



in Schools

STEM Challenge

F1 in Schools Academy

**Raising Aspirations and Attainment in Schools
through University - School Partnerships**



F1 in Schools Academy

F1 in Schools Academies are an ideal vehicle to facilitate effective and successful partnerships between Universities and Schools – whether as part of a Civic University Agreement, in which a University pledges commitment to its local community, or as a more general University-School partnership which aims to forge links with local Schools, supporting educational growth in their local area.

- Provides the University with a strategic and demonstrable positive impact in their community
- Facilitates effective collaboration between a University and local Secondary Schools, with a view to raising attainment across the curriculum
- Widens access to Higher Education opportunities – inspiring academically-minded students to apply to University, whilst also encouraging the more practical / technically-minded students to enhance their knowledge or skillset
- Facilitates outreach and mentoring programmes for University students in the form of workshops and school visits
- Aims to raise standards across Schools, removing the attainment gap between advantaged and disadvantaged pupils and promoting student success
- Facilitates Summer Schools for UK and International students, providing an additional income stream for the University
- Assists community regeneration and helps to improve the prospects of a local area

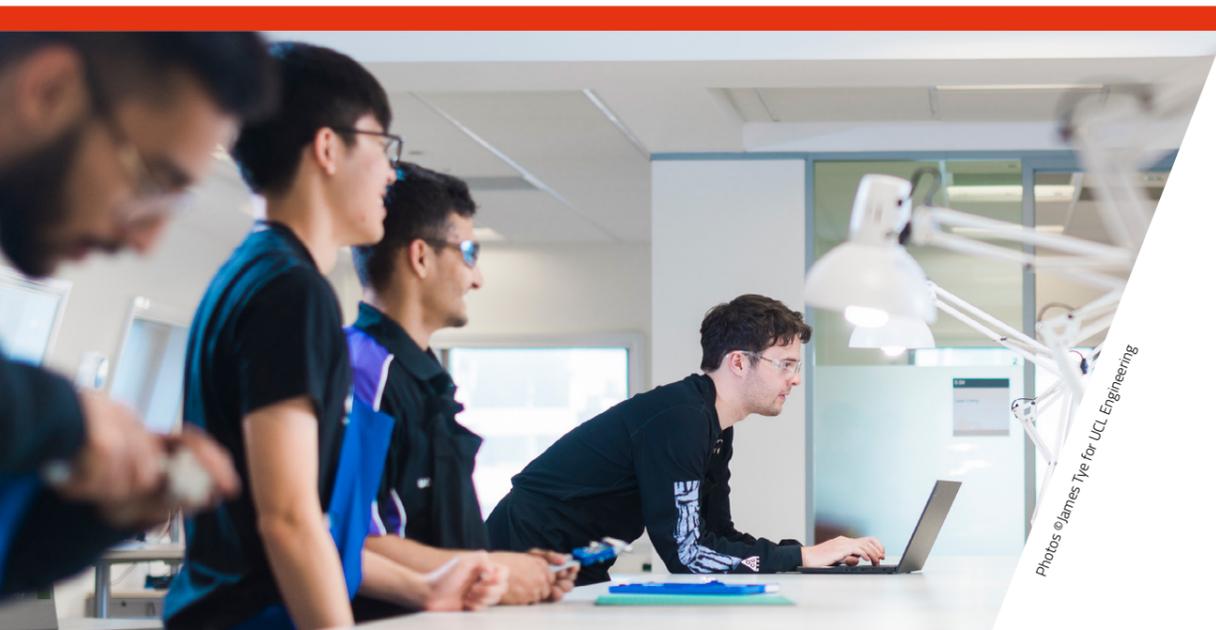


How a University will engage with local Schools will depend upon on its mission, strengths and local circumstances. Partnerships with Schools are diverse, and an F1 in Schools Academy is just one example of how a partnership can thrive, with the following positive achievements:

- Raising attainment and aspirations
- Fulfilling potential by engaging and motivating students of all abilities
- Encouraging greater participation and performance in STEM subjects
- Increasing the numbers of women studying and working in engineering
- Allowing pupils the opportunity to engage in both academic subjects and hands-on skills
- Encouraging independent learning alongside teamwork
- Facilitating curriculum development and enrichment
- Channelling talent through improving subject knowledge and critical thinking skills
- Providing learning opportunities and facilities – particularly to those students who might be disadvantaged by lack of access to the latest technologies and specialist equipment
- Providing an insight in to University life
- Preparing young people for the world of work

These are examples of how a University can provide support and expertise to its local Schools:

- Provide access to facilities and equipment
- Provide subject area expertise, in the form of mentoring, supported by undergraduates
- Create opportunities for resource-sharing
- Offer outreach programs
- Host Summer Schools to give school students experience of new subjects and university life



Photos © James Tye for UCL Engineering

F1 in Schools Academy

The Basic Concept

An F1 in Schools Academy is effectively a centre of excellence, or hub for local Schools taking part in F1 in Schools, providing technical know-how, educational support and access to F1 in Schools 'Make, Test and Race' equipment, which may otherwise not have been available at the School.

Once teams have registered for the Challenge, they can work on project management, business plans, sponsorship, marketing, sketching, car design and CFD analysis at their School. Car design and analysis is carried out using a suite of Autodesk Software, which is supplied free-of-charge by Autodesk to participating Schools.

Teams will then have the opportunity to visit their local F1 in Schools Academy to see their cars being manufactured on a CNC Router (plus 3D Printers for the wheels and aerofoils), with the finished cars being tested using the Air Trace Visualisation System and F1 Race Track - testing speed and performance.

In addition to providing access to manufacturing equipment and resources, the F1 in Schools Academy can provide participating Schools with support for all aspects of the Challenge, with University Students also mentoring local Teams – and this could take various forms, such as workshops or school visits. School Teachers will also benefit from this collaboration, as they will have access to the very latest CAD/CAM technologies.



Photos ©Matt Clayton for UCL Estates



Going forward, pupils may compete against other teams from their own school, or teams from other partner schools within the community. Teams can then take part in Regional Finals and, if successful, progress to the National Final, where further triumph would present them with the opportunity to represent their nation at the F1 in Schools World Finals.

The interaction between the University and local Schools is key to driving up aspirations and achievements, allowing pupils to thrive, whilst also offering an insight into University academic life. In addition to STEM-related skills, participation in the Challenge provides significant benefits for school students, in readiness for their chosen future careers.

The very first F1 in Schools Academy is based at UCL Mechanical Engineering's new MechSpace in Central London. F1 in Schools has enjoyed a long and successful association with UCL Mechanical Engineering, with the University students mentoring teams, as well as UCL providing valuable Scholarships for UK National Champions and World Champions.

Professorial Teaching Fellow, Tim Baker of UCL Mechanical Engineering said:

"The F1 in Schools Academy in our new MechSpace provides a space for us to collaborate with F1 in Schools further, bringing local schools to access equipment that is not always available to them, as well as the expertise of our undergraduates, who welcome the opportunity to mentor and inspire the younger generations of future engineers. We look forward to the Academy developing strong links with schools in the area and hosting students for their F1 in Schools development and test programme and hope that we can nurture further F1 in Schools World Champions."

F1 in Schools

An Overview

F1 in Schools Limited is a not-for-profit company, established with committed partners, to provide an exciting, yet challenging, educational experience through the magnetic appeal of Formula 1. It was launched in the UK in 2000 in 8 schools and now operates in over 26,000 schools across 51 countries worldwide.

As the world's biggest and most exciting STEM competition, F1 in Schools is a multi-disciplinary challenge, in which teams of students aged 9 to 19 use CAD/CAM software to collaborate, project manage, design, analyse, manufacture, test and then race miniature compressed air-powered F1 cars down a 20m track. As part of the process, teams must also raise sponsorship and manage budgets to fund research, marketing, team branding, travel and accommodation.

The F1 in Schools STEM Challenge aims to raise standards across schools, promoting student achievement in STEM related subjects and beyond, developing the next generation of engineers, technicians, scientists, and entrepreneurs. By adopting a grassroots approach, we actively encourage students from all backgrounds to take part in the Challenge by setting realistic performance goals and offering a variety of different entry levels, which helps students to develop their skills as they progress from one level to the next.

