

8. Reid trips and falls out of a very high window, 62 m above the ground. With what speed will he hit the ground? (Ignore air resistance, and no, you don't know his mass: he won't say--he's a bit sensitive about that...)
9. Harry (mass 55 kg) gets a running start at the top of the waterslide, at 2.3 m/s. The waterslide is 15 m high, and friction generates 1600 J of thermal energy on the trip down. Calculate how fast Harry will exit the slide.
10. A force of 250 N is exerted upward on a 0.50 kg arrow over a distance 1.2 m, which shoots the arrow upward.
- a. How high will the arrow rise?
- b. If the arrow only went half as high as expected in part (a), how much energy was "lost" due to friction and air resistance?
11. Joe is running from ravenous Sabre-Tooth Tigers, at a speed of 6.2 m/s. He grabs an overhead vine and swings upward. How high can he swing?

12. What power is output by a winch that can lift a 23 kg sack of rutabagas a vertical height of 12 m in 5.6 seconds?

13. Marc's ride-on mower has a 4500 W engine. It can accelerate the 250 kg mower from 5.0 m/s to 15 m/s in a time of 8.0 seconds.

a. What is the net work done on the mower?

b. How far does the mower travel?

c. How much work is done by the mower engine?

d. What is the work done by friction during the acceleration?

e. What average friction force exists during the acceleration?

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14. How much energy is required to raise 56.7 kg of aluminum ($C_{Al} = 900 \text{ J/kg}^\circ\text{C}$) from 5.0°C to 345°C ?

15. How much time will it take a 350 W heater to raise 2.3 kg of water ($C_{water} = 4200 \text{ J/kg}^\circ\text{C}$) from 12°C to 78°C ?

16. Matt heats 3.5 kg of iron to 560°C in a furnace, then drops it into 32 kg of his soup to warm it up from 34°C . Assume no heat loss in the container. The heat capacity of the soup is $3900 \text{ J/kg}^\circ\text{C}$, and the heat capacity of iron is $450 \text{ J/kg}^\circ\text{C}$. What is the final temperature of the soup?