



F1 in Schools

MINI PROJECT

Welcome to the F1 in Schools Mini Project....

The Project is an introduction to the world of F1 in Schools. The course has been divided into 8 sessions, which contain specific learning objectives to ensure each team is in a position to race their finished car as a team, at the end of the course. Sessions start off with all teams working together as a group to help group bonding and teamwork, before the different teams are encouraged to work independently on their own tasks, before coming back together as a group towards the end of the course. All teams will take part in a celebration race event to complete the course, with prizes awarded to recognise the teams' various achievements throughout the course.

OPTION 1 requires a Project Starter Pack, an Air Launch System with Pump and a 10m Roll-Out Track.

OPTION 2 requires a Project Starter Pack, F1 Race System Package with 24m Roll-Out Race Track. The cars are powered by 4gm compressed gas cartridges.

LESSON PLANS

Session	Learning outcomes	Outline description: Starter / Objective / Main activity / Plenary
1 (ALL)	What is F1 in Schools?	Play F1 in Schools video Understand the competition structure and opportunities on offer. Read the F1 in Schools Mini Project introduction and design brief to understand the challenge set over the duration of the project. Summarise F1 in Schools and what they think they will need to make a successful team
	Form the team	Who does what in an F1 team? Introduce different job roles. What roles are necessary in an F1 in Schools team? Discuss who in your team is suitable for these roles. For example: Team manager – how will they keep the team on track? What are the deadlines / targets to work to? Generate responsibilities for all team members – what does everyone need to work on?
	Name the team	Create a suitable team name. What's in a name? Discuss words that you can use to create a suitable name for your team. Decide on a team name for the project, discuss what will make the team appear focussed, professional and attractive to potential partners and sponsors. Introduce your team and structure to the group – who is taking each role?
	RESOURCES REQUIRED	What is F1 in Schools PPT F1 in Schools Mini Project Design Brief A2 paper / felt tips for team name ideas

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2 (ALL)	Research	<p>What makes a fast object?</p> <p>Understanding how to influence acceleration using aerodynamics. Make a paper aeroplane using a single piece of A4 paper and no additional fixings. Nominate a pilot per team, fly the planes and work out which ones are the most efficient and why.</p> <p>Understand how the F1 in Schools equipment works. See demonstration of equipment and sample car, discuss what factors are controlled and which can be influenced.</p>
		<p>Research how different objects are designed to travel fast. Produce a re-research poster explaining the science of speed, focussing on the three principles of aerodynamics: thrust, drag and lift.</p> <p>Present research to group, focus on describing which objects the team will look to use as inspiration for their designs and why.</p>
	RESOURCES REQUIRED	<p>A4 paper for aeroplane challenge</p> <p>F1 in Schools 24m Roll-Out Race Track and Race System / example F1 branded cars for racing demonstration / 4gm compressed gas canisters</p> <p>Or</p> <p>10m Roll-Out Race Track with the Air Launch System and Pump / sample cars</p> <p>A2 paper / felt tips for research poster</p>

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3 (ALL)	Sketching basics	<p>Back-to-back challenge (one student explains a shape, the other draws what they hear)</p> <p>Learn about basic 3D isometric drawing. Watch IsoSketch video, sketch a perfect cube</p> <p>Learn how to draw in isometric 3D and produce a series of drawings. Use IsoSketch to draw a basic 3D dice / toaster / mug / bird box using the tutorial videos.</p> <p>Create an F1 shape design in 3D. Use an F1 in Schools chassis template to sketch an F1-style car using IsoSketch and/or freehand skills.</p> <p>Speed cube race – use IsoSketch to draw a cube in the fastest possible time</p>
	RESOURCES REQUIRED	<p>A4 paper / pencils for starter</p> <p>A3 paper / IsoSketch 3D drawing tools / pencils / rubbers for sketching activity</p> <p>IsoSketch video tutorials (DrawingToolCo YouTube channel)</p> <p>F1 in Schools chassis template (A4)</p> <p>NOTE: If you have not purchased IsoSketch 3D Drawing Tools, this lesson could be taught using isometric drawing paper</p>

