

Answer on Question #63603-Physics-Other

1) Girl skis straight down a 25 degrees slope, starting from rest and travelling a distance of 17m along the slope. Use Conservation of energy to find her final velocity, assuming negligible air resistance and friction.

Solution

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

$$h = l \sin \theta$$

$$v^2 = 2gl \sin \theta$$

$$v = \sqrt{2gl \sin \theta} = \sqrt{2 \cdot 9.8 \cdot 17 \sin 25} = 12 \frac{m}{s}$$

2) A child swings on a swing so that her center of mass is located 86cm above the ground and 3.46m from the point where the rope is attached to the tree. If she swings so that her maximum amplitude causes the rope to make an angle of 48 degrees with the vertical, calculate the child's maximum speed at the bottom of the swing.

Solution

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

Maximal height under the bottom position is

$$h = l(1 - \cos \theta)$$

$$v^2 = 2gl(1 - \cos \theta)$$

$$v = \sqrt{2gl(1 - \cos \theta)} = \sqrt{2 \cdot 9.8 \cdot 3.46(1 - \cos 48)} = 4.7 \frac{m}{s}$$

3) A 25kg block slides 12 meters on level ground before coming to rest. If 760J of energy were required to overcome friction, calculate the coefficient of kinetic friction between the block and ground.

Solution

$$E = \mu mgl$$

$$\mu = \frac{E}{mgl} = \frac{760}{25 \cdot 9.8 \cdot 12} = 0.26.$$

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