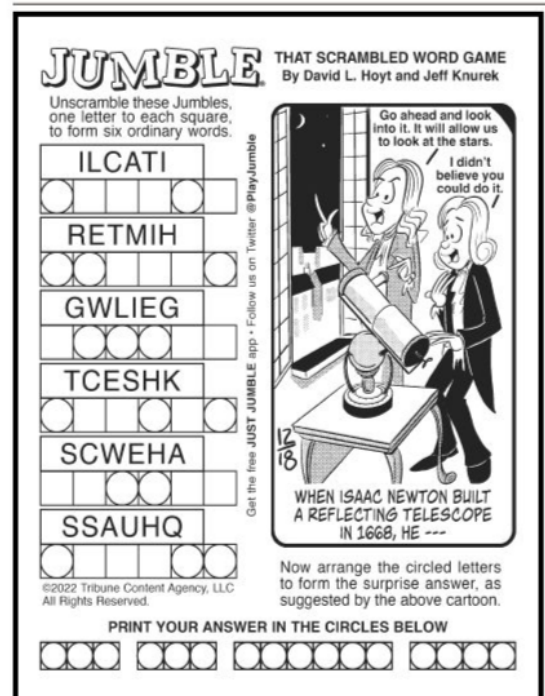




Module 5 and 6 Practice Problems

1. You push a box (mass = 20 kg) across the floor. $\mu_s = 0.38$, $\mu_k = 0.15$
 - a. What is the weight of the box?
 - b. What is the normal force?
 - c. What is the friction force that must be overcome to get the box moving?
 - d. If the box is accelerating at 0.5 m/s^2 to the right, how big is the force that is pushing the box?
2. You push a box that weighs 50 pounds, $\mu_s = 0.50$, $\mu_k = 0.41$
 - a. What is the normal force?
 - b. What is the friction that must be overcome to get the box moving?
3. You hang a 350-pound engine from the rafter in your garage. What is the tension in the chain holding up the engine?
4. You hang a 90-kg sculpture from the ceiling in a building. What is the tension in the cable that holds up the statue?
5. You hang a heavy punching bag (100 kg) from two ropes in your garage. Both ropes are at 60° angles. Find the tension in each rope.
6. You push on a gate 4 feet away from its hinges with a force of 30 pounds. What is the torque you are exerting on the gate?
7. You put a 40-pound box on a seesaw 6 feet from the balance point. Where would have to put a 52-pound box to make it balance?
8. A 30-kg box is sitting on a slide. The angle of the slide is 42° . There is no friction on the slide.
 - a. What is the weight of the box?
 - b. What is the normal force?
 - c. What is the weight force that is directed down the slide?
 - d. How fast is the box accelerating down the slide?
9. A 46-kg box is sitting on a slide. The angle of the slide is 55° . The coefficient of static friction is 0.48.
 - a. What is the weight of the box?
 - b. What is the normal force?
 - c. What is the weight force directed down the slide?
 - d. What is the friction force directed up the slide?
 - e. Would the box be moving or sitting still?

10. Two boxes are connected with a rope and you are dragging them down the sidewalk. The box on the left has a mass of 20-kg and the box on the right has a mass of 30-kg. You are pulling the boxes with a rope and the boxes are accelerating at 0.3 m/s^2 . The coefficient of friction is 0.27.
- Draw a free body diagram of the 20-kg box showing the weight, the normal force, the tension in the rope, and the friction force.
 - What is the weight of the box?
 - What is the normal force on the box?
 - What is the friction force on the box?
 - What is the tension in the rope?
 - Draw a free body diagram of the 30-kg box showing the weight, the normal force, the tension in the rope between the two boxes, the friction force, and the force of the rope you are pulling the boxes with.
 - What is the weight of the box?
 - What is the normal force on the box?
 - What is the friction force on the box?
 - With what force are you pulling on the rope?
11. Honors: You hang a 300-kg mass from two ropes. One rope is at a 50° angle from horizontal and the other is at a 45° angle. Find the tension in each rope.
12. Honors: Two boxes are connected with a rope and you are dragging them down the sidewalk. The box on the left has a mass of 30-kg and the box on the right has a mass of 25-kg. You are pulling the boxes with a force of 600 N. The coefficient of friction is 0.20.
- What is the tension in the rope between the boxes?
 - How fast are the boxes accelerating?