

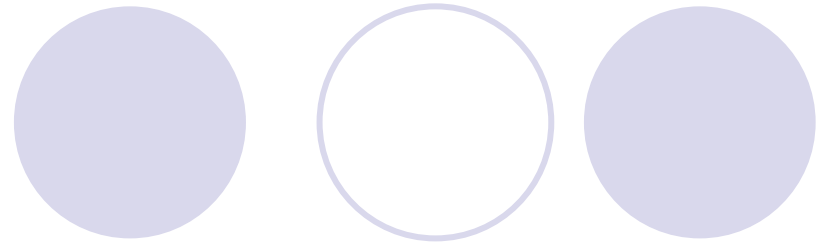
The title is centered on the page. It is surrounded by six light purple circles. Three circles are arranged in a horizontal row above the text, and three are arranged in a horizontal row below it. The circles are of varying fill styles: some are solid and some are hollow.

Acceleration and Motion

Section 4.1 Accelerated Motion

- Newton's Second Law: a net force acting on an object causes the object to accelerate in the direction of force.
 - Depends on the size of force and mass of object (Force = mass x acceleration)
 - Measured in $\text{kg} \times \text{m/s}^2$ (1 N = 1 kg x m/s^2)

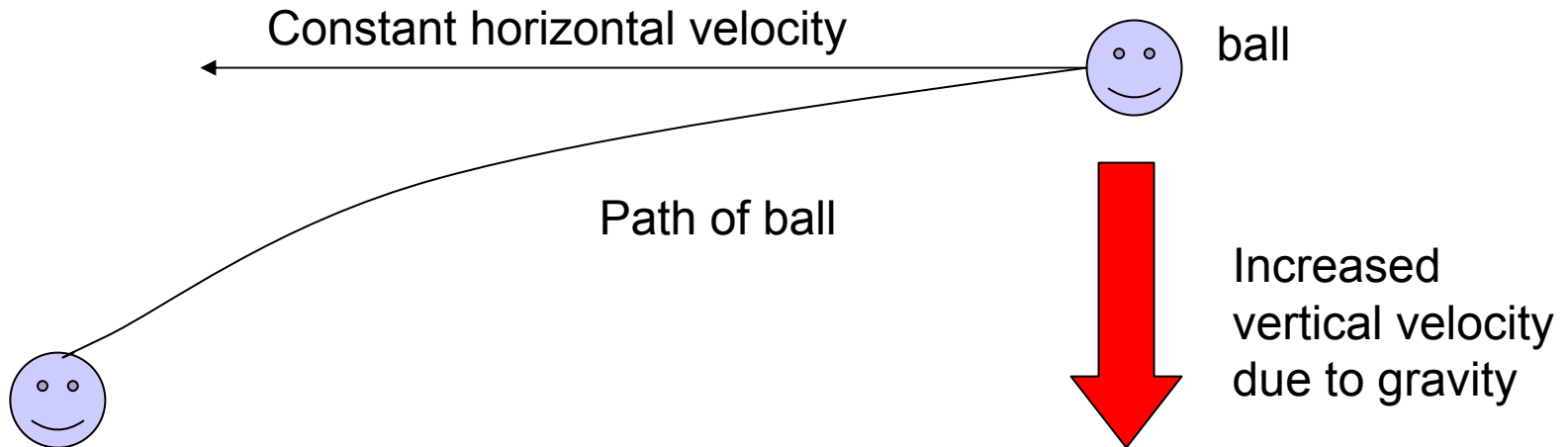
4.1 continued



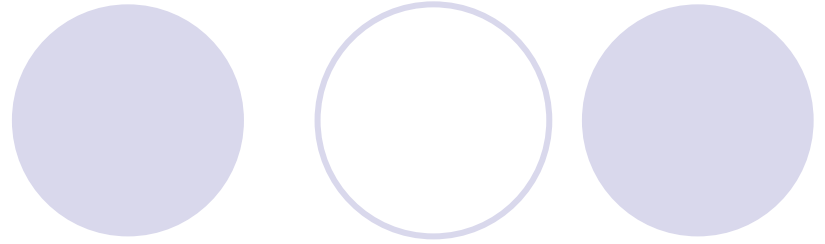
- Falling Objects: even if objects are different in mass; they will accelerate due to gravity at the same rate.
 - For earth $a = 9.8 \text{ m/s}^2$
 - Air resistance effects the rate of fall
 - Air resistance depends on speed, size, shape, and density of the object.
- Terminal Velocity: the highest velocity that will be reached by a falling object
 - As objects fall the increase in acceleration until they forces of inertia are balanced with gravity and the object will stop accelerating

