

Worksheet: Potential Energy Calculations

Instructions:

Solve each of the following questions by using the formula for potential energy: $E_p = mgh$. Show all your work and provide the final answer with appropriate units. Recall that g is the acceleration due to gravity on planet earth (9.8 m/s^2).

1. A book with a mass of 2 kg is placed on a shelf that is 3 meters high. Calculate the potential energy of the book.
2. A rock with a potential energy of 100 J is sitting on a cliff that is 20 meters high. Determine the mass of the rock.
3. A roller coaster car has a potential energy of 5000 J at the top of a hill. If the height of the hill is 50 meters, calculate the mass of the roller coaster car.
4. A basketball player jumps and reaches a height of 1.5 meters. If the player has a potential energy of 300 J at that height, find the mass of the player.
5. A pendulum bob has a potential energy of 50 J when it is at its highest point. If the height of the highest point is 0.5 meters, calculate the mass of the pendulum bob.
6. A weightlifter lifts a barbell with to a potential energy of 800 J. If the mass of the barbell is 41.2kg, calculate the height.
7. A diver with a mass of 51kg jumps off a diving board. If the diver jumps up to give a potential energy of 500J, what height is the diver?
8. A model roller coaster car has a potential energy of 2000 J at the top of a hill. If the height of the hill is 25 meters, calculate the mass of the roller coaster car in **units of grams (g)**.
9. A ball is thrown vertically upwards and reaches a height of 5 meters. If the ball has a potential energy of 100 J at that height, find the mass of the ball in **units of grams(g)**.
10. A monster truck has a potential energy of 529 kJ due to its height on top of a hill that is 10m high. Determine the mass of the truck.

Answer Key: Potential Energy Calculations

1.

Answer: The potential energy of the book is **58.8 J**.

2.

Answer: The mass of the rock is **0.51 kg**.

3.

Answer: The mass of the roller coaster car is **10.2 kg**.

4.

Answer: The mass of the basketball player is **20.4 kg**.

5.

Answer: The mass of the pendulum bob is **10.2 kg**.

6.

Answer: The height lifted by the weightlifter is **1.98 m**.

7.

Answer: The height reached by the diver is **1.00 m**.

8.

Answer: The mass of the model roller coaster car is **8160 g**.

9.

Answer: The mass of the ball is **2040 g**.

10.

The mass of the monster truck is approximately **5,398 kg**.