



The Annual Science & Technology Competition 2021-22 Straight line vehicle challenge



Design Brief

1) The aim is to design and make a **self-propelled** land vehicle capable of traveling in a straight line for a distance of at least 2m. The focus is on:

*Directional focus (straight line)

*Ability to travel at least 2m from the start and no further than 10m

*Re-usability after each run.

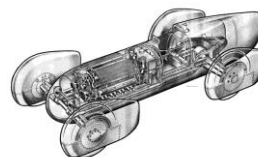
2) The vehicle must be self-assembled. Commercially made chassis will not be accepted nor will any form of remote control. Individual parts of the machine may consist of manufactured pieces e.g. motors, but commercially made vehicles or part vehicles will not be accepted. Construction kits i.e. Lego Technic, Knex, Meccano may be used.

3) The vehicle should finish its journey as close to the central line of the track as possible.

4) The design focus is straight line control for a distance of between 2m and 10m.

5) The finished vehicle must **not be**:

- a) Longer than 70 cm.
- b) Wider than 70 cm.
- c) Higher than 80 cm.



Some possible methods for driving the vehicle might be:

- Some elastic wound around an axle and secured to the chassis.
- An electric motor driving the wheels.
- An elevated weight driving the wheels as it falls.
- A springy object bent to store a given amount of energy connected to an axle by cord.
- Jet power, using a carefully filled balloon and a very light and efficient chassis with low resistance
- Any other safe method.
- Unfortunately solid fuel rockets will not be accepted due to child health and safety!



6) The vehicles will race down one of two tracks laid side by side. Gaining friction on the smooth floor will be vital to avoid the vehicle racing past the scoring zone.

Layout of the Course and Scoring

7) The layout and dimensions of the course (plan view) are shown on the attached diagram **Figure 1**. Please study this carefully. Each lane is 2m wide and separated by a central reservation. After the 10m runway there is a 'bumper' zone (just in case!). The vehicle must be reusable (no long periods of repair will be permitted before its next run.)

8) If the vehicle deviates from the track completely then it will not score points on that run.

9) The prime aim is to travel as close to the mid-line of the track as possible. In the heats, each team will have one practice run and three scored runs. The run which ends their journey within the scoring zone (2m to 10m from the start) closest to the mid-line will be regarded as the 'score' for that vehicle. The team can opt to make fewer runs if they wish to preserve the life of their racer. In the event of a tie, the vehicle with the most consistently high scores will win (i.e. the highest average).

10) All vehicles that enter the scoring zone (covering 2m from the start to 10m from the start) will receive 100 points. The measured distance from the mid-line of the track that the vehicle stops moving (**see Figure 1**) is a maximum of 100cm (being half of the 2m wide track). This distance will be deducted from the 100 points to provide the score for that run. For example, a vehicle that finishes its journey within the scoring zone 30cm from the mid-line (on either side) will score $100 - 30 = 70$ points. The maximum score is therefore 100 points for a vehicle that stops exactly on the mid-line.

11) Children may work as individuals or **groups of up to five/six** in the design and manufacture of their vehicles. Only two members of the team may operate the device for each run.

12) The **heats** will be held in school during the week beginning **Monday 11th July 2022**.

13) **The final** (Head to Head) has been scheduled for the afternoon of **FRIDAY 15th July 2022** at the **West Bridgeford School**. Mr Brierley will be in touch to discuss transport arrangements. In the finals, each vehicle will again be offered one practice run and then three test runs – with the highest scoring run counting. Finalists may repair damage to their racers (2 minutes only), but re-building or major modification will not be permitted on the day. **So strength is a key!**

14) We hope to be in a position to invite parents of the qualifying entries to the West Bridgeford School for the final but we will confirm this nearer the time.

15) There will be a **winning racer** for both UKS2 and LKS2, and these two winners will enter the final. A special prize will also be awarded for the **most ingenious device** in each phase, (i.e., not necessarily the fastest). This part of the competition will be judged by our esteemed judging panel. On the day of the final, a prize for the **most aesthetically designed and finished racer** for KS2 will also be awarded, judged by students from the West Bridgeford School.

May I take this opportunity to wish you every success with your entry. I look forward to seeing the racers in action. Happy designing and happy building and remember those key words:

***Straight line travel for at least 2m but no more than 10m *Re-usability**

