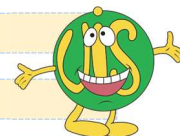


Design and Technology



Year Two Mechanics Short Term Planning & Resources



Topic lesson overview

Lesson 1	 Research	In Lesson 1, children will investigate how wheeled vehicles work. They will look at different vehicles and learn the key components wheel, axles, chassis and body. They will make a simple wheeled vehicle.
Lesson 2	 Research	In Lesson 2, children will learn some different techniques for attaching axles to the chassis. They will practice creating different axel holders to evaluate which are most effective.
Lesson 3	 Research	In Lesson 3 we will focus on how to create a strong wooden chassis. The children will learn how to join wood and reinforce it to create stronger joints.
Lesson 4	 Practice	In this lesson, the children will learn to use hacksaws and bench hooks to cut wood. They will practice in pairs how to do saw safely.
Lesson 5	 Design	Children will use a design brief to draw on what they have learnt so far to design their own wheeled vehicle with a chassis, body, axle holders, axles and wheels.
Lesson 6	 Create	Children will use their design briefs to create their vehicles. They will use the techniques they have learnt about and practised to make a wooden chassis to which they will attach a body. They will attach wheels and axles to the chassis using one of the methods they studied.
Lesson 7	 Evaluation	Children will test their vehicles in the 'Wacky Races'. They will evaluate how their vehicles performed and how they looked.



Prior learning: In Year One, children designed and created their own moving picture involving levers and sliders. They learnt to use tools for cutting, shaping, joining and finishing using components such as card, paper and fabric.

Meet some brilliant designers...



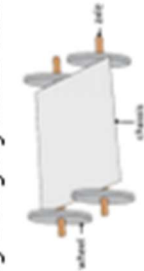
Ferdinand Porsche was a car designer, famous for designing the 'Beetle' and the Porsche cars which bear his name.



Frank Hornby was a British inventor and model designer who created 'Dinky' model cars, 'Hornby' model trains and 'Meccano' model kits.

1. How do wheels work?

We will learn how wheels work by exploring a range of model vehicles.



I know what a chassis, body, wheels, and axles are
I can explain how wheels and axles make a vehicle move



Research

2. How are wheels fixed to axles and chassis?

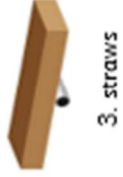
We will learn different ways to attach wheels and axles to the chassis.



1. clothes peg



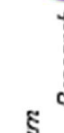
2. card triangles



3. straws



I know that wheels are attached to axles, which allow them to turn
I know different ways to attach wheels and axles to the chassis



Research

3. How do you make strong joints?

We will learn how to make strong wooden joints.



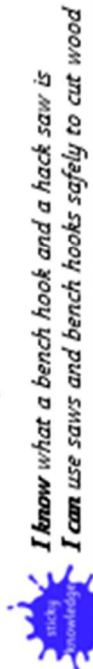
I know how to reinforce joints to make them stronger, stiffer and more stable



Research

4. How do you use bench hooks and saws?

We will learn to use saws, bench hooks and hand drills



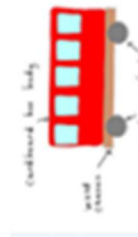
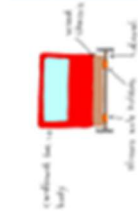
I know what a bench hook and a hand drill is
I can use saws and bench hooks safely to cut wood



Practice

5. How do you design a vehicle?

We will plan what we want our vehicle to look like, how we will build it and what tools and equipment we need.



I can follow a design brief to produce a plan



Design

6. How do designers create wheeled vehicles?

We will use our designs and apply the knowledge and skills we have practised to create our vehicles



I can follow a plan to produce a design



Create

7. How do designers evaluate their vehicles?

We will test our vehicles and evaluate them against the design brief



I can test my design to see if it works and make changes if needed
I can describe what works well and what I could improve in my design



