$x = x_i + vt + \frac{1}{2}at^2$ $v_f^2 = v_i^2 + 2ad$ $v_f = v_i + at$

$w = mg$ $F_g = \frac{Gm_1m_2}{r^2}$

$g = 9.8m/s^2$ $G = 6.67 \times 10^{11}(Nm^2/kg^2)$

$F = ma$ $F_f = \mu N$

$\tau = Fr\sin\theta$ $a_c = \frac{v^2}{r}$ $F_c = \frac{mv^2}{r}$

$p = mv$ $Impulse = F \times t$

$F \times t = \Delta(mv)$

$W = Fd$ $P = \frac{W}{t}$

$Eff = \frac{Work_{out}}{Work_{in}}$ $Eff = \frac{Power_{out}}{Power_{in}}$

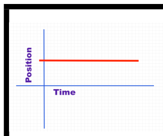
$KE = \frac{1}{2}mv^2$ $PE = mgh$ $PE = \frac{1}{2}kx^2$

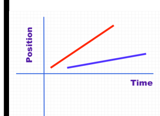
$$x_f = x_i + vt + \frac{1}{2}at^2$$

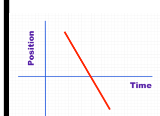
$$v_f = v_i + at$$

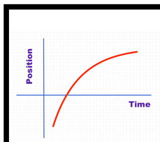
$$v_f^{\,2} = v_i^{\,2} + 2ad$$

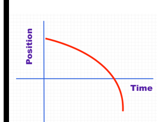
- vector
- scalar
- resultant
- equilibrant
- distance
- displacement
- speed
- velocity
- acceleration

