Puzzle 1: Missing Velocity Link

A four-bar mechanism has links **AB**, **BC**, and **CD**. Given that the velocity of **link AB** is known, and the velocity of **link CD** is also determined, how can you find the velocity of **link BC**?

Answer:

- Use the **velocity polygon method**.
- Start from a known velocity (e.g., the velocity of A).
- Construct the velocity diagram step by step using **vector addition**.
- Since the motion of links is relative, the unknown velocity of BC can be determined graphically.

Puzzle 2: Fastest Point on the Link

In a **slider-crank mechanism**, the crank rotates at a constant angular velocity. Which point on the **connecting rod** has the highest velocity?

Answer:

- The velocity is highest at the **farthermost point from the fixed pivot (big end of the rod)**.
- The **instantaneous center (IC) method** can be used to verify this.

Puzzle 3: Acceleration at Instant Center

You have a four-bar linkage with known angular velocities. What is the acceleration of a point that lies exactly on the **instantaneous center of rotation**?

Answer:

- The acceleration at the **instantaneous center** is always **zero** because it is momentarily at rest.

Puzzle 4: The Vanishing Vector

You are given a velocity diagram, but one of the vectors is missing. The mechanism is a **four-bar chain**, and all other vectors are properly drawn. What should you do?

Answer:

- Use **vector closure**: The sum of velocities in a closed-loop mechanism should be zero.
- If one velocity vector is missing, it can be found as the **resultant of the other three**.

Puzzle 5: Finding the Link with Maximum Acceleration

A cam-follower system operates at a constant cam speed. Which part of the follower mechanism experiences the highest acceleration?

Answer:

- The **contact point between the cam and follower** experiences the highest acceleration.
- The **acceleration is due to both radial (centripetal) and tangential components**.