PEAK OF FLIGHT NEWSLETTER

Issue 602 / June 20th 2023

APOGEE COMPONENTS
www.ApogeeRockets.com
4960 Northpark Dr, Colorado Springs CO 80918
Ph# 719-535-9335

In This Issue:

Getting Started In Rocketry

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4th of July Rocket Decor

https://www.apogeerockets.com/Model-Rocket-Kits/Skill-Level-3-Model-Rocket-Kits/So-Long

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Getting Started in Rocketry

By Michelle Mason

Getting Started in Rocketry

Getting started in rocketry can be both exciting and intimidating. We want rocketry to be as accessible as possible to as many people as possible, so this article is going to cover everything you need to know to start your rocketry hobby. And if you are already an experienced rocketeer, this reference may be a great resource for sharing with your friends and family to get them started in your favorite hobby!

We will be covering the following:

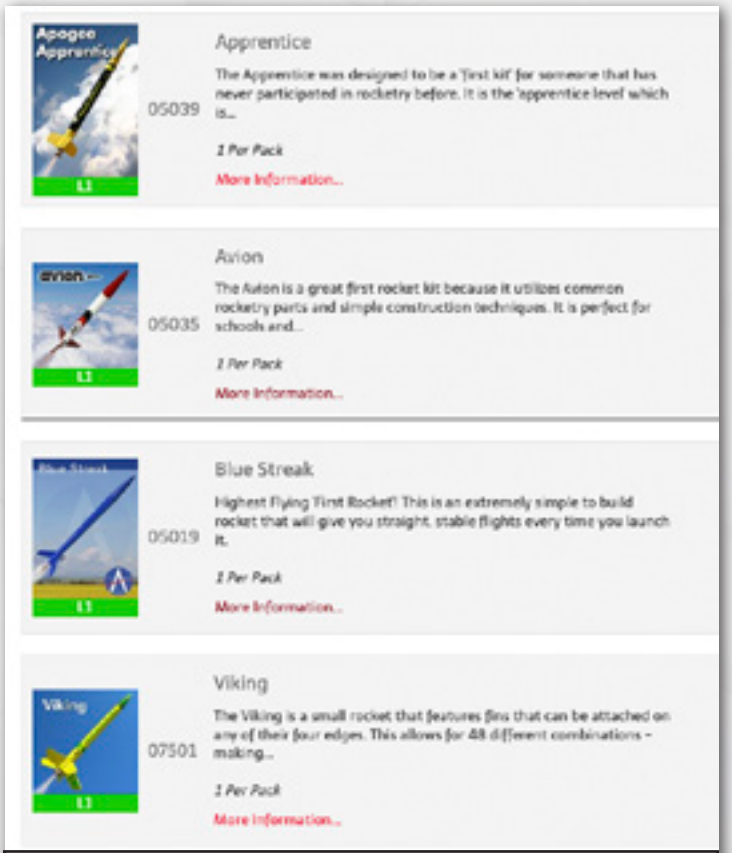
- How to choose a rocket, launch system, and motors?
- What else do you need?
- How to choose a launching location?
- Safety concerns
- Resources for learning building techniques and other rocketry basics

The Apogee Apprentice Starter Set

And if there is anything else you want to know, reach out and we can either direct you to an existing article, video or webpage, or we can possibly create one - we are always looking for content ideas.

What Model Rocket Should I Get?

Choosing a rocket may seem like a daunting task. There are so many options out there - how do you know which ones will work for you? If you are new to rocketry, I would highly suggest looking for a Starter Set like the Apogee Apprentice Starter Set: **https://www.apogeerockets.com/Rocket-Kits/Skill-Level-1-Model-Rocket-Kits/Apprentice-Starter-Set**. Many manufacturers sell starter sets like this, which contain a beginner rocket, a launch



A selection of Level 1 rocket kits found at www.ApogeeRockets.com

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About this Newsletter

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Newsletter Staff

Writer: Michelle Mason
Layout: Sky Luther

pad and controller, rocket motors, starters and recovery wadding. This makes it easy, because you have all the major components in one package. This also is a good way to get the equipment you need to fly, as the low power pad that comes in most starter sets will work with a lot of other kits as well.

The rocket kit that comes with most starter sets is generally a Skill Level 0 or 1, which means it is already built (Skill Level 0) or is simple to build and designed for beginners (Skill Level 1). If you want to buy additional models to build as well, or don't want to use the Starter Set, then look for Skill Level 1 rockets on the website (**https://www.apogeerockets.com/Rocket-Kits/Skill-Level-1-Model-Rocket-Kits**). Skill Level 1 means that they are simple to build, but they do require you to actually assemble the rocket. You will learn basic building skills that will help you to move forward in the hobby, which is super important as you start building more complicated rockets. Within the Skill Level 1 category, which rocket should you get? Pick the one that looks the coolest to you! There is no right or wrong answer. Each kit page on the Apogee site has a detailed description of the rocket. There is a section about why it is a Skill Level 1 rocket, and what the more difficult steps may be. There will also be parts photos, so you can see what you are getting. There may be videos for building steps, to introduce the rocket or to see it launch. We try to give you as much information as possible about each kit, so you can make an informed decision.

What Other Stuff Do I Need Besides a Rocket?

If you get the Starter Set, a lot of these items are included. But if you buy a non-Starter Set rocket kit, you will need to find these items as well.

