

FastTrack RC Curriculum Booklets

Electronic versions of these booklets and additional resources are available on the FTRC Team Web Site.

Booklet	Section	Title	
-	Welcome Pack	Binder Pocket	FTRC Web Login, Registration, Quick Start Guide
1	FastTrack RC National STEM League Handbook	A	FTRC Rules & Guidelines
		B	League Points Schedule, System & Points Forms
		C	Challenge Tracks & Scores
		D	Other (non-point) Challenges
2	Curriculum & Fundamentals	A	Customizing the FTRC Curriculum
		B	Pre-Requisites or First Steps for success in problem solving
3	Project Management & Marketing	A	Sponsorship, Marketing & PR
		B	Project Management: Example Team Plan
		C	Project Management: Our FTRC Team Plan
4	Chassis Set-Up Investigations (Procedure Booklet & Data Booklet)	A	Intro to Race Engineering
		B	Hitting Your Mark (Consistency)
		C	Gear Ratios & Track Mapping
		D	Traction (Friction Coefficients)
		E	Energy, Strategy & Scores
		F	Chassis Geometry (Caster, Toe)
		G	FTRC Tracks 1 - 10
5	Aerodynamics Design Guide (3D CAD Options)	A	Intro to Aero, Plate Activity
		B	Upside-Down Wings
		C	Design on the FastTrack (Car body design)
6	Mechanical Engineering & Fabrication (3D CAD Options)	Intro	Intro to Mechanical Engineering & Fabrication
		A	Lower Control Arm
		B	Chassis Underplate & Nose Cone
		C	Car-Wing System
7	P.I.T. Now: Charging with Alternative Energies (3D CAD Options)	A	History & Future of Transportation Presentations
		B	Optional Calculus Activity, P.I.T. Now
		C	Charging Your Electric FTRC car
		D	Wind Power Charging Station
		E	Solar Power Charging Station
		F	Caps, Trades & Carbon Taxes
8	Math Lessons	1-10	Math lessons
9	Science Lessons	1-12	Science Lessons
MS	Grades 6 - 8	1-13, 3 books	FastTrack RC for Middle Grades

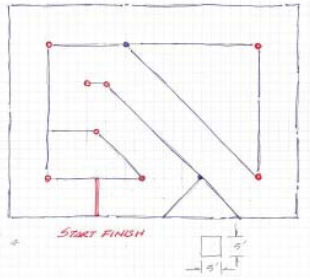
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FastTrack RC Integrated Curriculum

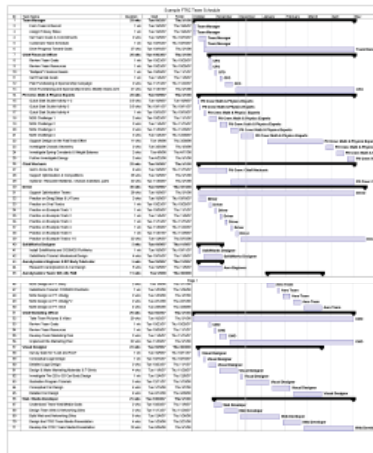
Print Pack Includes Booklets 1 - 6 and 10 - 12
 e-Curriculum at FTRC Team Web Includes Booklets 1 - 12

1. FTRC National STEM League Handbook



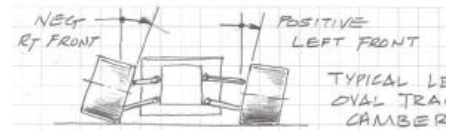
2. FTRC Curriculum & Fundamentals

3. Marketing & Project Management

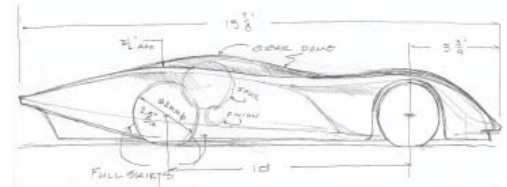


- Project Manager
- CFO
- Marketing
- WebDesigner
- Visual Designer
- Race Engineers
- 3D CAD Designer
- Aero Team
- Drivers

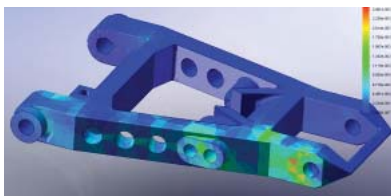
4. Chassis Set-Up Investigations



5. Aerodynamic Projects



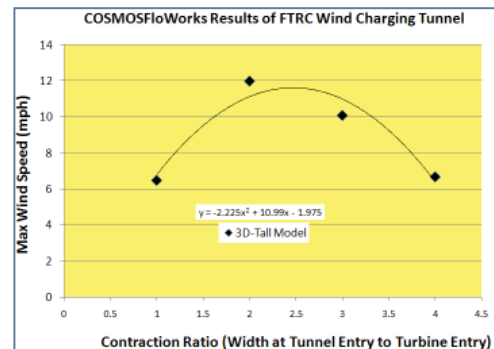
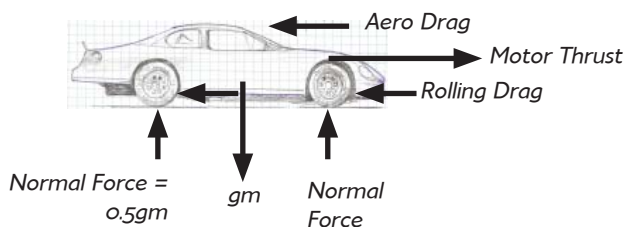
6. Mechanical Engineering



