

REC Unit 5: Arms and End Effectors

Catalog No.	77-8115-0050
Category	Mobile Robotics
Duration	15 Hours
Software	Coding platform of your choice that can be downloaded to the V5 controller

5.1 (Core): Introduction to Robotic Arms, Degrees of Freedom

Introduction

Degrees of Freedom

Examples of Degrees of Freedom in Two Dimensions

Degrees of Freedom in Three Dimensions

Paths and Degrees of Freedom

Complexity and Cost

Real Arm Designs

Solving Problems

Worksheet: Robotic Arms and Degrees of Freedom

Section 5.1 Review Test

5.2 (Activity): Robotic Arm Construction

Safety Review

Building the Arm

Assessment

5.3 (Core): Mass, Weight, Center of Weight, and Torque

Introduction

Center of Mass

Torque

Equilibrium

Using Forces and Torques Together

Conclusion

Worksheet: Mass, Weight, and Torque

Section 5.3 Review Test

5.4 (Activity): Center of Weight of BaseBot

Procedure
Calculations
Test
Assessment
Center of Weight - Conclusion

5.5 (Core): Relationship of Torque, Gear Ratio and Weight of Payload

Robots at Work
Torque, Moment, and Lifting Capacity
Torque Rating and Gear Ratios
The Four Basic Equations
Worksheet: Torque, Gear Ratio, and Payload Weight
Section 5.5 Review Test

5.6 (Activity): Stall Torque

Procedure
Calculate Torque
More Data Points
Graph Results
Questions

5.7 (Core): Remote Control and Limit Switches

Remote Control in Robotics
Wireless Control with Vex
Getting Controller Input
Getting Joystick Input
Button Problems
Limit Switches in Robotics Applications
Programming Aspects of Limit Switches
Worksheet: Radio Control and Limit Switches
Section 5.7 Review Test

5.8 (Activity): Windshield Wiper

- Introduction
- Adding Limit Switches
- Write Computer Program
- Intermittent Operating Mode
- Questions

5.9 (Core): End Effectors

- Introduction
- Types of End Effectors
- Friction and End Effectors
- Mechanisms and Linkages
- End Effector Designs Using Linkages and Gearing
- Choosing the Correct End Effector
- Worksheet: End Effectors
- Section 5.9 Review Test

5.10 (Activity): End Effector

- Procedure
- Write Control Program
- Competition
- Questions
- End Effector - Conclusion

Post-Test Unit 5