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**IDX G9 PHYSICS S STUDY GUIDE ISSUE 5**

**By Virginia and Joyce**

Chapter 6 By Virginia

**Chapter 6: Motion in Two Dimensions**

**Section 6.1: Projectile Motion**

**Key Concepts:**

•Projectile Motion: An object moving through the air under the influence of gravity alone.

•Trajectory: The curved path followed by a projectile (parabolic in ideal cases).

•Forces Acting on a Projectile

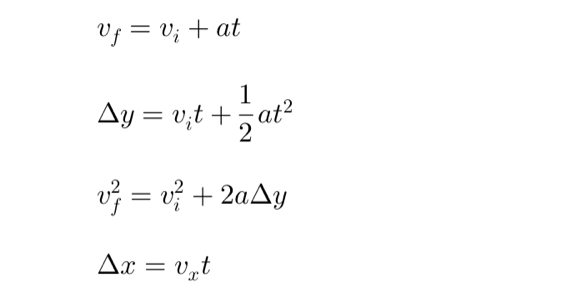
•Only gravity acts on it (if air resistance is ignored).

•Independence of Motion

•Horizontal motion: Constant velocity.

•Vertical motion: Accelerated motion due to gravity.

**Formulas:**



**Typical Projectile Motion Questions &Hints**

1. A stone is dropped from rest and falls for 8.0s. Find its velocity and displacement.

Steps to Solve:

(a) Find the velocity after 8.0s:

(b) Find the displacement during this time:

2. A projectile is launched horizontally from a height. Determine its time of flight and range.

Steps to Solve:

(a) Find the time of flight:

(b) Find the horizontal range:

3. “Monkey and Hunter Problem”: Where should the hunter aim?

Concept Explanation:

• The bullet and the monkey experience the same gravitational acceleration.

• Since both undergo the same vertical displacement, the hunter should aim directly at the monkey.

**Section 6.2: Circular Motion**

**Key Concepts:**

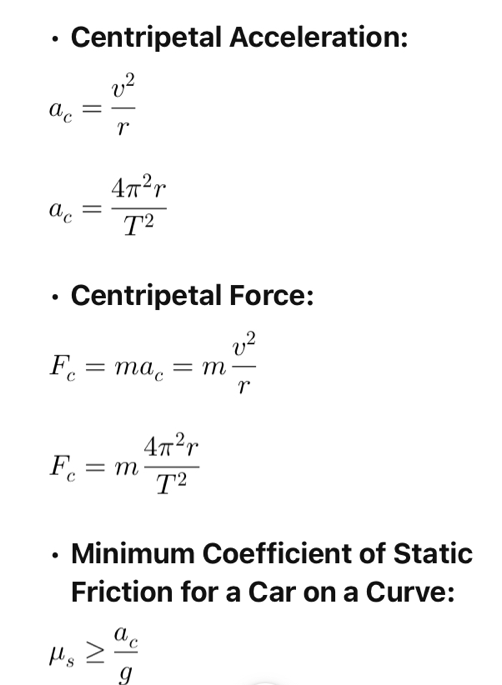
• Uniform Circular Motion (UCM): Movement at constant speed around a circle.

• Velocity: Always tangential to the circle.

• Acceleration: Always directed toward the center (centripetal acceleration).

• Centripetal Force: The net force required to keep an object moving in a circle.

**Formulas:**



**Typical Circular Motion Questions &Hints**

4. A stopper is swung in a circle. Find the tension in the string.

Steps to Solve:

1. Find the velocity using the period equation:

2. Find the centripetal force:

3. Since the tension in the string provides the centripetal force:

5. A car moves around a curve. Find its centripetal acceleration and required friction coefficient.

Steps to Solve:

(a) Find the centripetal acceleration:

(b) Find the minimum coefficient of static friction:

6. A passenger in a turning car feels pushed outward—explain why.

Concept Explanation:

• There is no actual outward force; this is an inertial effect due to the passenger’s resistance to changing motion.

• The car applies a friction force inward to keep the passenger moving in a circle.

**Steps to Explain:**

1. Draw the free-body diagram: Show forces acting on the passenger.

2. Identify the real force: The inward force (friction from the seat or door) keeps the passenger moving in a circle.

3. Explain the sensation: The body wants to continue in a straight line (Newton’s 1st Law), making it feel like an outward force is acting.

**Most Important: Centrifugal force is not real**