7. P.I.T. Now (Alternative Energies)

8. Applied Math Lessons

9. Applied Physics Lessons

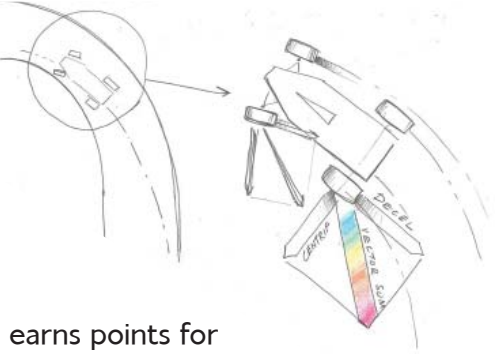


10-11-12. FTRC for Middle Grades

FTRC Curriculum Contents

The FastTrack RC (FTRC) is an integrated STEM¹ program and league in which students build teams around 1:10 scale cars that mirror professional motorsports teams in almost every way. Schools often start using the FTRC as a STEM course or club and over time, evolve to include the FTRC lessons in science, math, management, business enterprise and art/design classes.

The curriculum is broken into a number of booklets, each booklet with a number of projects or investigations. Though you do have to make some early choices about how to use the FTRC, the modular curriculum makes it easy to implement as a:



1. Math, Physics or Applied Science courses
2. Pre-engineering or STEM course
3. Pre-engineering or technology modules
4. STEM Club that competes over the web or face-to-face and earns points for integrating artists, writers, future business leaders.

Booklet #1 is the National FTRC STEM League Handbook that tells you how to earn points and run competitions. Practice internally, compete within your school or district or host a regional competition using the Challenge tracks and scores provided.

This Booklet #2 will help you plan how to organize and implement your FTRC program.

Booklet #3 is on Marketing & Project Management (PM). The marketing section provides you with tips for marketing your team to sponsors and an example marketing pack. The PM section provides you with common planning tools like Gantt Charts an example project plan.

The Chassis Set-Up Investigations Booklet #4, Aerodynamic Design Booklet #5 and Mechanical Engineering Projects Booklet #6 are race engineering resources.

- Chassis Set-Up means optimizing race performance through modifying and adjusting the chassis
- Aerodynamics Projects improve speed and handling with more down force and less drag.
- Mechanical engineering can improve the strength & stiffness to weight of various parts.

Go green and charge your car's battery through alternative energies using Booklet #7, PIT NOW. Make a solar or wind charging station and learn how to take a major step toward Petroleum Independent Transportation, NOW.

Booklets #8 and #9 are collections of Physics and Math extension lessons. Share them with all science and math teachers in your school or organization.

The Middle School booklet integrates 'small' RC cars with the 'big' FTRC cars for a grade-appropriate program that prepares students to excel in STEM through high school.

¹ STEM = Science, Technology, Engineering & Mathematics

FTRC Projects & Investigations

To reach any goal, students and educators must first define them. Once you understand your goals, you can plan how to achieve them. The Project Management & Marketing booklet will help you through this process that is critical for success in any organization.

A major goal for any FTRC team is to perform well in races. The FTRC car comes ready-to-run, but it doesn't run as well as you need it to. Only through race engineering can you get the high performance you want. Race engineering can boil down to two types of activities:

1. Set-up: adjust and optimize settings through investigation
2. Modification: design and modify parts through projects

Set-up means you are choosing the right setting or type for an existing part (like gears or springs). Modification means you're changing the part or building a new one altogether.

A goal in all setup and modification is to improve energy efficiency, but where will that energy come from? FTRC cars are fueled by electrical energy that can come from conventional power plants (plug into the wall), solar, bio or wind sources. The P.I.T. Now! projects help you solve one critical aspect of creating Petroleum Independent Transportation: establishing refueling (recharging) sites.

You can drive the FTRC car the moment it arrives but there are over 14 million answers to the question, "How will you set it up?". A "set up" is the combination of gear set, spring settings, camber, toe angles, etc. The right one depends on track layout, conditions and score. Chassis Set-Up investigations help solve the 'set up' problem.

There are an infinite number of ways you can modify the car to improve speed, handling and energy efficiency. If you sketched a concept car, it probably wouldn't look like the stock car you received. It might be sleek for low drag like full-sized electric cars. It might have an upside-down wing to add down force like a Sprint or Formula 1 car. Aerodynamic Projects guide you through designing & engineering your concept car body.

With all the added down-force you'll get from your new or improved car body, parts like the lower control arm might need to be reinforced to keep from snapping. The Mechanical Design & Fabrication book guides you through the process of evaluating and engineering improved parts. (Optional) You'll save time and resources by using 3-D CAD to make sure you fabricate only effective designs.

A curriculum specifically for middle grades is provided.

Reinforce and extend core standards-based concepts from FTRC projects with lessons from the Math and Science on the FastTrack books. Share them with science and math teachers in your school.

