PEAK OF FLIGHT NEWSLETTER

ISSUE 557 / SEP 28TH 2021

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EDUCATIONAL RESOURCES AT APOGEE COMPONENTS

https://www.apogeerockets.com/Rocket-Kits/Skill-Level-2-Model-Rocket-Kits/Pluton

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APOGEE COMPONENTS

PEAK OF FLIGHT

Educational Resources at Apogee

By Michelle Mason

With the new school year starting, it seemed like a good time to go over the many resources that Apogee Components has to help teachers, mentors, coaches, club leaders, and others share model rocketry with students. Honestly, we have so many resources that even we forget them all! This article will present you with some tools to include rocketry in your programs this year. And if we are missing something, let us know! We are always looking for ideas and resources to make model rocketry as accessible as possible to all ages.

If you are reading this newsletter, you are probably familiar with our website www.ApogeeRockets.com. While Apogee is a retail company, we actually like to think of ourselves as an educational company that sells products and resources. That is why we make so much of our material available at no cost (as you will see below). An educated customer is actually a happier customer, because you can be confident that when you do decide to spend money with us, those products will be exactly what you need to accomplish your goal. The first section below covers the free materials we have available.

www.ApogeeRockets.com/RockSim/RockSim_Information

FREE RESOURCES

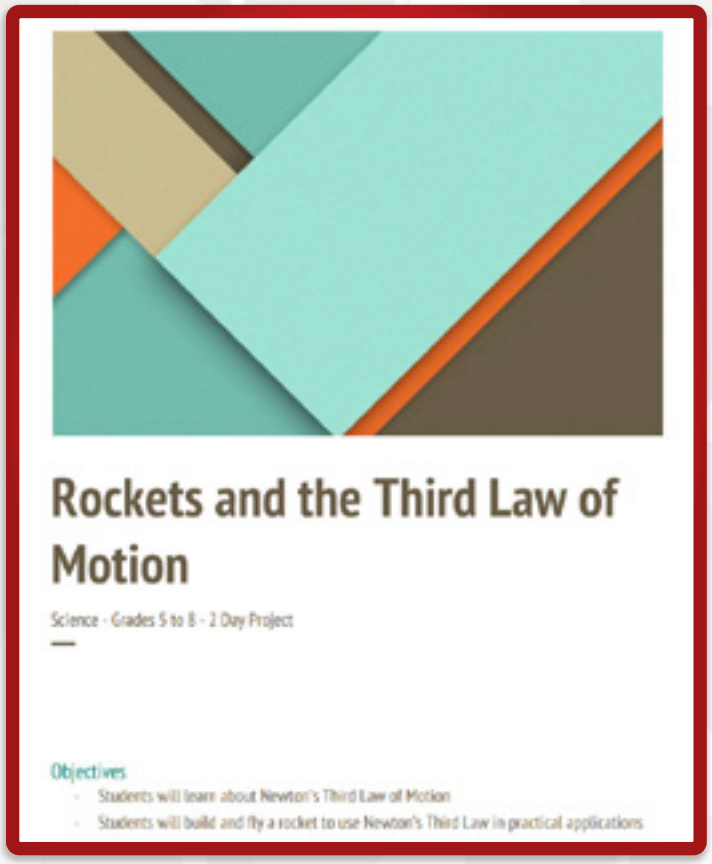

FIGURE 1: FREE LESSON PLANS

We have had a number of teachers and educators ask about lesson plans for rocketry, and in 2020, we added a number of them to our website, accessible at: www.ApogeeRockets.com/Ed. These plans range in age from upper elementary school through high school, and include a range of topics including rocket design, stability, determining optimum parts to achieve your desired goal, and basic physics. The plans list which National Standards they meet as well, which helps teachers line up projects with the goals they are working to reach. The page also includes a massive rocketry project intended to simulate starting a rocketry company similar to SpaceX, and the process the company takes from idea through execution.

