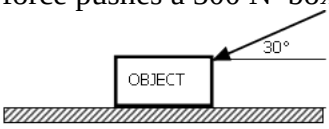
Energy worksheet

1. A dog pulls a 40 kg wagon with a force of 300 N over distance of 50 m. How much work was done by the dog?

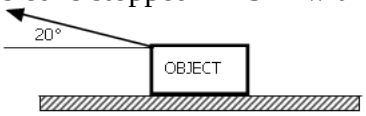
2. In order to insert a nerf dart into a toy gun, 50 J of energy needed to be used. If the dart was inserted 6 cm, then how much force was required to install the nerf dart?

3. A bicyclist did 30,000 J of work while traveling with a force of 10,000 N. How much distance was covered by the bicyclist?

4. A box is pushed by a 600 N force that acts at a 30° angle with the ground. The force pushes a 500 N box 10 meters from rest. How much work is done?



5. A 175 kg bob-sled is stopped by a force applied at a 20° angle with the ground. The sled is stopped in 25 m with 800 J of work. What is the magnitude of the force?

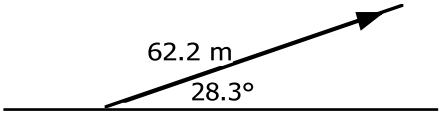


6. What is the kinetic energy of a 80 kg football player running at 8 m/s?

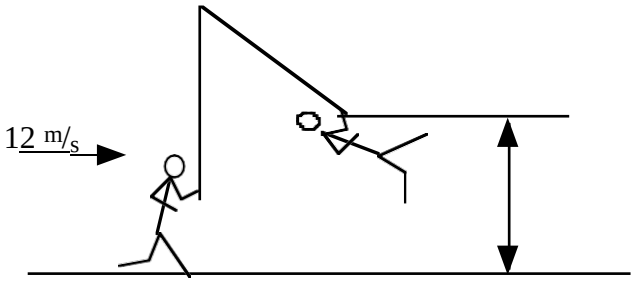
7. How fast must a 0.0050 kg bullet travel if it is to have the same kinetic energy as a 20,000 kg locomotive traveling at 2 m/s?

8. A 7.3 kg gallon paint can is lifted 1.78 meters vertically to a shelf. What is the change in potential energy of the paint can?

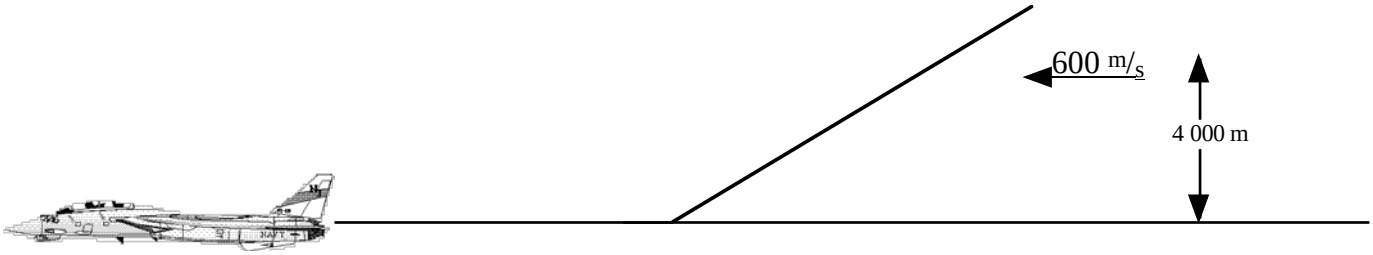
9. A car coasts 62.2 meters along a hill that makes a 28.3° angle with the ground. If the car's mass is 1234 kg, then what is the change in potential energy?



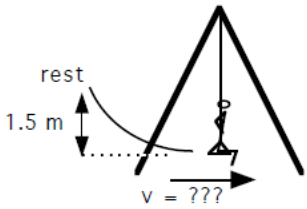
10. What is the highest height Tarzan can travel to given the information below?



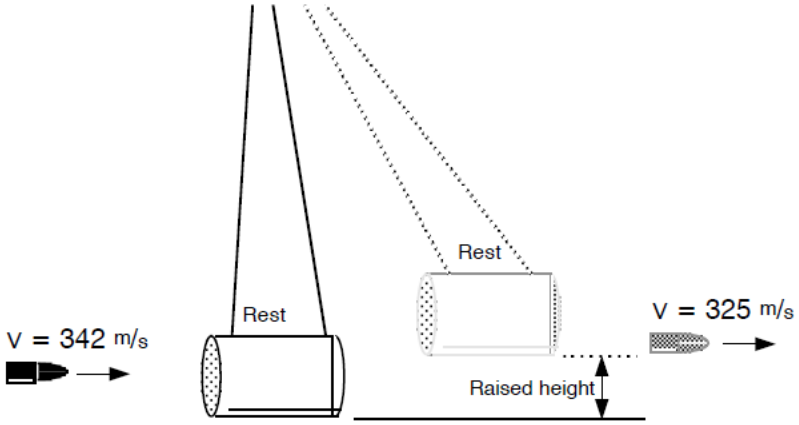
11. What is the jet's new velocity if it coasts to its new, lower, altitude?