Section 4.2: Projectiles and Circular Motion

- Projectiles: any object thrown or shot through the air
 - Follow a curved path due to gravity
 - Projectiles will land at the same time as dropped objects



4.2 continued

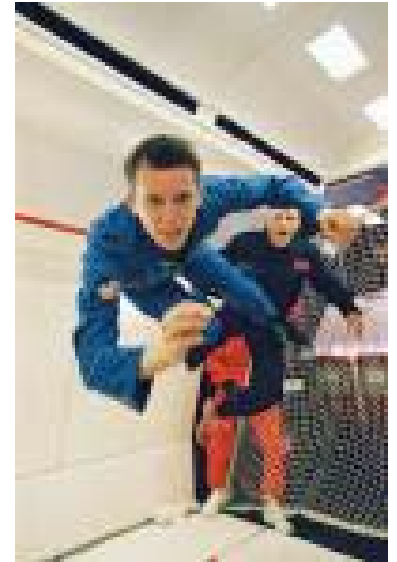


- Moving in Circles:
involves objects traveling
in curved paths
 - Centripetal acceleration:
acceleration toward the
center of a curved or
circular path
 - Centripetal force: force
acting on the object that
causes a moving object to
move in curved path



4.2 cont.

- Weightlessness in Orbit:
 - For true weightlessness to occur you must not have gravity affecting the object
 - Apparent weightlessness occurs when objects are in “free fall” with the exact rate of acceleration as gravity. (imagine riding in a super fast elevator)



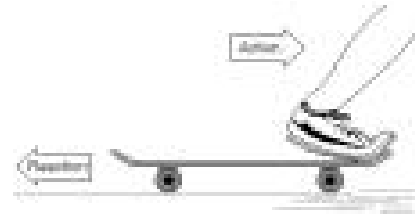
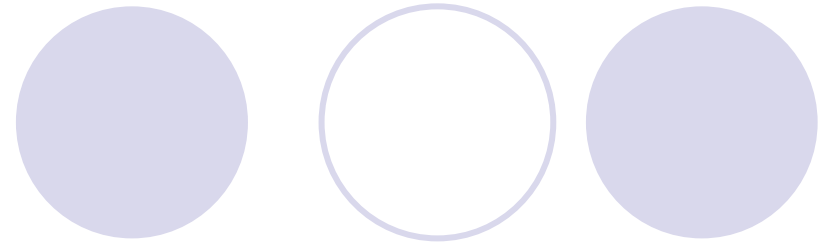
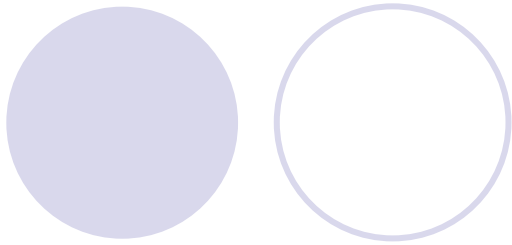
Section 4.3: Science & Society

- Effects of Weightlessness
 - Weakening of heart and bones
 - Can be lessened by isometric exercises



Section 4.4: Action and Reaction

- Newton's Third Law: when an object exerts a force on a second object, the second object exerts a force that is equal and opposite to the first object
 - Every action there is an equal and opposite reaction
 - Example: gun recoil, balloon, leaping from a boat



4.4 continued

- Rocket
Propulsion:
works on the
principle of
Newton's 3rd law



4.4 cont.

- Momentum: a property a moving object has due to its mass and velocity
 - Momentum (p) = mass (m) x velocity (v)
 - Units are $\text{kg} \times \text{m/s}$
 - Depends on the mass of the object
 - Momentum is continuous unless gravity acts on it