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About this Newsletter
You can subscribe to receive this e-zine FREE at the Apogee Components website www.ApogeeComponents.com, or by clicking the link here Newsletter Sign-Up

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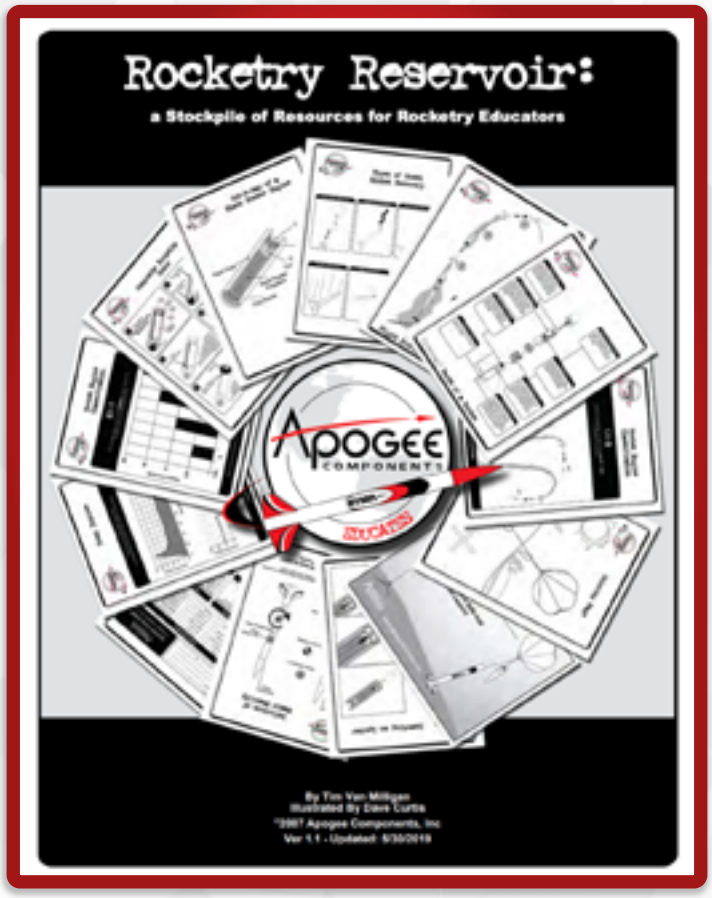

FIGURE 2: FREE ROCKETRY RESERVOIR PDF

For the teacher who wants a more comprehensive resource, the Rocketry Reservoir is a must have PDF. This 100 page document covers all of the basics when teaching about model rocketry, including parts of the rocket, why motors are named the way they are and how they work, basic physics like lift and drag, how to safely set up a model rocket launch, and much more. There are student worksheets and teacher resources for each topic, which can easily be projected or copied for quick distribution. Whether you are doing a full unit on all the aspects of model rocketry or just a quick launch where you want to cover a few basics, this reservoir of knowledge is indispensable.

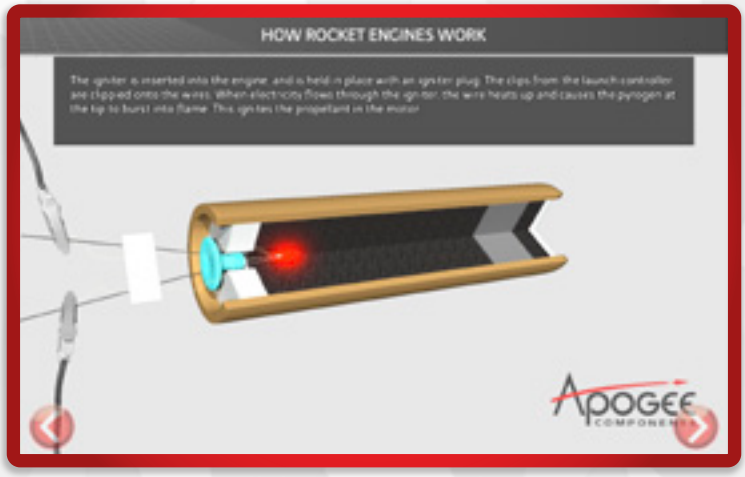

FIGURE 3: FREE ANIMATIONS AND INTERACTIVE PAGES

Sometimes, a worksheet just doesn't cut it. In this case, we have several animations and interactive web pages that are fun and informative. We have two animation videos showing how Black Powder Motors (https://www.apogeerockets.com/Tech/How_Rocket_Engines_Work) and Composite Motors (https://www.apogeerockets.com/Tech/How_Composite_Rocket_Engines_Work) burn - did you know they burn differently? This is something that would be impossible to show in real life, so we have created this resource to explain the process, walking step by step from ignition until the parachute ejection charge is deployed.