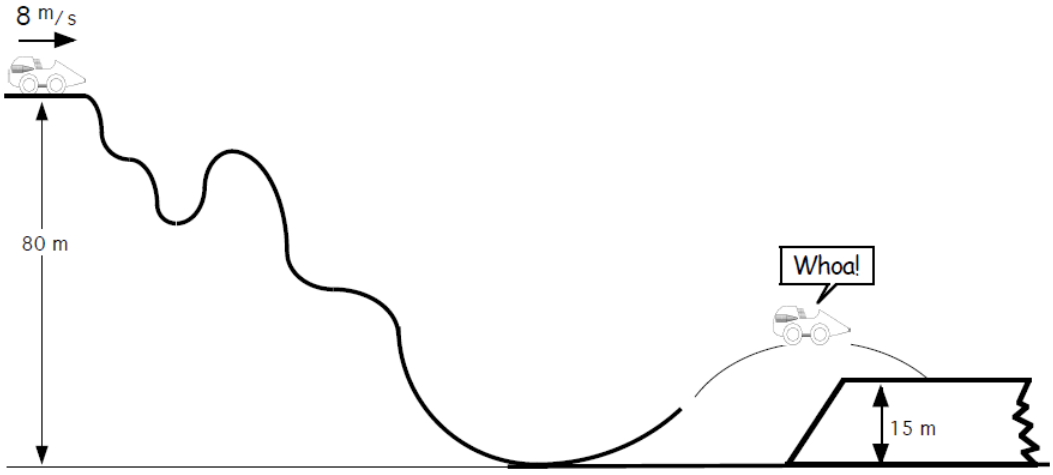
12. What is the velocity of the rider at the bottom of the swing?



13. A bullet is shot into a can filled with 19.88 kg of clay. The filled can is tied to the end of a string so that it can act like a pendulum. The bullet (mass = 0.012 kg) is traveling 342 m/s before it impacts the clay filled can. The bullet passes through the can. The bullet exits the back of the can at 325 m/s.
What is the maximum height of the can?



This information is related to questions 14 - 17
A roller coaster car, 500 kg, is to travel from 8 m/s down a wavy hill. It will coast without friction. Near the end of the ride it will make a death defying jump.



14. What is the total energy of the system at the top of the hill?

15. What is the total energy of the system at the bottom of the hill?

16. What is the speed of the cat at the bottom of the hill?

17. What is the speed of the car after landing on the 15 m hill?

18. A 1500 kg does 20,000 J of work when it accelerates across 200 m. The car starts from 20 m/s before traveling the 200 m. What is the final velocity of the car?

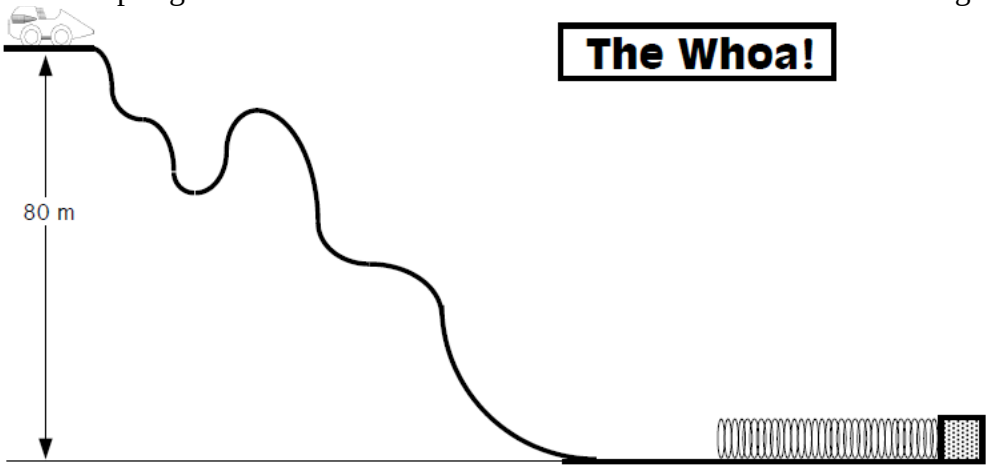
19. A bullet, 10 g, is shot through a piece of wood. The bullet enter the wood at 600 m/s. The wood is 5 cm thick. The wood exerts 10,000 N of force to slow the bullet down. How fast is the bullet traveling when it leaves the piece of wood on the opposite side?

