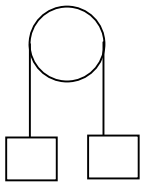
Name: hr: AP Physics Unit 5 Test Review

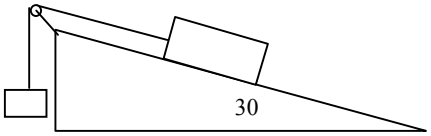
Test Review Forces 1

Additionally go over the Chapter 5, Reviews and Questions 1-12 from the book
You will draw FBD for each problem to get full points

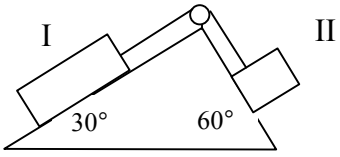
1. Two blocks are connected over a pulley. One mass is 2.0 kg while the other is 3.0 kg.
   a. What is the acceleration of the blocks?
   b. What is the tension in the rope?



2. Two blocks are on either side of a frictionless wedge as shown below. The mass on the ramp is 0.5 kg and the hanging mass is 0.7 kg.
   a. What is the acceleration of the blocks?
   b. What is the tension in the rope?



3. Two blocks are on either side of a frictionless wedge as shown below. The mass of block I is 5.0 kg. What is the mass of block II in order for the blocks to remain at rest.



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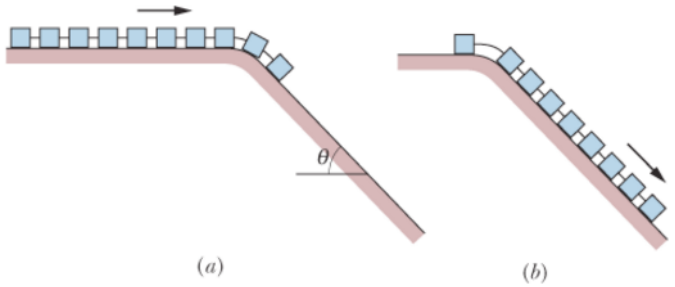
4. What produces the fear factor in the last car of a traditional gravity-driven roller coaster? Let's consider a coaster having 10 identical cars with total mass *M* and massless interconnections. Figure a shows the coaster just after the first car has begun its descent along a frictionless slope with an angle θ. Figure b shows the coaster just before the last car begins its descent. What is the acceleration of the coaster in these two situations?



5. A 0.250 kg particle moves along an *x* axis according to $x(t) = 5.00 - 4.00t + 3.00t^3$, with *x* in meters and *t* in seconds. In unit-vector notation, what is the net force acting on the particle at $t = 2.00\ s$?

6. A 0.250 kg particle moves in an *xy* plane according to $x(t) = 59.0 - 2.00t + 1.00t^3$ and $y(t) = -45.0 + 2.00t^3$, with *x* and *y* in meters and *t* in seconds. In unit-vector notation and in magnitude-angle notation, what is the net force acting on the particle at $t = 2.00\ s$?

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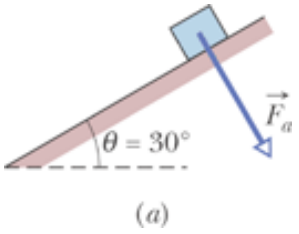
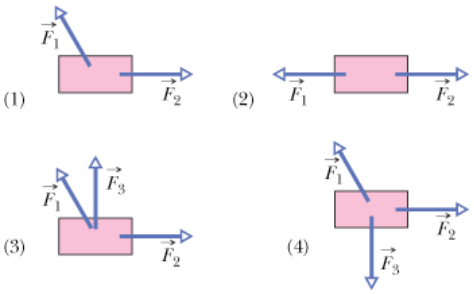
7. A force $\vec{F}_a$ is applied to a 4.00 kg block located on a plane inclined at angle $\theta = 30°$. The applied force is into the plane and has magnitude $F_a = 10.0\text{N}$. What is the normal force on the block? Assume that friction holds the block in place.



(a)

8. At time $t = 0$, constant $\vec{F}$ begins to act on a rock moving through deep space in the $+x$ direction. (a) For time $t > 0$, which are possible functions $x(t)$ for the rock's position: (1) $x = 4t - 3$, (2) $x = -4t^2 + 6t - 3$, (3) $x = 4t^2 + 6t - 3$? (b) For which function is $\vec{F}$ directed opposite the rock's initial direction of motion?

9. Fig shows overhead views of four situations in which forces act on a block that lies on a frictionless floor. If the force magnitudes are chosen properly, in which situations is it possible that the block is (a) stationary and (b) moving with a constant velocity?



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10. Figure shows three blocks being pushed across a frictionless floor by horizontal force $\vec{F}$. What total mass is accelerated to the right by (a) force $\vec{F}$, (b) force $\vec{F}_{21}$ on block 2 from block 1, and (c) force $\vec{F}_{32}$ on block 3 from block 2? (d) Rank the blocks according to their acceleration magnitudes, greatest first. (e) Rank forces $\vec{F}$, $\vec{F}_{21}$, and $\vec{F}_{32}$ according to magnitude, greatest first.