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An additional animation of how Two Stage Rockets Work (https://www.apogeerockets.com/Tech/How_2-Stage_Rockets_Work) shows what happens when two motors are stacked on top of each other.

FIGURE 4: PHASES OF A ROCKET'S FLIGHT

Next, we have animations on Phases of a Rocket's Flight (https://www.apogeerockets.com/Tech/Phases-of-a-Rockets-Flight). This steps through each phase of the rocket's flight from lift-off to landing. Each phase has a popup that explains in detail when the phase begins and ends, and what is happening during this time. This allows students to not only visualize, but also understand the importance of each phase of a flight.

FIGURE 5: THE INTERNAL AND EXTERNAL PARTS OF A ROCKET

Finally, we have an interactive page that covers both the internal and external Parts of a Rocket (https://www.apogeerockets.com/Tech/Parts_of_a_Rocket). This allows the user to click on each part and see the purpose of it as well as links to learn more and also browse our inventory to see the different varieties available.

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Free Educational Resources and Technical Information

In addition to the tools mentioned above, we have even more assistive material under our How-To & Guides menu. Our Educational Resources section contains additional pages with helpful links on topics like starting a model rocketry program, design and construction tips, payload ideas, predicting a rocket's altitude and more.

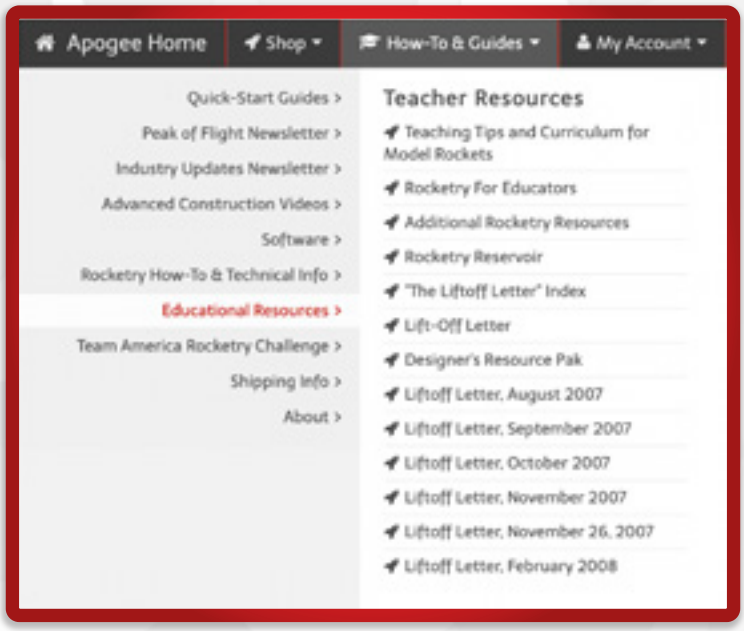

FIGURE 6: HOW-TO & GUIDES MENU ON THE APOGEE WEBSITE

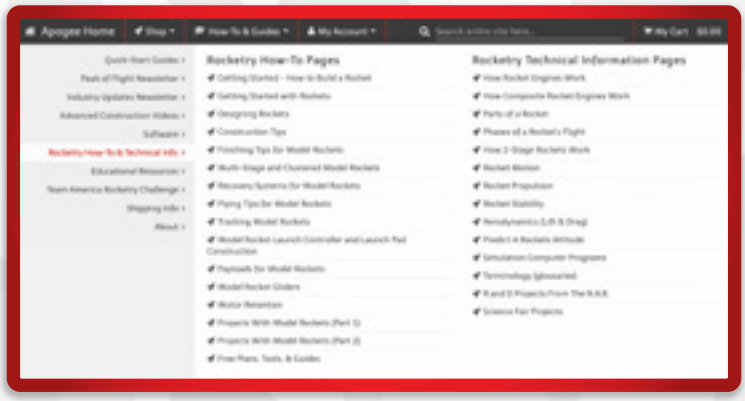

FIGURE 7: APOGEE'S ROCKETRY HOW-TO & TECHNICAL SECTION

In the Rocketry How-To & Technical section, there are links to many of the pages listed above, as well as more technical information like terminology and Science Fair project ideas.

