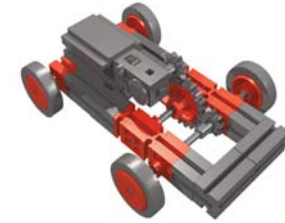


Principles of Robotics



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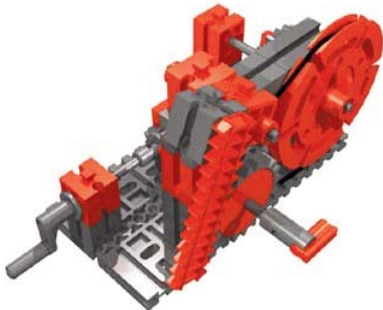


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PROGRAM OVERVIEW

The *PCS Adventures!*TM Academy of Robotics empowers students to explore the basic foundations of robotics and mechanical control by completing an exciting array of hands-on activities.

Academy students participate in creating physical and tangible projects. These projects and the setting of the robotics lab are relevant to real world experiences. The Academy of Robotics compels students to build models, design experiments, and solve problems in a challenging, fun atmosphere!

PRINCIPLES OF ROBOTICS

- **RO101 - Introduction to Robots:**

Students are introduced to the definitions of robotics, and to some of the underlying principles to the study of robots and robot arms. Students build mock robots, automatons, robotic vehicles, arms and end effectors.

- **RO201 - Mechanical Control of Your Robot:**

Students are introduced to different methods of mechanical steering and control of robots. Students experiment with belt drives, stops, pawls, pneumatics and rack and pinion steering. Terms and activities cover new concepts and reinforce those learned in RO101.

- **RO301 - Feedback:**

Students explore the concepts of input, output, feedback, and switches. Terminology and activities cover principles central to automatic control of robots.

- **RO401 - Integration Projects:**

Students apply their knowledge in an intensive, personalized research and design project. Terminology and activities cover the differential and the flyball governor. Students are encouraged to explore fun robotic projects on their own or as part of a larger science contest.



SUGGESTIONS FOR TEACHING

Each Academy of Robotics unit has the same basic components which are designed to be used in the order presented. However, as you become more comfortable with the materials, you will find that the activities can be used in any order to meet your teaching style and the students' needs. Whether in RO101 or RO401, the components of the modules in each course are Preparation, Background, Project 1, Project 2, Challenges, and a Personal Project. The last unit in every course includes a long-term group project called a Cooperative Challenge. Assessment and student portfolio building is done using the Academy of Robotics Online Assessment Website (aor.edventures.com).

Preparation: This page gives you a brief overview of the unit, itemizes the materials needed for Project 1 and Project 2, and gives preparation tips for the unit.

Background: This section provides vocabulary terms and background information of the unit. We recommend you read it before teaching. Terms can be looked up using the Term Browser accessed at the *PCS Edventures!*TM Website. "WOW" is an introductory activity provided for you to capture student interest in the topic and to demonstrate the basic principles covered in the unit.

Project 1 and Project 2: These projects introduce the principles and skills needed to master the topic. The three major sections to the projects are the:

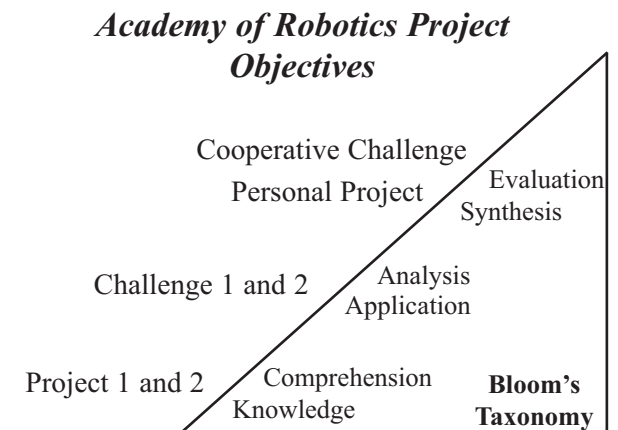
1. "Make sure you have:" section listing the materials;
2. "Build..." section giving the building procedures;
3. "Try this..." section providing the assessment questions and activities.

In the "Make sure you have:" section, lists of materials are presented with pictures for ease of use. The "Build..." section includes text and step-by-step instructions for the project. The "Try this..." section is intended to be used with the Online Assessment process within the Academy of Engineering Online Assessment Website (academy.edventures.com). Student answers should be recorded on their copy of the project page, then recorded online when convenient. The Answer Key is in the Appendix.

Challenges: Each module includes two challenges. These are open-ended activities designed to assess the student's ability to apply the principles learned in Projects 1 and 2. Fewer instructions are given, and the student is allowed greater latitude in meeting the requirements of the challenge.

Personal Projects and Cooperative Challenges: These are synthesis activities. Students, alone or in groups, should be encouraged to reflect on the content and processes they have learned by doing the projects and challenges. Their project should demonstrate their mastery of the material.

The objectives of the components are intended to correspond with the levels of Bloom's Taxonomy shown to the right.



