Answer on Question #44574, Physics, Other

Question:

A shell is fired vertically upwards with a velocity v1 from a trolley moving horizontally with velocity v2. A person on ground observes the motion of the shell as a parabola, whose horizontal range is

(1) 2v1^2*v2/g

(2) 2v1^2/g

(3) 2v2^2/g

(4) 2v1v2/g

Answer:

Horizontal range equals:

$$x = v_2 t$$

where t is of motion.

Time of motion can be found from (object moving if his height >0) :

$$h = v_1 t - \frac{g t^2}{2} = 0$$

Therefore, time of motion equals:

$$t = \frac{2v_1}{g}$$

Finally, horizontal range equals:

$$x = v_2 t = \frac{2v_1 v_2}{g}$$

Answer: (4) $\frac{2v_1 v_2}{g}$