20. What is the potential energy of a spring that is compressed 0.53 meters from equilibrium if the spring constant is 219 N/m?

21. What is the spring constant of a spring that is stretched 34.2 centimeters if 1298 J of energy is used to stretch the spring?

22. What is the stretched distance of spring with a spring constant of 12.5 N/m if the spring uses 127 J?

This information is related to questions 23 - 29
A roller coaster car is to travel from rest down a wavy hill. Then it will coast without friction into the spring. The roller coaster will compress the spring until it comes to rest. The spring constant is 200 N/m. The mass of the roller coaster is 500 kg.



23. What is the total energy of the system at the top of the hill?

24. What is the total energy of the system at the bottom of the hill?

25. What is the total energy of the system before it hits the spring?

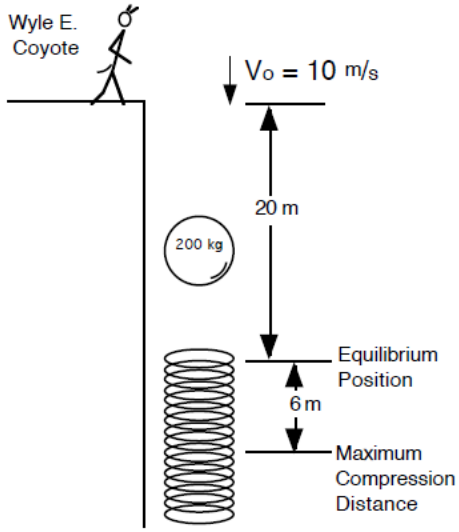
26. What Is the total energy of the system when the spring is completely compressed?

27. What is the speed of the car at the bottom of the hill?

28. What is the speed of the car before it hits the spring?

29. What is the maximum distance the spring is compressed?

This information is related to questions 30 – 32
Wyle E. Coyote is still trying to catch that road runner -when will he learn? As part of this new ACME trap he throws a ball down on a spring as shown.

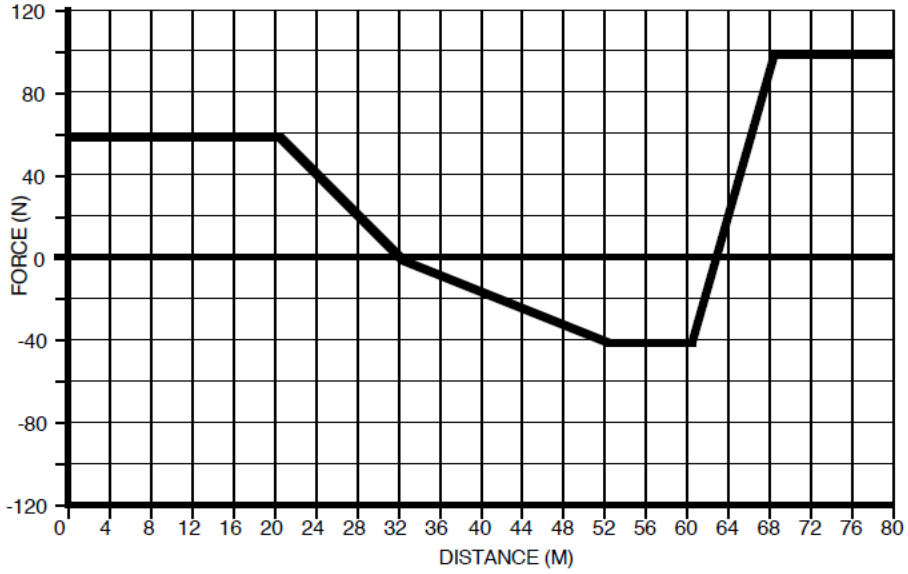


30. What is the velocity of the ball the instant it makes contact with the spring?

31. What is the spring's spring constant?

32. How fast is the ball traveling when the spring is compressed 2 meters from the equilibrium position of the spring?

This information is related to questions 33 – 35



33. What is the work done over the first 12 meters?

34. What is the work done over the first 32 meters?

35. What is the work done over the first 52 meters?

36. A student lifts a bucket with a 98 N force in 30 seconds out of a well. If the bucket is lifted 30 m then;

(a) How much work is done on the bucket by the student?

(b) How much power is exerted by the student?