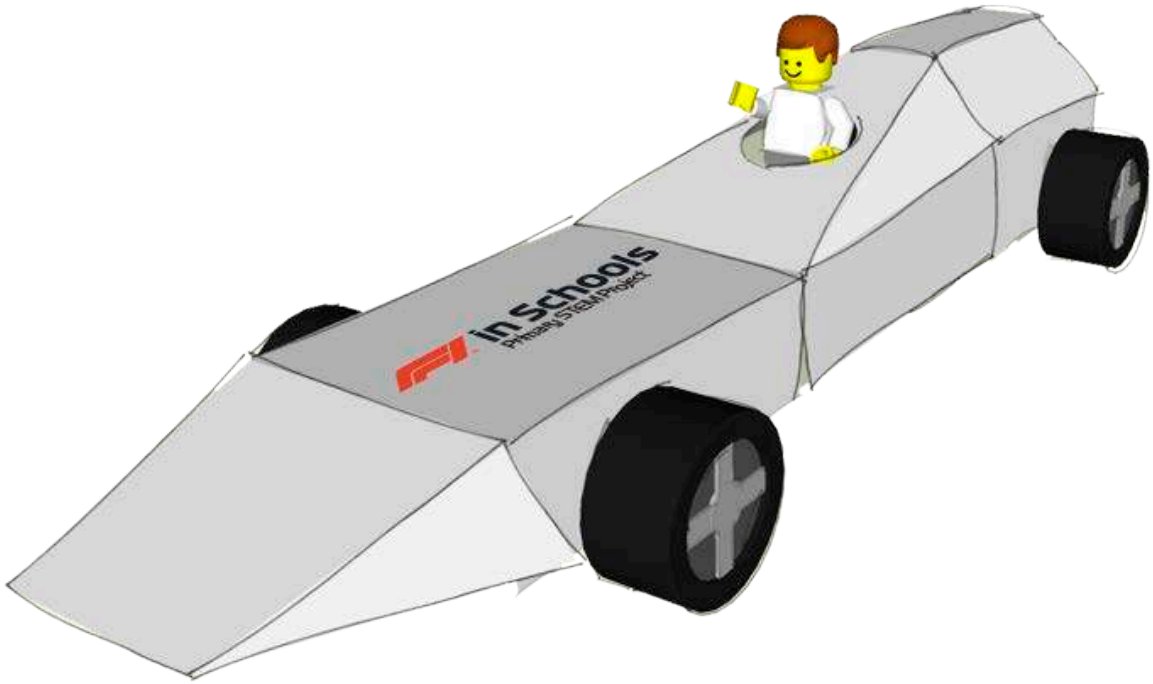
F1 in Schools
Primary STEM Project



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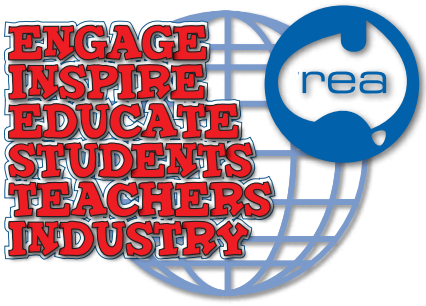

AUTHORISED AGENT

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Re-Engineering Australia Foundation Ltd. acknowledges the valuable contributions of Engineering in Motion in the development of this Challenge.

LOGOS

Contents

What is the F1 in Schools Primary STEM Project? 4
Getting Started 5
Frequently Asked Questions 5
1-2 Day Experience 7
Typical 1 Day Project Timeline 8
- Session 1 - Team Organisation and Planning 9
- General Rules 10
- Session 2 - Building a Car 11
- Safety Instructions 17
- Session 3 - Racing 18
- STEM Classroom Questions & Activities 19

Full Program Implementation 20
- Manufacturing Team Tee Shirts 21
- Preparing an A1 Poster 22
- Verbal Presentation 22
- Areas for Student Research 23

Summary of Costs 23
Poster Scorecard 24
Verbal Presentation Scorecard 25

WHAT IS THE F1 IN SCHOOLS PRIMARY STEM PROJECT?

F1 in Schools Primary STEM Project engages primary students as young as 5 years old in building and racing a paper based F1® car. The program has been designed as a subset of the High School F1 in Schools™ STEM Challenge and is aimed at students in years K-7, engaging them in a STEM activity which is fun.

The Challenge has students building a paper version of an F1 car. The Challenge is designed as a stepping stone via which students can develop an understanding and interest in Science, Technology, Engineering and Mathematics (STEM).

The skills the program aims to develop include problem solving, research, communication, collaboration and teamwork: skills that will not be replaced by disruptive technologies and skills that have been identified as being in demand by industries the world over.

Engaging Young Minds

Research has shown that the earlier you can engage young minds and expose the students to the fun and excitement of STEM the better. Students as young as 5 years old have the opportunity to learn through a hands on approach about engineering principles involving the design, manufacturing, research, development and racing of a Formula One car.

A key goal of this program is to link primary schools with high schools although this is not a necessary component of the program. This is aimed at fostering an environment of collaboration between schools, providing an opportunity for primary students to be mentored by high school students and facilitating access to technology which may exist only in the high school. The interaction between primary and high schools also aids in the transition of students from Primary School to High School.

In the five years of F1 in Schools Primary STEM Project in Australia we've seen over 18,000 students become absolutely absorbed in to how much fun STEM can be. At this early age primary students have few career stereo types established. It is the perfect time to influence their interest in STEM.

Where Could F1 in Schools™ and the F1 in Schools Primary STEM Project Take You?

The F1 in Schools Primary STEM Project is designed as a stepping stone via which students can develop an understanding and interest in Science, Technology, Engineering & Mathematics (STEM). As pupils move from primary to high school, they will be able to continue to develop their STEM skills by engaging in complementary programs such as F1 in Schools, 4x4 in Schools and SUBS in Schools. These STEM Challenges allow the students to participate at a regional, state, national and international level.

Within the F1 in Schools STEM Challenge the National Champions from 44 countries around world are invited to compete at the F1 in Schools™ World Finals where they will go head to head to become the F1 in Schools World Champions, a status achieved by 6 other Australian Teams.

Implementation

The program can be implemented as a 1-2 day short program where the students build and race a car only, or a full implementation can be spread over a much longer trajectory to meet a broader set of learning goals.

In both instances the program will have the students working in teams, defining roles, examining the science of motion, design graphics for the car, testing the aerodynamics of their car and finally racing their car against others to see who is the fastest.

A full implementation of the program will allow students to undertake a set of more complex research projects which examine a number of STEM elements. The areas of the research can be chosen to fit with current study goals but could include areas such as the science behind motion including momentum, force, energy and as an option even more complex concepts such as aerodynamics. The longer implementation format also has students manufacturing team tee shirts, producing an A1 size project display board which covers key components of their team's research and presenting a 5 minute verbal presentation of their activities to a set of judges covering their efforts, the key concepts of their design and the areas of STEM they have learned to apply to real life situations i.e. how aerodynamics and motion may impact real life issues like riding a bike.

For students in years 5 & 6 the option also exists for the students to design their own car bodies and possibly even 3D printing of a set of wings to fit on their car.