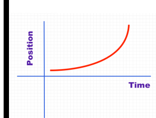


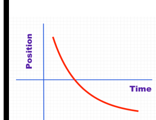


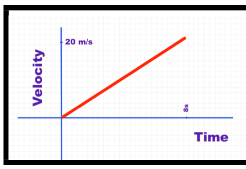


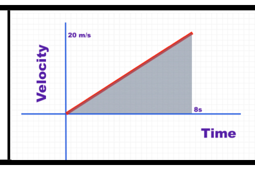










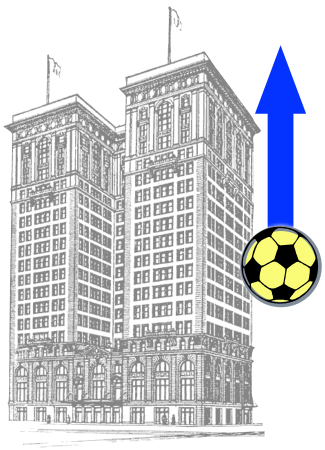


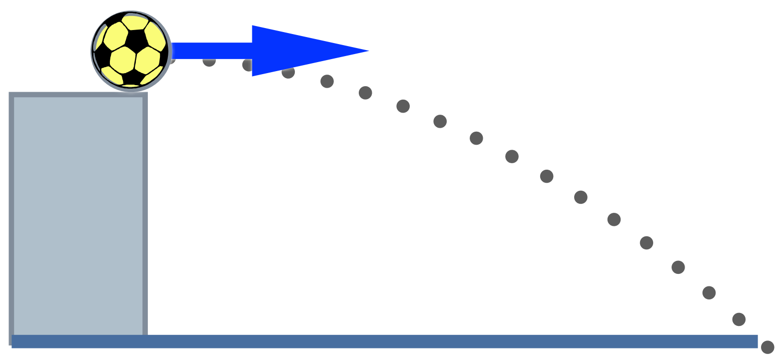
Academic Physics Midterm Review

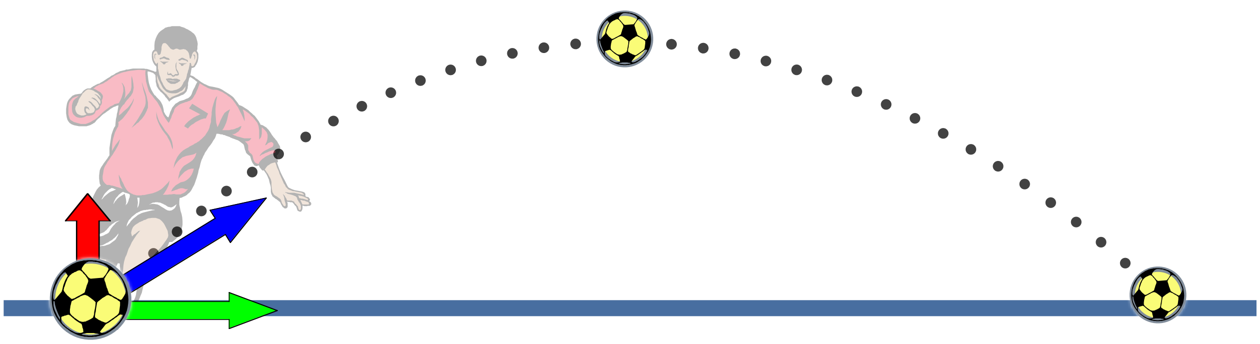
$$x_f = x_i + vt + \tfrac{1}{2}at^2$$

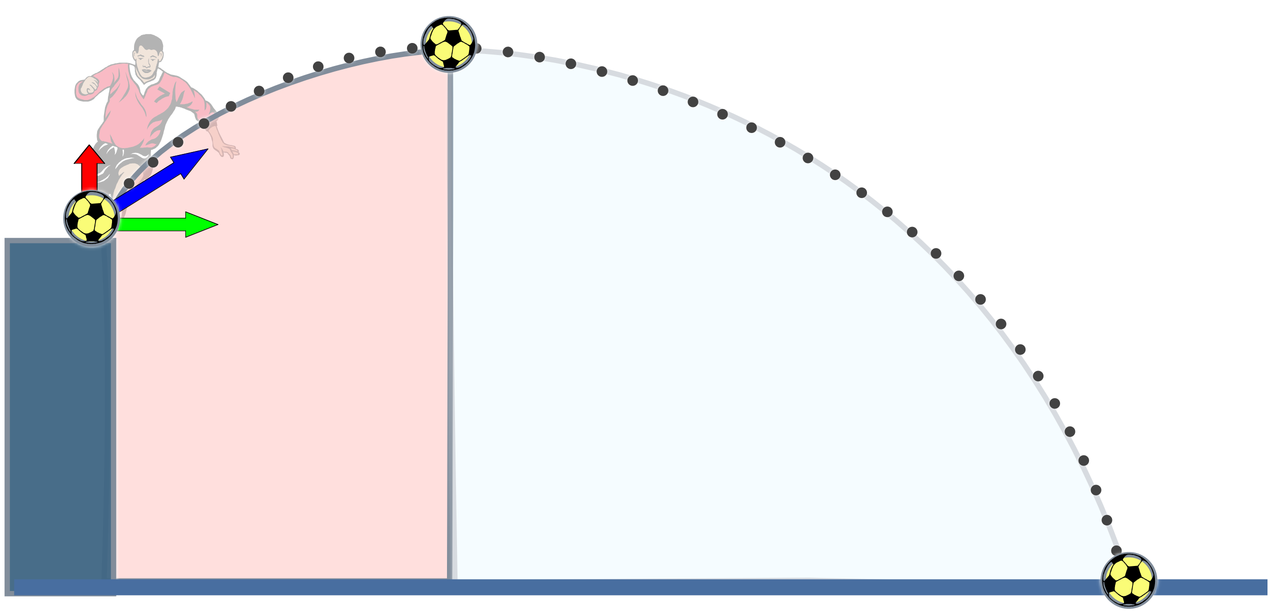
$$v_f = v_i + at$$

$$v_f^2 = v_i^2 + 2ad$$









$$x_f = x_i + v_i t + ½at^2$$

$$v_f = v_i + at$$

$$v_f^2 = v_i^2 + 2ad$$

$$\bar{F} = m\bar{a}$$

$$\bar{F} = \mu\bar{N}$$

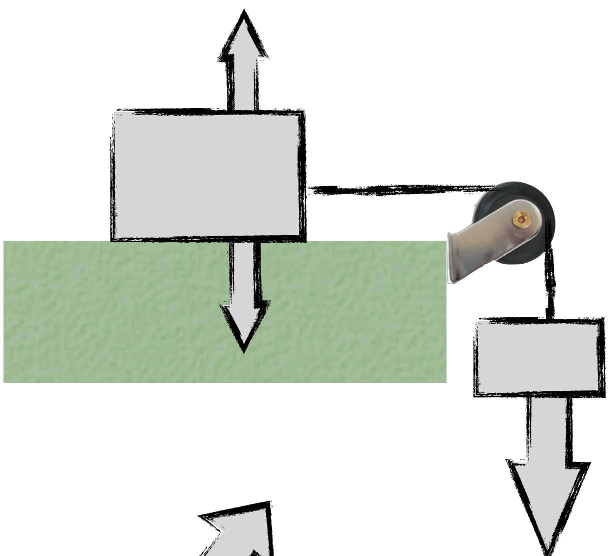
$$\bar{w}_{\parallel} = \bar{w}sin\theta$$