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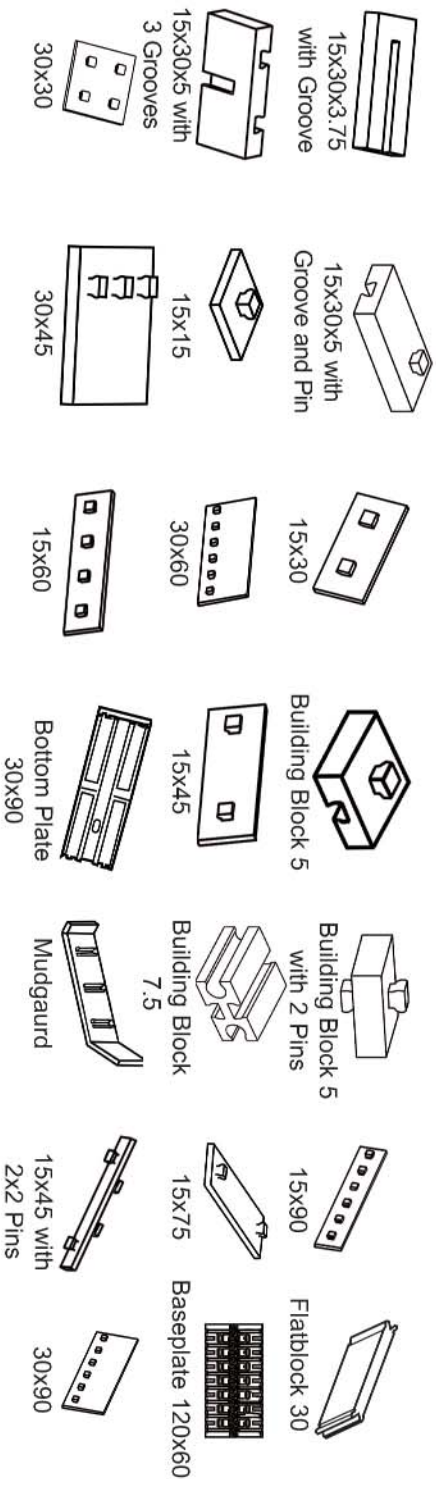
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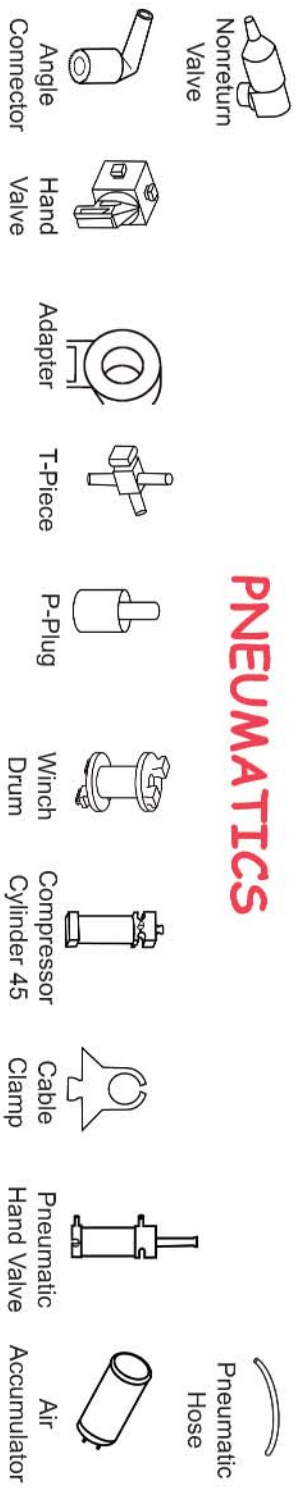
Teacher Answer Key

fischertechnik® NOMENCLATURE

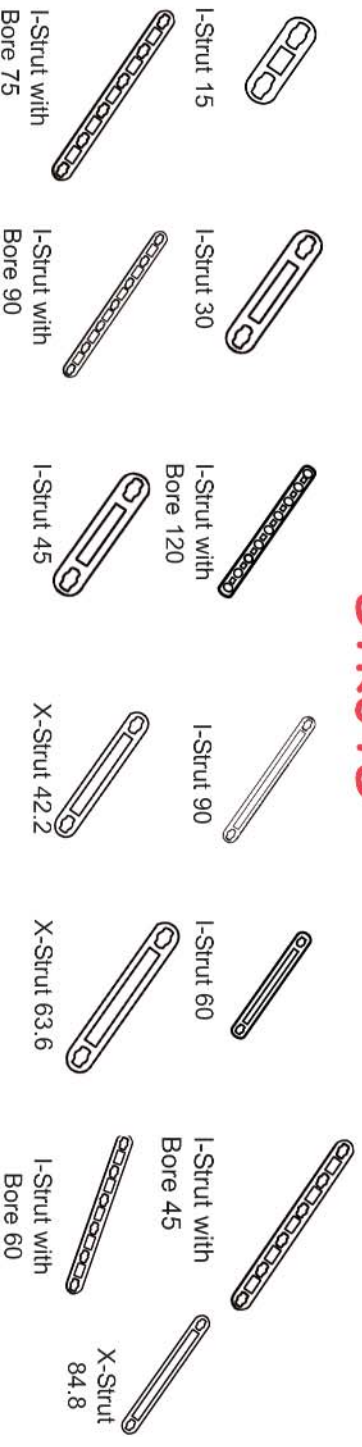
PLATES



PNEUMATICS



STRUTS



MISCELLANEOUS