Evaluate

Key vocabulary: Glossary

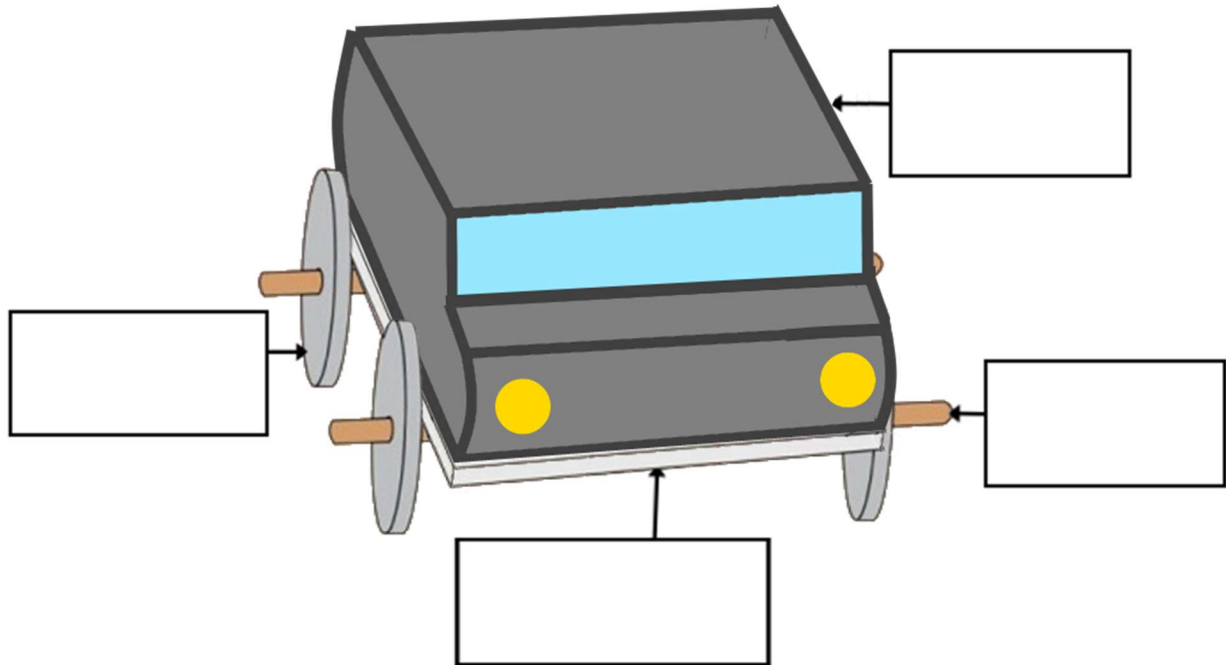
axle	the rod passing through the centre of a wheel	bench hook	a wooden device which holds an object in place to be cut	chassis	the base on which a vehicle is built	hack saw	round parts that help a vehicle to move
axle holder	the part of the vehicle through which the axle fits	body	the main structure of the car	dowelling	a wooden rod	wheels	a hand-powered drill



1 Look at the word bank below:

axle wheel chassis body

Use the word bank to label the vehicle



I know what a chassis, body, wheels, and axels are

Vocabulary Check: Draw lines to match the words to the pictures

2

hacksaw

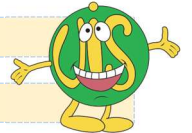
bench hook

dowelling

axel

axel holder





Session 1: How do wheels work?

Research lesson



I know what a chassis, body, wheels, and axels are
I can explain how wheels and axels make a vehicle move

Introduction

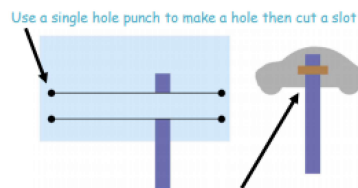


Introduce the mechanics Ferdinand Porsche and Frank Hornby. Explain that Ferdinand Porsche was a car designer, famous for designing the 'Beetle' and the Porsche cars which bear his name. Frank Hornby was a British inventor and model designer who created 'Dinky' model cars, 'Hornby' model trains and 'Meccano' model kits. Show example of their work.

Retrieval & Recap



Activate prior knowledge



Retrieval: Remind of children previous work in DT in Year One when they made moving pictures. Share a pop up book to illustrate/Discuss what the different components were that made the pictures move (sliders and levers).

