

Question 1. Sally, who has a mass of 52.7 kg, is skating on an ice rink at an angle of 157.3 degrees in an x-y coordinate system. Her speed is 7.31 m/s. Calculate her x and y momentum components.

Question 2. A 16.3 kg block sliding along a frictionless floor collides with a wall and bounces back the way it came. Its initial speed was 21.3 m/s and its speed after the wall collision was 13.7 m/s. If the collision lasted 0.031 seconds, what was the average force of the collision impulse.

Question 3. Another "cannon" question, this time we require you to use the Law of Conservation of Mechanical Energy to solve it. The cannon is tilted up at 37.3° and fires a 3.7 kg cannon ball at a speed of 31.7 m/s. The cannon is located on the castle wall, 10.7 m above the ground. What is the cannon ball's speed when it hits the ground?

Question 4. a) An empty elevator of 1030 kg is raised 166 m by a motor that is 85.0% efficient in 1 minutes 17 seconds. What is the power expended by this elevator motor?

b) The same elevator system now lifts, in the same time (1 minute 17 seconds), 8 people whose average mass is 73.6 kg each (a maximum load). How much power is needed this time?

c) What is the minimum safe horsepower for this motor?

Question 5. A disk has an angular speed of 17.3 rad/sec and is slowing down at an angular rotation acceleration of -0.73 rad/sec^2 .

a) How long before it comes to rest?

b) How many rotations will it make before coming to rest?

Question 6. Bill has a mass of 73.3 kg, The beam is 3.75 m long and has a mass of 21 kg. The rope is attached at the 2 m point and the maximum tension the rope can support is 2300 N. How far out on the beam can Bill go before the rope breaks? (Hint: Draw or identify all torques in the system about point A.)

