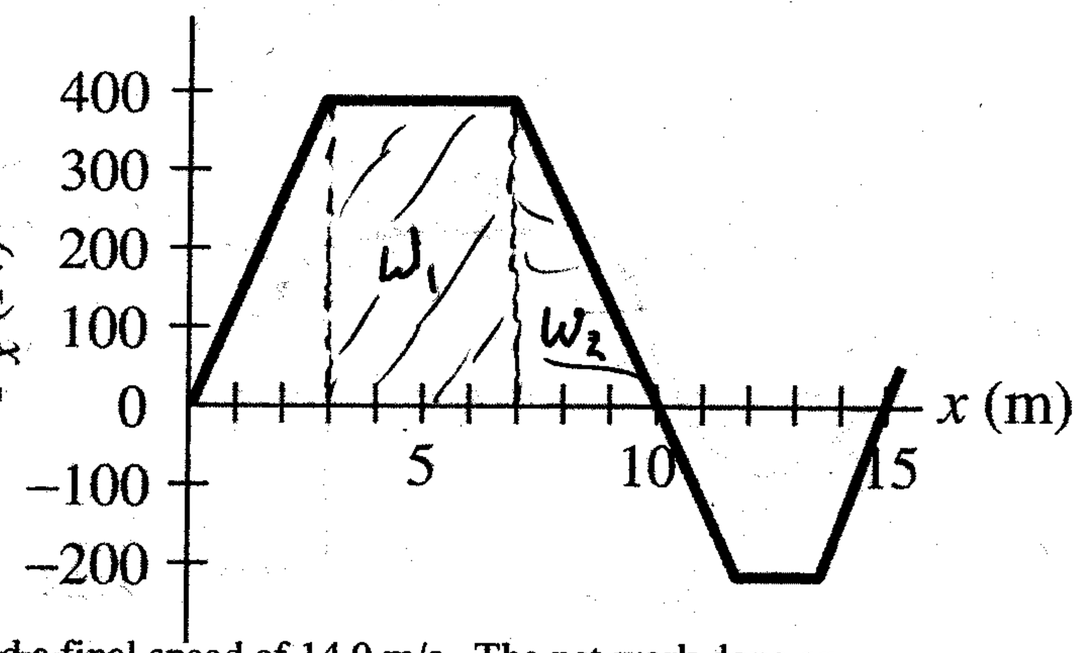
53%

Q 13. The figure plots the force in the x direction applied to a body as a function of x. The total work done by the force as the body is moved from 3.0 m to 10.0 m is, in J,

a) 600 b) 1600 c) 2000 d) 2200

e) 2800



$W_1 = (400N)\,4m = 1600J$

$W_2 = \frac{1}{2}(400N)\,3m = 600J$

$W = W_1 + W_2 = 2200J$

85%

a 14. A 2.2 kg object has an initial speed of 10.0 m/s ~~and a final~~ speed of 14.0 m/s. The net work done on the object by all forces acting on it, between the initial and final position is, in J,

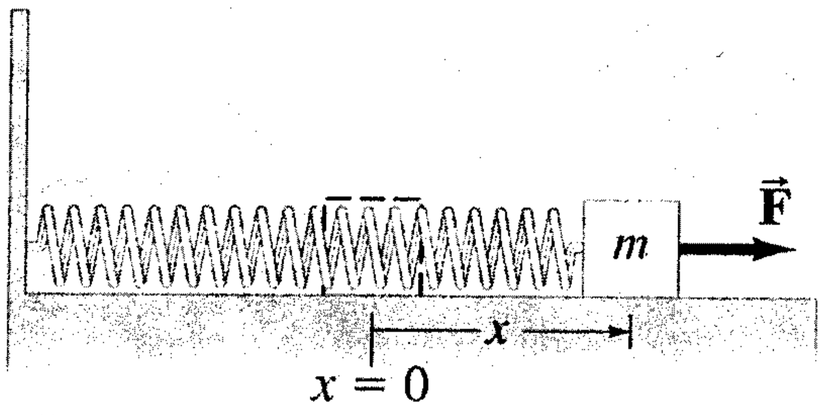
a) 110 b) 340 c) 220 d) 200 e) 8.4

$W_{net} = \frac{1}{2}mv_f^2 - \frac{1}{2}mv_i^2 = 110J$

45%

C 15. m=3.0 kg, F=20 N, and the spring constant is 75 N/m. If there is no friction and the block begins at rest at x=0 (spring at equilibrium length), for what value of x (in m) will it come back to zero speed?

a) 3.2 b) 0.75 c) 0.53 d) 2.1 e) 1.1



$W_{net} = W_F + W_g = F_x - \frac{1}{2}kx^2$

$= 0$

$x = \frac{2F}{k} = 0.53m$

65%

C 16. An 80 kg man climbs a vertical rope at a constant speed of 0.50 m/s. How much power (in W) does he need to exert to do this (that is, at what rate must he do work on the rope to climb at that speed)?

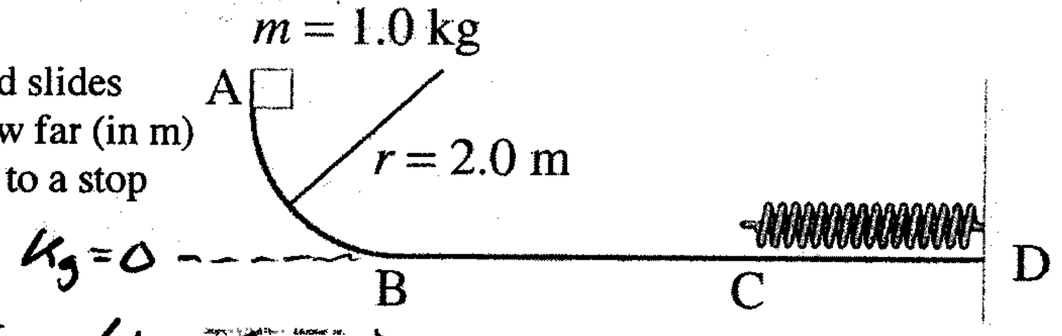
a) 40 b) 10 c) 390 d) 200 e) 120

$P = Fv = mgv = 390W$

52%

b 17. The mass in the diagram is released from rest and slides on the frictionless surface until it hits the spring. How far (in m) will the spring be compressed when the block comes to a stop if its spring constant is 100 N/m?

a) 0.32 b) 0.63 c) 0.39 d) 0.20 e) 0.45



$E_i = mgh = 19.6J \quad (h = 2.0m)$

$E_f = \frac{1}{2}kx^2$

$E_i = E_f$

$x = \sqrt{\frac{2(19.6J)}{1.0kg}} = 0.63m$

43%

d 18. Repeat question 17 if, between points B and C there is a coefficient of sliding friction of 0.20, and the distance from B to C is 2.0 m.

a) 0.16 b) 0.40 c) 0.31 d) 0.56 e) 0.28

$E_f - E_i = W_f = -\mu_k mgd = -3.92J$

$E_f = W_f + E_i = -3.92J + 19.6J = 15.7J = \frac{1}{2}kx^2$

$x = 0.56m$