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4 (ALL)	Buisness plan/ Sponsorship	Upsell a standard classroom object (e.g. a pencil, paper recycling bin etc). Decide budget and deadlines. Create required budget for project – what do we need? Discuss with all team members and complete order form. Discuss and generate ROI (return on investment) proposal for potential sponsors. Write introductory pitch to deliver to potential sponsors. Create tiered chart for different levels of support. Upsell your own team brand to the group
	Graphics (BRAND)	Logo sample recognition quiz. Design a team logo and uniform. Create several options for the team logo and share these with the team for feedback. Apply chosen design to a uniform template. Generate car graphics to match the other branding elements, thinking about how these will be produced and applied to the final product. Reflect: what does your name / logo say about you?
	Iterative design (DESIGN)	Rapid sketching warm up – 3D shapes / cubes in a minute Create at least 3 different concepts for the design of the car. Create designs for the car in isometric, showing the evolution of a basic idea. Model designs using basic modelling materials. Use chassis forms to model aerodynamic body shape using plasticine and adding card wings. Review ideas according to research and photograph all solutions. Evaluate and choose preferred option(s) to take to next stage
	Material Investigation (ENGINEER)	Assemble the standard chassis net using instructions provided. Create the rolling chassis. Add the axles / axle bushes / wheels / propulsion tube and tether guides to the chassis. Test the alignment of the axles and fitment of the wheels on a smooth, flat surface. Review performance of chassis and make any changes to the setup.
	RESOURCES REQUIRED	Team baseball cap and/or T-shirt template (A4) Component order form (A4) Stationery / A4/A3 paper for generating ideas Standard chassis kit

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5 (ALL)	The Pitch	Speak clearly from the opposite side of the room. Gain sponsorship in the form of manufacturing materials and stickers to apply to the car livery. Present the team, members designs and sponsorship opportunities to potential sponsors. Offer logo placement options, ROI opportunities, speak clearly and convincingly. Review pitches and award sponsorship where appropriate (options – various colours of card for manufacturing, sheets for producing transfers or stickers etc.)
	RESOURCES REQUIRED	Sticker sheets Drawing materials

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6 (ALL)	Budget	<p>Review sponsorship gained and calculate final project cost</p> <p>Produce a budget summary. Create a full team budget summary sheet, using the order form to work out how much CREDIT the team has spent, how much they raised and how much they have remaining.</p> <p>Discuss what the team would spend any additional funds on, or how they could raise more.</p>
	Uniform (BRAND)	<p>Team uniform recognition quiz</p> <p>Produce the team uniform (apparel) for race day. Apply team logo, sponsor logos and graphic elements to white team baseball cap using fabric pens</p> <p>Review completed uniform with the team, focus on quality control and brand exposure</p>
	Present (DESIGN)	<p>Match the car to the team brand quiz</p> <p>Create ideas for car livery in 2D. Translate onto the body components, working with the Engineering Team to complete components when they are ready.</p> <p>Review completed car with the team, focus on quality control and brand exposure</p>
	Manufacturing (ENGINEER)	<p>Top 5: What makes a high-quality finished product?</p> <p>Manufacture the car body using card. Using basic modelling materials, create the body of your final design. Order any additional materials required through the finance department.</p> <p>Quality check: is the product in need of alteration / finessing? Make checklist of areas to finish / improve</p>
	RESOURCES REQUIRED	Budget Summary sheets White team baseball caps or T-shirts/ fabric pens Car livery design template sheets A4 card sheets

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OPTIONAL LESSON 7 (ALL)	Smoke tunnel testing	<p>Smoke tunnel demonstration - explain what to look for, what causes vortices and how to overcome turbulence.</p> <p>Test the car using a smoke tunnel. Run visual smoke test with team's car and discuss possible improvements to the design.</p> <p>As a team, agree what changes (if any) will be made to the design.</p>
	Aerodynamic developments	<p>Develop design using smoke tunnel testing research. Use feedback to make any changes needed to the design before submitting to Parc Ferme.</p> <p>Take votes from all teams as to which car they think will perform best on track and why.</p>
	RESOURCES REQUIRED	Denford Air Visualisation Tunnel

