

Forces, Motion, and Energy

Book M

Forces and Motion

Chapter 2

Name _____

Class _____

Test Date FRIDAY, 5/9/14

Chapter 2 – Forces and Motion

Section 1 Gravity and Motion p. 36 - 43

I. Gravity and Falling Objects

A. Gravity and Acceleration

*Objects released from the same height at the same time will hit the ground
at the same time because acceleration due to gravity is the same for all objects.

B. Acceleration Due to Gravity (gravity = 9.8 m/s^2)

C. Velocity of Fall Objects – * velocity = gravity • time

$$\Delta v = g \times t$$

II. Air Resistance and Falling Objects

*A flat sheet of paper will have more air resistance than a crumpled up sheet of paper because it has more surface area.

A. Acceleration Stops at the Terminal Velocity

*The constant velocity of a falling object when the force of air resistance is equal in magnitude and opposite in direction to the force of gravity is called ____

terminal velocity

B. Free Fall Occurs When There Is No Air Resistance

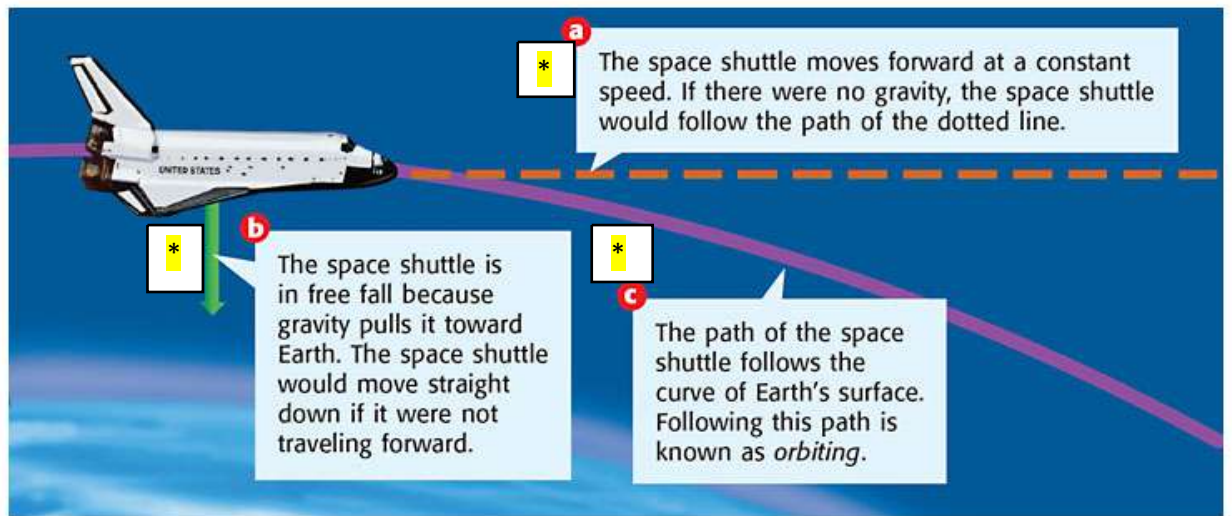
If gravity is pulling an object down and no other forces are acting on the object, the object is in free fall

III. Orbiting Objects Are in Free Fall

*Because of free fall, astronauts float in orbiting spacecrafts.

A. Two Motions Combine to Cause Orbiting

*If a spacecraft is orbiting Earth, it is moving forward and it is also in free fall



****Know about this diagram for the test! What is happening at each point?**

B. Projectile Motion and Gravity

The curved path that an object follows when thrown, launched, or otherwise projected near the Earth's surface is called projectile motion

****circle the examples of projectile motion***

Leaping frog

ball pitched

box sliding on the floor

skydiver falling toward Earth

Sliding Kinetic Friction

IV. Projectile Motion and Gravity

A. Horizontal Motion \longleftrightarrow

B. Vertical Motion

*When you throw an object, gravity pulls it downward and gives the object vertical motion.



Section 2 Newton's Laws of Motion p. 44 - 51

I. Newton's First Law of Motion

*An object at rest remains at rest, and an object in motion remains in motion at constant speed and in a straight line unless acted on by an unbalanced force.

A. Part 1: Objects at Rest

B. Part 2: Objects in Motion

C. Friction and Newton's First Law

*a moving object that is not acted on by an unbalanced force will stay in motion.

D. Inertia and Newton's First Law

* Inertia is the tendency of an object to resist being moved or, if the object is moving, to resist a change in speed or direction until an outside force acts on the object.

E. Mass and Inertia

* Mass is a measure of inertia.

* An object with a large mass has more inertia than an object with a small mass. **Kenny cannot move a house!*

* Circle the object that would have more inertia **(1,000 g = 1kg)**
3,500 g (or 3.5 kg.) 7kg (or 7000 g)

II. Newton's Second Law of Motion

*The acceleration of an object depends on the mass of the object and the amount of force applied. $F = m \cdot a$ Force = mass x acceleration

A. Part 1: Acceleration Depends on Mass

Acceleration and Mass are inversely related.

*As the mass increases the acceleration of the object decreases.

B. Part 2: Acceleration Depends on Force

Acceleration and **force** are directly related. An object's acceleration will **increase** when the force on the object **increases**.

Which object has the least acceleration?

- An empty grocery cart pushed hard
- **a full grocery cart pushed lightly**

C. Expressing Newton's Second Law Mathematically

$$F = m \times a$$

III. Newton's Third Law of Motion

Whenever one object exerts a **force** on a second object, the second object exerts an **equal** **and** **opposite** force on the first.

OR * All forces act in **pairs**.

A. Force Pairs Do Not Act on the Same Object

B. All Forces Act in Pairs – Action and Reaction

*Action/Reaction Pairs

- *An animal's legs **exert** a force on the Earth allowing it to jump
- *A bat **exerts** a force on a ball allowing it to sail through the air.

C. The Effect of a Reaction Can Be Difficult to See

- *Gravity **exerts** a force on ball allowing it to hit the ground.

Chapter 2 Forces and Motion

Section 3 Momentum p. 52 - 55

I. Momentum, Mass and Velocity

A quantity defined as the product of the mass and velocity of an object is called

momentum.

A. Calculating Momentum

$$p = m \times v$$

(momentum equals mass times velocity)

II. The Law of Conservation of Momentum

*When a moving object hits another object, some or all of the momentum of the first object is transferred to the object that is hit. The momentum before the collision is equal to the momentum after collision.

*The Law of Conservation of Momentum states that any time objects collide, the total amount of momentum stays the same.

A. Objects Sticking Together

B. Objects Bounding Off Each Other

C. Conservation of Momentum and Newton's Third Law