Launch Pad and Launch Controller

In order to launch the rocket, you need a launch pad and controller (**https://www.apogeerockets.com/Launch-Accessories/Launch-Pads/Estes-Porta-Pad-II-Launch-Pad-Electron-Beam-Launch-Controller**). If you fly with a school or club, they may have these already that you can use.

The launch pad is the base that you set the rocket on. It has a rod that sticks up in the air, and you slide the launch lugs on the rocket (they look like little straws on

Estes Porta Pad II Launch Pad & Launch Controller

the outside of the main body) over the rod. This keeps the rocket facing up while it is being prepped and during the beginning of launch. If you just set the rocket on the ground and it fell over while launching, it could hurt someone or do damage to property. The pad also keeps the rocket off the ground, and has a metal plate below it. This keeps the motor's heat from starting a fire in dry grass. Finally, when the rocket launches, the rod guides the rocket while it is still going slow. Once it leaves the rod, it should be going fast enough to safely guide the rocket using the fins. This is why bigger rockets use a longer launch rod, because it takes longer for them to be stable enough to leave the rod.

The Launch Controller is the battery pack that ignites the motor. It is a box that holds batteries, and then wires that are stretched out and clip to your motor's starter (sometimes called an igniter). The controller is important, because it allows you to safely control when the rocket motor is ignited. Usually there is a safety key that has to be inserted, and then a button to be pushed to ignite the motor. This way, when you are putting the motor in the rocket and hooking the wires up to the starter, the motor won't accidentally ignite while you are there. You will need to provide batteries for your launch controller - check the page or package to see what size, as they can vary between "AA" and 9V for a low power controller.

Both the Launch Pad and Controller are based on the size of the rocket and the motor you

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NEED A PARACHUTE?
APOGEE HAS THE ONE YOU'RE LOOKING FOR!
www.ApogeeRockets.com/Building-Supplies/

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The level 1 Avion rocket ready for flight

are using. For most beginner rockets, this will be a low power pad and controller (all kits on the Apogee website state the required launch pad on the page). That means they will fly on A, B, C (and sometimes small D) motors. The launch controller's power is based on the assumption that you will use those size motors. Bigger motors require more energy to ignite, so they will need a more powerful controller, usually 12V. And as mentioned above, the larger size rockets need a bigger launch pad to accommodate the taller and heavier rocket. As you become more advanced in rocketry, this will become important if you want to fly larger models.

Choosing Motors

For beginner rockets, you will generally be using small 18mm diameter A, B and C motors (https://www.apogeerockets.com/Rocket_Motors/Estes_Motors/18mm_Motors). There are some smaller 13mm "A" motors and 18mm "D" motors, but those tend to be less common for beginner rockets. But how do you choose a motor for your rocket? The Starter Sets usually come with an "A" motor, because that is a good place to start. For motors, every time you go up a letter, you double in power. So 2 x "A" motors = 1 x "B" motor. Generally, for your first flight, you will want to use a motor with lower power. The reason for this is that on your first flight, you may realize that you glued a fin on a little crooked or a little loose, for example. The lower power motors won't be as stressful on the kit, and the flight won't go as high. So you can test fly your rocket on that lower power motor, make sure everything is glued on securely, and then try out a more powerful one.

Motor	Manuf & Type/ Casing	Color	Comment	Alt.
All	All	All	All	All
1/2A6-2 #05753	Estes Single Use	--		96 ft (29 m)
A8-3 #05747	Estes Single Use	--	Great first flight!	289 ft (88 m)
B4-4 #05749	Estes Single Use	--		643 ft (196 m)
B4-4 #05692	Quest Single Use	Fast Black Jack		724 ft (221 m)
B6-4 #05735	Estes Single Use	--		650 ft (198 m)
B6-4 #05698	Quest Single Use	White Lightning		765 ft (233 m)
C5-3 #05734	Estes Single Use	--		1099 ft (335 m)
C6-5 #05738	Estes Single Use	--		1326 ft (404 m)

A section of A, B, and C motors available at www.ApogeeRockets.com

Every rocket on the Apogee website includes a recommended motor table. This table is on the kit page, and you can get to it by scrolling down on the page (for example, the Avion rocket's motor table: https://www.apogeerockets.com/Rock-

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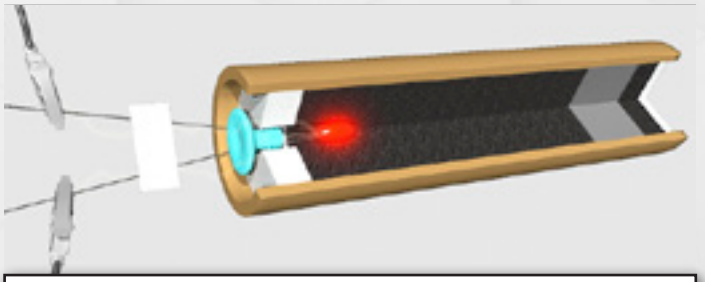
et-Kits/Skill-Level-1-Model-Rocket-Kits/Avion#motors). It will tell you which motors are recommended, how high they will fly, and sometimes notes like “Good for first flight” or “Good for small fields”. You can also see which motors are in stock. As long as you pick a motor listed in the table, you should be good. There are other motors available that aren’t always good for a rocket, so make sure to use this table when choosing motors. There are a few beginner kits that are a bit heavier, and so they can’t fly on “A” motors, for example. So the table will show only “B” and “C” motors instead. Always pay attention to how high the rocket is going to go as well. Later we will discuss your launching site, and if that site is small, you don’t want to choose a motor that will go super high. Choosing a motor is just as important as choosing a rocket.

