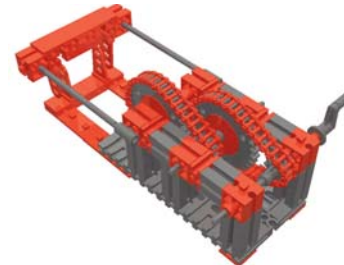
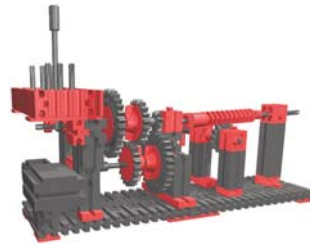
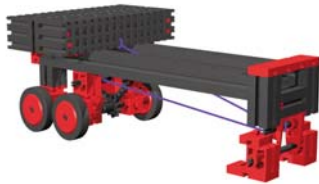


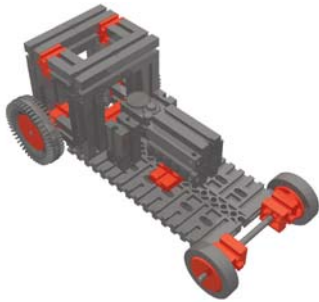


**Gear Train Series  
Teacher's Edition**

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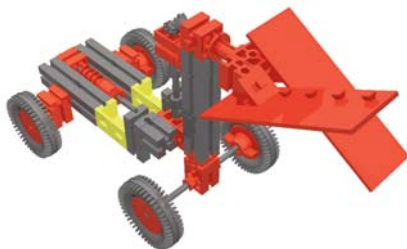
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## PROGRAM OVERVIEW

**T**he *PCS Edventures!* Academy of Engineering empowers students to learn the basic foundations of Mechanical Engineering, Structures and Architecture, and Software Engineering by completing an exciting array of hands-on activities.

**A**cademy students complete physical, tangible projects, the outcomes of which are relevant to the real-world setting of the Academy learning lab. Unlike many computer-based or Internet-delivered programs, the Academy of Engineering compels students to turn away from the computer and build models, design experiments, and solve problems in a challenging, fun atmosphere.

## THE GEAR TRAIN SERIES

- **ME103 - Introduction to Gear Trains**

Provides a step-by-step formula for calculating the ratio of a gear train. Students will learn how the ratio of a gear train can alter the speed and torque of a machine. Mathematical accuracy and calculations will be imbedded into each unit. Terminology introduced includes nomenclature specific to gears and gear train systems.

- **ME203 - Belt and Chain Reduction and Gear Transmission Methods**

Provides continued experience in the area of belt and chain reduction. Students experiment with both systems of power transfer to explore the advantages and disadvantages of both types.

- **ME303 - Torque and Horsepower**

Provides an in-depth study of the mathematical workings for finding Work, Torque, and Horsepower. Students will be able to understand when horsepower is desired rather than torque and what type of everyday machines demonstrate these concepts.

- **ME403 - Study of Complex Gear Systems**

This unit provides students with the opportunity to apply all of their knowledge in an intensive, personalized research and design project. Students are required to integrate technology into their project and present it to their class. They must also teach a lesson to their peers. Students apply their knowledge to the design and creation of gear systems. A summation of the series, ME403 includes, but is not limited to, the concepts of gear ratios, work, and torque.

# SUGGESTIONS FOR TEACHING

Each Academy of Engineering 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 ME103 or ME403, 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 Engineering Online Assessment Website ([academy.edventures.com](http://academy.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 for the unit. We recommend you read it before teaching. Terms can be looked up using the Term Library accessed at the *PCS Edventures 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:** This project either introduces the principles and skills needed to master the topic, or it gives instructions for building a device which will be used in an experiment presented in Project 2. The three major sections to the project are:

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.

