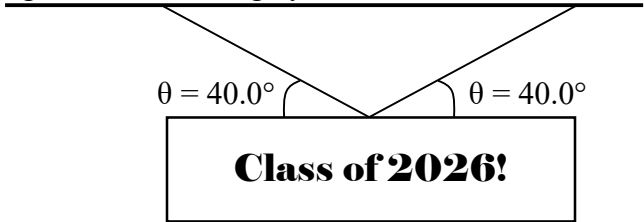
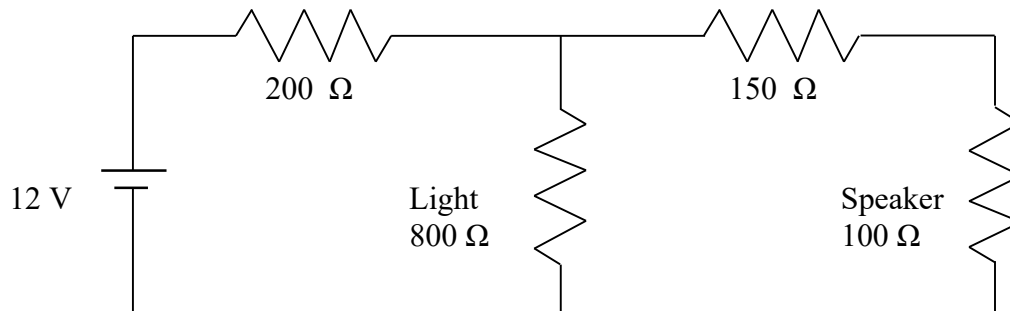


Final Exam Math Problem Practice

- Brody and Benaiah are playing football. In 3 seconds, Brody runs 8 yards forward, then 3 yards backwards.
 - What is the total distance he traveled?
 - What is his displacement?
 - What is his average speed?
 - What is his velocity?
- Ally drops her physics book (mass 1.4 kg) off a 200-meter tall building. Assume there is no air resistance.
 - How far does the book fall in 2 seconds?
 - How long does it take the book to hit the ground?
 - What is the book's velocity just before it hits the ground?
- Paxton throws a ball straight up into the air at a speed of 42 m/s. What is the maximum height that the ball will reach?
- Max drives his car $3 \hat{i} + 5 \hat{j}$ miles, then turns and travels $-4 \hat{i} - 2 \hat{j}$ miles.
 - What is the car's displacement from its starting point?
 - Honors: If the car travels this path in 0.25 hours, what is the speed of the car and what is the velocity of the car?
- Amelia is trying to push a 300-kg box across the floor ($\mu_s = 0.48$, $\mu_k = 0.31$).
 - Draw a free body diagram showing all the forces on the box.
 - What force must she exert on the box to get it moving?
 - Once the box is moving, what force does she have to exert on the box to keep it moving at a constant velocity?
- Timmy is hanging a 20-kg sign from the ceiling by two wires.
 - Draw a free body diagram showing all the forces on the sign.
 - Calculate the tension in the wires.
- Ruth (mass = 70 kg) is roller skating down a hill. The top of the slope is 15 meters above the ground.
 - Calculate Ruth's potential energy.
 - If the hill is frictionless, how fast would she be going when she reached the bottom of the hill?

8. Daniel and Bella were on the bumper cars at Fiesta Texas. Daniel's car (mass 125-kg) was going forward with a speed of 6 m/s and Bella's car (mass 120-kg) was going backward with a speed of (4 m/s). The two cars collided and stuck together. What was the velocity of the cars as they slid? Assume there is no friction.
9. Will is swinging on a rope swing across the river. The length of the rope is 12 meters. How long does it take Jayden to make one complete swing (back and forth)?

10. Caleb installs lights and a loud speaker on his car. His circuit looks like this:



- a. What is the effective resistance of the circuit?
 - b. What is the current in the circuit?
11. Tim finds a glowing rock and determines that it is radioactive and that it has a half-life of 20 days. When Levi weighed the rock, it had a mass of 312 grams. What is the rock's mass after 100 days?
12. Mason's truck has a flat tire. He uses a hydraulic jack to raise the truck so he can fix it. The small piston of the jack has an area of 0.2 m² and the large piston has an area of 0.9 m². His truck weighs 8,000 N.
- a. How much force does he have to apply to the small piston to raise the truck?
 - b. What is the pressure of the fluid inside the jack?
13. Emaleigh made a cardboard boat and is floating it at Canyon Lake. The combined mass of Emaleigh and her boat is 450 kg. When it floats, 0.8 m³ of the boat is below the surface of the water. The density of lake water is 1020 kg/m³.
- a. What is the weight of Emaleigh and her boat?
 - b. What is the buoyant force on the boat?