Igniters/Starters

All motors that Apogee sells come with starters (also called igniters). There are a few larger motors sold by other vendors that do not come with them, so just be aware to look for this when buying motors elsewhere. Starters are little wires that you place in the motor to ignite it. There are usually two wires connected at the top by a blob of some sort. That blob could be made out of a few different materials, but what it does is, when the launch controller sends the electricity to the starter, that blob gets hot and ignites. That small flame and heat then ignites the motor’s propellant which begins to burn, pushing the rocket up into the sky (https://www.apogeerockets.com/Tech/How_Rocket_Engines_Work). If you buy additional starters, you will need to make sure to buy ones that fit the motor you are using. There are a bunch of different starters for all sizes of motors. For small 18mm Estes Black Powder motors, they come with the Estes StarTech™ Motor Starters: (https://www.apogeerockets.com/Rocket_Motors/Estes_Accessories/Estes_Starter_6pk). On the Apogee website, we list all compatible starters on the motor pages.



A cut away example of how black powder rocket motor igniters function

Recovery Wadding

Recovery Wadding is treated tissue paper or toilet paper that protects the parachute or streamer in your rocket from the motor’s hot gasses (https://www.apogeerockets.com/Building_Supplies/Parachutes_Recovery_Equipment/Disposable_Wadding). When your motor is done burning the propellant, the rocket will coast for a few seconds while a delay material is burning inside the motor. Once that delay is burnt all the way through, an ejection charge is expelled out the front of the motor. That charge is hot gas and bits of propellant, which flows forward in the rocket and pushes the parachute or streamer out the front of your rocket. But that means that heat is hitting your plastic parachute or streamer, and it could melt. So we use this special recovery wadding to protect it. You can’t use normal toilet paper or tissue paper, because those will burn. The treatment makes them heat resistant. You will crunch up a few pieces and put them in the rocket between the motor and the parachute or streamer. They will pop out and float away on each flight, so you will need new wadding for each flight.

Recovery wadding to protect your parachute

Tools and Building Supplies

These items do not come in the Starter Set, so you will need them for any rocket you buy. On the Apogee kit pages, we list what each kit needs for additional supplies and building tools, so you know exactly which items you will need to buy separately, or find around the house. Many of them you might have

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An assortment of basic building tools and supplies

on hand already. Here is a list of common items needed, but make sure to check the kit page for any specialty items:

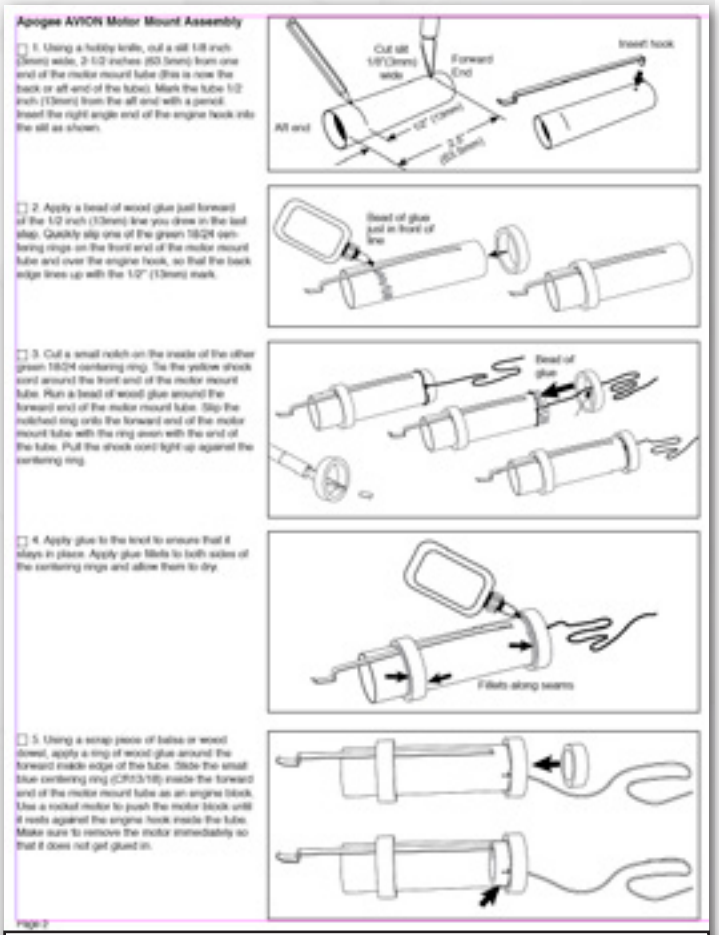
- Pencil - for drawing marks on the rocket for assembly
- Ruler - to measure for your marks
- Scissors - to cut out tube marking guides
- Masking Tape - to hold guides in place
- Hobby Knife - to cut notches in centering rings (**https://www.apogeerockets.com/Building-Supplies/Tools/Hobby-Knife-1-with-Blade**)
- Wood Glue or White Glue - to glue tubes together
- Plastic Modeling Cement or Super Glue - to glue the nose cone and shoulder together (**https://www.apogeerockets.com/Building-Supplies/Adhesives/Insta-Cure-Super-Thin-CA-Glue-1-oz-BLUE**)
- Finishing Supplies like sanding sealer, paint and sandpaper (200 and 400 grit) - to paint the rocket; You have a lot of options here, from spray paint to markers, depending on the age of the person decorating the rocket and their skills
- Batteries for Launch Controller - check the controller to see what size is needed

There are often optional tools listed as well. These are not required, but will make building a bit easier. These include:

Optional Tools for Easier Assembly or Flight:

- Aluminum angle for drawing lines on the body tube (you can also use a door frame)
- Fin alignment jigs - if you are building a rocket where you have to glue on the fins, these assist in getting the fins on straight; choose the one that fits your body tube size and number of fins (**https://www.apogeerockets.com/Building-Supplies/Fin-Alignment-Jigs**)

How Do I Build the Kit?



