

## Answer on Question 74926, Physics, Other

### Question:

The maximum speed of a child on a swing is  $5.3 \text{ m/s}$ . The child's height above the ground is  $1.2 \text{ m}$  at the lowest point in his motion. How high above the ground is he at his highest point? (Ignore dissipative forces).

### Solution:

Let's first find the distance between the lowest point and the highest point in the motion of the child from the law of conservation of energy (kinetic energy of the child at the lowest point converted to the potential energy at the highest point):

$$KE = PE,$$

$$\frac{1}{2}mv^2 = mgh,$$

here,  $m$  is the mass of the child,  $v$  is the maximum speed of the child on a swing,  $g = 9.8 \text{ m/s}^2$  is the acceleration due to gravity and  $h$  is the distance between the lowest point and the highest point in the motion of the child.

Then, we get:

$$h = \frac{v^2}{2g}.$$

Finally, we can find how high above the ground is child at his highest point:

$$H = h_0 + h,$$

here,  $h_0$  is the child's height above the ground.

Let's substitute the numbers:

$$H = h_0 + h = h_0 + \frac{v^2}{2g} = 1.2 \text{ m} + \frac{\left(5.3 \frac{\text{m}}{\text{s}}\right)^2}{2 \cdot 9.8 \frac{\text{m}}{\text{s}^2}} = 2.63 \text{ m}.$$

### Answer:

$$H = 2.63 \text{ m}.$$

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