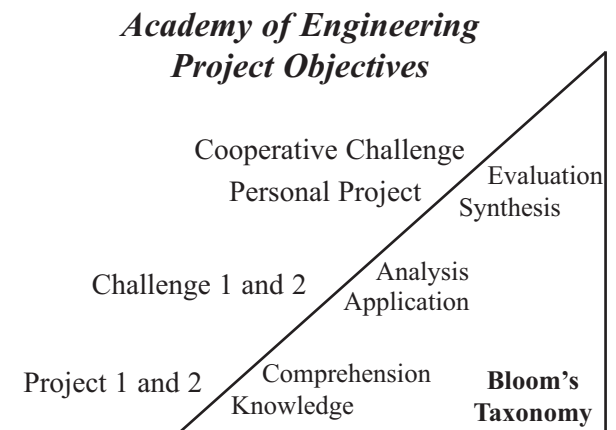
In the "Make sure you have" section, lists of materials are presented with pictures for ease of use. The "Build..." section includes text and photographic instructions for the project. The "Try this..." section is meant to be used with the Online Assessment process within the Academy of Engineering Online Assessment Website ([academy.edventures.com](http://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.

**Project 2:** This project functions just like Project 1, however, it will generally focus more on comprehension of the principles than on building.

**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 mastery of the material.

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



# Gear Train Series Table of Contents

## ME103 - Introduction to Gear Trains

### *ME103 UNIT 1: GEAR REDUCTION*

Preparation .....	1
Standards .....	2
Background .....	3
Project 1: Gearing Down .....	4
Project 2: Itty Bitty Winch .....	7
Challenge 1: Paper Crinkler .....	11
Challenge 2: More Power! .....	11
Personal Project .....	12

### *ME103 UNIT 2: POWER RATIOS*

Preparation .....	14
Standards .....	15
Background .....	16
Project 1: Souped-Up Cruiser .....	17
Project 2: Amazing Rolling Windmill .....	22
Challenge 1: Drag Racers .....	28
Challenge 2: Who's the Strongest? .....	28
Personal Project .....	29

### *ME103 UNIT 3: SPEED RATIOS*

Preparation .....	31
Standards .....	32
Background .....	33
Project 1: A Few Quick Turns .....	34
Project 2: Blown Away by Speed Ratios .....	38
Challenge 1: Buzz Saw .....	42
Challenge 2: Goal Kicker .....	42
Personal Project .....	43

### *ME103 UNIT 4: WORM GEAR REDUCTION*

Preparation .....	45
Standards .....	46
Background .....	47
Project 1: A Clever Hoist .....	48
Project 2: A Helping Hand .....	53
Challenge 1: Wheelin' with the Worm .....	58
Challenge 2: Worm Driven Gate .....	58
Personal Project .....	59
Cooperative Challenge .....	61

## ME203 - Belt and Chain Reduction and Gear Transmission Methods

### *ME 203 UNIT 5: REDUCTION WITH BELTS AND CHAINS*

Preparation .....	63
Standards .....	64
Background .....	65
Project 1: The Claw: Belt Version .....	66
Project 2: The Claw: Chain Version .....	71
Challenge 1: Crossing Guard: Belt Version .....	77
Challenge 2: Crossing Guard: Chain Version .....	77
Personal Project .....	78

### *ME 203 UNIT 6: GEAR TRANSMISSION*

Preparation .....	80
Standards .....	81
Background .....	82
Project 1: Forward and Reverse .....	83
Project 2: Three-speed Transmission .....	88
Challenge 1: Worm Gear Transmission .....	96
Challenge 2: Four-Speed Transmission...or is it Six? .....	96
Personal Project .....	97
Cooperative Challenge .....	99

# Gear Train Series Table of Contents

## ME303 - Torque and Horsepower

### ME 303 UNIT 7: TORQUE AND HORSEPOWER

Preparation .....	101
Standards .....	102
Background .....	103
Project 1: Torque .....	104
Project 2: Horsepower .....	108
Challenge 1: More Motors, More Torque .....	111
Challenge 2: More Power to You! .....	111
Personal Project .....	112
Cooperative Challenge .....	114

## ME403 - Study of Complex Gear Systems

### ME 403 UNIT 8: DRIVE TRAINS

Preparation .....	116
Standards .....	117
Background .....	118
Project One: The Tractor Sled .....	119
Project Two: The Tractor .....	125
Challenge One: Test Your Tractors! .....	131
Challenge Two: Pull that Bottle! .....	131
Personal Project .....	132
Cooperative Challenge .....	134

## Appendix

Teacher Answer Key .....	136
Alignment with National Science Standards .....	142
Alignment with Project 2061 Benchmarks .....	143
Quizzes .....	145
Quiz Answer Key .....	153

