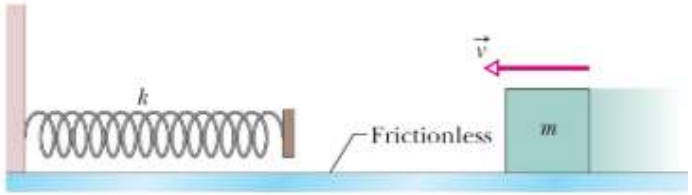
GP1-Q07

Problem 1

In the figure, a block of mass m slides across a horizontal frictionless counter with speed v. It then runs into and compresses a spring of spring constant k. When the block is momentarily stopped by the spring, by what distance d is the spring compressed? (01小題)

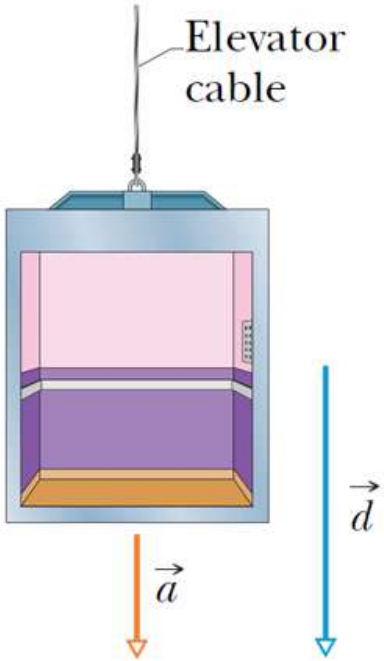


the distance d=_____ [m,k,v]

01: **ANS:=v*sqrt(m/k)**

Problem 2

In the figure, An elevator cab of mass $m = 500$ kg is descending with speed $v_i = 4.0$ m/s when its supporting cable begins to slip, allowing it to fall with constant acceleration $\vec{a} = \vec{g}/5$ (figure). (a) During the fall through a distance $d = 12$ m, whta is the work W_g done on the cab by the gravitational force? (b)During the 12 m fall, what is the work W_T done on the cab by the upward pull of the elevator cable? (c) What is the net work W done on the cab during the fall? (d) What is the cab's kinetic energy(K) at the end of the 12 m fall? (04小題)



Problem 3

A.The only force acting on a body with mass m as it moves along a positive x axis has an x component $F_x = -6x$. The velocity at x = a is u. What is the velocity(v) of the body at x=b? (b > a)

v=_____ [m,u,b,a]

06: **ANS:=sqrt(u**2-6*(b**2-a**2)/m)**

Problem 3

B.A single force acts on a 3.0 kg particle-like object whose position is given by $x = 3t - 4t^2 + t^3$, with x in meters and t in seconds. Find the work done on the object by the force from t = 0 to t = 4.0 s. (01小題)

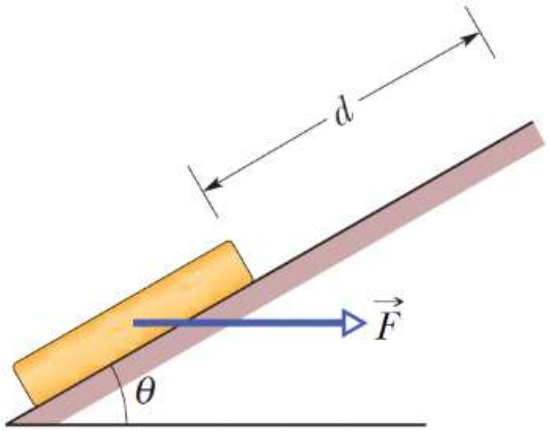
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work done=____ J

07: **ANS:=528**

Problem 4

In the figure, a horizontal force $\vec{F}$ of magnitude 20.0 N is applied to a 3.00 kg psychology book as the book slides a distance d = 0.500 m up a frictionless ramp at angle $\theta = 30.0^o$. During the displacement, what is the net work done on the book by (a)$\vec{F}$, (b)the gravitational force on the book, and (c)the normal force on the book? (d) If the book has zero kinetic energy at the start of the displacement, what is its speed at the end of the displacement? (04小題)



(a)W_F=____ J

08: **ANS:=8.66**

(b)W_g=_____ J

09: **ANS:=7.35**

(c)W_N=_____ J

10: **ANS:=0**

(d)v=_____ m/s

11: **ANS:=0.935**

Problem 5

A fully loaded, slow-moving freight elevator has a cab with a total mass of 1200 kg, which is required to travel upward 54 m in 3.0 min, starting and ending at rest. The elevator's counterweight has a mass of only 950 kg, and so the elevator motor must help. What average power is required of the force the motor exerts on the cab via the cable? 一滿載緩慢移動的貨運電梯的總質量為1200 kg，從開始到結束在3.0分鐘內需要向上行駛54 m。 電梯的配重(在電梯反向下拉的重量)只有950公斤，因此電梯的電動機(馬達)必須提供幫助。計算電動機通過電纜施加在駕駛室上的力需要多少平均功率？ (01小題)

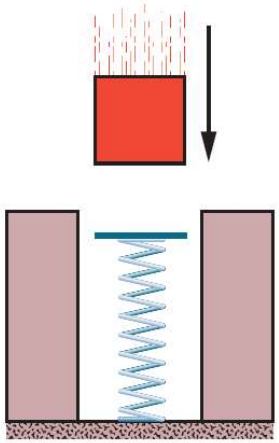
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the average power=_____ W