I do



Teacher Modelling



Model exploring a range of toy cars, ideally some that can be taken apart into component parts. Introduce Key vocabulary. Share the meaning of each word. Use MTYT to teach vocabulary using flash cards.

body



wheel



axle



chassis



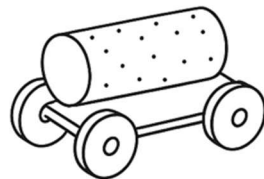
axle holder



We do



Guided Practice



Introduce simple wheeled vehicle. Children to work in group of 2 or 3 to make vehicles, modelled one step at a time by the teacher. Regularly use the vocabulary of axles, axle holder, body, wheels and chassis.

I do



Teacher Modelling

Recap key vocabulary. Recap meaning of each word.

body



wheel



axle



chassis



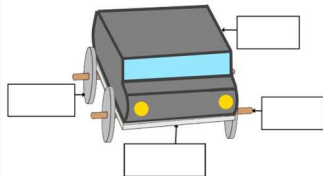
axle holder



We do



Guided Practice

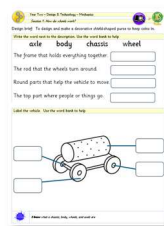


Together, label a picture of a vehicle using the vocabulary labels.

You do



Independent Learning & Application



Children to match key vocabulary to definitions and label diagram of vehicle.



Revisit key learning

Revisit today's learning.

Ask children to share their models and recap the different parts using the key vocabulary / sticky knowledge (*wheels, axles, chassis, body, axle holder*).

Ask children to explain how the vehicle moves, referring to the key vocabulary / sticky knowledge.



I know that wheels are attached to axels, which allow them to turn
I know different ways to attach wheels and axels to the chassis

Retrieval & Recap

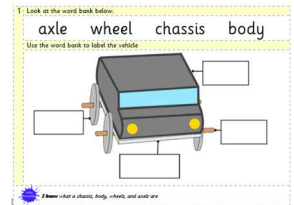


Activate prior knowledge



Retrieval activity: Remind children of their previous work in DT on preparing food. Ask children to recall the different methods of holding food when cutting them.

Recap last session's learning: **I know** what a chassis, body, wheels, and axels are. Remind them of the famous mechanics and the vehicles that they examined.
 Complete the Quick Check activity – to label the parts of a vehicle.

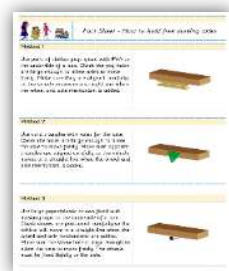


Introduction



Introduce the 'Wacky Races'.
 Show the children the design brief and explain that we will be learning how to make a vehicle, learning the different techniques.

I do
 Teacher Modelling



Show children three examples of how axels can be attached to a chassis.

Look at the models and describe how they have been made.

Model how to make each different axel holder.



We do



Guided Practice

Work through each example, one step at a time. Children in groups of 2 to 3 to follow the steps to make their own models. Use the language of axels, wheels and chassis. Use the term axel holder to describe the different ways the axels are attached to the chassis.

Try out the models to see which method is most effective.

You do



Independent Learning & Application



Children to draw and label the different axel holder methods they have made.

Use the word bank to support labelling.

Revisit



Revisit key learning

Revisit today's learning. What is the sticky knowledge?

I know that wheels are attached to axels, which allow them to turn
I know different ways to attach wheels and axels to the chassis

Ask children to talk to their partner to describe the different ways to attach axels.



I know how to reinforce joints to make them stronger, stiffer and more stable

Retrieval & Recap



Activate prior knowledge

Retrieval: Remind of children previous work in DT when they produced a sewn pocket. Show children three types of stitching. What are they called?



Recap last session's learning:

I know that wheels are attached to axles, which allow them to turn

I know different ways to attach wheels and axels to the chassis

Ask children to describe the different types of axel holders.

I do



Teacher Modelling



Recap on the 'Wacky Races' from previous session and explain that we are going to be making our own 'wacky racers' for the competition. Remind children of the design brief and explain that we will have to learn and practice some skills to help us make our vehicles. We will then have to design them before making them. Explain that today we will be learning how to make a strong wooden chassis with strong joints.

We do



Guided Practice



Compare a chassis without strong joints with one with strong joints.

Go through the steps to making a strong chassis

You do



Independent Learning & Application



Children to work in pairs to create a chassis with strong joints, following the step by step instructions.

Revisit



Revisit key learning

Revisit today's learning.

I know how to reinforce joints to make them stronger, stiffer and more stable

Ask children to describe what they did to reinforce the joints to make them stronger.