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8 (ALL)	Racing	<p>Welcome the teams, play F1 music and reveal the track.</p> <p>Teams race their cars head-to-head over 2 rounds of racing. Race cars once in each lane, head-to-head recording the result of each pair. Race results (win/lose) are added to a tally chart. If there is a tie at the end of racing, teams race against each other in sudden death format, with ultimate winner recorded. Top three calculated using either race results or sudden death competitors. Drivers set a reaction time. Teams nominate a driver to set a reaction time using the online system, their best of 4 attempts is added to a separate leader board, this is kept out of sight to keep suspense.</p> <p>Prize-giving. Reaction time (driver) podium, Race win (team) podium. Team brand award, Sponsorship pitch award, Car design award, Finance award (most CREDIT left)</p>
	RESOURCES REQUIRED	F1 in Schools Roll-Out Race Track and Race System / 4gm Compressed Gas Cartridges or 10m Roll-Out Race Track and Air Launch System, Reaction timer (online system – project onto board) Prizes



Following are a selection of useful worksheets and information sheets to assist in delivering the F1 in Schools Mini Project.

Additional help and guidance may be found by exploring F1 in Schools Primary Class Guide-book or the Denford Primary STEM Project on line resources. Both available FOC online.

To view F1 in Schools Video : [CLICK HERE](#)

To view F1 in Schools Primary Class: [CLICK HERE](#)

To view Denford Primary STEM Project Resources: [CLICK HERE](#)

INTRODUCTION

Welcome to the world of F1 in Schools!

You're about to start a journey that could stretch way beyond this summer, so get ready to join your teammates and build your very own F1 team!

F1 in Schools is a **STEM** (Science, Technology, Engineering, Mathematics) Competition, where teams follow the process of Research –Design –Analyse –Make –Test –Race to compete with their own miniature F1 cars.

At the heart of an F1 in Schools team is a Project Manager, who oversees the different activities such as design, testing, manufacturing, marketing, promotion and finance –basically all the essential roles in a real F1 team.

Your challenge: Identify specific roles for each team member, then work collaboratively as a team to create the following items:

A team brand, logo and identity

Team uniform (apparel)

An aerodynamic F1 in Schools race car

A budget and team sponsorship presentation

Prove yourselves:

At the end of this mini project, you will race your car against the other teams to find out who has designed and manufactured the fastest car. You'll also present your teams to potential sponsors to gain their support for your team and earn vital CREDIT to put towards the cost of manufacturing your car and producing team uniforms.

There will be **awards** and **prizes** on offer to reward the teams' hard work, so every team member must contribute equally to ensure the team, as a whole, performs at its best!

100 C Start-up fund: F1 in Schools encourages new teams to enter the competition. As new entrants, you have been given a start-up fund to put towards the cost of manufacturing your items, in CREDITS(C). Each team has been given a fund of 100 C, which will start you off, but won't be enough on its own. You'll need to raise more CREDIT through gaining sponsorship, so think carefully about how you can convince a sponsor that they should pay to put their logo on your car and team uniform...

Job Roles and Having Fun: For your team to be a success, each team member must contribute equally and play to their strengths, so good Project Management is crucial!

Above all, F1 in Schools should be fun, so enjoy the challenge, do your best and work together as a team to support each other in any way you can. The best teams are the ones who really enjoy what they do and help each other achieve their goals

..... so, welcome to **F1 in Schools!** Have fun finding your passion, we'll see you at the track...

DESIGN BRIEF

Your task is to make, test and race a miniature F1® racing car made from card, which will race down the F1 in Schools 24m Roll-Out Race Track, powered by a compressed gas Power Pack.

Or your car will be raced down the 10m Roll-Out Race Track using the Air Launch System and Pump.

Working as a team you must use a range of techniques to show design work, including freehand 3D sketches and card modelling skills.



TEAM ROLES:

TEAM MANAGER: The Team Manager will work closely with all members of the team, helping out where needed and keeping the team on track.

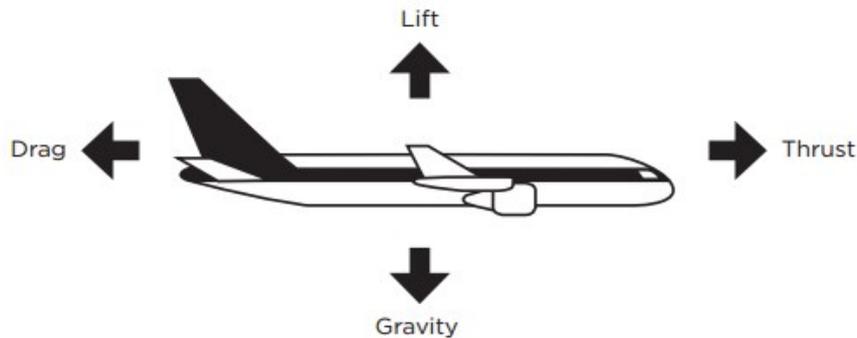
MANUFACTURING ENGINEER: The Manufacturing Engineer is responsible for making the car, based on the ideas of the Design Engineer.