12: **ANS:=740**

Problem 6

In the figure, a 250 g block is dropped onto a relaxed vertical spring that has a spring constant of k = 2.5 N/cm (figure). The block becomes attached to the spring and compresses the spring 12 cm before momentarily stopping. While the spring is being compressed, what work is done on the block by (a) the gravitational force on it and (b) the spring force? (c) What is the speed of the block just before it hits the spring? (Assume that friction is negligible.) (d) If the speed at impact is doubled, what is the maximum compression of the spring? (04小題)



(a)W_g=____ J

13: **ANS:=0.29**

(b)W_{spr}=____ J

14: **ANS:=-1.8**

(c)v=____ m/s

15: **ANS:=3.5**

(d)the maximum

16: **ANS:=0.23**

Problem 7

A constant force of magnitude 10 N makes an angle of 150° (measured counterclockwise) with the positive x direction as it acts on a 2.0 kg object moving in an xy plane. How much work is done on the object by the force as the object moves from the origin to the point having position vector $2\hat{i} - 4\hat{j}$ m? (01小題)

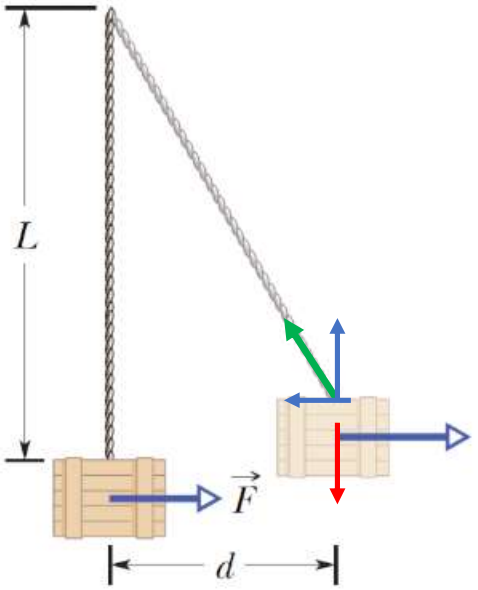
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work sone=___ J

17: **ANS:=-37**

Problem 8

A 230 kg crate hangs from the end of a rope of length L =12.0 m. You push horizontally on the crate with a varying force $\vec{F}$ to move it distance d = 4.00 m to the side (figure). (a) What is the magnitude of $\vec{F}$ when the crate is in this final position? During the crate's displacement, what are (b) the total work done on it, (c) the work done by the gravitational force on the crate, (d) the work done by the pull on the crate from the rope?, and (e) the work done by the force? (05小題)



(a)the magnitude of $\vec{F}$=_____ N

18: **ANS:=797**

(b)the total work=_____ J

19: **ANS:=0**

(c)W_g=_____ J

20: **ANS:=-1547**

(d)W_{rope}=_____ J

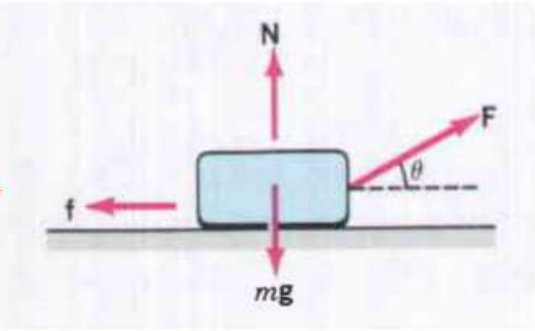
21: **ANS:=0**

(e)W_F=_____ J

22: **ANS:=1547**

Problem 9

A block of mass m = 4 kg is dragged 2 m along a horizontal surface by a force F = 30 N acting at 53° to the horizontal (figure). The initial speed is 3 m/s and $\mu_k = 1/8$. Find: (a) the change in kinetic energy of the block; (b) its final speed. (02小題)



(a)the change in kinetic energy of the block=_____ J

23: **ANS:=32**

(b)its final speed=_____ m/s

24: **ANS:=5**

Problem 9

The only force acting on a 2.0 kg canister that is moving in an xy plane has a magnitude of 5.0 N. The canister initially has a velocity of 4.0 m/s in the positive x direction and some time later has a velocity of 6.0 m/s in the positive y direction. How much work is done on the canister by the 5.0 N force during this time? (01小題)

work=____ J

25: **ANS:=20**

The force on a particle is directed along an x axis and given by F = (x - 1). F is in N and x in meter. Find the work done by the force in moving the particle from x= 0 to x=6. (01小題)

work=_____ J

26: **ANS:=12**

Problem 9

A 100 kg block is pulled at a constant speed of 5.0 m/s across a horizontal floor by an applied force of 122 N directed 37° above the horizontal. What is the rate at which the force does work on the block? (01小題)

---

power=____ W

27: **ANS:=490**

Problem 10

A block of mass 0.1 kg is attached to the end of a spring whose spring constant is k = 40 N/m. The block slides on a horizontal surface for which $\mu_k = 0.1$. The spring is extended by 0.05 m and then released. (a) Find the work done by the spring up to the point at which it is compressed by 0.03 m. (b) Find the net work done on the block up to this point. (02小題)

(a)work done by spring=____ J

28: **ANS:=0.032**

(b)work done by friction=____ J

29: **ANS:=-0.0078**