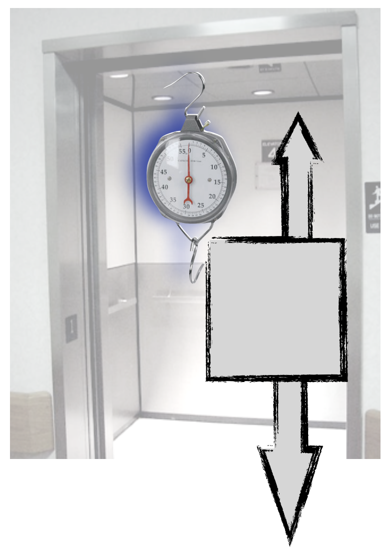
$$\bar{w}_{\perp} = \bar{w}cos\theta$$

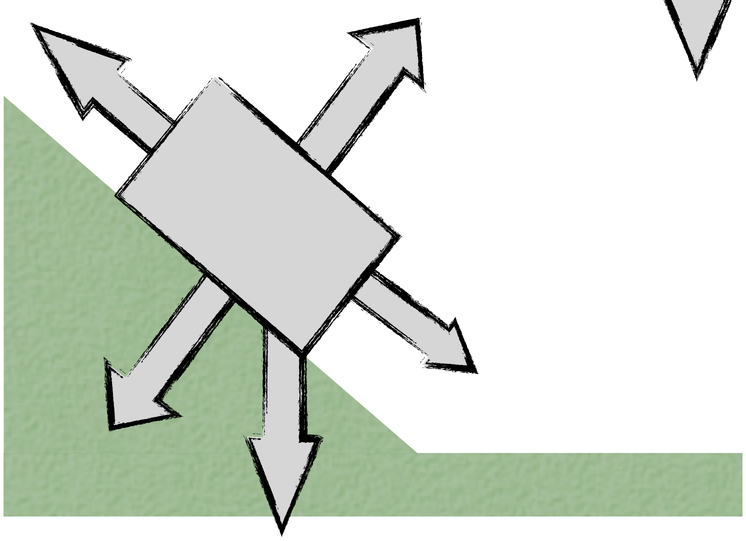
1ST

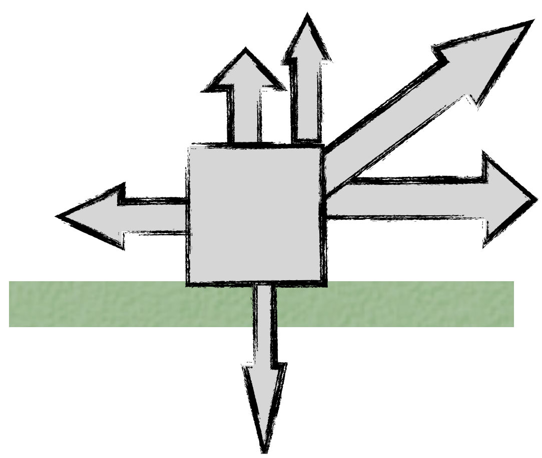
2ND

3RD



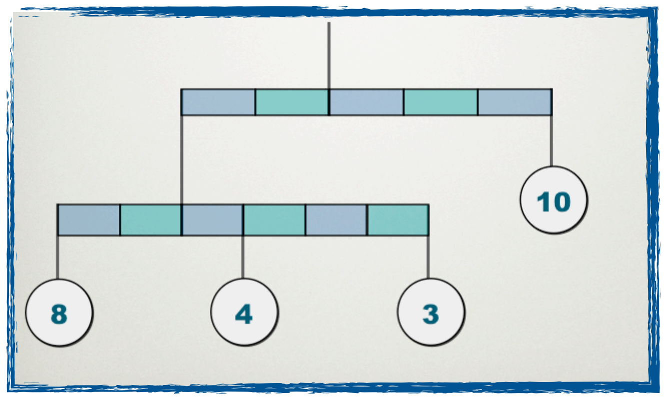


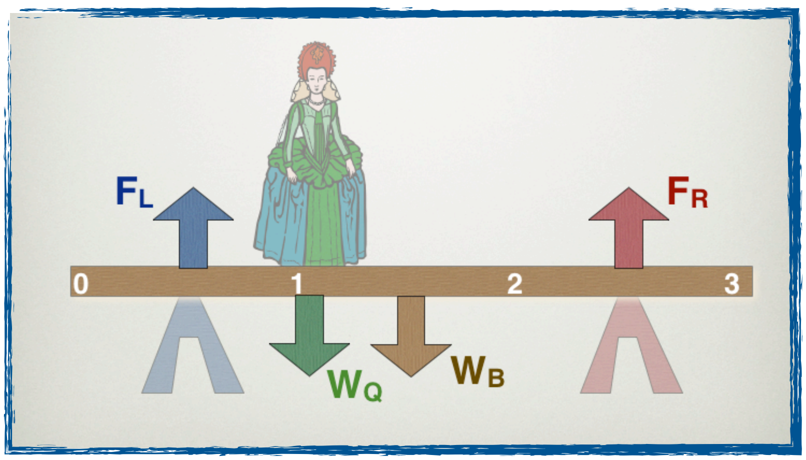