DESIGN ENGINEER: The Design Engineer is responsible for designing an aerodynamic body shell for the car. The Design Engineer will need to discuss ideas with the manufacturing Engineer to make sure that their ideas are possible.

GRAPHIC DESIGNER: The Graphic Designer is responsible for how the car looks and will oversee the design of the team's logo and uniform.

AERODYNAMICS

PAPER AEROPLANE CHALLENGE



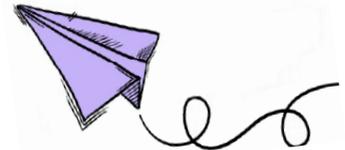
An aeroplane in flight is acted on by four forces:

LIFT, the upward acting force;

GRAVITY, the downward acting force;

THRUST, the forward acting force;

DRAG, the backward acting force (also called air resistance).



Drag and gravity are forces that act on anything that is lifted from the earth and moved through the air. Thrust and lift are artificially created forces used to overcome the forces of nature and enable an aeroplane to fly.

The aeroplane's engine and propeller combine to produce thrust to overcome drag. Their wings are designed to produce lift to overcome gravity.

Using a piece of paper make a basic paper aeroplane and nominate a pilot to fly the plane.

Think about...

Which directions would forces act upon a plane while it is in flight? What causes these forces?

How is thrust created to propel the paper plane?

How could you change the effects of forces on the plane to help it go faster or to slow it down?

Discuss with your team the forces that are acting upon the plane and whether those forces are thrust, drag, lift or gravity.

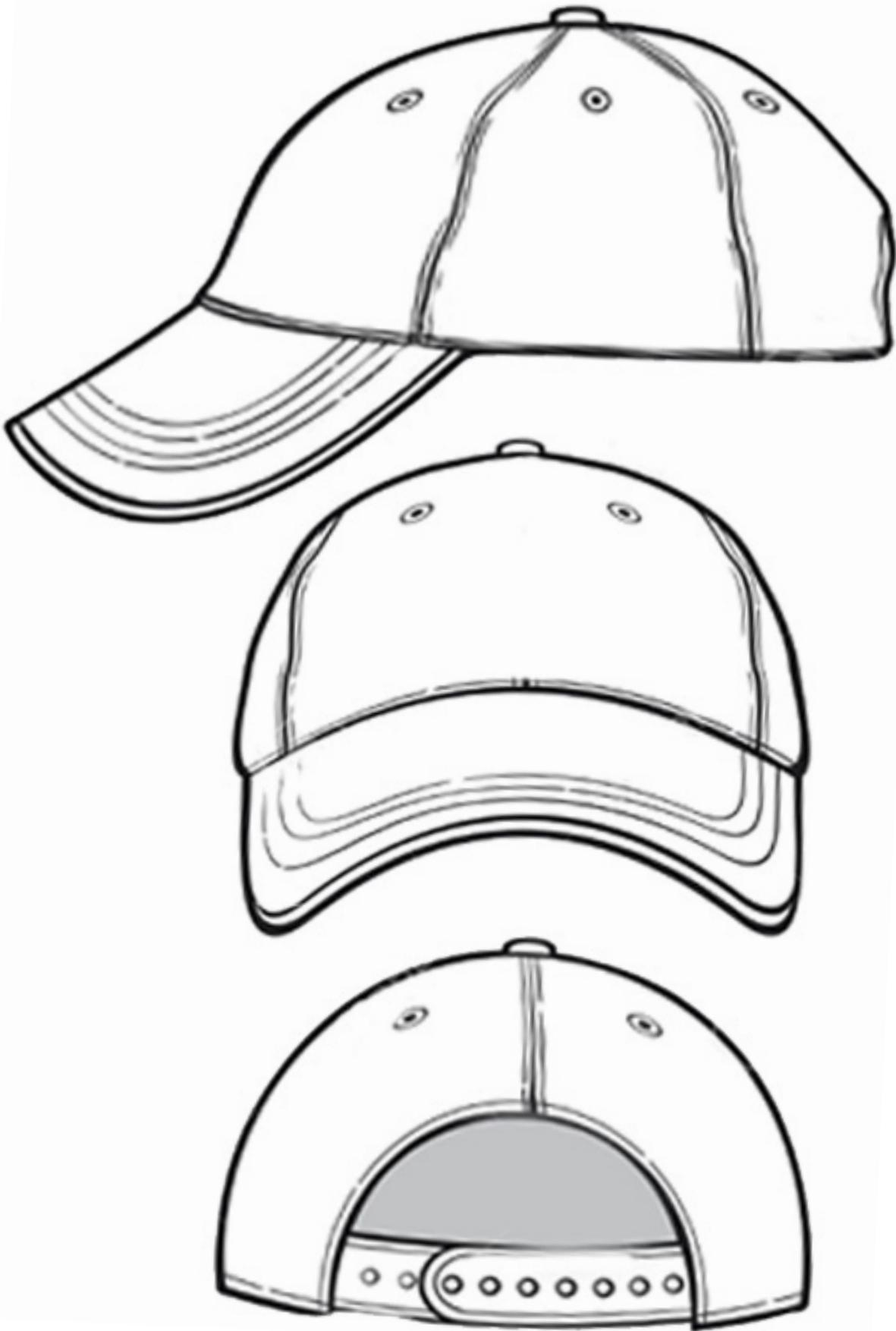
Consider how animals use forces to move faster or slower.