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The Challenge is all-encompassing, spanning age ranges from 9 to 19, irrespective of social background and ability, attracting participation from both boys and girls. By virtue of the fact that the students form teams to take part, there is an opportunity for less academically-able students to participate and to demonstrate their practical skills and strengths by being part of a team.

F1 in Schools links the world of education to the essential life and employability skills which students need to launch their future careers. Participating students have progressed to positions with automotive companies and motorsport teams (case studies are available), and some have progressed to placements in Formula 1 – all of which demonstrates that F1 in Schools is highly successful in developing and nurturing high calibre talent.

F1 in Schools

The Challenge

Working in teams of between 3 and 6, each student is assigned a role. The team prepares a project and business plan, develops a budget and raises sponsorship. Teams are encouraged to collaborate with industry and to forge business links. Using 3D CAD (Computer Aided Design) software, the team designs a miniature Formula One car, then aerodynamics are analysed for drag coefficient in a virtual-reality wind tunnel using Computational Fluid Dynamics Software (CFD).

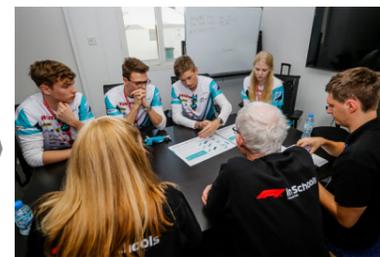
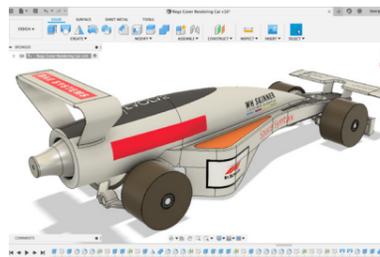
Using 3D CAM (Computer Aided Manufacture) software, the team evaluates the most efficient machining strategy to manufacture the car on a CNC Router. Aerodynamics are tested in wind and smoke tunnels. Then, the race is on, at more than 70kph. Cars race side-by-side along 20-metre straight track. Teams are not only judged on car speed, but also on supporting evidence of their design, along with a verbal presentation and their marketing display stand in "the pits". Teams compete regionally, nationally and internationally for the F1 in Schools World Championship Trophy.

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F1 in Schools

The Process



1 Form an F1 in Schools Team

A team is formed of 3-6 students, with a team name and allocated job roles: Team & Project Manager, Manufacturing Engineer, Design Engineer, Graphic Designer and Resource Manager. The team then registers for the regional finals.

2 Project Management, Business Plan and Sponsorship

The team prepares a business plan, develops a budget and raises sponsorship. Teams are encouraged to collaborate with industry and create business links.

3 Design

Using 3D CAD (Computer Aided Design) software, the team designs an F1 car to the specifications set by the International Rules Committee - just like in Formula 1.

7 Pit Booth

Teams put together an informative display, showing their work through all stages of the challenge, also incorporating their team identity.

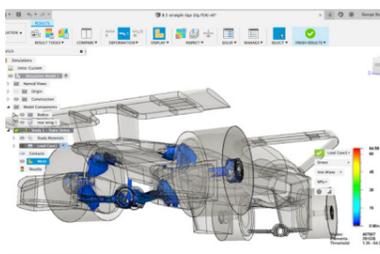
8 Scrutineering

Cars are submitted to Parc Ferme, where the judges scrutinise every dimension to check that they comply with the Rules and Regulations.

9 Engineering Judging

Judges question teams on how their cars have been manufactured and why particular designs were chosen.

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4 Analyse

Aerodynamics are analysed for drag coefficient in a virtual reality wind tunnel using Computational Fluid Dynamics Software (CFD).

5 Make

Using 3D CAM (Computer Aided Manufacture) software, the team evaluates the most efficient machining strategy to manufacture the car on a CNC Router.

6 Test

Aerodynamics are tested in air trace visualisation tunnels.