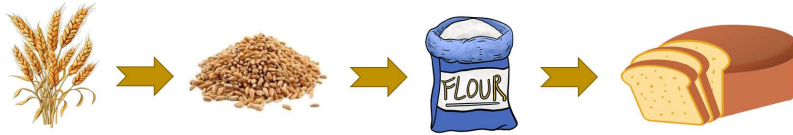
***I know** what a bench hook and a hack saw is*
***I can** use saws and bench hooks safely to cut wood*

Retrieval &
Recap



Activate
prior
knowledge

Retrieval: Ask children to recall the food journey for how bread is made from previous DT topic.



Recap last session's learning:

***I know** how to reinforce joints to make them stronger, stiffer and more stable*

Ask children to tell their partner how they made a stronger chassis.

I do



Teacher
Modelling

bench hook



hacksaw



Introduce Key vocabulary:

Model how to use the equipment safely.

Explain the importance of working in pairs, with partners vigilantly watching that their partner is using the saw safely (position of finger on saw, position of hand holding wood, ensuring bench hook is correctly in position)

We do



Guided
Practice



With children in partners, go through each step.

Swap over for both partners to have a go at sawing and spotting

You do



Independent
Learning &
Application

Children to work in practice cutting wood using saw and bench hooks

Revisit



Revisit key
learning

Revisit today's learning.

***I know** what a bench hook and a hack saw is*
***I can** use saws and bench hooks safely to cut wood*

Ask children to describe how to cut safely.

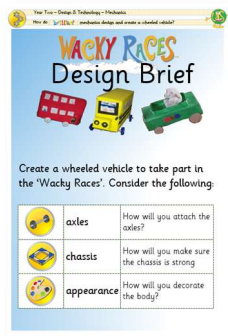


I can follow a design brief to produce a plan

Retrieval & Recap



Activate prior knowledge



Recap the learning so far from the topic.

What are the key parts of a vehicle?

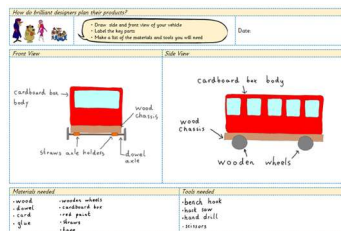
What are the different types of axle holders?

How do you make joints stronger?

I do



Teacher Modelling



Referring to the design brief, model designing own vehicle, initially discussing ideas with class, from front and side view, describing materials.

We do



Guided Practice



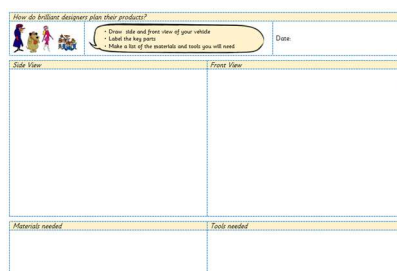
Share with children the various designs of vehicle bodies (blow up to A3 size). You may want some completed examples ready made by the teachers.

Allow children to discuss in partners their ideas for vehicle models and share with the class.

You do



Independent Learning & Application



Children to create own designs drawing on previous practice of skills, exploring vehicles and looking at other people's examples.

After designing, children may want to source vehicle body from home to bring in (small cereal box, tetra-pak carton for example)

Revisit



Revisit key learning

Revisit today's learning.

I can follow a design brief to produce a plan

Children to share designs, explaining how they have fulfilled the design brief.



I can follow a plan to produce a design

Retrieval & Recap



Activate prior knowledge

Vocabulary Check: Match the words to the pictures

2	hacksaw	
	bench hook	
	dowelling	
	axel	
	axel holder	

Recap the learning so far from the topic. Focus on the design brief, creating strong joints, and using the saw.

Complete Quick Check.

I do



Teacher Modelling

Model using own design to begin creating own model.

Carefully model measuring dimensions of base of body to create chassis, remembering to take of the width of the wood strips to measure the width pieces. Model different ideas for decorating body of vehicle, for example paint, covering in paper, turning inside out, using masking tape.



Guided Practice

You do



Independent Learning & Application

Revisit



Revisit key learning



Children to create own models of vehicles. Parent support may be very useful for this.

Children to share completed vehicles.