How do animals create the forces required for flight.

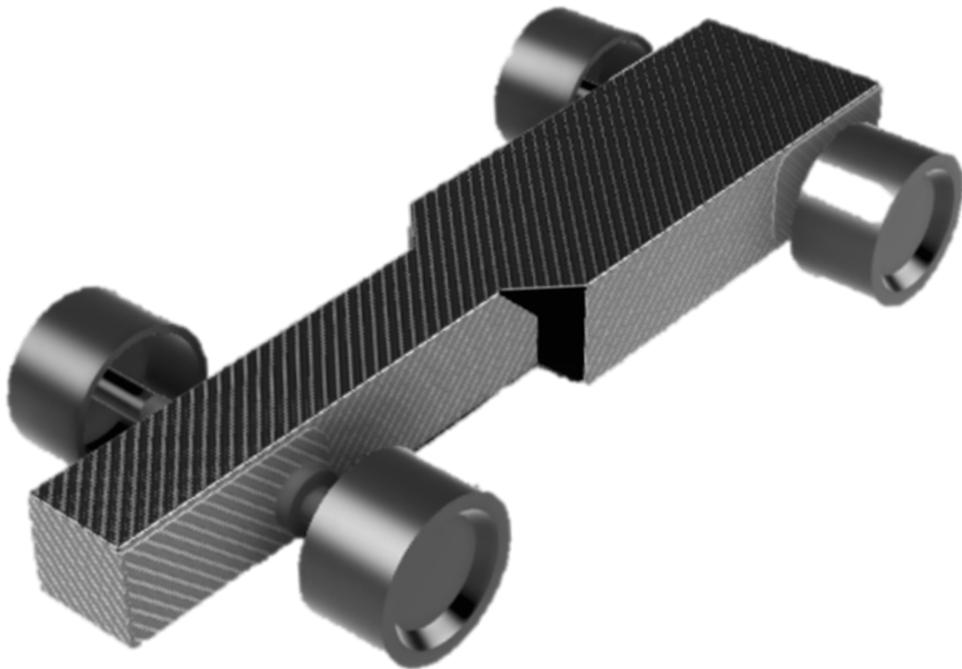
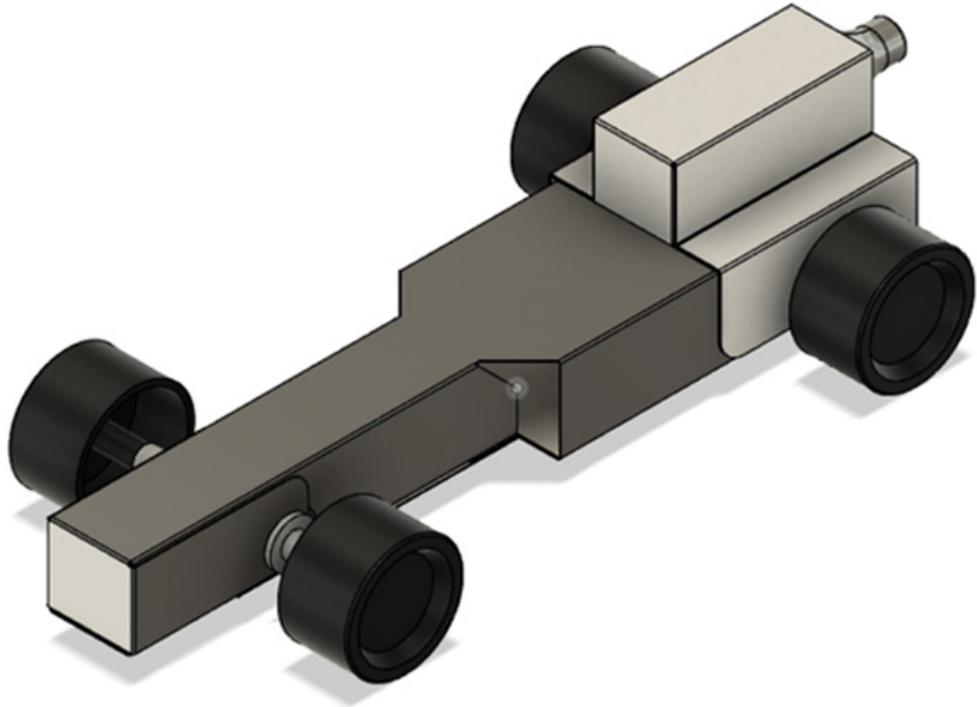
How does a streamlined shape affect the forces acting on an animal?