10 Verbal Presentation

Teams prepare a presentation to perform to a panel of judges covering all aspects of the challenge. This is presented within a set time limit.



11 Portfolio Judging

The teams present two A3 portfolios documenting their project: one enterprise portfolio (documenting business strategy) and one engineering portfolio (documenting the construction of the car).



12 Race

Teams are judged on car speed, as well as supporting evidence of their design, verbal presentation and marketing display stand in "the pits". Teams put the cars to their ultimate test by racing them over a 20m distance with the F1 in Schools Track and Race System.

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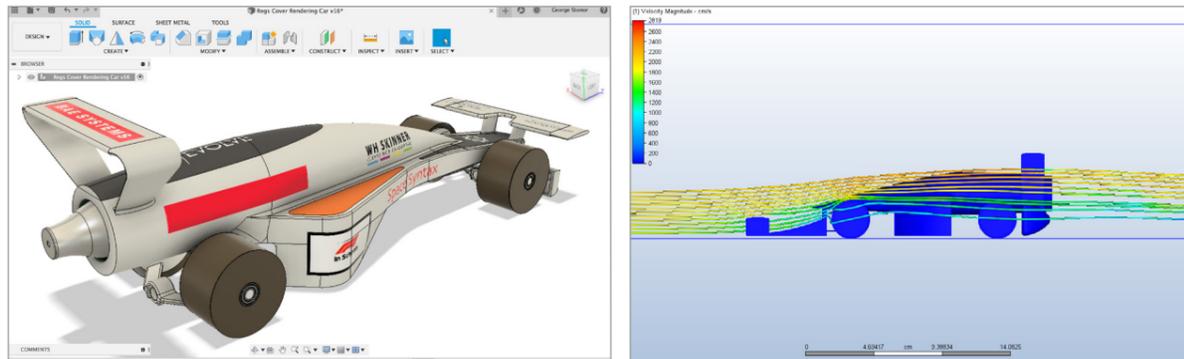
F1 in Schools

Design, Analyse, Make, Test and Race Equipment

DESIGN & ANALYSE

As F1 in Schools' Premium Global Software Partner, Autodesk provides an extensive suite of 3D Design Software free of charge to all schools participating in the F1 in Schools Challenge.

Using this industry-standard software, teams can design and analyse their model F1 cars, with aerodynamics being analysed for drag coefficient using Computational Fluid Dynamics (CFD) software.



DENFORD LIMITED

A British manufacturer, and 'Proud Founder and Sponsor' of the F1 in Schools STEM Challenge, Denford manufactures and supplies a comprehensive portfolio of hardware and software products, including CNC routers, milling machines, lathes, 3D printers and laser cutters. Denford has designed and produced the official range of F1 in Schools Race equipment - including the F1 Race Track and Race Control System - which was developed to meet the evolving needs of teams taking part in the Challenge.

MAKE

-CNC Routers

Denford offers a range of CNC Routers, which when fitted with the F1 in Schools Car Manufacturing Fixture, are an ideal solution for the manufacture of F1 Car designs.

-3D Printers

As part of the F1 in Schools Challenge, 3D Printers can be used for printing front and rear wings, wheels, wheel support systems and nose cones, allowing teams to enhance and fine-tune their car designs.