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Free Peak of Flight Newsletter Archive

FIGURE 8: PEAK OF FLIGHT NEWSLETTERS

Every other week we release our Peak of Flight Newsletter. Each issue contains a specific topic that has come up in the model rocketry community. We archive all of these and make them available to the public at: https://www.apogeerockets.com/Peak-of-Flight?pof_list=archives. With over 550 issues released so far, this is a huge resource for anyone looking to learn more about rocketry. If you want to look for articles by topic, we also offer a topical index of the articles: https://www.apogeerockets.com/Peak-of-Flight?pof_list=topics.

Free Video Tutorials

The ability to share videos has opened up teaching model rocketry to a new level. Being able to watch someone walk through a process, or manipulate an item so you can see it from all angles allows you to gain a much better understanding than following 2D printed instructions, or trying to see a kit by just viewing the photos. Apogee has embraced videos and has so many, it can be overwhelming. These are some of the categories of videos available.

FIGURE 9: ADVANCED CONSTRUCTION VIDEOS

Released every other week, our **Advanced Construction Videos** (https://www.apogeerockets.com/Advanced_Construction_Videos/all) complement our Peak of Flight Newsletter. In these how-to videos, Tim Van Milligan walks through a specific task each time. Not only

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Educational Resources at Apogee

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FIGURE 10: ROCKSIM VIDEO TUTORIALS

does this show the process of how to do the project, but Tim will also give his thoughts, offer up alternatives, and sometimes even makes mistakes (just like every modeler) and then has to correct them. Seeing this through video gives a much more complete experience.

Tim has also taken a number of our kits and made **video series around building the kits**. This covers several of our beginner kits, including our Getting Started in Rocketry video series (https://www.apogeerockets.com/How-To/Getting_Started_How_to_Build_a_Rocket), which covers building a Skill Level 1 beginner kit. This is great for first time builders because they can see the process before they even start, and re-watch each step as they work along. The videos also cover some of our more complicated rockets, where it is nearly impossible to write out directions for some of the most complicated steps, like the Saturn V kit: https://www.apogeerockets.com/Rocket-Kits/Skill-Level-5-Model-Rocket-Kits/Saturn-V-1-70th-Scale.

In addition to this, Apogee also has a number of video tutorials (https://www.apogeerockets.com/RockSim/RockSim_Video_Tutorials) on how to use the RockSim software (https://www.apogeerockets.com/RockSim/RockSim_Information). These tutorials walk through the beginning steps of running a simulation using a file already loaded into the system, and progress onto designing your own kit and flying more complicated setups like strap-on pods and dual-deployment. These videos train the user on how to use the software, and answer the most common questions Apogee gets from customers. In 2021, Apogee also started doing RockSim Live training videos (https://www.apogeerockets.com/RS-Live-Training), where users can ask Tim questions in real time. We archive those as well to be used later. Each video lists the topics covered and the time stamps, so you can jump straight to the answer to your question immediately.

FIGURE 11: ROCKSIM TRAINING LIVE

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FIGURE 12: UNBOXING WITH A ROCKET SCIENTIST

All of these videos and more are also available on the Apogee Components YouTube channel (https://www.youtube.com/c/apogeerockets). The YouTube channel also includes fun videos like Unboxing with a Rocket Scientist, where you can hear Tim's thoughts as he opens up a kit and looks through the package and instructions, and Behind the Scenes at Apogee.

Legal, Rules and Regulations and Safety

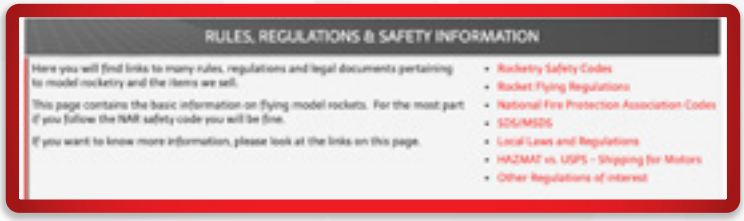

FIGURE 13: ROCKSIM TRAINING LIVE

One of the things that many teachers are concerned about is the safety of model rocketry, as well as the rules around flying rockets. Apogee provides a page on our website linking to all the National Laws, Rules and Regulations surrounding model rocketry at: https://www.apogeerockets.com/Legal. This includes the laws regarding flying from the FAA, fire codes from the National Fire Protection Association, the Model Rocketry Safety Code from the National Association of Rocketry, as well as SDS (formerly MSDS) sheets for items. Rocketry has proven an incredibly safe hobby because we follow these safety codes.