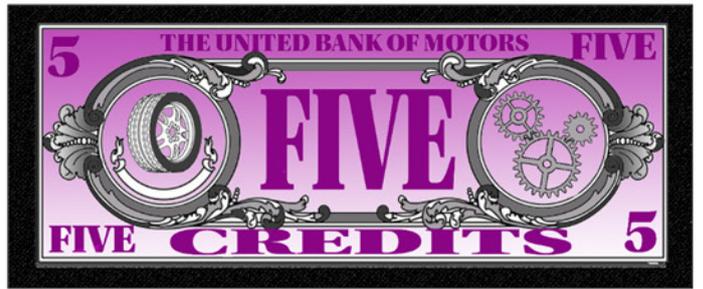
Think how weight can increase the effects of gravity. Elephants don't fly!

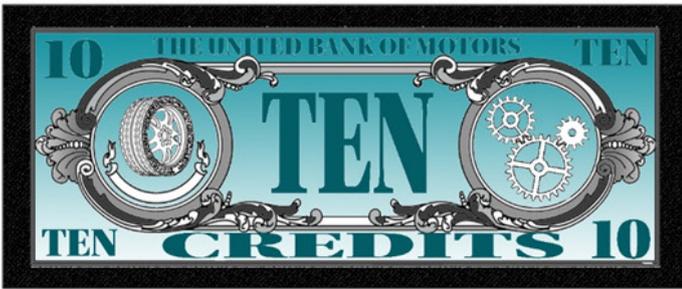
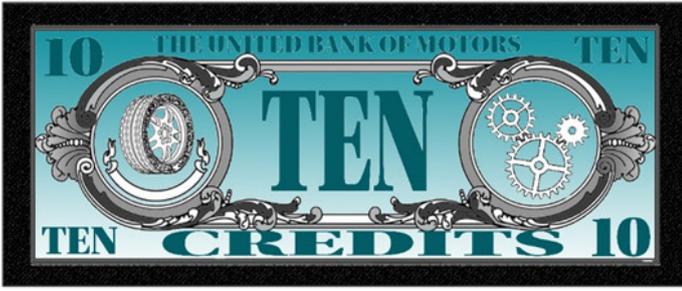
As a team discuss how the information that you have learned can help you to develop the fastest car possible.











LOGO ANSWER SHEET

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COMING SOON....