The Challenge can be implemented within a school across multiple year groups or can be aligned with a single student stage groups. It can also be implemented so as to have older students engaging as mentors of students participating at lower levels i.e. Stage 3 students mentoring and teaching Stage 1 or 2 students.

The skills the program aims to develop include problem solving, research, communication, collaboration and teamwork, skills that are clearly identified as aiding the transition through high school and in demand by industries the world over. These are the skills that will not be replaced by disruptive technologies.

Another key goal of this program is to link primary schools with local high schools. This is aimed at fostering an environment of collaboration between the schools, providing an opportunity for primary students to be mentored by high school students and to facilitate access to technology such as race tracks, wind tunnels and smoke tunnels which may exist in the high school. The interaction between primary and high schools also helps students make the transition from the F1 in Schools Primary STEM Project to the F1 in Schools STEM Challenge.

GETTING STARTED

Becoming involved is a simple process. The following are the steps you should take to become involved in the challenge:

1. Register your interest on the www.rea.org.au/school-registration-form,
2. Optional introductory meeting with an REA coordinator
3. Optional training session on how to run the program which will be organised by REA,
4. Purchase the F1 in Schools Primary STEM Project car kits from https://store.rea.org.au/ web page.
5. Purchase or arrange access to a race track, timing system and, if available a wind tunnel, from a local high schools or from REA if one is available.
6. Arrange for an REA coordinator or technician to be available at key times during the running of an event if required.

FREQUENTLY ASKED QUESTIONS

Below is a selection of frequently asked questions which address the commonly answered questions. If however you have a different question or issue, please do not hesitate to get in touch.

Q1. How much does it cost to take part?

The cost can be broken down into the following areas:

1. There is no registration cost to the school taking part in the challenge but the schools will need to register their interest on the REA website (www.rea.org.au).
2. F1 in Schools Primary STEM Project Car kits and Co2 cylinders are available from the https://store.rea.org.au/ web site. As a budget, the cost of a car kit and gas cylinders to race a car is in the order of $7 per student.
3. You will need to have access to a race track and race timing system. There are four ways this can happen:
    a. There many tracks and timing systems already located in high schools around the country and REA may be able to help you link with a high school where this equipment is available for loan.
    b. Schools can purchase the new Primary STEM Challenge roll out track and air launch system from the https://store.rea.org.au/ website.

a. A third option, depending on location, would be to access a track and timing system owned by REA. Some transportation & hire costs would be involved in this option.

b. In Victoria only, the government has funded an F1 in Schools track and race control system that Victorian schools can borrow at no cost. Contact REA on 1300 204 478 for further information

3. An optional half day training program for teachers can be undertaken for first time teachers either at our offices or alternatively at your school. The cost of this is $350.00 (inc GST) plus any travel & living costs involved.

4. REA staff on-site assistance is available at a rate of $660.00 per person per day plus Travel & Living expenses were relevant.

Q2. How do we register to take part?

If you intend to deliver the F1 in Schools Primary STEM Project, with or without the assistance of REA, you need to register your school's participation via the following link www.rea.org.au/school-registration-form, This is free.

Q3. What support would we receive from REA?

Each school is given training on how to design and manufacture the car by the project coordinator. Schools are also paired up with local high schools involved in the F1 in Schools™ STEM Challenge who are able to loan the race track and timing system to the school and also help with running the program. REA will work with and support both you and your team throughout the initial start up implementation.

Q4. When does the challenge run?

The challenge is available to run at any time throughout the year but does not generally result in an external competition.

Q5. How may students can be involved at one time?

Schools have involved groups of students as little as a class through to a whole school. The ideal maximum number of students for a one day program is 50. If you would like to involve more students than this you should consider running the program over two or more days to allow sufficient time for the students to maximise their learning outcomes.

Q6. Where can I buy the equipment from?

All equipment and consumables can be purchased from our REA Store website (https://store.rea.org.au/). REA can help direct you to a local high school, TAFE or university from where you will be able to access a race track, timing system or 3D printer..

Q7. How do teachers get trained?

REA runs a half day training program for teachers on our premises. We are also available to come on-site to host training. The cost of the training is $350 (inc GST) plus any Travel & Living costs involved.

Q8. What is the duration of the program?

The program can be run over 1-2 days in its shortened form or it can be extended to run over a number of week or months to align with a predefined set of teaching goals. This document describes how to run the program in both short and extended formats.

1-2 DAY EXPERIENCE

1-2 DAY EXPERIENCE

The 1-2 day experience focuses on the students forming a team, designing a logo, building a car, placing their logo graphics on the car and then racing.

By virtue of the effort involved to bring students and teachers up to speed with the program, participants should be limited to a maximum of approximately 50 students in the first instance. This will allow enough time to give all students the appropriate exposure to the program and the STEM concepts being highlighted.

For larger numbers of students the program can be spread out over a number of days with the students building and decorating their cars on one or more days with the racing on a separate day.

REA has been involved in implementing the program at a school which included all 650 students. This was achieved over a week during which time the stage 3 (year 5/6) students were introduced to the program first and then these students became mentors for the Stage 2 students (years 3/4), helping them to build and race their cars. The Stage 2 students were then used to help and mentor the Stage 1 (year K-2) students to build and race their cars.

In this staged approach, the learning outcomes for each year level can be modified to align with the learning capacities of the students. It is a regular outcome for stage 3 students having been taught the higher level STEM concepts and skills, to instinctively take on the role of mentors to the younger students, teaching in a language and method that gels with these younger students. Students quickly become the teachers which in itself provides the students with an opportunity to self learn higher level communication skills.

In addition to running a local competition within an individual school we would encourage primary schools to come together in an organised event, possibly at a high school as a means of creating a spirit of competition between students and schools. It is at this higher stage of participation, that the addition component of a verbal presentation and display could be introduced as components of the competition.

TYPICAL ONE DAY PROJECT TIME LINE

The following is a typical project time line for running a one day F1 experience.

Introduction

8:30am – 8:40am	Class rooms – roll call & notices.
8:40am – 8:45am	Move to gymnasium
8:45am – 9:15am	Project briefing and demonstration (racing & video)
9:15am – 9:25am	Live demonstration of building a car
9:25am – 9:30am	Back to classrooms

Session 1 — Team Organisation & Planning

9:30am – 9:40am	Create teams within home group classes (4 per team)
9:40am – 10:00am	Create team name and colors (corporate identity)
	Team Logo
	Team Motto
10:00am – 10:20am	Decorating the car body
10:20am – 10:40am	Recess

Session 2 — Building a Car

10:40am – 12:30pm	Car development
	Build cars
	Develop artwork / graphic design
	Examine Aerodynamics
	Make modifications to car
	Testing
12:30pm – 1:10pm	Lunch

Session 3 — Racing & Presentations

1:10pm – 2:40pm	Racing
2:40pm – 2:50pm	Presentations
2:50pm – 3:00pm	Classroom pack up

SESSION 1 – TEAM ORGANISATION AND PLANNING

The first thing that students need to do is to organise themselves into teams, consisting of groups of 4 with each student responsible for a different component of the design, production and racing of a paper F1® car.

Once students have organised their teams, they should assign the following roles;

Team Manager: _____

Graphic Designer: _____

Engineer: _____

Race Technician: _____

Each role will have specific responsibilities throughout the day as outlined below.

