



synergy

# SCHOOLS SOLAR CHALLENGE

## Competition Rules

# The Rules

## The Synergy Schools Solar Challenge is a solar vehicle design, build and race challenge.

The challenge requires participants to apply engineering skills and a knowledge of solar energy and photovoltaics. While the cars are simple in design they need to be built accurately and fast. A hands on, fun STEM learning experience providing students with an opportunity to challenge themselves and to compete against their peers from other schools.

## Spirit of the Competition

We ask students to enter the "Spirit of the Competition". We hope students will learn new skills and be prepared to be involved in fair and fun racing. Fairness is a priority and the reason why we are providing a standard kit on competition day for all participating teams to build and race. We are encouraging a contribution of ideas and not dollars.

Item	Quantity
Solar Panel – KM 2v 700mA Panel	1
Motor – KM F-18FS & Mount	1
Axel – Fibreglass rod 3mm & collars	2
Corflute sheet	1
Wheels	8
Gear Pack	1
Switch (on/off)	1
Wire – Red & Black, 2 pieces	2 @ 0.35m
Battery Pack	1
2 x AA Batteries if no sunlight	2

### Standard kit

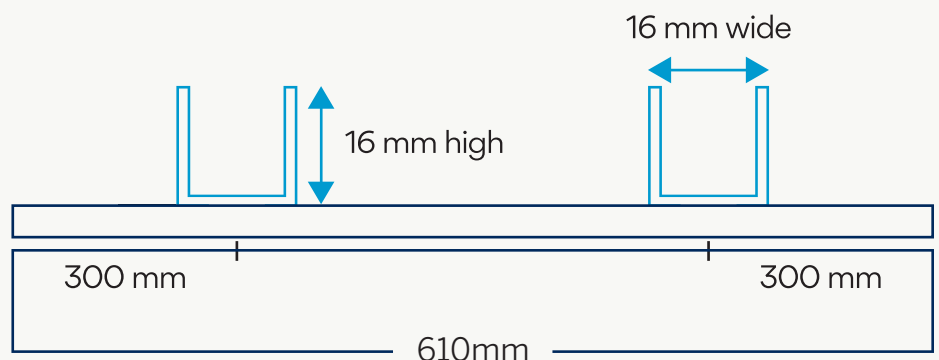
A solar vehicle kit will be provided on race day, containing:

### Other items

- ✓ Guide pins
- ✓ A sticky label
- ✓ Double sided tape
- ✓ Scissors

## The Track

There is a U channel stuck to a flat smooth board (Corflute). The length of the track is 20m. The car will need some form of guide pins to ensure it will run smoothly along the track, these **guides will be on the outside of the U Channel**. We will race four cars at a time. The track is joined every 2.4m and this creates small bumps. Your guides will need to take this into account. Please call an official (wearing a blue shirt) if you are unsure.



# The Car

In order to keep the race in line with the spirit of the competition, the following rules apply to the construction phase of the competition.

## Approved additional construction materials

Additional materials must be approved by a race official on the day. For example:

- tools to help construction such as pliers or wire strippers are allowed
- material to help angle the solar panel such as foam, cardboard or balsa is most likely to be approved.
- any electronic charge devices and high tech high large dollar construction materials or technique replacing kit items or additional to the kit will not be approved.
- any materials (such as dry ice) or devices (spray cans) to cool the solar panels will not be approved.

## Construction must include:

- ✓ The on/off switch
- ✓ The battery pack
- ✓ The sticky label with your school name and competition number on it.
- ✓ Standard kit items

## Construction must not include:

- ✗ Extra or replacement of standard kit items such as the solar panel and motor
- ✗ Modifications to the corflute chassis

# The Design and Engineering Challenge

## Your challenge is to make the fastest car.

There are a number of races in the competition so your car needs to be durable. Your team will participate in at least one heat, which will run as a 'best out of three' challenge. Each team will verse the same team three times with the winning team progressing through to different stages in the heat.

Teams who win in a heat will progress to the next stage and eventually the best two teams on the day will race off in the final.

Accuracy of construction and strength is important to get you first across the line. Alignment of wheels and motor are most important. The track is a straight line so you need the car to track straight. The motor has two small pinion gears to choose from. Whichever one you choose needs to line up smoothly with the main gear.

The aim of this race is fun and simplicity. If you make the project too complicated there may be more chance of failure due to breakdown. It is important to have a go at innovative ideas but this is about speed over a straight course.

The gear ratio will have a large impact on the speed and acceleration of the car. You should have done some testing of the different ratios and wheel size at school in preparation for race day. Apply this knowledge when designing your race day vehicle. Same goes for your solar panels, use your school experiences in wiring them up and placement on the chassis.



## Scrutineering

Prior to construction, additional material needs to be checked to establish if they comply with these rules. It is important that you read these rules carefully and take special note of what is provided in the Standard equipment, allowable extras and construction must and must not.

Race order will be determined by random draw. You will line up in this race order near the start. Teams will be provided with a cardboard paddle to cover the solar panels. Be alert and listen for your school name to be called. When called move to your race position ready to start.

# The Race



## The Start

When called:

- team members need to move to their positions:
  - » one at the start with the car
  - » one or two spaced apart on the outside of the track and
  - » one at the finish line to stop and switch off the car
- The team member with the car will be asked to place the car on the track:
  - » check car guide pins are secure and on either side of the U channel
  - » cover the solar panels with the cardboard paddle and
  - » turn the switch on the car to the ON position

When the cars are ready the starter will call, Ready, Set, GO. The student will lift the cardboard paddle to expose the solar panels to the sun and the race will start. The race is to the other end of the 20 m track. It is not timed. The winner is the first past the finish line. Your catcher at the finish line will stop and turn off the car to prevent the car from crashing into the sand bags.

### Points to consider:

1. The car needs enough power to start from a standing start.
2. The paddle needs to fully block the sun so the car will not move at the start line until the paddle is removed.
3. You need to get the car on and off the track as easily as possible.
4. Each team is permitted the maximum of one false start.

## The Race Tournament

The tournament will be a knock out series of race heats. Heat winners will be determined by the best of three, first past the finish line races. The winners move forward to the next round of heats.

If there is not enough solar power on the day you will be asked to run your cars on the batteries provided.

The last four winners or after two rounds of racing teams will be provided with fresh batteries.

***Have fun and good luck!***

## Suggested Reading

- **Model Solar Car Racing by Peter Harley** - Available from Kite Magic Coogee
- **Model Solar Cars: Optimising Their Performance by Stan Woithe** - Available – Give Kite Magic a call