A sample of instructions found in Apogee rocket kits

So you've chosen the rocket kit. You have all the supplies needed to build. Now what? Where do you start? Every Apogee brand rocket has very detailed instructions

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in it that should walk you through each step with both text and an image. We spend a lot of time making sure our instructions tell you exactly what you need to know to build successfully.

In addition to the kit instructions, we have a number of How-To videos on our website, as well as a few DVDs that walk you through the process. The Apprentice Starter Set comes with a DVD of how to build that kit, and the video is also available on the kit page. Our Avion kit (which differs from the Apprentice in that it has balsa fins you need to attach one at a time), also has a video series on the kit page: https://www.apogeerockets.com/Rocket-Kits/Skill-Level-1-Model-Rocket-Kits/Avion#faqs. For general building tips, we have over 300 Advanced Construction Videos on specific topics (https://www.apogeerockets.com/Advanced_Construction_Videos/all). So if you aren't sure how to do a specific technique, you will likely be able to find a video of it on one of these pages. And if not - let us know!

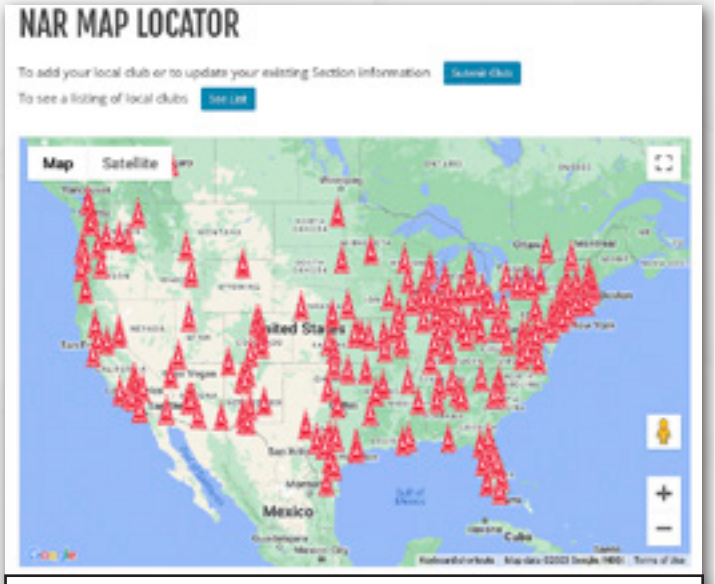
One of hundreds of available videos to help you get started with various tips and tricks

We also have a Quick Start Guide for beginners that has a lot of resources on it, not only about building and flying, but informational links as well: https://www.apogeerockets.com/New-to-Model-Rocketry .

Finally, if you have a question about a step, you can always reach out to us directly, either by phone (719-535-9335) or email: https://www.apogeerockets.com/Contact . We want you to be successful in your build, and are glad to help.

Where Do I Fly?

This is one of our most common questions, and also one of the most difficult to answer. The reason is that the regulations can vary by city, county and state. So what may be legal in our town may not be in yours.



A visual map of the many locations available to fly your rocket

The best option, if it is available, is to fly with a rocketry club. There are two national rocketry associations, so there are clubs all over the country. You can find the club closest to you by going to the National Association of Rocketry's (NAR) website at: https://www.nar.org/find-a-local-club/nar-club-locator/ or the Tripoli Rocketry Association's (TRA) Prefecture (club) site: https://www.tripoli.org/content.aspx?page_id=225&club_id=795696&mt=-None . The local clubs will know all the local rules and regulations for flying in your area. Even if there isn't a club super close by, a club in your state may know the rules and be able to tell you where it

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is ok to fly. They may also know of rocketeers in your area that would be happy to help you launch.

Another option is to fly with a school or scout club. They may have permission from the school to launch on school grounds or private land. Flying in a group is also nice, because you will have more help with setting up, launching, following the rockets in the sky, and recovering them. Plus, it's just a lot of fun to see everyone's rockets launch!

If you are trying to launch by yourself, then you will need to do some research. You will need to find a location large enough to fly safely. In the next section, we will discuss the NAR safety code, which gives estimates for field size based on the motor selected.

We also have a page of the rules and regulations of flying rockets at a national level here: **https://www.apogeerockets.com/Legal**. For your local restrictions, check with the city, the fire department, and schools. You may be able to launch in parks or sports fields, but that may require permission or notification. In our city, for example, model rockets are not allowed in city parks because there is a city regulation preventing projectiles in parks. While the rule was made to prevent archery, it also affects model rockets. But the cities an hour away from us do not have this rule. So always check - this is where the local clubs are a great resource. Also, remember to check for local fire bans - those do affect model rockets, and are very important to follow. Make sure to be prepared in case a fire does break out - a fire extinguisher is highly recommended to have on hand, just in case.

But is it Safe?