Team Manager

Your responsibilities could be as follows:

1. Ensure members of your team understand their roles and responsibilities,
2. Ensure that your team meets deadlines (refer to time-line),
3. Book in testing time with the wind tunnel if available,
4. Book in time in the Art Room if available for the graphic designer,
5. Book in time in the TAS Workshops for the engineer,
6. Book in starter testing for your Race Technician,
7. Assist the other team members in completing their jobs:
   - You might need to ask for help yourself
   - You might need to get one of your team members to help others,
   - You could use teachers or visiting mentors for help on tasks or advice.

Graphic Designer

Your duties could be:

1. Decide on your team colors:
   - Talk with your team members to develop your design theme,
   - Design the color scheme of your car.
2. Identify your 'sponsors':
   - Establish how you will acknowledge a sponsor on your car,
   - Incorporate sponsor logos into the graphic design of the car.
3. Apply the graphic design to your car.

Engineer

Your duties are as follows:

1. Become familiar with the instructions and construction process.
2. Work with the Race Technician so they understand how the car is connected to the race track and the relationship between the chassis and the tether line,
3. Work with the Team Manager and the Graphic Designer to establish when the graphics will be completed on the body ready for assembly,
4. Test the car's rolling resistance - how freely do the wheels spin and determine if there are any modifications to the wheel that need to be made to make the car go faster,
5. Work with the Race Technician in wind-tunnel testing and look for design modifications to the body which you feel will make it go faster,
6. Assist the Race Technician during racing.

Race Technician

Your duties are as follows:

1. Become familiar with the racing process
   - Start positioning procedure
   - Launching procedure
   - Tethering of the car
2. Work with the Engineer to minimize wheel resistance.
3. If you chose to add a driver to your car this could either be a Logo character or made of plasticine.

GENERAL RULES

Weight restriction:

46.5 grams minimum weight without the canister inserted.

Chassis & Canister Housing:

The standard chassis and canister housing must be used as these have been designed specifically to withstand the loads the car will undergo when racing with an 8gm CO2 cannister. The chassis and canister housing can not be changed or modified in any way.

Body:

A body is supplied but an alternative body can be designed and manufactured by the students. For stage 3 students this alternative body can be made from another material (plastic, cardboard, but not metal). While the car can have up to two aero-foils (wings), no modifications are allowed to cover the wheel or protrude past the width of the wheels. Wings can be 3D printed.

Wheels and Metal Axles:

The supplied wheels and axles must be used and no changes can be made to either of these parts. The wheels are allowed to be lightly sanded to remove any bumps on the wheel tread.

Glue or sticky tape can be used.

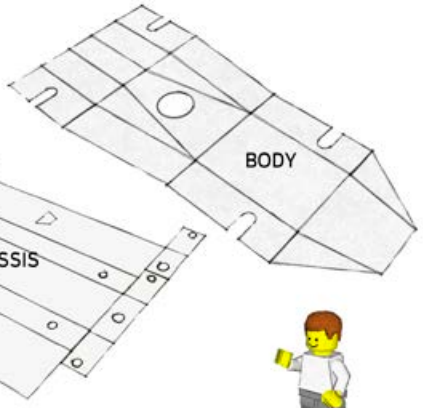
Driver:

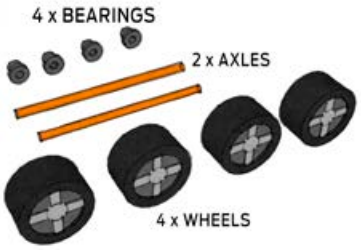
The driver must be secured to the seat – the driver can be made from Lego or plasticine but not metal.

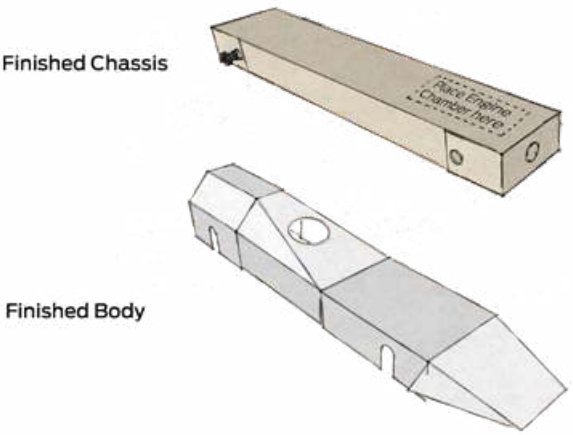
SESSION 2 – BUILDING A CAR

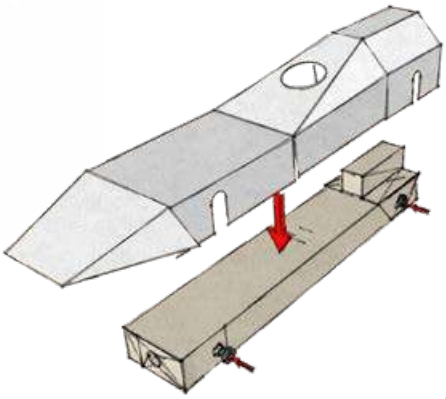
You will be provided with the following components, which when assembled, form the bones of an F1® race car.

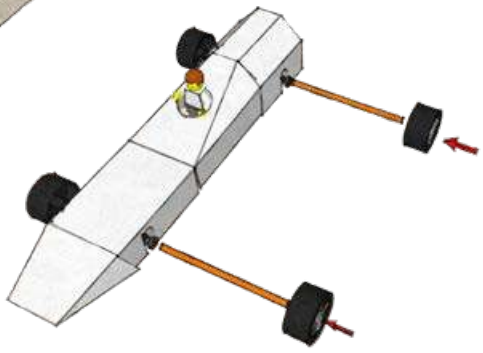
The students will need to fold the three major paper templates into the following assemblies which go together to form a car.

