body takes to pass a horizontal line A in both directions is T_A , and the time to go by a second line B in both directions is T_B , then, assuming that the acceleration is constant, its magnitude is

$$g = \frac{8h}{T_A^2 - T_B^2}$$

where h is the height of line B above line A .

