Name: _____ Total Points: _____
(Last) (First)

Physics 201

Exam 2

Write also your name in the appropriate box of the scantron

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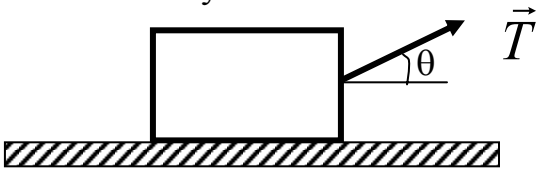
Multiple choice questions

Answer all of the following questions. Read each question carefully. **Fill the correct bubble on your scantron sheet**. Each question has exactly one correct answer. All questions are worth the same amount of points.

1. You are standing on a bus stopped at a red light. The light turns green and the bus start accelerating. The work done by the friction force acting on you by the floor of the bus is

A. positive
B. negative
C. 0
D. Can't tell without knowing the acceleration

2. A block of mass m is pulled along a rough horizontal floor by an applied force $\vec{T}$ as shown. The vertical component of the force exerted on the block by the floor is



A. **mg**
B **mg-Tcosθ**
C. **mg+Tcosθ**
D. **mg-Tsinθ**
E. **mg+Tsinθ**

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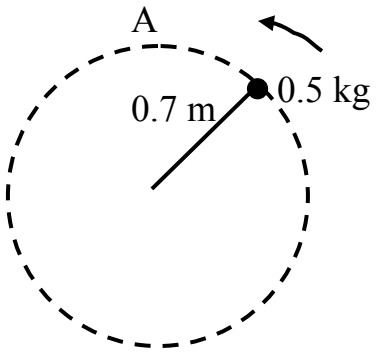
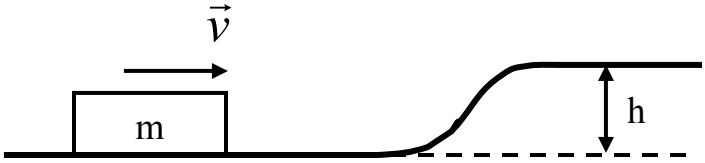
3. The 0.5 kg iron ball shown is being swung in a vertical circle at the end of a 0.7 m long string. How slowly can the ball go through its top position (point A) without having the string go slack? ($g=9.8\ m/s^2$)



A. 1.3 m/s
B. 2.6 m/s
C. 3.9 m/s
D. 6.9 m/s
E. 9.8 m/s

4. For a block of mass m to slide without friction up the rise of height h shown, it must have a minimum initial speed of



A. $\frac{1}{2}\sqrt{gh}$
B. $\sqrt{\frac{gh}{2}}$
C. $\sqrt{2gh}$
D. $2\sqrt{2gh}$
E. $2\sqrt{gh}$

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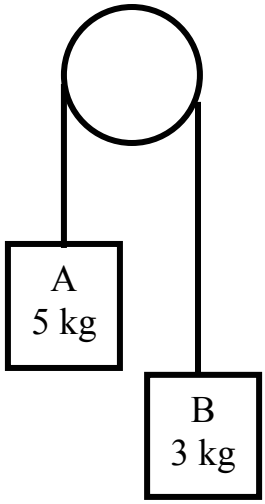
Questions 5 through 9 all refer to the same problem.

Two masses A (5kg) and B(3kg) are connected by a massless inextensible string passing over a frictionless pulley as shown. At t=0s, you observe that block A is moving up.



5. What is the direction of the acceleration of block A?

A. up
B. down
C. undefined since $\vec{a}_A = 0$

6. How does the magnitude of the acceleration of block A compare with the magnitude of the acceleration of block B?

A. $|\vec{a}_A| > |\vec{a}_B|$
B. $|\vec{a}_A| < |\vec{a}_B|$
C. $|\vec{a}_A| = |\vec{a}_B|$

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7. How does the magnitude of the tension acting on A by the string compare with the magnitude of the tension acting on B by the string?

A. $\left|\vec{T}_{AS}\right| > \left|\vec{T}_{BS}\right|$

B. $\left|\vec{T}_{AS}\right| < \left|\vec{T}_{BS}\right|$

C. $\left|\vec{T}_{AS}\right| = \left|\vec{T}_{BS}\right|$

8. How does the magnitude of the net force acting on A compare with the magnitude of the net force acting on B?

A. $\left|\vec{F}^{A}_{net}\right| > \left|\vec{F}^{B}_{net}\right|$

B. $\left|\vec{F}^{A}_{net}\right| < \left|\vec{F}^{B}_{net}\right|$

C. $\left|\vec{F}^{A}_{net}\right| = \left|\vec{F}^{B}_{net}\right|$

9. Between t=0s and t=2s, how does the change of kinetic energy of block A compare with the change of kinetic energy of block B?