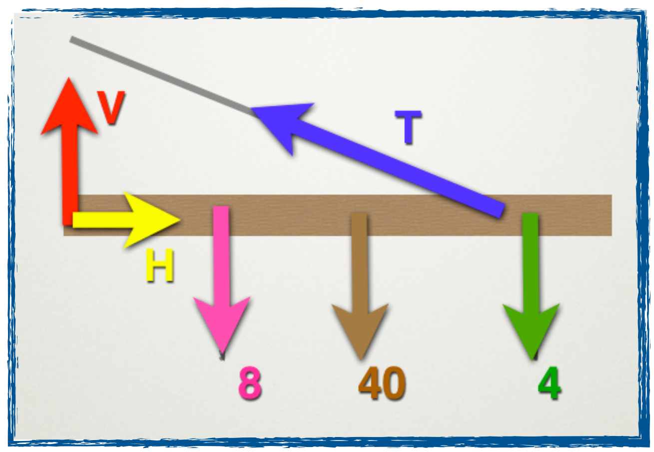


CLOCKWISE = COUNTERCLOCKWISE
UP = DOWN
LEFT = RIGHT

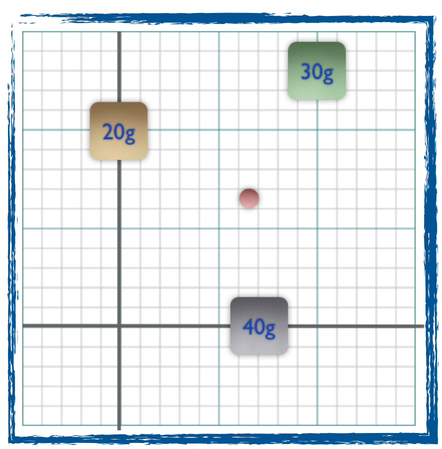
$$\tau = F d \sin\theta$$







$$x_{cm} = \frac{x_1 m_1 + x_2 m_2 + x_3 m_3}{m_{total}}$$

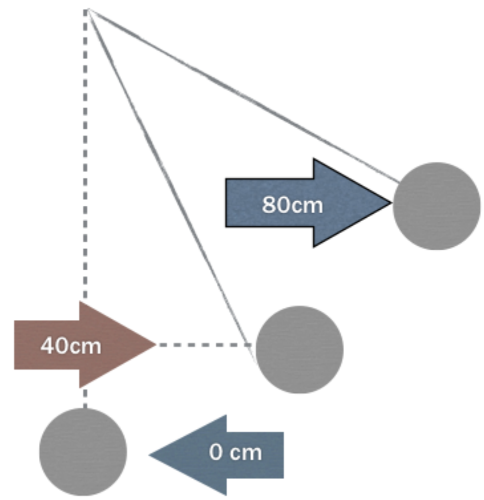