Model rocketry is actually a very safe hobby. The National Association of Rocketry developed a safety code many years ago (**https://www.nar.org/safety-information/model-rocket-safety-code/**), which all members of the hobby follow to ensure that we all stay safe. The code is mostly common sense steps, and also includes a chart on how large your field needs to be based on your motor size. The more powerful the motor, the larger the launch field required, so the rocket doesn't drift into trees, power lines, neighborhoods, etc. If you want to read more on ways to make your launch extra safe, see Jim Bassham's Peak of Flight article: **https://www.apogeerockets.com/education/downloads/Newsletter501.pdf**

LAUNCH SITE DIMENSIONS

Installed Total Impulse (N-sec)	Equivalent Motor Type	Minimum Site Dimensions (ft.)
0.00–1.25	1/4A, 1/2A	50
1.26–2.50	A	100
2.51–5.00	B	200
5.01–10.00	C	400
10.01–20.00	D	500
20.01–40.00	E	1,000
40.01–80.00	F	1,000
80.01–160.00	G	1,000
160.01–320.00	Two Gs	1,500

Recomended launch site requirements

This is also another good reason to fly with a club. Club members are experienced, and can help troubleshoot and teach about the launching process. They are also set up with safety in mind, so their equipment is the correct distance away, safety procedures are followed, and there are multiple people around to help with any issues that arise. Clubs are also insured, so if something does happen (which is rare), there is some protection there as well.

Is It Educational?

Model rocketry is a great hobby that is not only fun, but educational too. You can turn a fun rocket launch into a science fair project, a classroom exercise, even a whole unit on physics! There is so much that can be learned from model rocketry that it would be impossible to list everything here. In article #557 (**https://www.apogeerockets.com/education/downloads/Newsletter557.pdf**), I compiled a list of many of the resources we have available.

For younger rocketeers, it can be as

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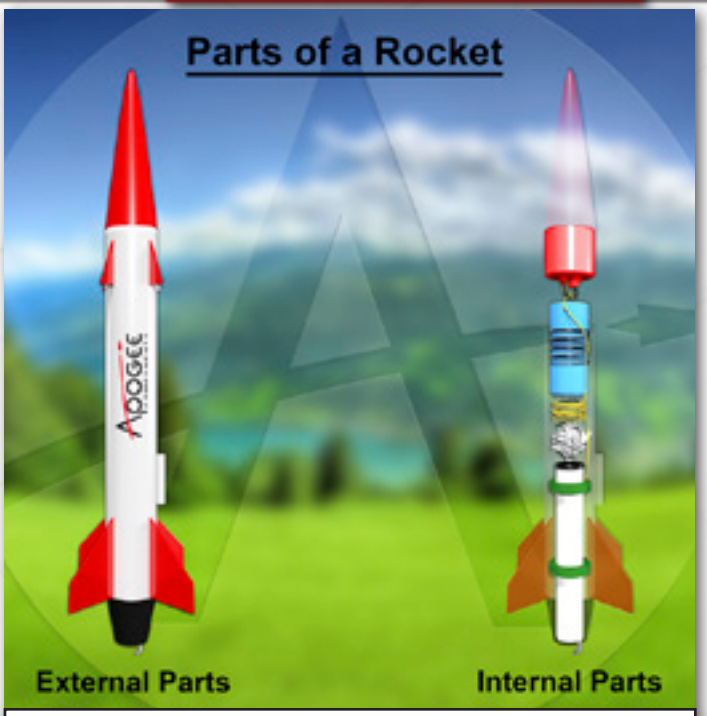


Helpful graphic to learn the different parts of a rocket

Rocketry is fun for all ages!

simple as following instructions and assembling the rocket. You can also learn about the parts of a rocket, how motors are named, phases of a rocket's flight and more (https://www.apogeerockets.com/Edu/Rocketry_Reservoir). For older students, there are units on Newton's Laws and physics (https://www.apogeerockets.com/Ed). We even have a publication on how to incorporate rocketry into non-science related subjects like English and Art: https://www.apogeerockets.com/Rocket_Books_Videos/Pamphlets_Reports/Teaching_with_Model_Rocketry.

Once you have flown the rocket, you can also analyze what happened. Did the rocket fly like you thought it would? If not, what might have affected it? What could you do differently next time? When doing rocketry, it is pretty much impossible not to learn something!

I'm Still Not Sure…

There are a lot of worries about model rocketry that make people resistant to trying it out, whether due to safety concerns or the assumed complexity of the hobby. We get phone calls all the time asking about this. Martin Jay McKee tackles many of those barriers in his article #586: https://www.apogeerockets.com/education/downloads/Newsletter586.pdf . At the end of the day, rocketry is a great hobby for rocketeers of all ages. It is a fun family or group activity, and a good way to meet new people at club launches. It can also be a gateway hobby to a job in Aerospace Engineering or other scientific careers. It can seem intimidating at first, but it really is an easy hobby to try out, and relatively inexpensive. Rocketeers also love to share their hobby with others, so if you are feeling nervous, reach out to one to help you out. You can also watch some of our videos to become familiar with rocket techniques and terms, or go visit a club launch to see what all the fun is about! And if you still are unsure, give us a call and we will get you started on the right track for success.