TEST

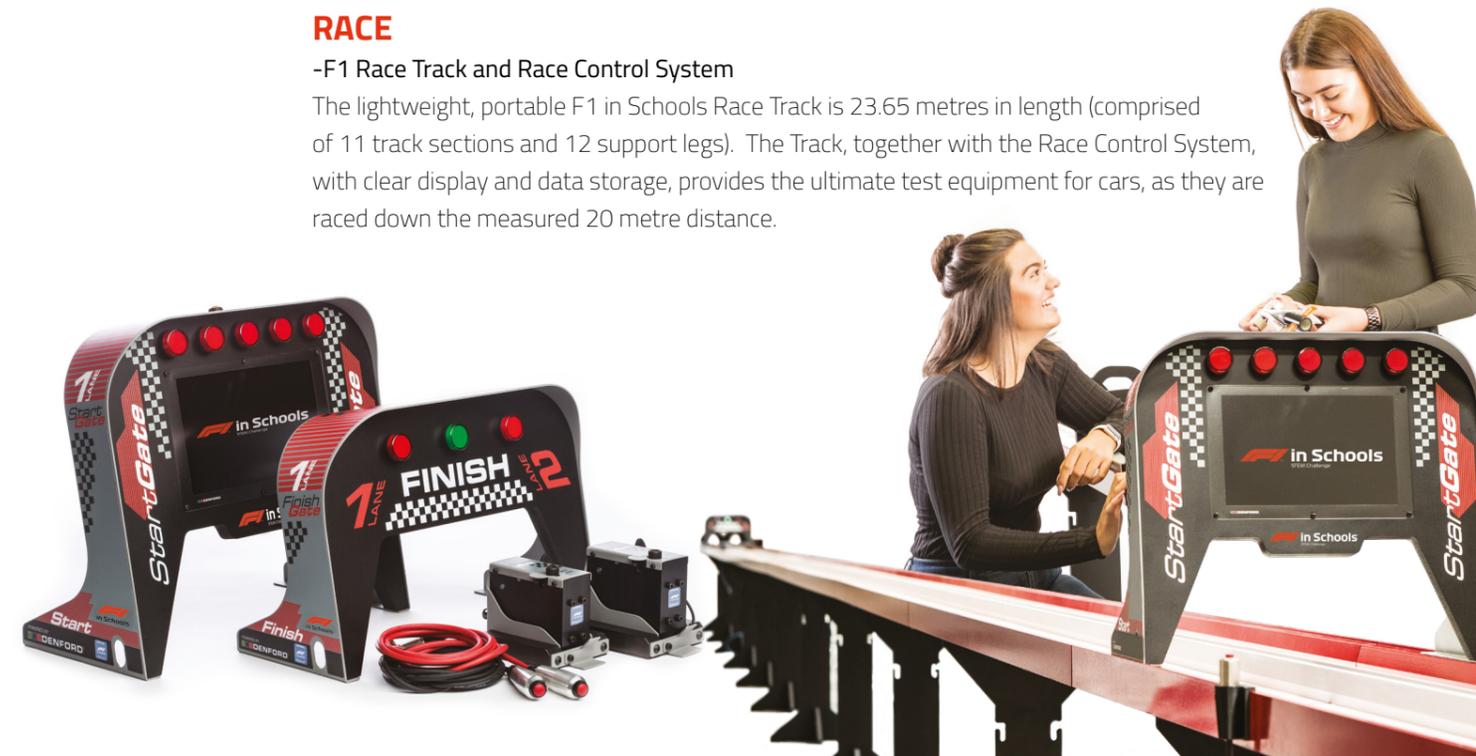
-Air Trace Visualisation System

The Air Trace Visualisation Tunnel is an essential part of the test process. Featuring variable wind speeds, it is simple to use, compact in design and easy to set up. Use it with the Air Trace Smoke Generator to run a steady stream of smoke-like vapour over an F1 in Schools car to demonstrate its aerodynamic capabilities.

RACE

-F1 Race Track and Race Control System

The lightweight, portable F1 in Schools Race Track is 23.65 metres in length (comprised of 11 track sections and 12 support legs). The Track, together with the Race Control System, with clear display and data storage, provides the ultimate test equipment for cars, as they are raced down the measured 20 metre distance.