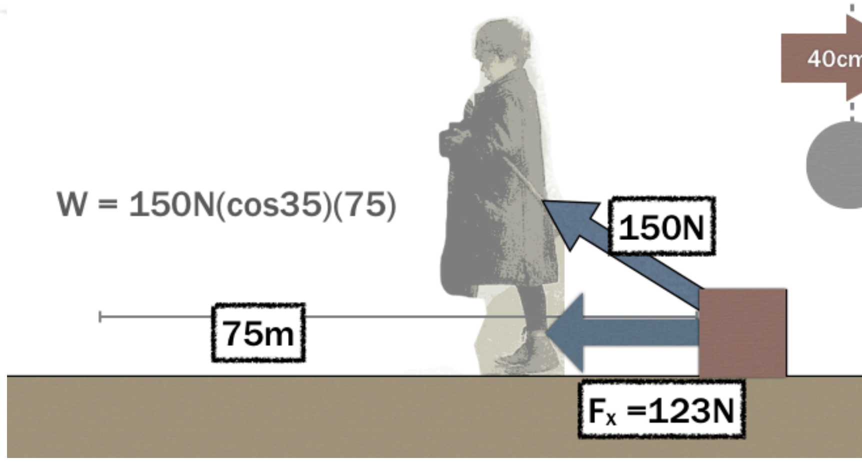
$W = F\,d$

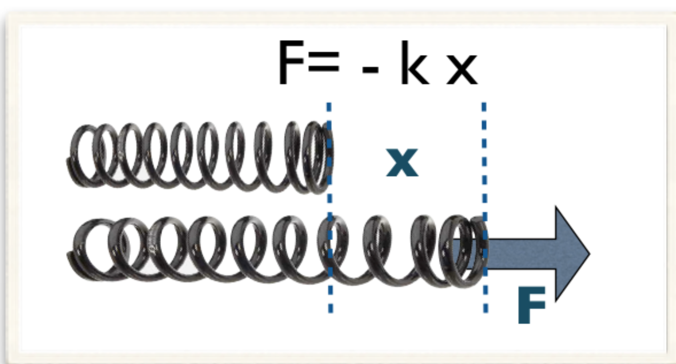
$PE = mgh$

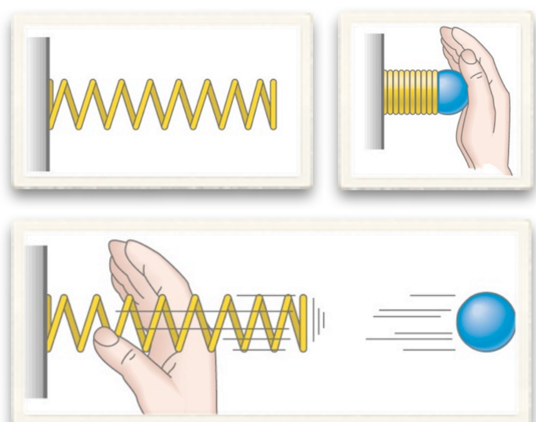
$KE = \frac{1}{2}mv^2$

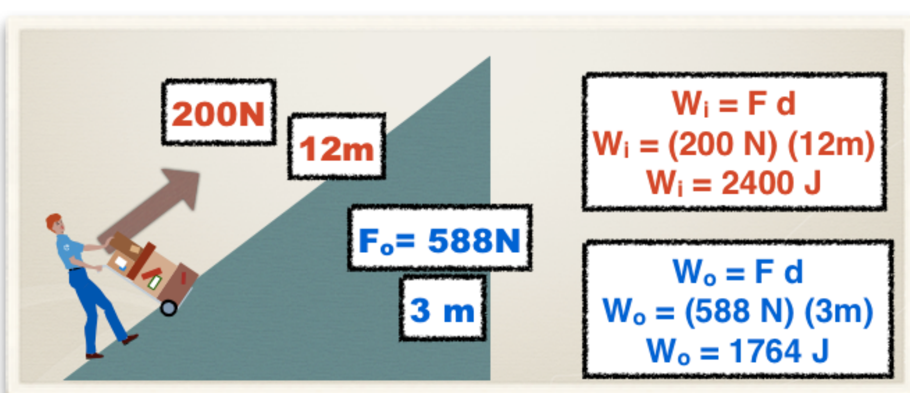
$P = W / t$











Review the following chapters:

Chapter 1: A Physics Toolkit
Chapter 2: Representing Motion
Chapter 3: Accelerated Motion
Chapter 4: Forces in One Dimension
Chapter 5: Forces in Two Dimensions
Chapter 6: Motion in Two Dimensions
Chapter 7 section 2: Using the Law of Universal Gravitation
Chapter 8 section 2 and 3: Rotational Dynamics and Equilibrium
Chapter 9: Momentum and Its Conservation
Chapter 10: Energy, Work, and Simple Machines
Chapter 11: Energy and Its Conservation

Please understand the following terms:

Physics
Dimensional analysis
Significant digits
Scientific method
Hypothesis
Scientific law
Scientific theory
Measurement
Precision
Accuracy
Independent variable
Dependent variable
Line of best fit
Direct relationship
Quadratic relationship
Inverse relationship

Motion diagram
Particle model
Coordinate system
Origin
Position
Distance
Magnitude

Vector
Scalar
Resultant
Time interval
Displacement
Position-time graph
Instantaneous position
Average velocity
Average speed
Instantaneous velocity

Velocity-time graph
Acceleration
Average acceleration
Instantaneous acceleration
Free fall
Acceleration due to gravity

Force
Free-body diagram
Net force
Newton's second law
Newton's first law
Inertia
Equilibrium
Apparent weight

Weightlessness
Drag force
Terminal velocity
Interaction pair
Newton's third law
Tension
Normal force

Component
Vector resolution
Kinetic friction
Static friction
Coefficient of kinetic friction
Coefficient of static friction

Projectile
Trajectory
Uniform circular motion
Centripetal acceleration
Centripetal force

Gravitational force
Law of universal gravitation

Lever arm
Torque
Moment of inertia
Center of mass

Impulse
Momentum
Impulse-momentum theorem
Closed system
Isolated system
Law of conservation of momentum

Work
Energy
Kinetic energy
Work-energy theorem
Joule
Power
Watt
Machine
Effort force
Resistance force
Mechanical advantage
Ideal mechanical advantage
Efficiency
Compound machine

Kinetic energy
Gravitational potential energy
Reference level
Elastic potential energy
Law of conservation of energy
Mechanical energy
Thermal energy
Elastic collision
Inelastic collision

Some other things to remember:
Parallax
Calibration
Margin of uncertainty
Free body diagram
Weight
What does the graph look like for a:
- Linear
- Inverse
- Parabolic
- Quadratic

What does the length of a displacement vector represent?

What information can you find out from a position-time graph?

What is the area under a velocity-time graph?

What is the area under a force-time graph?

Problems

A bicyclist maintains a constant velocity of 8.0 m/s for a distance of 880 m. How long does it take the bicyclist to travel this distance?

If a runner accelerates from 5 m/s to 13 m/s in 8 s, her average acceleration is _____.

A car's velocity decreases from 32.0 m/s to 20.0 m/s over a period of 9.0 s. What is the car's average acceleration?

If a sprinter accelerates from rest at a constant rate of 4.0 m/s^2, how fast will she be running after 8.0 s?

A pebble falls from a bridge into the river below. If the pebble falls for 7.20 s, what is its velocity when it hits the water?

A car with an initial displacement of 11.0 m and an initial velocity of 19.0 m/s accelerates at an average rate of 0.60 m/s^2 for 2.0 s. What is the car's displacement after 2.0 s?

A racing cyclist is traveling at 15.3 km/h when she speeds up with a constant acceleration of 0.77 m/s^2. What is her velocity after 3.00 s?

If the ball's initial horizontal velocity is 3.9 m/s, how far from the building is the ball when it hits the ground?

In a penalty kick, a soccer player kicks the ball from ground level with an initial velocity of 20.0 m/s, 23.0° above the horizontal. Assume that air resistance is negligible. What is the maximum height, ymax, of the soccer ball?

What is the flight time of the soccer ball in the previous problem?