Item Web Pages

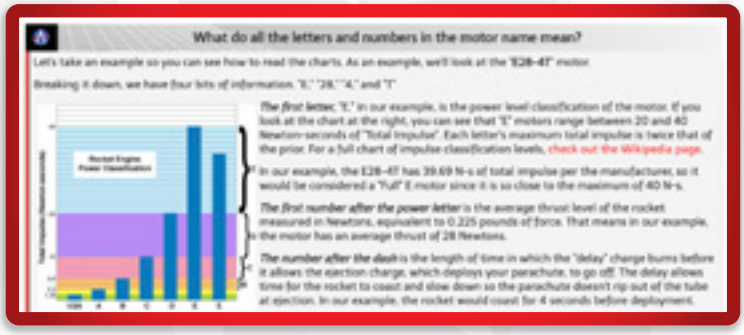

FIGURE 14: MOTOR PRODUCT PAGE INFORMATION

While the item pages are normally viewed as a way to purchase items, they actually are so much more. Each item page includes a description of the item. Motor pages will explain in detail about how the motor is named, the different propellant types, and additional equipment required. Kit pages tell the story of the rocket, explain why it is rated as a certain skill level, list tools and supplies needed to build

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them, and recommend motors. Part pages explain the function of the part, describe the materials used to make them, and link to other parts that they fit. Most pages have frequently asked questions, related items linked, and some have instructional or informational videos. If you compare our item pages to other websites, you can see that we consider them informational pages instead of just throwing up a photo and a price.

Grant Program

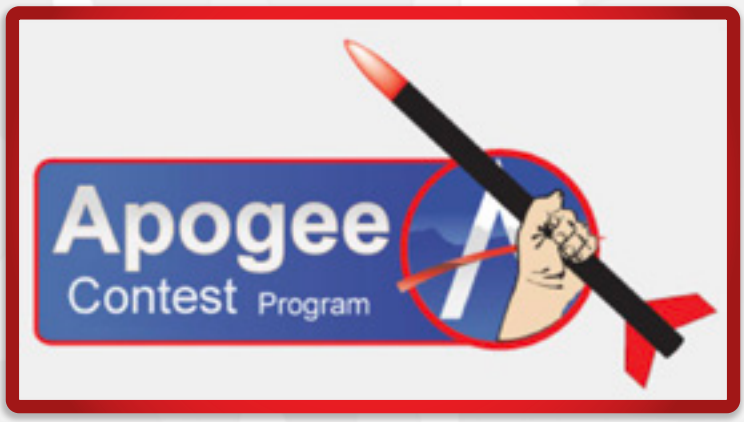

FIGURE 15: APOGEE GRANT PROGRAM

We get asked all the time if we can sponsor school teams and clubs. In response to that, we created an annual Apogee Grant Program (https://www.apogeerockets.com/Rocketry_Grant_Program), which provides $300 in store credit to the winner. The applicants need to provide a video explaining their program, why they love Apogee, and how they use our products in their program. The deadline is November 30th each year, and we'd love to see more groups apply.

TARC Resources

FIGURE 16: QUICK START GUIDE

There are many educational rocketry competitions across the country and world, but The American Rocketry Challenge is one of the biggest. Because of this, we have created a number of helpful tools for TARC, which are grouped in our Quickstart Guide: https://www.apogeerockets.com/Team-America-Rocketry-Challenge. This challenge provides middle and high schoolers the opportunity to compete for scholarships by building and flying rockets to meet the annual altitude and flight time goals.

All of the above resources mentioned are completely free to use, because we feel that education is one of the best marketing strategies. The more informed you are, the better you can make decisions about what to buy and what NOT to buy. With that being said, we do offer a number of great products that we think are invaluable, which we would also like to highlight.

