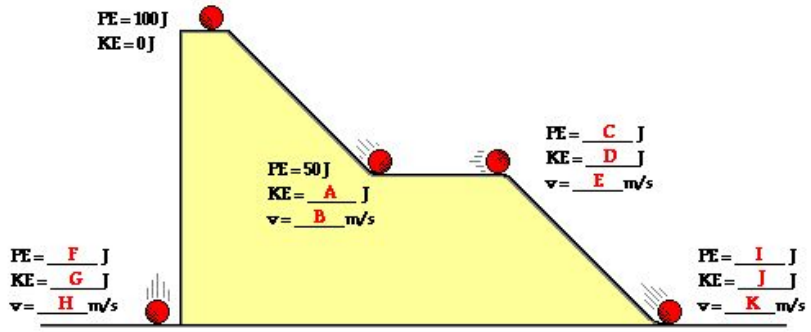
Kinetic and Potential and Total Mechanical Energy Questions

1) **Use your understanding of the work-energy theorem to answer the following questions. Then click the button to view the answers.**

1. Consider the falling and rolling motion of the ball in the following two resistance-free situations. In one situation, the ball falls off the top of the platform to the floor. In the other situation, the ball rolls from the top of the platform along the staircase-like pathway to the floor. For each situation, indicate what types of forces are doing work upon the ball. Indicate whether the energy of the ball is conserved and explain why. Finally, fill in the blanks for the 2-kg ball.



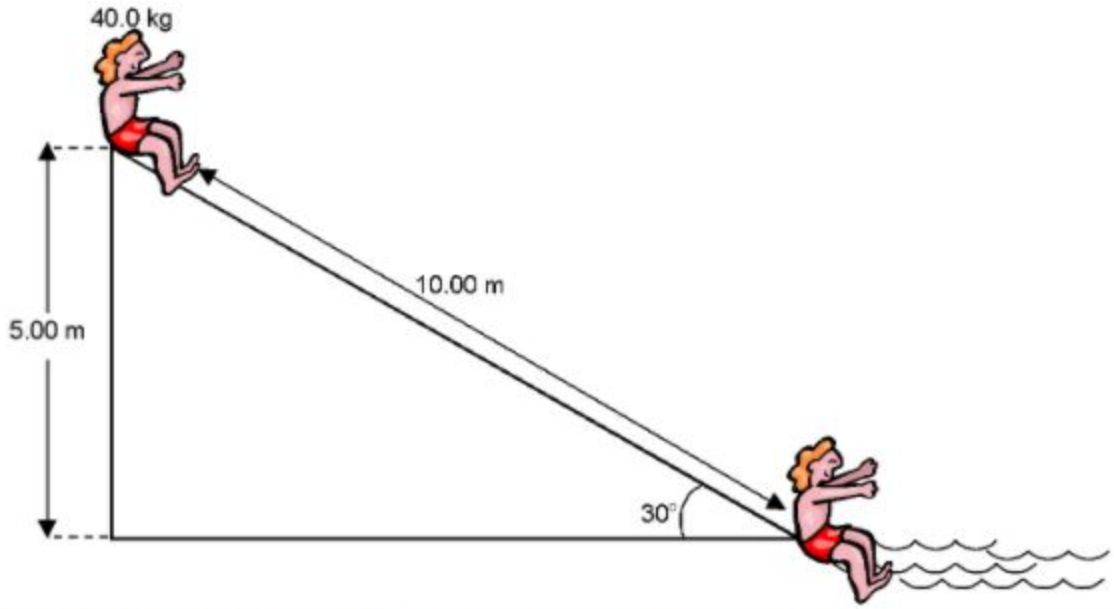
See Answer

2)

Yves has a mass of 40.0 kg. Starting form rest, he slides down a slide which is 10.00 m long. The height of the slide is 5.00 m and it forms an angle of 30° with the horizontal.

Frictional forces are negligible.

The diagram below illustrates the situation.



a) Determine the kinetic energy of the child at the bottom of the slide.

b) What is his velocity when he reaches the water?

3)

If it weren't for resistance forces, children would arrive at the bottom of a slide with too much speed and that could lead to injuries. A 28 kg child should arrive safely at the bottom of a slide, similar to the one shown below, with a speed of 5.5 m/s. Assuming no friction, what speed must the child push off with from the top of the slide to arrive safely at the bottom?	

4)

Logan throws a measuring tape straight upwards with a velocity of 12 m/s to his father who is working on the roof of their house. The father catches the measuring tape 5.3 m above its initial starting position. (Neglect air resistance.)

What is the velocity of the measuring tape when caught by the father?

A) 6.3 m/s

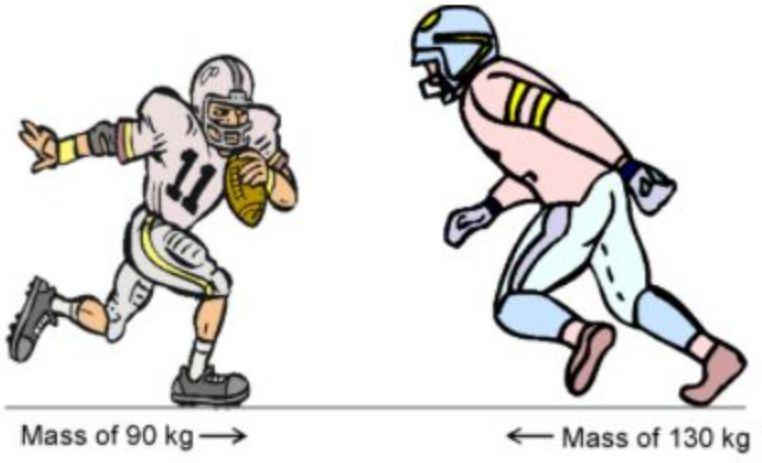
B) 11 m/s

C) 16 m/s

D) 40 m/s

5)

During a football game, a 90 kg player is running towards a 130 kg player. They continue on their respective paths until they collide with one another.



Which of the following statements correctly describes the state of each player at the moment of collision?

A) The 130 kg player has a higher inertia.

B) The 90 kg player has a higher inertia.

C) The players have equivalent inertia.

D) The players have no inertia.

6)

Juliet dropped her keys from her balcony. Romeo caught the keys at 1 meter above the ground when the velocity of the keys was 12 m/s.

At what height **above the ground** were the keys when Juliet dropped them?

A) 7.35 m

B) 8.35 m

C) 14.69 m

D) 15.69 m