The cars on an amusement-park ride travel at a constant velocity of 8.0 m/s on a circular track that has a radius of 6.0 m. What is the magnitude of each car's centripetal acceleration?

If each car in the previous problem has a mass of 160.0 kg, what is the net centripetal force acting on each car?

A clown in a circus act swings a 4.7-kg metal ball attached to a 82.0-cm nylon string in a horizontal circle above her head, making one revolution in 0.93 s. What is the tension force, FT, exerted on the string by the ball?

The resultant of a 10-N force acting on an object to the right and a 40-N force acting on the object to the left is _____.

An object at rest on a horizontal surface has a weight of 300 N. In order to move the box a minimum
force of 40 N is required. The coefficient of static friction is _____.

Two horizontal forces, one 160.0 N and the other 300.0 N, are exerted in opposite directions on a boat on a lake. What is the net horizontal force on the boat?

Two dogs play tug-of-war with a rope toy that has a mass of 0.60 kg. If one dog pulls on the toy with a force of 150.0 N, and the other dog pulls in the opposite direction with a force of 118.0 N, what is the horizontal acceleration of the toy?

What is the force of gravity on a person who has a mass of 56.0 kg?

A 56.0-kg boy rides in an elevator that accelerates upward at 1.72 m/s^2. What is the net force exerted on the boy?

Two teams, the Fifes and the Drums, are playing tug-of-war. Each team has 4 members. Both teams exert a force of 2012 N on the rope. The rope is not moving. What is the net force on the rope?

Two people are paddling together in a canoe. Each exerts a horizontal force of 338 N toward the back of the canoe. What is the net horizontal force on the canoe?

Refer to item above. If the combined weight of the canoe and the two paddlers is 187 kg, what is the acceleration of the canoe?

If you exert 30.0 N of horizontal force while pushing a 9.2-kg box across the floor at a constant velocity, what is the coefficient of kinetic friction between the floor and the box?

The frictional force of a 3.0-kg block of wood on a wooden table is 6.8 N. If you push the block with a force of 13.8 N, what is its acceleration across the table?

A skier is at rest on a hill sloped at 50.0°. The coefficient of kinetic friction between the snow and the skis is 0.18. The skier starts skiing downhill. How fast is the skier going after 5.0 s?

A planet has a mass of 6.0×10^{24} kg, which is about eight times the mass of its single moon. If the distance between the planet and the moon is about 3.2×10^5 km, what is the gravitational pull of the planet on the moon?

A 8 kg ball is traveling at 15 m/s. What is its kinetic energy?

A ball of mass 0.6 kg has 108 J of kinetic energy. What is the velocity of the ball?

A ball traveling at 20 m/s has 1800 J of kinetic energy. What is the mass of the ball?

Jorge tightens a bolt on his bicycle with a wrench that is 0.40 m long. If he pulls perpendicularly on the end of the wrench with a force of 180 N, how much torque does he apply?

Salma, who has a mass of 52 kg, and Josh, who has a mass of 63 kg, are trying to balance a seesaw. Salma's position is 0.3 m from the pivot point. How far should Josh sit from the pivot point to balance Salma?

Given Josh's distance from the pivot point in order to balance Salma, what must be his moment of inertia?

Two skaters, Elena and Tara, face each other on the ice. Elena has a mass of 56.4 kg, and Tara has a mass of 38.3 kg. Both are motionless until they push away with a force of 43 N. Then Elena has a velocity of 1.2 m/s. What is Tara's velocity?

A 0.088-kg ball strikes a wall with a velocity of 32.1 m/s. The wall stops the ball in 0.26 s. What force does the wall exert to stop the ball?

A 925-kg car is moving along a straight highway with a velocity of 94 km/h. The driver applies the brakes and reduces the car's speed to 32 km/h in 9.5 s. What is the impulse on the car?

A 2400-kg car is traveling at 22 m/s when it crashes into the rear end of a 1450-kg car traveling at 20 m/s in the same direction on ice. The two cars become stuck together and slide on the ice. How fast do the two cars move together immediately after the collision?

A child holds onto a string attached to a toy boat and exerts a force of 12.0 N to pull the boat a distance of 5.2 m along a straight shoreline. If the child holds the string at a 25.0° angle with the horizontal, how much work does she do on the toy boat?

How much power would be developed if the work were done in 3.5 s?