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VALUABLE RESOURCES FOR PURCHASE

FIGURE 17: ROCKSIM

RockSim Software/Launch Visualizer

As mentioned above, the RockSim software (https://www.apogeerockets.com/Rocket_Software/RockSim) is a great tool for designing your custom built rocket. For students, it allows them to design a rocket, tweak it, play with different motors, all without the difficulty or expense that real world experimentation would require. Once they have honed their design, they can use the software and determine the real world parts needed to build their rocket and fly it. Many of the students in the TARC competition mentioned above find this software invaluable. It allows them to test different design and motor combinations to narrow in on the best choices to meet the qualifications. Without a tool like RockSim, they would have to build and fly repeatedly, which would waste time and resources.

There is also a free 30 Day Trial of RockSim available to test out.

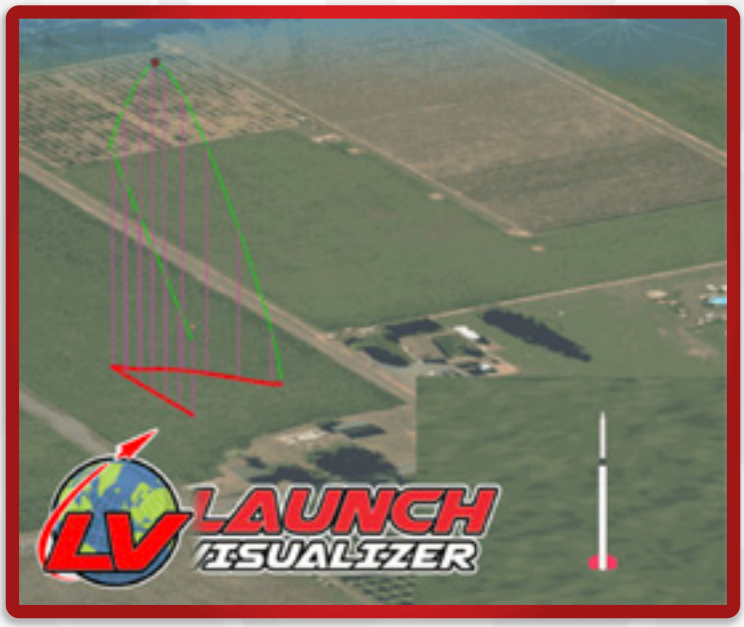

FIGURE 18: LAUNCH VISUALIZER

In partnership with RockSim, the soon-to-be-released Launch Visualizer will allow the student to view their rocket design launching from a real world location, and to analyze the flight in order to fine-tune the flight further to achieve their mission.

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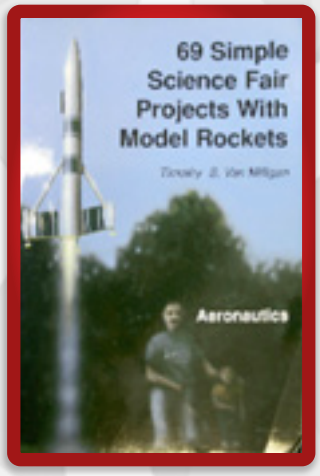

FIGURE 19: SCIENCE FAIR PROJECTS BOOK

Books

Apogee sells a variety of model rocketry books. For students, the Model Rocket Design & Construction is a useful book that covers assembly techniques to design your own kit from scratch. It includes a large glossary of terms at the back, and the book covers a variety of rocket designs including the standard 3-Fins-and-a-Nose-Cone, helicopters, gliders, multi-stage and more. Our 69 Simple Science Fair Projects with Model Rockets book offers a variety of ideas for when project time comes around.

Data Sheets, Pamphlets & Reports

As a teacher or group leader, you might be thinking that you would like to fly rockets with your students, but don't know how to quantify or grade their work. We offer a number of products that can assist with a successful launch day.

The Apogee Data Sheets (https://www.apogeerockets.com/Rocket_Books_Videos/Data_Sheets) provide a sheet to draw out the design, a sheet to write out all the specs of the rocket, another to prep for launch, and a final sheet to record all of the flight data from the launch. Not only does this direct the student to think out each step of the process, it provides useful data for feedback after the flight.