F1 in Schools

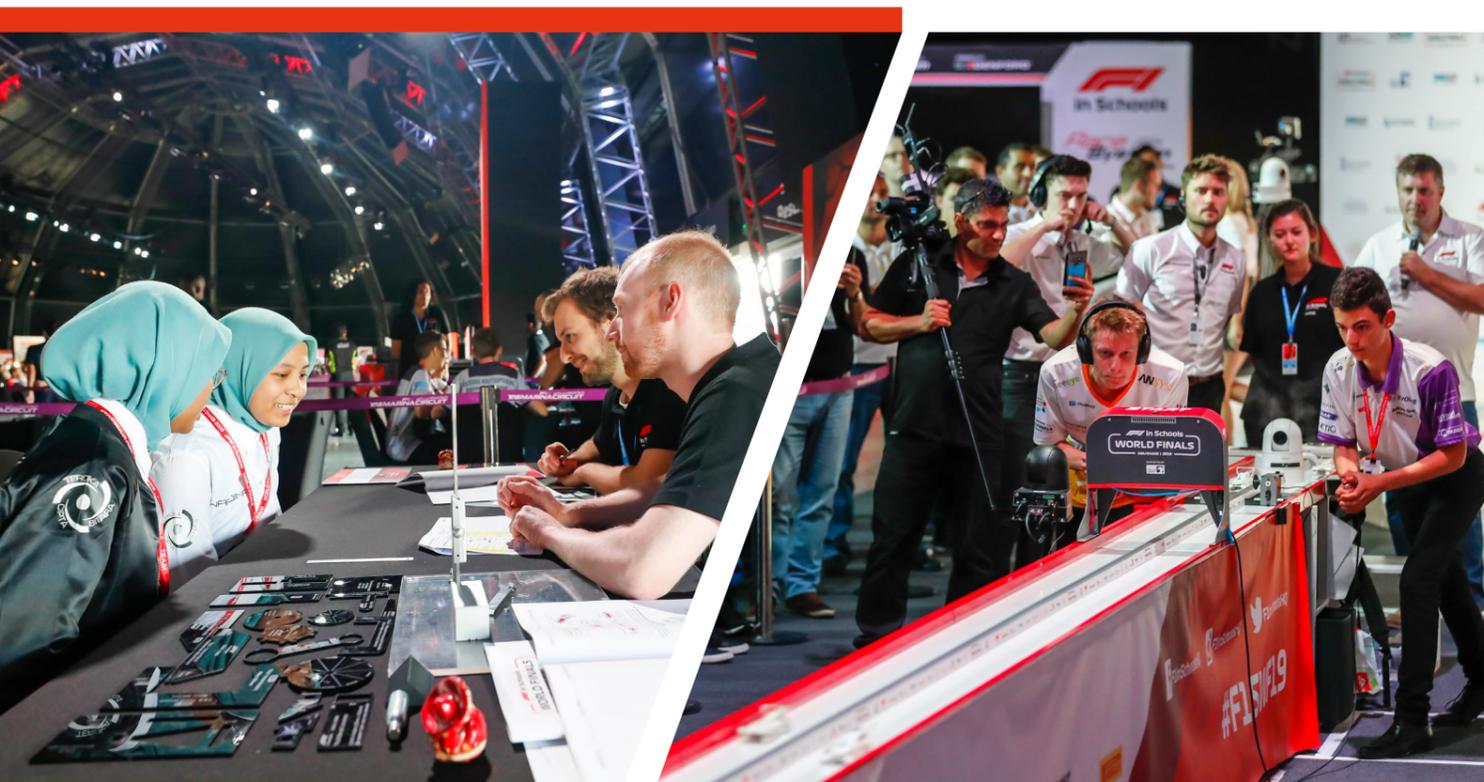
OUR MISSION

We offer a unique and exciting way to enhance the learning of Science, Technology, Engineering and Maths (STEM) related subjects.

This is achieving great results worldwide and we know that we are increasing the intake of students into careers in Manufacturing and Engineering. We are privileged to have the support of the Formula 1 Community – in particular Mr Chase Carey – and, of course, the Formula 1 Teams, who make our students welcome in the F1 Paddock and in their factories.

Each year students competing in the F1 in Schools World Finals are able to exclusively apply for a chance to be selected for a place in the world's first programme dedicated to identifying and training a new generation of F1 engineers run by the legendary Williams F1 Team.

ROKIT WILLIAMS RACING



Chase Carey with 2020 World Champions - Team Evolve UK

“We are very proud that F1 in Schools continues to grow exponentially and that it is inspiring many thousands of young people into careers in science and technology.”