A. $\Delta KE_A = \Delta KE_B$

B. $\Delta KE_A = -\Delta KE_B$

C. $\Delta KE_A < \Delta KE_B$

D. $\Delta KE_A > \Delta KE_B$

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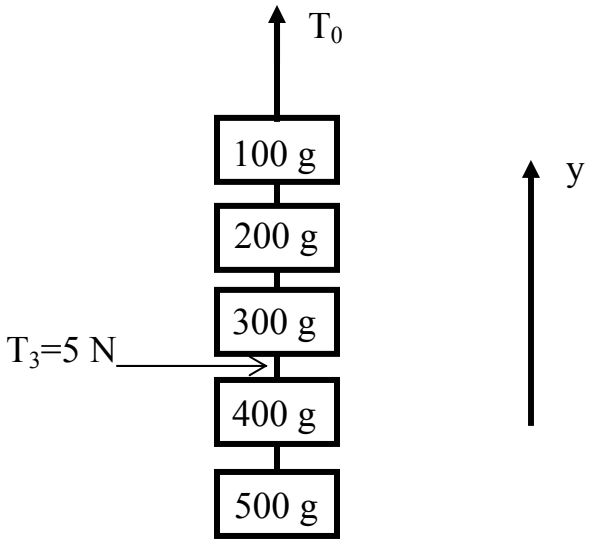
Questions 10 through 14 all refer to the same problem.

Five 100 g masses are connected by massless inextensible links to form a vertical chain as shown. The chain starts moving at t=0 from rest. The tension in link 3 is observed to be 5 N. Take g=9.8 m/s^2.



10. Find the acceleration of the chain (as indicated by the y axis, the positive direction is up).

A. 12.5 m/s^2
B. 5.6 m/s^2
C. -4.2 m/s^2
D. -8.3 m/s^2
E. -9.8 m/s^2

11. Find the magnitude of the tension T_0 at the top of the chain

A. 0 N
B. 6 N
C. 8.3 N
D. 12.4 N
E. 14.7 N

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12. What is the sign of the work done by T_0 on the system made of the 5 masses and links when the system is moving?

A. positive
B. negative
C. 0

13. Find the magnitude of the net force acting on the system made of the 5 masses and links

A. 2.3 N
B. 6.4 N
C. 8.7 N
D. 9.3 N
E. 14.7 N

14. The third link between the 300 g and 400 g masses suddenly breaks. After the 3rd link breaks, what is magnitude of the tension acting on the 500g mass by the 4th link between the 500 g and 400 g masses?

A. 0 N
B. 0.9 N
C. 4.9 N
D. 8.8 N
E. 12.4 N

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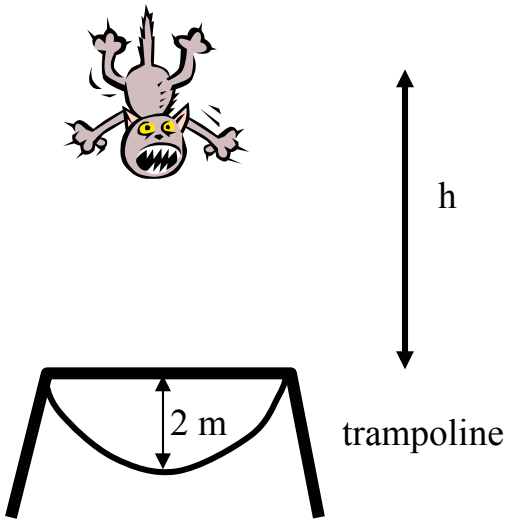
Questions 15 through 18 all refer to the same problem.

A 5kg cat falls off a roof located a height h above a trampoline. The cat lands on the trampoline. The trampoline deflects 2 m before bringing the cat to a temporarily halt. The spring constant of the trampoline is k=125 N/m. Take g=9.8 m/s^2.



15. When the cat comes momentarily to rest, how much work has been done by the force on the cat by the trampoline?

A. -500 J
B. -250 J
C. 0 J
D. 250 J
E. 500 J

16. What is the sign of the net work done on the cat during the entire fall (from the point where the cat falls off the roof to the point where the cat comes momentarily to rest).

A. positive
B. negative
C. 0

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17. What is the maximum magnitude of the acceleration experienced by the cat?

A. 9.8 m/s^2
B. 19.6 m/s^2
C. 31.4 m/s^2
D. 40.2 m/s^2
E. 59.8 m/s^2

18. What is the height h?

A. 2.1 m
B. 3.1 m
C. 5.1 m
D. 7.1 m
E. 10 m