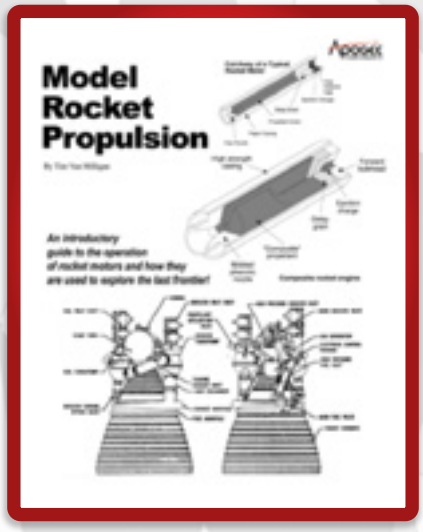

FIGURE 20: TEACH ABOUT HOW MOTORS WORK

In addition to the Data Sheets, we also sell a number of publications intended for educators and group leaders (https://www.apogeerockets.com/Rocket_Books_Videos/Pamphlets_Reports). The Conducting a Safe & Scientific Launch in Large Group Settings mimics the launch of the Space Shuttle, while providing the steps needed to ensure your launch is successful and safe. The Altitude Tracking Device is an inexpensive, ground based way to track a rocket's altitude. This also teaches some rudimentary geometric ideas, but is easy enough for young rocketeers to use.The Model Rocket Propulsion booklet explains in simple terms how model rockets work. It includes questions for students and a teacher's answer key, which provides built in learning tools. Teaching with Model Rocketry provides model rocketry topics for every educational subject, so you can even incorporate model rocketry into non-STEM classes to reach a broader pool of students.

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FIGURE 21: ONE OF THE APOGEE ROCKET BUILK PACKS

Beyond educational tools, Apogee also provides model rocket kits that are suited to teaching environments. Several of our kits are available as bulk packs (https://www.apogeerockets.com/Rocket-Kits/Bulk-Rocket-Packs), making larger numbers of kits more affordable for a larger group setting. These kits are all easier skill levels, so that they are easy to build in a classroom or group environment. We also carry motor bulk packs (https://www.apogeerockets.com/Rocket_Motors/Motor_Bulk_Packs) which reduce the cost per motor. And the Bulk Packs can be made into a Combo Set, so you can get the kits, motors, launch pad and launch controller that you will need.

FIGURE 22: A SCIENCE FAIR PROJECT KIT

We also provide two individual Science Fair rocket kits. These are designed with the project in mind, The Fin Shape Science Experiment kit (https://www.apogeerockets.com/Rocket-Kits/Skill-Level-2-Model-Rocket-Kits/Fin-Shape-Science-Experiment-Kit) examines how fin shape affects altitude, where the Avion Science Fair kit (https://www.apogeerockets.com/Rocket-Kits/Skill-Level-1-Model-

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Rocket-Kits/Avion-Nose-Cone-Science-Fair-Kit-24mm) looks at how nose cone shape changes the flight.

These are just a handful of the resources that Apogee Components provides through our website to assist people in learning more about rocketry. Pretty much every page on our website has some sort of content to help you learn more about rocketry, and that is intentional. If you haven't noticed it yet on our website, here is our mission statement: Your Success is Our Mission.

With that in mind, our final resource to highlight is our staff. Apogee is one of the few model rocketry companies that you can call and talk to a real person. If your question is not answered here or on our website, you can email, chat or call us during business hours and we will work to answer all your questions, and find the products and resources you need to accomplish your goals. That might be a fun, end of year launch day for elementary school kids, a year long STEM based project with high school students, a science fair project with a child, or just a weekend trip to the park with some friends. Everyday we get calls, chats and emails from teachers, students, mentors and parents asking for assistance with their rocketry projects. We enjoy helping our customers get what they need, and celebrate when we see photos of their successful flights. Let us help you to achieve your mission.

Additional Resources:

https://www.apogeerockets.com/education/downloads/Newsletter07.pdf

https://www.apogeerockets.com/education/downloads/Newsletter190.pdf

https://www.apogeerockets.com/education/downloads/Newsletter171.pdf

https://www.apogeerockets.com/education/downloads/Newsletter112.pdf

https://www.apogeerockets.com/education/downloads/Newsletter22.pdf