

1. If a man lifts a 20 kg bucket from a well and does 6 kJ of work, how deep is the well?

2. What is the KE (kinetic energy) of a 3000 kg car moving at 100 **km/hr**? How much heat in Joules will be lost through friction in the brake linings when the car is brought to a stop?

3. A very good major league pitcher can throw a baseball at 161 km/hr. If the baseball has a mass of 0.15 kg, find the KE of the ball.

4. A 2 g bullet leaves the barrel of a gun at a speed of 300 m/s. (a) Find its KE. (b) If the length of the barrel is 50 cm, find the average force exerted on the bullet by the expanding gases as it moves the length of the barrel.

5. A baseball player throws a baseball (0.15 kg) straight up into the air with an initial speed of 20 m/s. What is the kinetic energy of the baseball?

6. How much work does it take to bring a 1485 kg red 458 Italia Ferrari moving at 50 m/s to a stop?

7. What is the gravitational potential energy of a 45 kg gazelle that is standing on the edge of a 35 m high cliff?

8. Lake Point Tower in Chicago is the tallest apartment building in the United States (although not the tallest building in which there are apartments). Suppose you take the elevator from street level to the roof of the building. The elevator moves almost the entire distance at constant speed, so that it does 1.15×10^5 J of work on you as it lifts the entire distance. If your mass is 60.0 kg, how tall is the building?

9. The brightest, hottest, and most massive stars are the brilliant blue stars designated as spectral class O. If a class O star with a mass of 3.38×10^{31} kg has a kinetic energy of 1.10×10^{42} J, what is its speed?

10. The largest turtle ever caught in the United States had a mass of 861 kg. How much work did it take to raise the turtle 5.45 m onto the deck of a research ship?

11. The fastest speed achieved on Earth for any object, with the exception of sub-atomic particles in particle accelerators, is 15.8 km/s. A device at Sandia Laboratories in Albuquerque, New Mexico, uses highly compressed air to accelerate a small metal disk to supersonic speeds. Suppose the disk has a mass of 0.20 g. What is the kinetic energy of the disk?

12. The male polar bear is the largest land-going predator. Its height when standing on its hind legs is over 3 m and its mass, can be as large as 680 kg. In spite of this bulk, a running polar bear can reach speeds of 56.0 km/hr. Determine the kinetic energy of a running polar bear, using the maximum values for its mass and speed.