

**Answer on Question#38957 – Physics – Other**

Given the kinematics equation for the motion of an object falling from rest,  $x = .5gt^2$ , what kind of relationship is predicted between  $x$  and  $t$ ? (select all that apply)

- 1)  $x = k \cdot t$ , where  $k$  is a constant
- 2)  $x = k \cdot t^2$ , where  $k$  is a constant.
- 3) displacement,  $x$ , is proportional to time,  $t$ .
- 4) displacement,  $x$ , is proportional to the square of the time,  $t^2$ .
- 5) displacement,  $x$ , has a linear relationship with time,  $t$ .
- 6) displacement,  $x$ , and time,  $t$ , obey a power law.
- 7)  $x = k \cdot t + b$ , where  $k$  and  $b$  are constants.

**Solution:**

Equations of motion for the object:

$$x = \frac{gt^2}{2} = \frac{g}{2} \cdot t^2 = kt^2$$
$$g = \text{const} = 9.8 \frac{\text{m}}{\text{s}^2} \Rightarrow$$

First:  $x = kt^2$ , where  $k$  is a constant.

Second: displacement,  $x$ , is proportional to the square of the time,  $t^2$ . (Because  $x = kt^2 \Rightarrow x \sim t^2$ )

- Answer:** 2)  $x = k \cdot t^2$ , where  $k$  is a constant.  
4) displacement,  $x$ , is proportional to the square of the time,  $t^2$ .