I can test my design to see if it works and make changes if needed
I can describe what works well and what I could improve in my design

Retrieval &
Recap



Activate
prior
knowledge

Recap the learning from throughout the topic. Children to share how succesful their vehicles were. Why?



I do

Teacher
Modelling

We do



Guided
Practice

You do



Independent
Learning &
Application

Revisit



Revisit key
learning

Year Two – Design & Technology – Mechanics
 Session 7: How do vehicles work?

How do brilliant mechanics evaluate their work?

How successful was your vehicle? Date:

I have developed these skills:

Appearance: Does my creation look like my design?

Wheels: How did I attach the wheels? Did the wheels turn?

Strength: Was my vehicle strong? Why?

Things I changed:

Things I would do differently:

Recap the design brief from the 'Wacky races' poster. Explain that today is the day of the 'Wacky Races' and that we are going to evaluate our vehicles. Make explicit what the design criteria are and that we want to evaluate if our vehicles look good and if they can travel in a straight line.

To begin with, ask the children which skills they have developed during the project.

Complete the first section of the evaluation.

Children can then put their completed vehicles on their tables and do a 'gallery' style observation so that they quietly walk around the whole room to look at everybody else's vehicles. Ask a few children to share which vehicles they particularly liked and why.

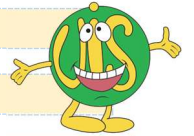
Children then complete the 'Appearance' section of their evaluation.

Set up a long, wide ramp, ideally with several 'lanes' so that a number of vehicles can be released at the same time. Tell the children we are going to race them down the ramp. The children need to observe if their vehicle can successfully move down the ramp in a straight line in one piece!

Run the event in heats, with winners of each heat going through to the semi-finals and the final (e.g., racing 3 or 4 vehicles at a time, resulting in 10 heats, 3 semi-finals of 3 vehicles and a final of 3 vehicles). You may want to either video this or invite parents to watch.

Children then evaluate how successful their vehicle was at travelling down the ramp.

Revisit learning from whole topic.



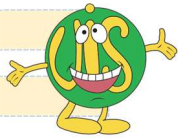
WACKY RACES™

Design Brief

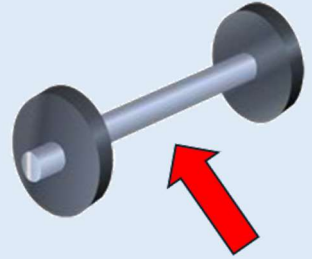


Create a wheeled vehicle to take part in the 'Wacky Races'. Consider the following:

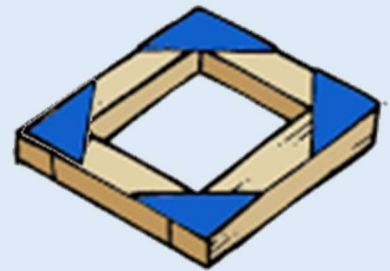
	axles	How will you attach the axles?
	chassis	How will you make sure the chassis is strong
	appearance	How will you decorate the body?



axle



chassis

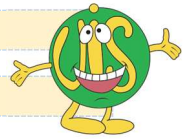


body



dowelling





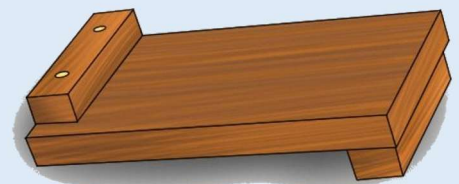
wheel



axle holder

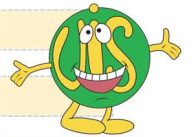


bench hook



hacksaw





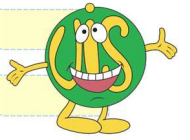
WACKY RACES™

Design Brief



Create a wheeled vehicle to take part in the 'Wacky Races'. Consider the following:

	axles	How will you attach the axles?
	chassis	How will you make sure the chassis is strong
	appearance	How will you decorate the body?