Check out our Facebook page
www.facebook.com/ApogeeRockets

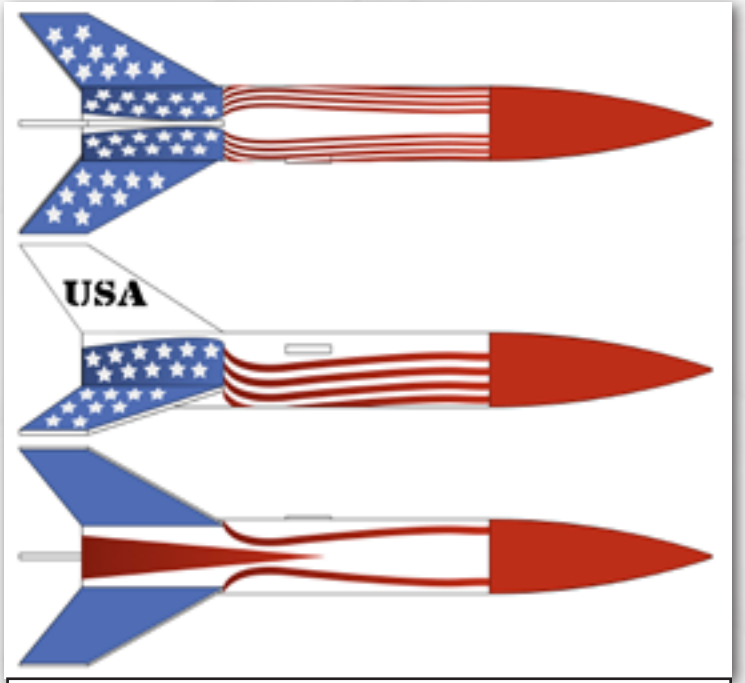
4th of July Wayfarer Parts List

05062 - (1) Wayfarer
- Printed decal sheet of choice

Order parts at:
https://www.apogeerockets.com/Quick_Order

Recomended Motors
Estes - B4-2 (278ft/85m)
Quest - B6-4W (385ft/117m)
Estes - C5-3 (662ft/202m)
Estes - C6-5 (779ft/238m)
Quest - C18-6W (898ft/274m)
Quest - D16-6 (1095ft/334m)

Download the high resolution decals for the 4th of July Wayfarer at:
https://www.apogeerockets.com/Peak-of-Flight-Rocket-Plans

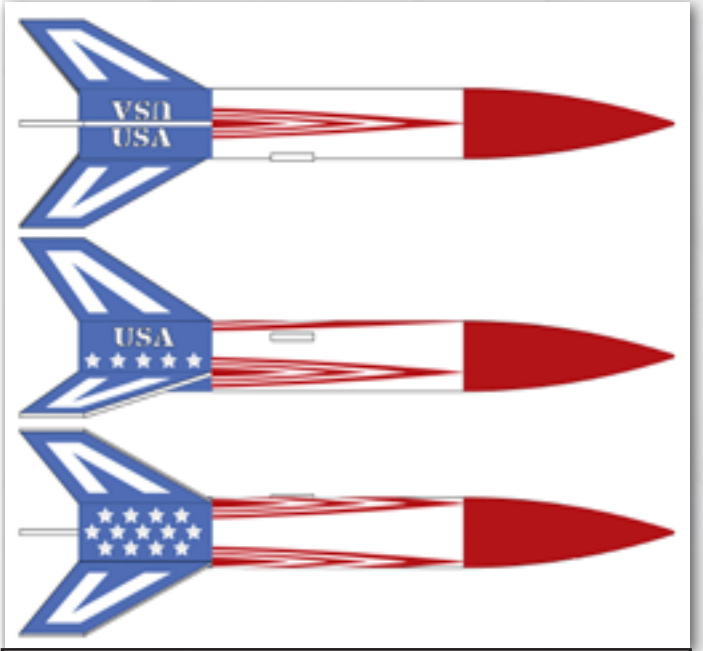


Theme 1

The 4th of July Wayfarer By Sky Luther

Introduction:

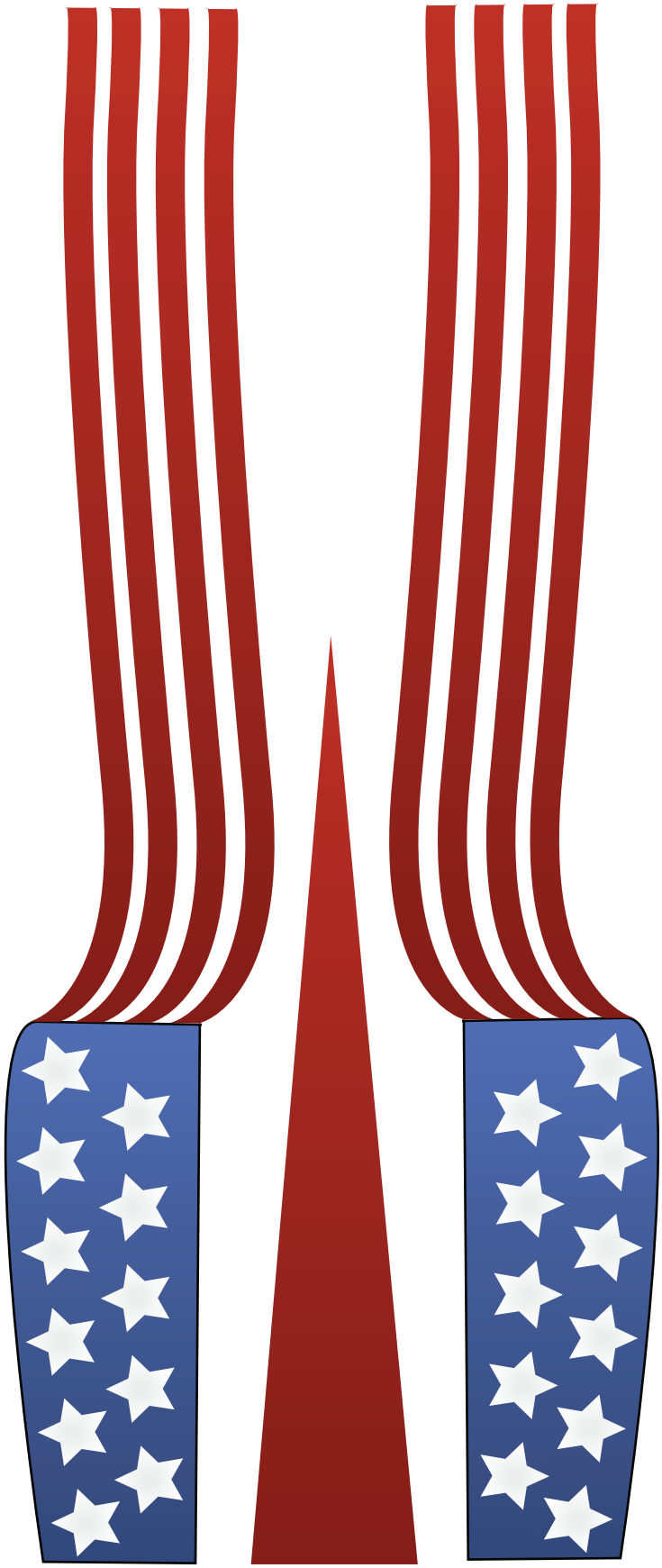
The 4th of July, or Independence Day, is a significant event in the history of the United States. It marks the day in 1776 when the Continental Congress declared the American colonies independent from British rule, as stated in the Declaration of Independence. This document emphasized the rights of individuals and laid the groundwork for a government by and for the people. The 4th of July is a celebration of the sacrifices made during the Revolutionary War and symbolizes the birth of a nation founded on liberty, equality, and self-governance. It also serves as a unifying occasion for Americans, who come together in festivities to honor their shared heritage and express gratitude for their freedoms. The principles of the American Revolution have had a global impact, inspiring independence movements and democratic struggles worldwide. The 4th of July stands as a testament to the courage and determination of the American people, and it continues to represent the ideals of freedom and self-determination that resonate both nationally and internationally.

