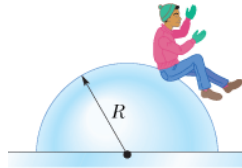


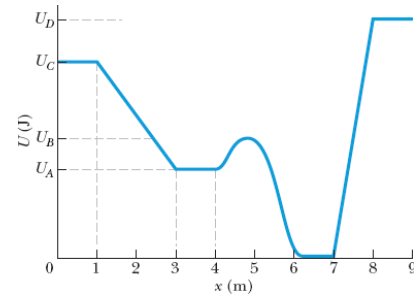
Chapter 8 – Problem Day

20. A single conservative force $\vec{F} = (6x - 12)\hat{i}$ N, where x is in meters, acts on a particle moving along an x -axis. The potential energy U associated with this force is assigned a value of 27 J at $x = 0$. (a) Write an expression for U as a function of x , with U in joules and x in meters. (b) What is the maximum positive potential energy? At what (c) negative value and (d) positive value of x is the potential energy equal to zero?

36. A boy is initially seated on the top of a hemispherical ice mound of radius $R = 13.8$ m. He begins to slide down the ice, with a negligible initial speed. Approximate the ice as being frictionless. At what height does the boy lose contact with the ice?



40. The figure shows a plot of potential energy U versus position x of a 0.200 kg particle that can travel only along an x -axis under the influence of a conservative force. The graph has these values: $U_A = 9$ J, $U_C = 20$ J, and $U_D = 24$ J. The particle is released at the point where U forms a “potential hill” of “height” $U_B = 12$ J, with kinetic energy 4.00 J. What is the speed of the particle at (a) $x = 3.5$ m and (b) $x = 6.5$ m? What is the position of the turning point on (c) the right side and (d) the left side?



52. You push a 2.0 kg block against a horizontal spring, compressing the spring by 15 cm. Then you release the block, and the spring sends it sliding across a tabletop. It stops 75 cm from where you released it. The spring constant is 200 N/m. What is the coefficient of kinetic friction?
58. A child whose weight is 267 N slides down a 6.1 m slide that makes an angle of 20° with the horizontal. The coefficient of kinetic friction between slide and child is 0.10. (a) How much energy is transferred to thermal energy? (b) If she starts at the top with a speed of 0.457 m/s, what is her speed at the bottom?

Chapter 8 Answers

- 8a) 0.151 J
- 8b) 0.113 J
- 8c) 0.188 J
- 8d) 0.038 J
- 8e) 0.075 J
- 8f) all answers remain the same

- 17a) 8.35 m/s
- 17b) 4.33 m/s
- 17c) 7.45 m/s
- 17d) as angle increases, initial velocity decreases

- 21a) 4.85 m/s
- 21b) 2.43 m/s

- 25a) No
- 25b) 933 N

- 27a) 784.8 N/m
- 27b) 62.8 J
- 27c) 62.8 J
- 27d) 0.8 m

- 31a) 0.347 m
- 31b) 1.69 m/s

- 34) 1.254 cm

- 39a) 2.13 m/s
- 39b) 10 N
- 39c) +x direction
- 39d) cannot reach, turns at $x = 5.735$ m
- 39e) 30 N
- 39f) -x direction

- 45a) 30.1 J
- 45b) 30.1 J
- 45c) 0.225

- 53) 1.225 m

- 63) 0.2 m

- 64) reaches Point B with 3.4 m/s velocity