Answer on Question 62663, Physics, Other

Question:

A cat chases a mouse across a $1.7\ m$ high table. The mouse steps out of the way, and the cat slides off the table and strikes the floor $2.0\ m$ from the edge of the table. What was the cat's speed when it slid off the table? The acceleration of gravity is $9.81\ m/s^2$. Answer in units of m/s.

Solution:

Let's first find how long a cat fall from a high table from the formula:

$$h = \frac{1}{2} g t^2,$$

here, h is the height of the table, g is the acceleration of gravity, t is the time.

Then, from this formula we can calculate how long a cat fall from a high table:

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{2 \cdot 1.7\ m}{9.81\ m/s^2}} = 0.58\ s.$$

As we know the time we can calculate the cat's speed when it slid off the table from the formula:

$$d = vt,$$

here, d is the horizontal distance that cat travel before it striking the floor, v is the cat's speed when it slid off the table and t is the time that cat takes to fall from a high table.

Then, from this formula we can calculate the cat's speed when it slid off the table:

$$v = \frac{d}{t} = \frac{2.0\ m}{0.58\ s} = 3.45\ \frac{m}{s}.$$

Answer:

$v = 3.45\ \frac{m}{s}$.