Write the word next to the description. Use the word bank to help

axle body chassis wheel

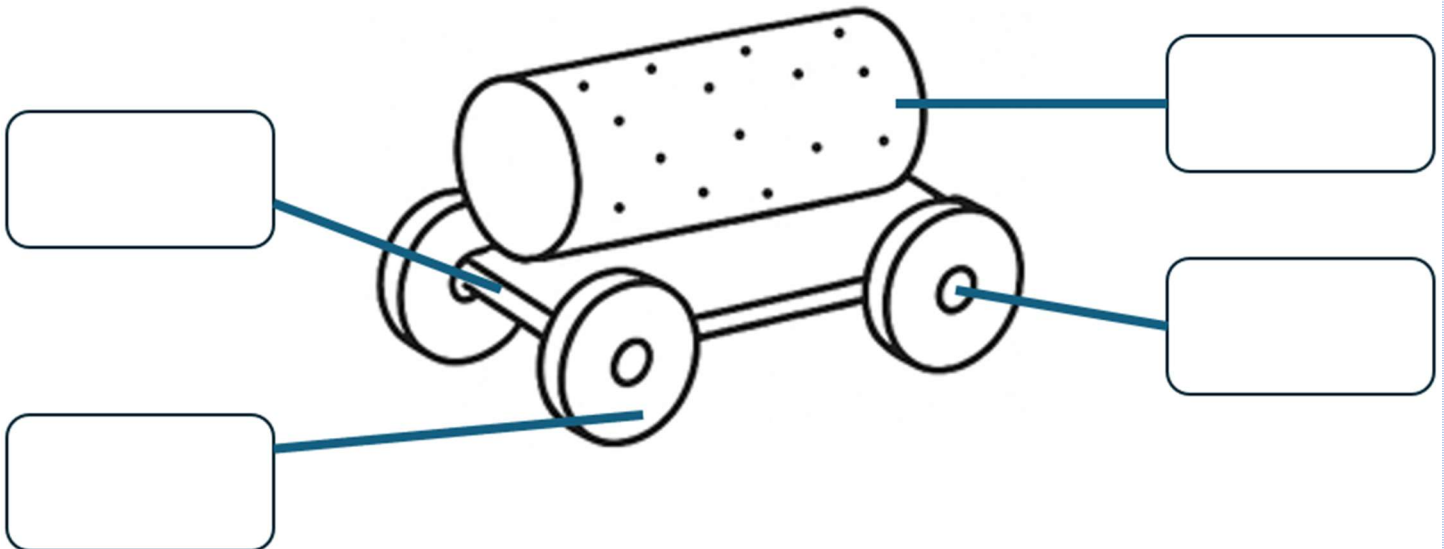
The frame that holds everything together.

The rod that the wheels turn around.

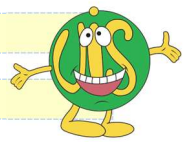
Round parts that help the vehicle to move.

The top part where people or things go.

Label the vehicle. Use the word bank to help



I know what a chassis, body, wheels, and axels are



Instructions for how to make a simple vehicle



Cardboard Roll Vehicle (With Chassis + Body)

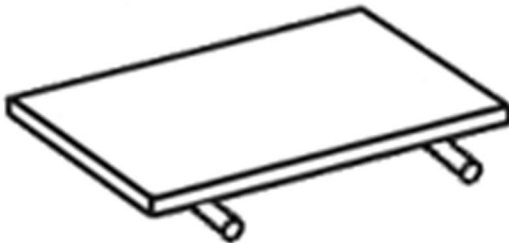


What You'll Need:

- a cardboard roll
- piece of stiff card
- 2 wooden dowels
- Glue, tape, scissors
- Blu Tack or split pins
- Pens, stickers

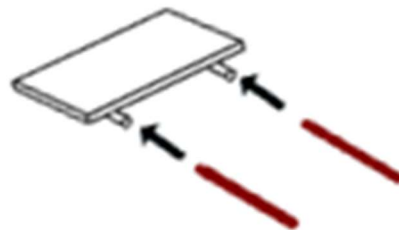
1. Make the Chassis

Cut a rectangle of stiff card.
Tape two straws underneath for axle holders.



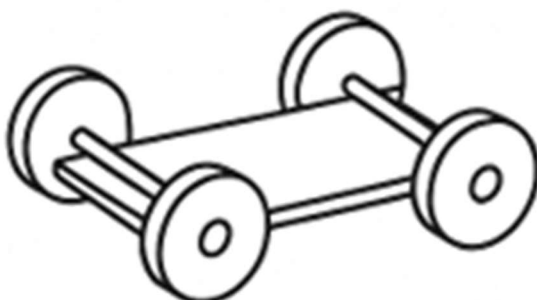
2. Add the Axles

Slide the dowels through the straws.