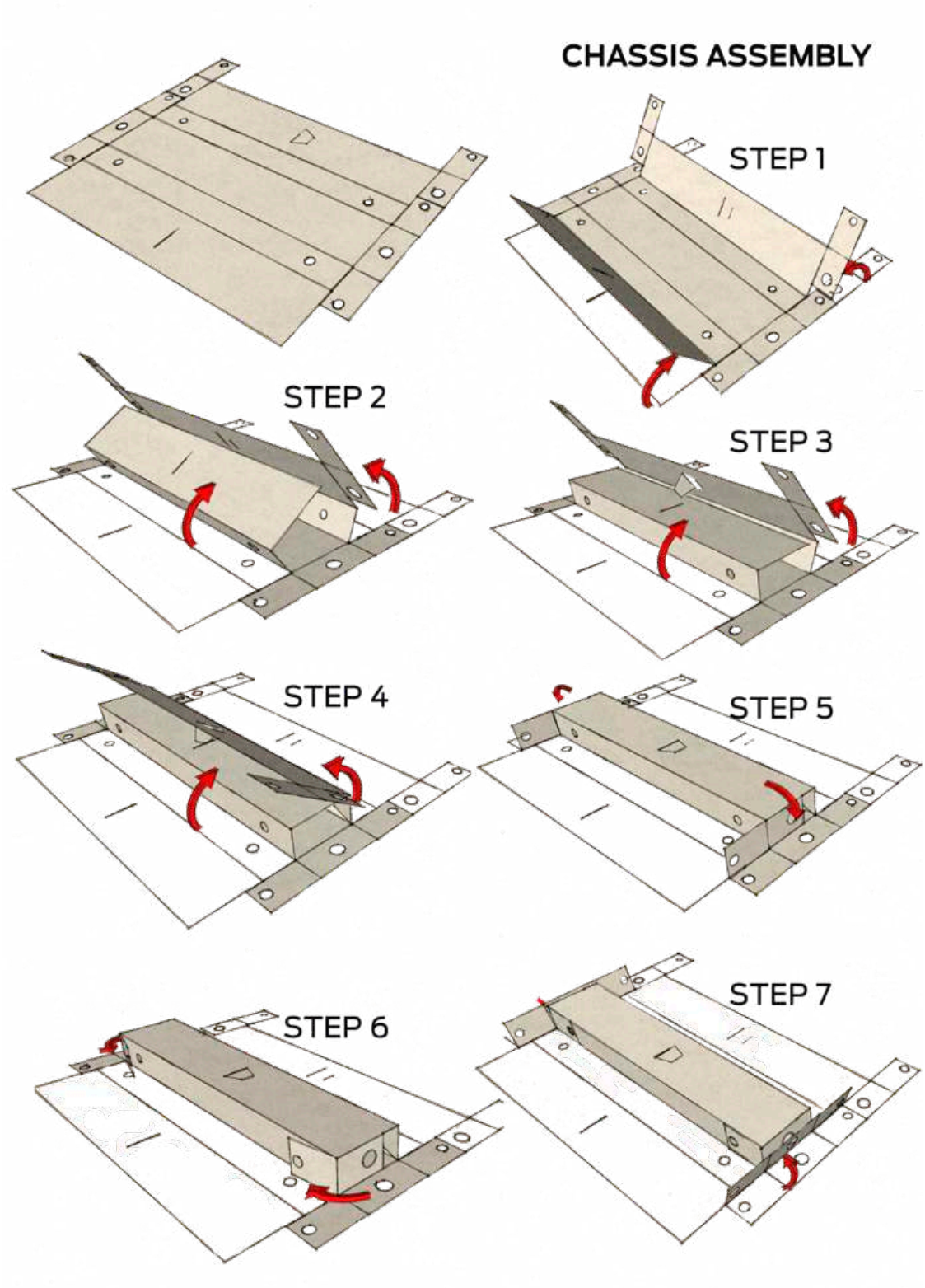




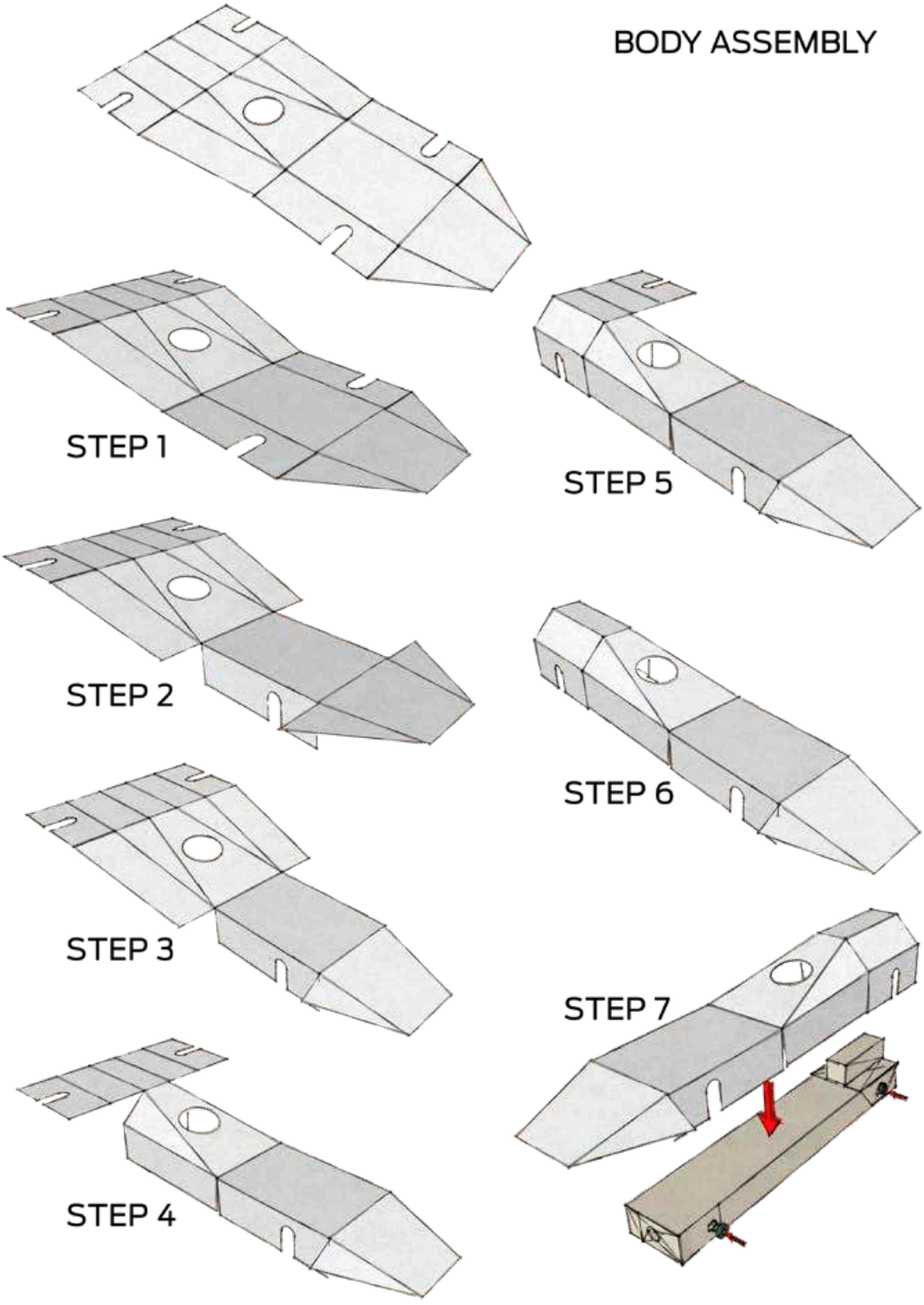




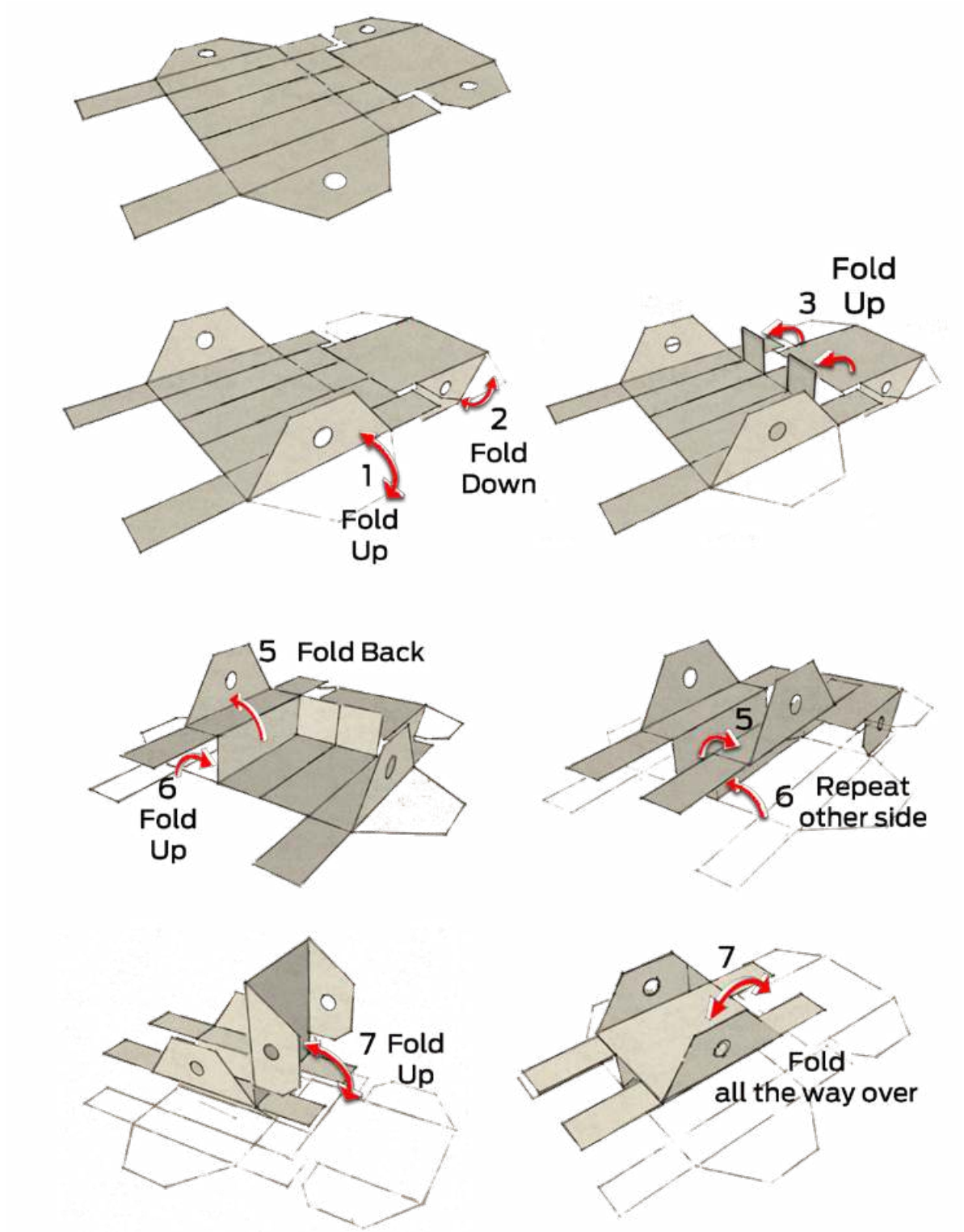




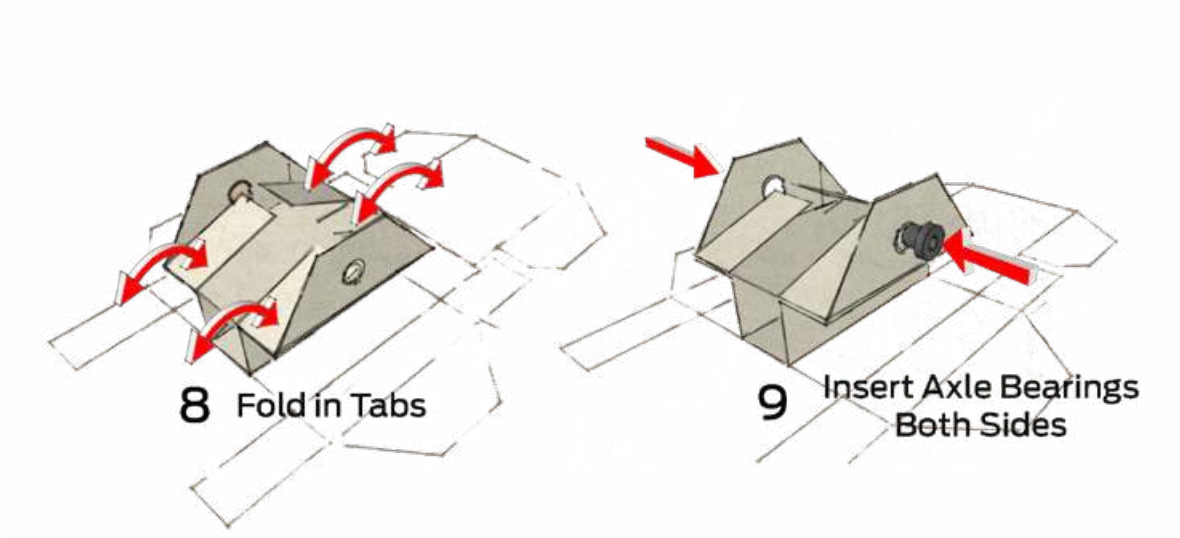
BODY ASSEMBLY



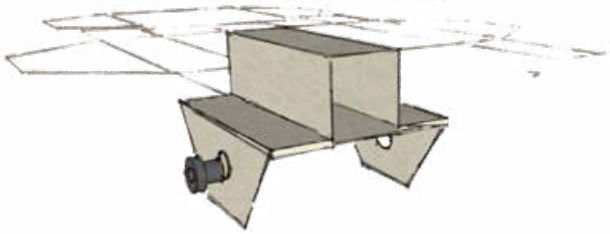
CANISTER HOUSING ASSEMBLY

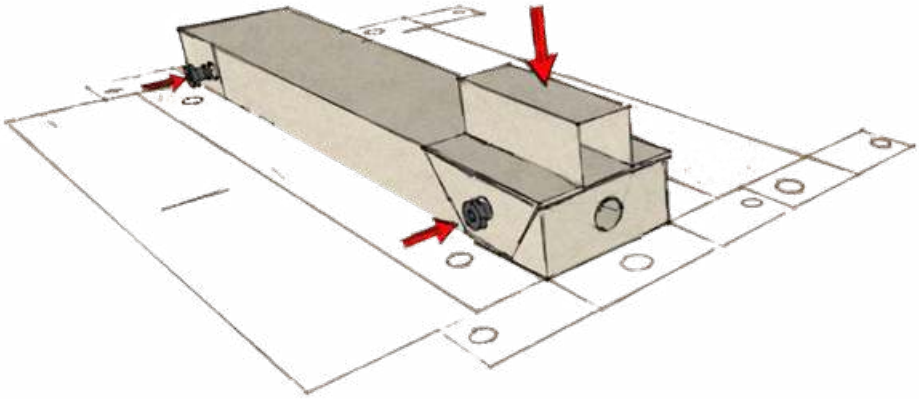


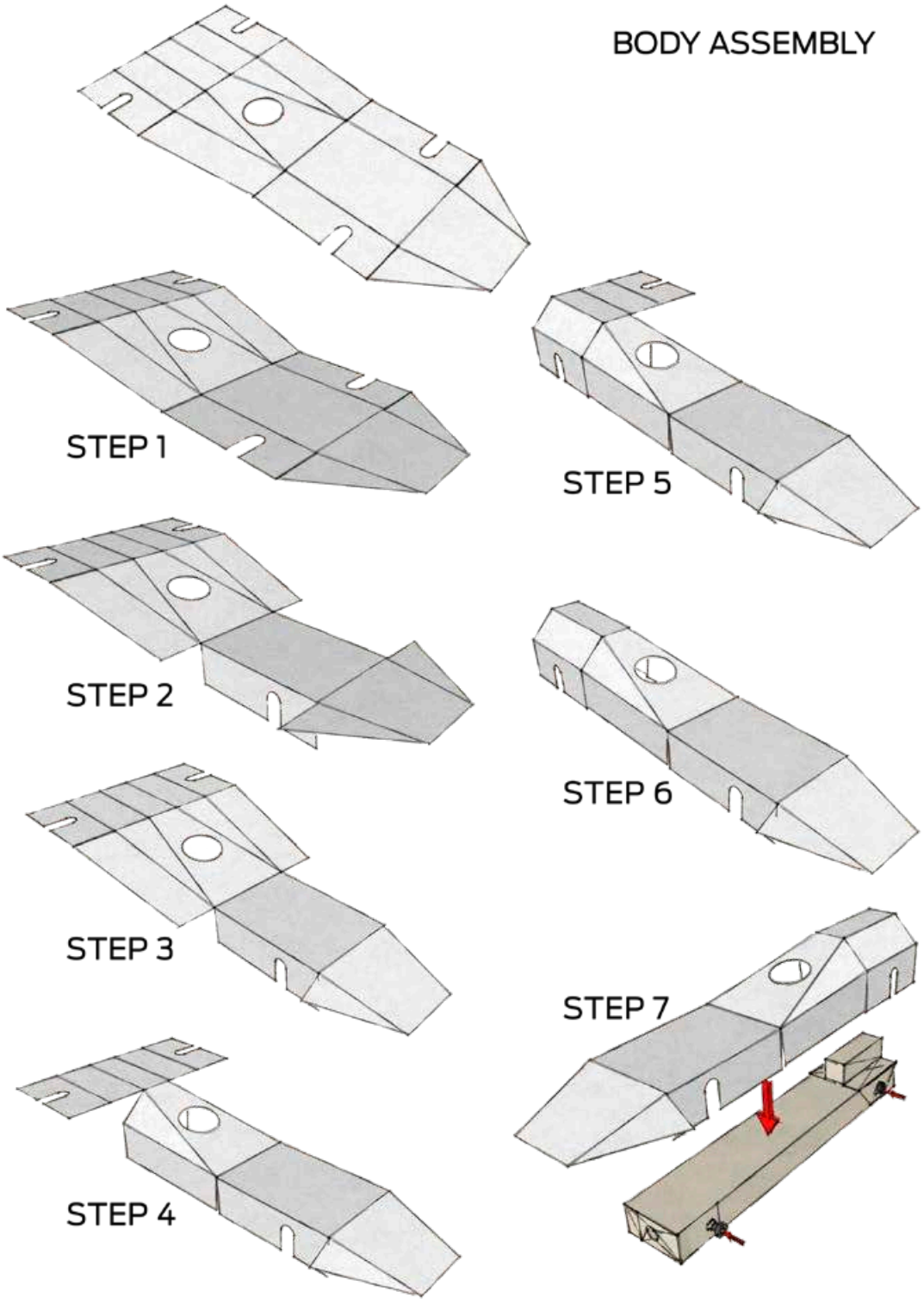
CANISTER HOUSING ASSEMBLY (cont.)



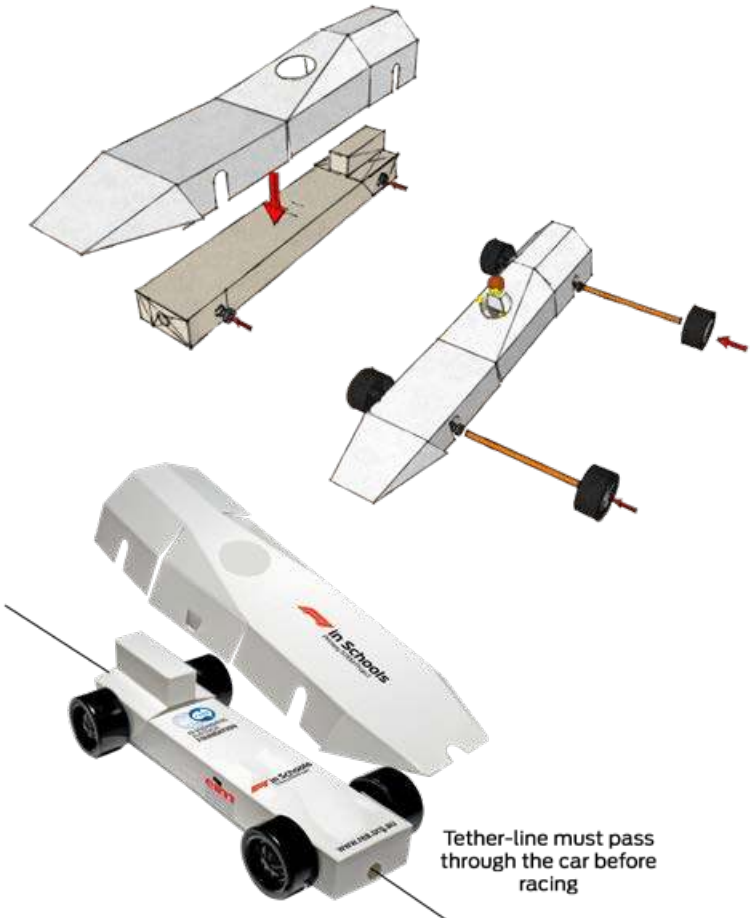
Finished Housing







FINAL ASSEMBLY



Safety Instructions

The components that make up the F1 in Schools Primary STEM Project have been designed and tested with a focus on user safety.

To prevent accidents the following directions must be strictly adhered to:

- The components that make up a car must be folded and assembled exactly as shown in these instructions.
- A competent adult must check that the resultant car assembly is correctly folded and assembled.
- Racing is to be closely supervised by a responsible adult at **ALL** times.
- Under no circumstances are canisters containing more than 8 grams of CO2 to be used to propel the Paper Racer.
- Additional strengthening of the chassis, CO2 housing and body can be undertaken via the application of glue, staples or tape at the discretion of the supervising adult

Race cars **MUST** be fixed to the track via the tether line inserted through the two tether line guide holes at each end of the chassis.

Session 3 – Racing

Driver

All cars must have a driver (Playmobile or Lego child type). The driver height Min: 40mm / Max: 60mm. The driver must be attached with Velcro to the chassis for safety in a sitting position.