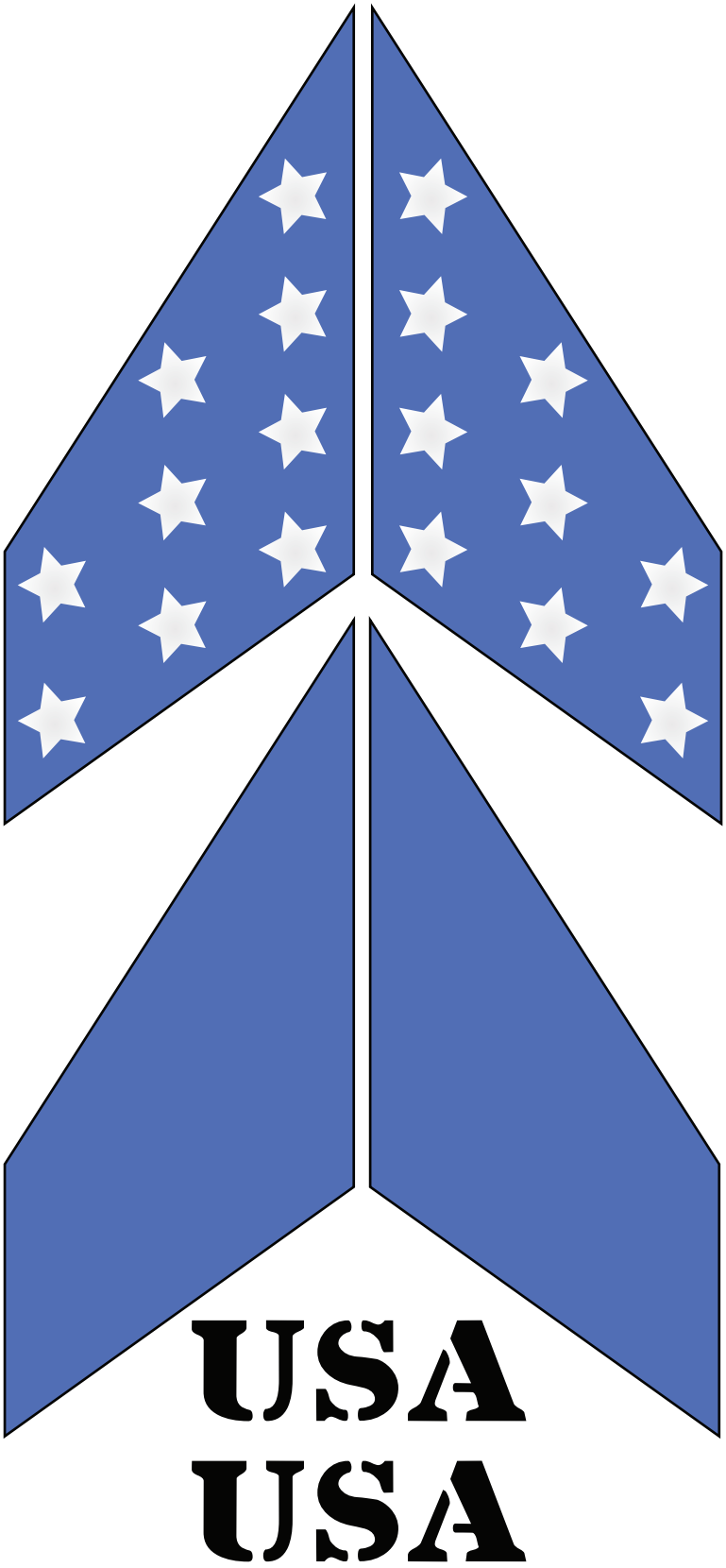


Theme 2

With this in mind, we've created two special 4th of July themed designs for our Wayfarer rocket!! These exclusive patriotic themed renditions captures the patriotic spirit and adds a festive touch to your rocketry adventures. With its vibrant red, white, and blue color scheme, adorned with stars and stripes, these alternate design options embody the essence of the 4th of July. Whether you're launching your rocket at your local launch or joining a community event, these alternate designs will make your Wayfarer rocket stand out and symbolize the freedom and unity cherished on this special day. Soar into the sky with pride as you honor the nation's history and values with this captivating 4th of July themed design pack for your Wayfarer rocket.

Print on white decal paper of your choice, cut out, and apply using the image on page 10 as a reference.

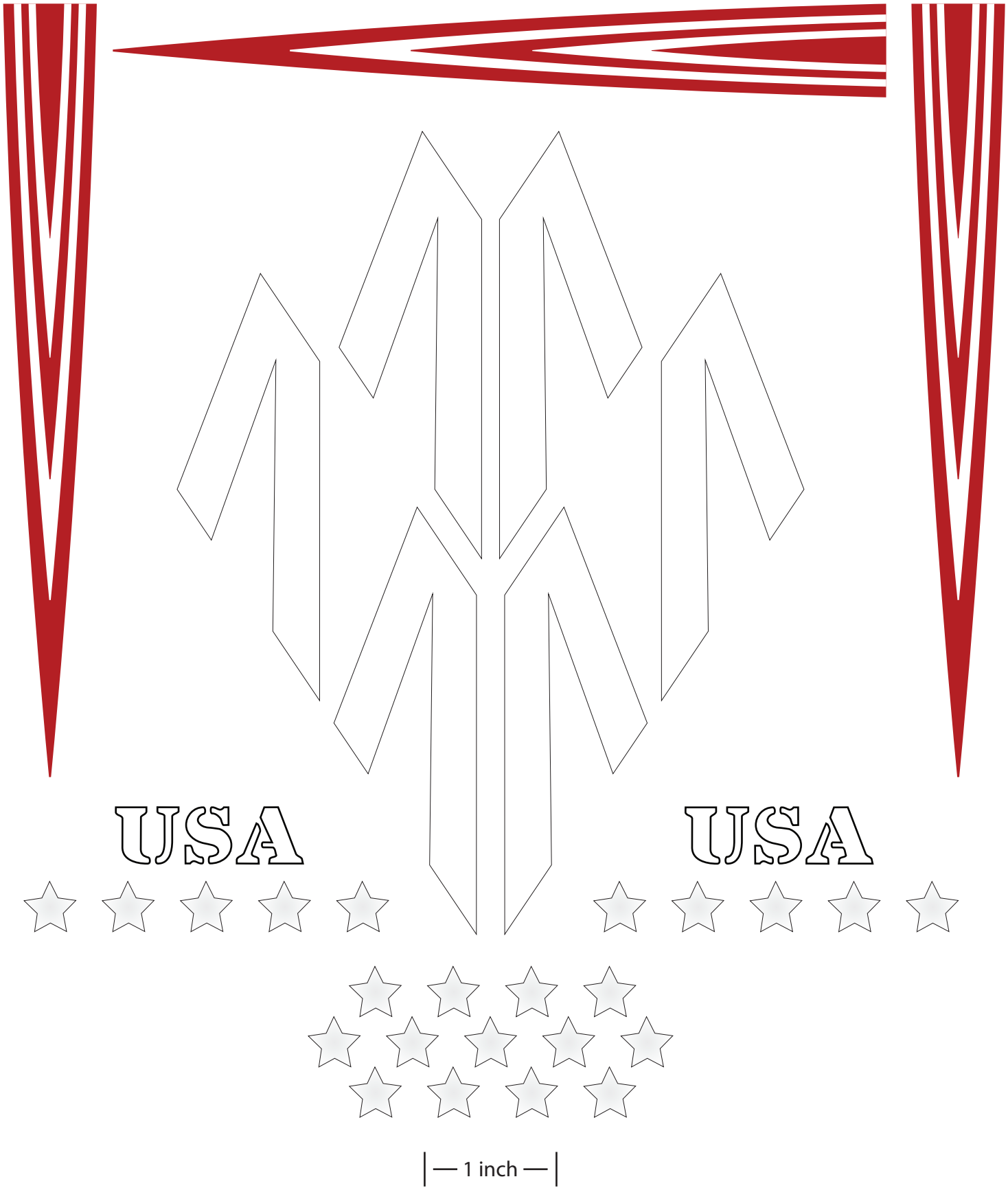




Theme 1

1 inch

Print on white decal paper of your choice, cut out, and apply using the image on page 10 as a reference.



Theme 2