Chase Carey - Chairman and CEO Formula 1



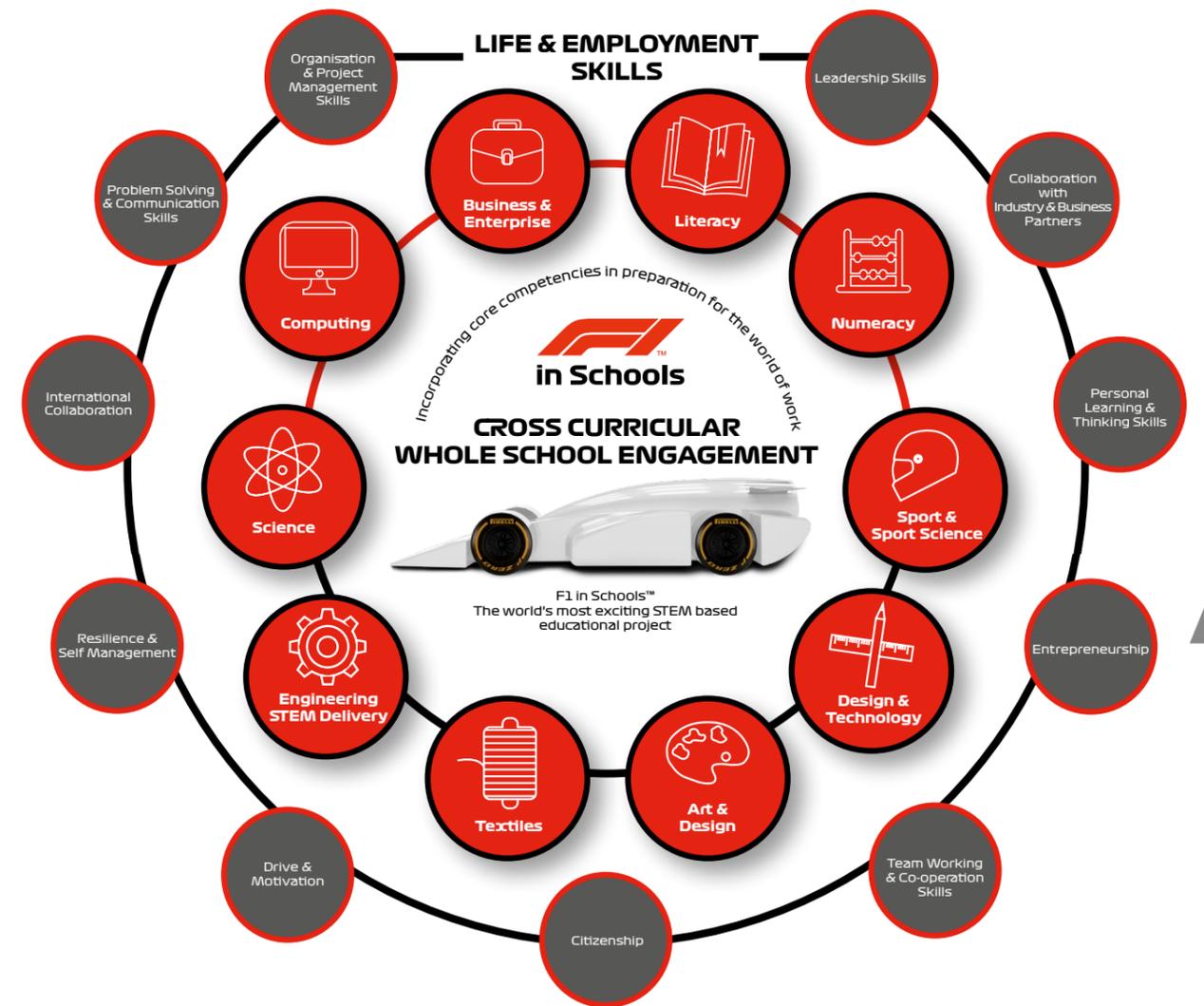
HUB & SPOKE

K-13 STEM DEVELOPMENT PATHWAY



LIFE & EMPLOYMENT SKILLS

BUILDING LIFE SKILLS NOT JUST STEM





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