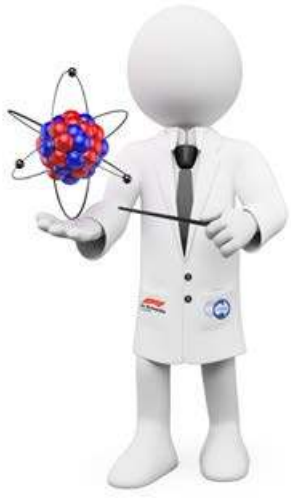
Racing

Then, it's time for the students to enjoy the thrills and high speed excitement of being in a Formula One® team and racing their futuristic car at more than 80 KM/H. The opportunity to compete brings with it a sense of excitement particularly when the competition is so intense that teams win by less time than it takes to blink!

The sense of achievement for the students in having formed a team with their friends...with each one having a different responsibility such as team manager or race engineer or marketing manager...then creating a team name and colorful design for their cars .... developing new and interesting ways to design a sleek, aerodynamic racer...making it in the classroom...possibly testing it in smoke and wind tunnels ...and then launching it down the 20-metre track.

Along the way the students learn much more than engineering and manufacturing. They are introduced to project management, team work, mentoring other students and public speaking. The "soft skills" which are so important to future employers.

The F1 in Schools Primary STEM Project is a well-rounded and holistic applied learning program. It introduces skills and confidence which make a difference to students across all of their subjects.



STEM Classroom Questions & Activities

Science Questions

1. Why does the cylinder become cold after the car has been fired?
2. What are the key factors that will make your car go faster?
3. What is the difference between acceleration and velocity?
4. What is meant by the term aerodynamics?
5. Would adding a driver make your car go faster or slower?

Mathematics Questions

1. What is the time you recorded for the race?
2. What was your reaction time?
3. What was the time the car took to travel the length of the track?
4. How long is the track?
5. What is the average speed down the track?
6. What time will your car record for the race if its average speed was 80km/hr?

Engineering

1. What components of the car are influenced by friction?
2. Can you make a drawing of the air flowing around the car?
3. Would the car go faster if the gas cylinder was heated?
4. What is a better way to stop the car at the end of the track?

Technology

1. Develop a design of wings for the front and rear of the car that could be 3D printed?
2. How is the speed of the car measured?
3. What other information would it be helpful to know about the car's performance?
4. How could you collect this information?

FULL PROGRAM

(EXTENDED TRAJECTORY)

FULL PROGRAM IMPLEMENTATION

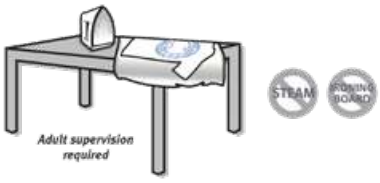
The following is an example of the application of the F1 in Schools Primary STEM Project over and extended period which will allow students to undertake a set of additional components of the programs and undertake research which examines a number of STEM elements. The areas of the research can be chosen to fit with current study goals but could include areas such as the science behind motion including momentum, force, energy and as an option even more complex concepts such as aerodynamics.

The extended programs, covers the following elements:

1. Selecting a Team.
2. Designing a Team Logo.
3. Building an F1 Car.
4. Designing and manufacturing team tee shirt utilising iron transfer technology,
5. Producing an A1 size project display board which covers key components of their team's research.
6. Preparing a 5 minute verbal presentation about the roles of each of the members of the team, their team branding and logo and areas of STEM they have learned to apply to their care and to real life situations i.e. how aerodynamics or motion may impact real life issues like riding a bike.
7. For students in years 5 & 6 the option also exists for the students to design their own car bodies and possibly even 3D printing of a set of wings to fit on their car.

The program also facilitates opportunities for leadership and mentoring skills to be developed. Students in stage 3 (year 5/6) students, after being introduced to the program can then become mentors and leaders to teams of Stage 2 students, helping them to build and race their cars. The Stage 2 students can them also be used as mentors to stage 1 students.

Some of these elements have been previously described in this document, The following sections of this document cover the extended components of the program.



Adult supervision required

MANUFACTURING TEAM TEE SHIRTS.

1. Design

The students can create your own image in Microsoft® Word, PowerPoint® or similar to design their team logo.

2. Print

- Select and purchase a suitable image transfer medium manufactured by supplied such as Quirkii, Avery & Epsom. These are all available from Officeworks. Each comes with a set of instructions which differ from those listed here.
- Make sure to FLIP THE IMAGE if required by the instructions before printing if required by the transfer paper instructions. You can either use the software to do this or select mirror image (reverse, flip image) option from your printer's setting.

3. Trim

- Trim the excess transfer material around the image.

4. Surface Preparation

- Use a hard, heat-resistant surface.
- DO NOT USE ironing board.
- Set a cotton pillow case on hard surface and lay garment on top.
- Set iron for NO STEAM. Iron should NOT HAVE WATER.
- Set iron to HIGH or COTTON SETTING. Iron the pillowcase and garment to REMOVE WRINKLES.

5. Iron Transfer onto Garment

- Place transfer with printed image facing down onto garment.
- Iron transfer in sections using FIRM PRESSURE.
- Evenly iron transfer to make sure all areas are covered.
-

Ironing Time for A4 Sheet:

- Full sheet = 3 minutes
- 1/2 sheet = 1 1/2 minutes
- 1/4 sheet = 1 minute

6. Cool Down

- Remove garment from heating area and allow transfer to cool for about 2-3 minutes.

7. Peel

- Carefully peel the backing paper from the garment.

8. Wash before wearing

- To avoid ink bleeding or ink smearing, please wash the garment prior to use.

PREPARING AN A1 POSTER

Teams are to develop an A1 size posters covering the following areas of the project:

- Team members and their rolls in the team.
- Their team identity including logo, color scheme and decoration of their car and marketing of their team to attract sponsors.
- STEM research they have undertaken covering concepts such as aerodynamics.
- Areas of STEM they have learned and how they apply to life situations.
- What would they do to make their car go faster

Team preparation

Most importantly, teams need to ensure that all areas to be assessed are included within the context of their poster. It is each team's decision on how and where each area is presented on their poster.

All team members must be present during the judging session.

Judging process / procedure

Poster will take place in an area define for team displays. The Judges will usually introduce themselves then ask the team to stand clear of their poster so the Judges can conduct assessments. Team members may be asked questions by Judges to help them find certain content and or seek further explanation.

VERBAL PRESENTATION

Teams are required to prepare and present a 5 minute verbal presentation on their project.

What will be judged?

- Presentation structure and technique.
- Use of visual aids
- Effective use of multimedia and / or other 'props.'
- Team contribution and effective participation by all team members.
- Team dynamic and levels of enthusiasm and energy.
- Presentation composition and clarity of explanations.
- Use of time and how effectively was the 5 minute used.
- Learning experiences ie. how did the F1 in Schools Challenge project benefit team members.

Team Preparation

- All team members must be present during the verbal presentation judging session.
- The team have the option to use a laptop to show supporting material to their presentation (optional).
- Teams need to ensure that all presentation resources are working correctly and tested and ready with them for verbal presentation.

Judging process / procedure

Teams will be given an opportunity at the start of their time to set up and test their laptop (optional) and any other presentation technologies and resources. The team will inform the Judges when they are ready to begin.

The Judges start timing the 5 minute duration and will provide a discreet time warning signal when one minute of presentation time remains. The team will be asked to cease presenting when the time limit has been reached.

Judges may then ask team members questions about components of their presentation or elements of the project.

