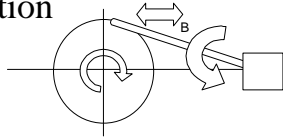


Chapter 12

Plane Motion Relative Motion



Miami University

1

Objectives

- Review of Sine and Cosine Laws
- Linear Relative Motion
- Planar Relative Motion
- Angular Relative Motion

2

Review of Cosine Law

- Cosine Law:

$$BC^2 = AC^2 + AB^2 - 2(AC)(AB)\cos a$$

3

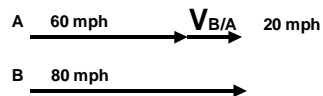
Review of Sine Law

- Sine Law:

$$\frac{\sin a}{BC} = \frac{\sin b}{AC} = \frac{\sin c}{AB}$$

4

Linear Relative Motion

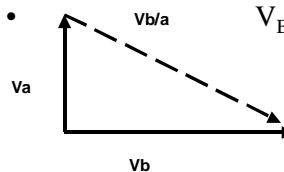


- $V_A = 60 \text{ mph}$
- $V_B = 80 \text{ mph}$
- $V_B = V_A + V_{B/A}$
- Note: Subscripts MUST cancel

5

Planar Relative Motion

- $V_A = 40 \text{ mph} \uparrow$
- $V_B = 60 \text{ mph} \rightarrow$
- $V_B = V_A + V_{B/A}$
- $V_{B/A} = \text{Hypotenuse}$



6

Displacement & Acceleration

- We have shown relative velocities.
- You can use the same technique for relative displacement and accelerations
- Displacement: $s_B = s_A + s_{B/A}$
- Acceleration $a_B = a_A + a_{B/A}$

7

Book Examples

- Example 12-4: Sliding Bar
- Example 12-5: Rotating Linkage

8

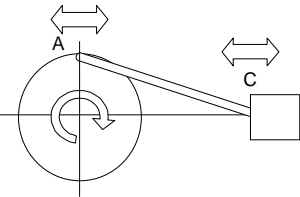
Linkage Rules

- Convert rotation to tangential movement
(example: $v = r\omega$)
- Determine motion at other end of linkage
(example: next link rotates about a pin)
- Use vector triangle to solve for unknown vector
(be sure vector equation is correct)

9

Connecting Rods

- Note that point A and C both move horizontally at this point. Which means that $V_{C/A} = 0$ when A is at 12 and 6 o'clock position.



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Week 6 Homework

- Chapter 12
 - Prob. 6, 8, 9, 16, & 26
- Read Sections 12-2 & 12-3

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