



Guidance for Parents and Guardians KS4 Re-Inventing Wheels

Using your judgement, taking into consideration the working environment, your child's ability or time you have to complete the activities with your child, you can decide if you keep the activities as full day projects, or smaller bitesize chunks to enjoy over a longer period of time. This document has been designed to aid parents and families to work together to encourage academic and educational involvement throughout this difficult time.

Your child is going to create a vehicle powered by elastic band(s) using sustainable and recyclable items. You may wish to encourage them to work under a team name. If a working model is produced, maybe they could compare race times against their friends!

Complete all work in an exercise book (unless directed otherwise by your child's teacher)

1. **Look at Resource 1. Look at the definitions and match them to the appropriate words**

You should encourage your child to use these words in the tasks they will undertake later. You may wish to ask your child to write out the words and their definitions as a revision exercise.

2. **Watch a variety of YouTube videos about constructing air powered and rubber band powered cars - they will give you ideas on ways to construct the vehicle.**

You may find it useful to pause and discuss the videos at appropriate moments to discuss what is happening in further detail. You should be able to judge which style of vehicle is feasible for the resources you have at home – this will be what you will be working towards.

3. **Draw a “bottle shape” and list the features of the bottle and ideas you have which suggest why this shape is appropriate for a car. You will need to think about your key words i.e. thin wheels to reduce friction. What about the feel of the surface?**

This activity needs to emphasise the aerodynamic shape of the bottle, its smooth surface and how this cuts down on friction. You may like to discuss manufactured cars and how and why they are shaped as they are.

4. **Now list the components that your car will require. The most obvious thing will be wheels, but there are others!**

Allow your child some thinking time to consider the components that the car will need. You can check and discuss answers once they have finished.

5. **Once you have made your list, sketch your car on paper (you may like to take up two pages in your book if you need lots of room). You must remember that you are**



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constructing your vehicle out of re-cyclable materials and it will probably look very different to the cars in the YouTube videos

TIP: Provide measurements in your diagram: this will be helpful if you decide to construct your car from scratch using thin cardboard. Consider appropriate materials for each component part.

This exercise requires some “thinking time”. Encourage your child to consider appropriate measurements, based on what they have discussed with you previously. If they are going to create a car from cardboard you will need to think about shape and weight, as well as how it will all be held together. Help your child (if required) to sketch out an initial design and then, on a different page/piece of paper, re-sketch the design with more precise measurements – if this is appropriate.

6. Now, go and seek out your materials! Here’s where you may have to get really creative as you may not have exactly what you would like!

Below is a list which might inspire you, but the list is really endless. Please remember to check with the other people in your house that it’s OK to use whatever you have selected.

Materials:

- Plastic bottle(s) – washing up liquid, shampoo etc
- Elastic bands
- Wooden BBQ skewers (you could use pencils or old paint brushes)
- Cocktail Sticks
- Bottle tops – metal or plastic
- Aluminium foil
- Old CDs
- Cardboard (of different thicknesses)
- Cardboard Boxes
- Paper
- Paper clips
- Dried pasta (hollow)
- Toilet roll tubes

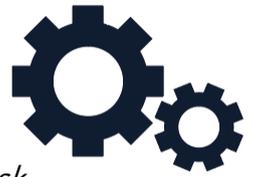
Useful tools:

- Sellotape
- Blue-tac
- Glue-gun
- Pens
- Scissors

7. Now for the bit you’ve been waiting for ... construct your car!
This part will take you some time (maybe two hours!), but the more you plan, and measure, the easier this part will be. Be prepared to be a little frustrated!



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As your child begins to think about how their car will be held together, ask questions about what they imagine the car will look like; how will one part be attached to another? Etc. It may be useful to look at the YouTube videos again at this point. Try to encourage our child to think ahead and help them to anticipate any problems. People can learn from their mistakes too!

8. Once you've completed the masterpiece...get your child to explain you the following:

- What worked well?
- What you found most challenging?
- What could be improved upon?
- How you adapted design or materials to accommodate needs?
- How far you think their car will "travel"?

Encourage your child to use the key words that they defined at the beginning. Try to get your child to push themselves to verbally explain their ideas – help them to achieve full explanations by asking appropriate questions as you go along e.g. What makes you think that? How do you know that?

9. You will need to find a relatively smooth surface – ideally a kitchen floor or a hallway – you could use the top of a dining table or even a safe space outside. Now you can experiment with the car

Complete Resource 2. You may like to keep testing the distance the car travels...see how far it can go. You could design a graph to display the distances travelled.

This should be a fun activity which allows your child to experiment with measuring distances and recording timings. Encourage them to try to better the timings. Encourage accurate recording of their findings in their book.

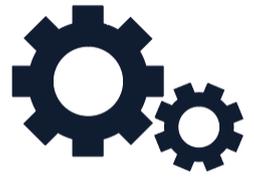
10. Complete Resource 3 which will ask you to consider friction

Discuss the relative advantages and disadvantages of the different types of transport – encourage your child to focus on friction. You may like to look together at appropriate internet sites to learn more about the importance of friction. This could be a separate mini topic in itself. Perhaps your child could produce a poster which explains their findings?

11. Your final task will be to create a new vehicle which creates less friction than your car design – you may like to take some ideas from Resource 3 as inspiration

As your child has already completed a similar exercise, you should allow them the freedom of construction without any assistance as this will test what they have learned.





12. When you have come up with your new design, complete Resource 4

Ask your child questions about their new vehicle and allow them to explain how this task was different (or not) from the previous one. Did they find it easier because they'd done something similar or was it more difficult? If so, why and how?

13. You may like to get in contact with friends via Skype or Facetime and see their constructions – you could compare timings and see whose car goes farthest!

The focus as always, should be on fun. If it is appropriate, encourage your child to socialise with their friends and discuss the work they have undertaken.

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