AREAS FOR STUDENTS RESEARCH

The following are some area which the students may like to research:

Logos

- What is a good logo?
- What are the elements of a logo that make it cool?
- What should their logo say about their team?
- What is marketing?

Team Work

- How is an F1 team organised?
- How many people in an F1 team?
- What are the roles in an F1 Team?

The things that influence speed

- What is Aerodynamics?
- Why do F1 cars have wings?
- How do wings work?
- What is Friction?
- What is Momentum?
- Power, Energy and Force
- How do you calculate speed?

What shape should our car be to go fast & Why?

SUMMARY OF COST

The following is a list of the potential cost to be involved:

Consumables

Car kits including wheels and axles (Lego driver not included) cost approximately $7:00 per car.

Tee shirts for students can cost from $3.50 per student.

Logo transfers sheets are available from many sources including Officeworks. A pack of 5 A4 transfer sheets will cost approximately $20. An alternative is for the students to paint the logos on their tee shirts

Co2 Cylinders to power the cars will cost approximately 90c per cylinder. These cylinders are a one time use. The number of races will dictate the number of cylinders you will require.

Training & On-site Assistance

Optional on-site training and support will cost $450 per day plus travel and living cost if appropriate. There are some high schools within your region who may be able to assist you with running the program.

Race Track and Timing System

Tracks can be borrowed from high schools who already participate in the F1 in Schools program. REA will assist you to make contact with a schools who will be able to loan you a race track and tining system. Alternatively, you can purchase or rent a race track and timing sytem from REA. Call us for a costing.

SAMPLE JUDGING SHEETS

POSTER

Team:

No.

P

Layout				Score
Project Management	1……2……3 Little evidence of project management presented.	4……5……6……7 Simple management and planning used to guide progress. A range of resources considered.	8……9……10 Comprehensive project management. A wide range of factors considered; e.g. scope, time, resources and project risks.	
Team Work	1……2……3 Limited team work evident.	4……5……6……7 Evidence of effective team work and roles defined	8……9……10 Highly structured team with clear roles. All team members had effective and critical contributions. Role interactions recognised	
Portfolio Clarity & Quality	1……2……3 Difficult to follow with basic presentation standard.	4……5……6……7 Clear structure, well organised. Good use of ICT's enhancing presentation and impact.	8……9……10 High impact and professional throughout. Consistent and clear organisation. Excellent use of ICT's to enhance presentation	
			Portfolio Total	**/30**

MARKETING				Score
Team Identity	1……2……3 Inconsistent, limited or obscure identity	4……5……6……7 Effective team identity consistent through various project components.	8……9……10 Excellent and highly effective team identity. Consistently applied through all project elements.	
Marketing	1……2……3 Limited or irrelevant	4……5……6……7 Some marketing activity / sponsorship explained	8……9……10 Creative and effective activities linked to sponsorship	
Poster Layout	1……2……3 Repetition of folio elements	4……5……6……7 Clear and effective presentation and messaging. Some project development displayed.	8……9……10 Clean, well-organised and has high impact. Highly professional with attention to detail. Well-presented project developments.	
			Total	**/30**

/60

Verbal Presentation

Team:

No.

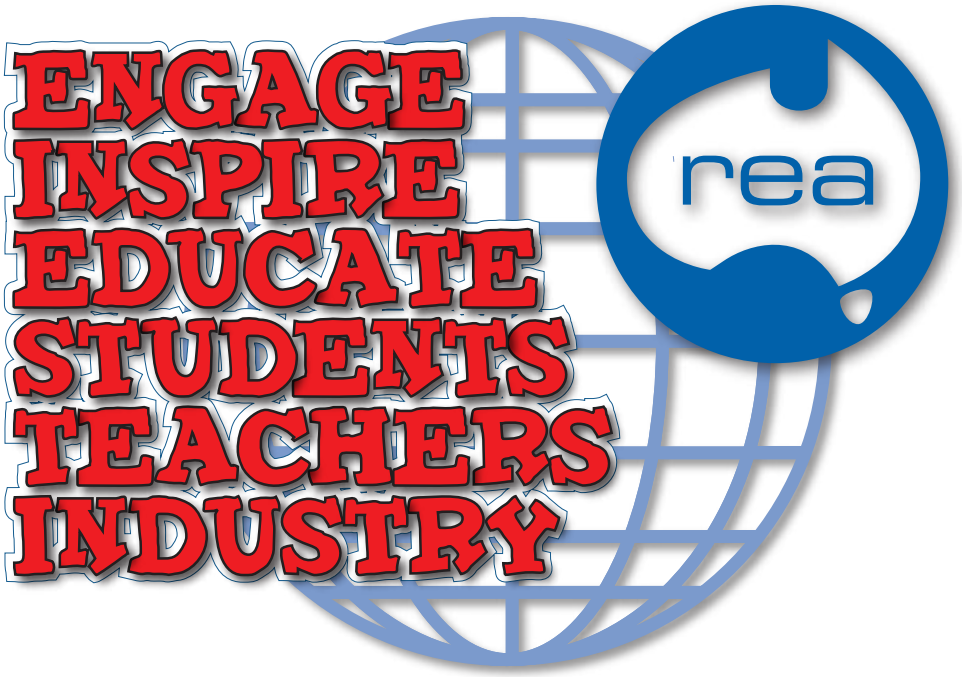
V

TECHNIQUE				Score
Visual Aids	1……2……3 Little use of aids.	4……5……6……7 Some aids used effectively	8……9……10 Highly professional aids effectively improve communication	
Team Contribution	1……2……3 Minimal team participation	4……5……6……7 Good contributions from most team members	8……9……10 Excellent team work with all members participating effectively	
Dynamic	1……2……3 Artificial and/or low energy	4……5……6……7 Generally enthusiastic and lively delivery	8……9……10 Passionate with consistent and appropriate levels of animation	
Engagement	1……2……3 Minimal engagement	4……5……6……7 Some audience connection at times	8……9……10 Audience fully engaged and excited throughout presentation	
			Technique Total	/40

COMPOSITION				Score
Concept Clarification	1……2……3 Several concepts lacked clarification	4……5……6……7 Clear and appropriate explanations	8……9……10 Concise and creative clarification of ideas requiring explanation	
Use of Time	1……2……3 Too fast or ran out of time	4……5……6……7 Good timing. Balanced topic depth and pace	8……9……10 Ran on time or under. Excellent balance of depth for each topic	
Presentation Agenda	1……2……3 No agenda presented	4……5……6……7 A basic agenda presented and could be followed by audience	8……9……10 Clear presentation outline. Excellent connections between topics and easy for audience to follow	
			Composition Total	/30

SUBJECT MATTER				Score
Innovation	1……2……3 Little innovation presented	4……5……6……7 Innovations described and justified	8……9……10 Originality. Clever innovations with high positive project affect	
Collaboration (i.e. Sponsorship and/or Support)	1……2……3 Little collaboration	4……5……6……7 Links with industry or higher education described	8……9……10 Collaborations justified with learning and project outcomes	
Learning Experiences	1……2……3 No real reflections discussed	4……5……6……7 Good explanation of some learning outcomes	8……9……10 A range of personal, lifelong learning and career skills acquired	
			Subject Matter Total	/30

Technique Total + Composition Total + Subject Matter Total = VERBAL PRESENTATION TOTAL /100



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