

Conceptual Physics, 343 Period 02
Chapter 4 Syllabus

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Reading Assignment:

Due:	Sections / Pages
12/17	4.1, 4.2, 4.3
1/2	4.4, 4.5
1/7	4.6

Homework: *See attached pages for Problems*

Due:	Questions / Problems
12/17	Problems: 1, 2, 3
1/2	Problems: 4, 5, 6
1/7	Problems: 7, 8, 9, 10
1/8	Problems: 11, 12, 13
1/14	Problems: 14, 15, 16, 17
1/17	Problems: 18, 19, 20

Points to know:

Force

Newton's Three Laws of Motion

Inertia

Mass

Weight

Gravity

Normal Force

Vector Forces

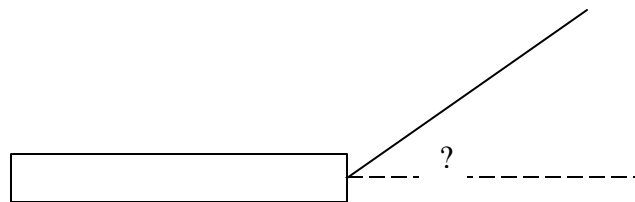
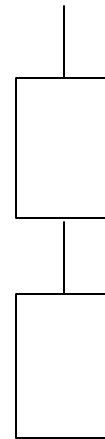
Free Body Diagrams

Friction

Incline Plane

Problems:

1. What force is needed to accelerate a 50 kg box at 2.5 m/s^2 ?
2. The net force moving a bike and rider is 320N. If the acceleration is 3.4 m/s^2 , what is the mass of the bike and rider?
3. A 10.0 kg box is supported by a rope. What is the tension in the rope?
4. A 20.0 kg box rests on a table. What is the normal force of the box?
5. A 10.0 kg box is placed on top of the 20.0 kg box. What is the normal force exerted by the table? What is the normal force exerted by the 20.0 kg box onto the 10.0 kg box?
6. What is the force required to accelerate a 7.00 g bullet from rest to 175 m/s in a rifle barrel which is 0.7 m long?
7. A fisherman pulls a fish out of the water with an acceleration of 4.5 m/s^2 upward. The fishing line he is using can have a maximum tension of 22 N or it will break. What is the maximum mass the fish can be without breaking the line?
8. A 10.0 kg bucket is attached to a rope with 63 N of tension. What is the acceleration of the bucket? Is it up or down?
9. One 3.0 kg bucket is hanging by a rope which is attached to a second 3.0 kg bucket which is also attached to a rope. What is the tension in each rope?
10. If the buckets in Problem 9 are now accelerated up at 2.7 m/s^2 , what is the tension in each rope?
11. A child on a sled has a total mass of 75 kg. If the sled is being pulled on by a rope with 250 N at an angle of 30° up from the horizontal. How much of that force pulls the sled forward?
12. Using problem 11, what is the acceleration that the sled will undergo?
13. Using problem 11, what is the normal force of the sled?



14. A 5.0 kg box has a $\mu_s = 0.2$ with a table. What is the minimum force needed to overcome static friction?
15. If the coefficient of kinetic friction between a 30 kg crate and the floor is $\mu_k = 0.3$, what is the horizontal force required to move the crate at a constant velocity across the floor? What would it be if $\mu_k = 0$?
16. Assuming the crate in problem 15 was being pushed by a force of 340 N, what would the net acceleration be?
17. A 1200 kg car has an initial velocity of 45 m/s. The coefficient of kinetic friction for rubber on road surface is $\mu_k = 0.8$, how long would it take the car to come to a rolling stop?
18. A ramp is 15 m long and is at a 20° angle up from the horizontal.
 - a) If a 4 kg block is placed at the top of the ramp, what acceleration will the block undergo?
 - b) What will the acceleration be if the block is increased to 6 kg?
 - c) What time will it take for the block to reach the bottom?
19. Assuming that the block in problem 18 is given an initial push of 2.5 m/s up the ramp,
 - a) How far up the ramp will the block go?
 - b) How long will it take for the block to return to the bottom of the ramp?
20. A ramp is 12 m long and is at a 30° angle up from the horizontal.
 - a) If a 2 kg block is placed at the top of the ramp and the block has a coefficient of kinetic friction of $\mu_k = 0.25$, what acceleration will the block undergo?
 - b) What will the acceleration be if the coefficient of kinetic friction increases to $\mu_k = 0.6$?
 - c) What time will it take for the block to reach the bottom in both a) and b)?