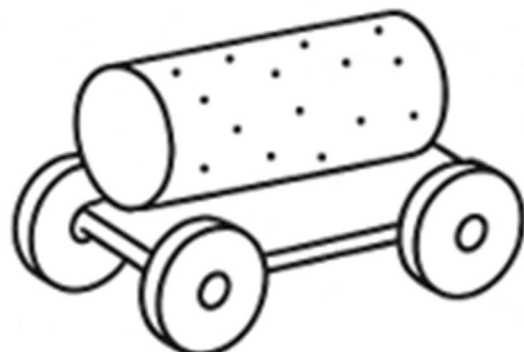
3. Attach the Wheels

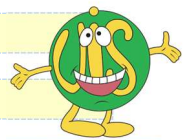
Push a wheel onto each end of the dowels. Use Blu Tack or split pins to hold them in place.



4. Create the Body

Decorate the cardboard roll, then glue it on top of the chassis.
Decorate and test!





Which different ways can you attach axles?



Can you draw 3 different ways to attach axles to the chassis? Draw and label your diagrams.

Date:

Word bank

chassis

body

axle

axle holder

wheels

Method 1

Method 2

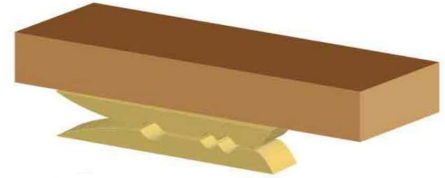
Method 3



Fact Sheet - How to hold free moving axles

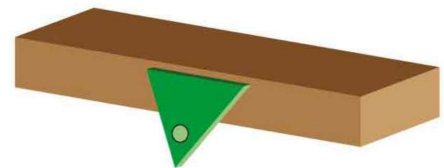
Method 1

Use pairs of clothes pegs glued with PVA to the underside of a box. Check the peg holes are large enough to allow axles to move freely. Make sure they are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.



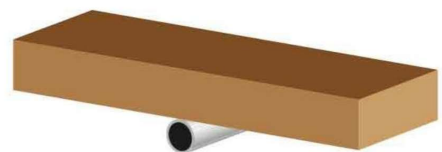
Method 2

Use card triangles with holes for the axle. Check the holes are large enough to allow the axle to move freely. Make sure opposite triangles are aligned carefully so the vehicle moves in a straight line when the wheel and axle mechanism is added.



Method 3

Use large paper/plastic straws fixed with masking tape to the underside of a box. Check straws are positioned carefully so the vehicle will move in a straight line when the wheel and axle mechanisms are added. Make sure the straw hole is large enough to allow the axle to move freely. The wheels must be fixed tightly to the axle.





Fact Sheet - How to create corner joints

Step 1

Fold the corner of a strip of card over so that the end side meets squarely with the bottom side.



Step 2

Cut across the fold line.



Step 3

Continuing folding and cutting to create 4 right-angle triangles.



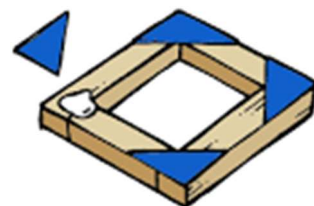
Step 4

Place the parts of the frame together to make a rectangle shape.



Step 5

Glue each right angle onto the corners of the frame.

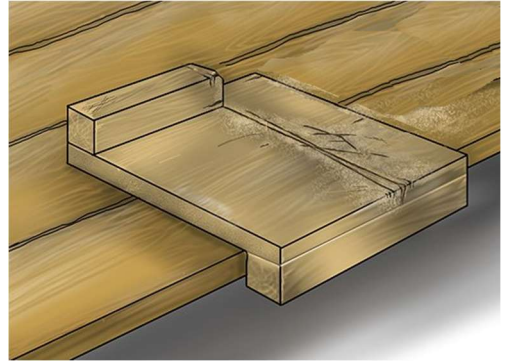




Fact Sheet - How to saw using a bench hook

Step 1

Place the bench hook over the edge of the table, with the shorter lip on the top.



Step 2

Place the wood against the lip, holding it firmly with your hand, keeping your thumb away from the saw. Grip the saw with your pointer finger pointing forward and line it up at the edge of the bench hook lip.



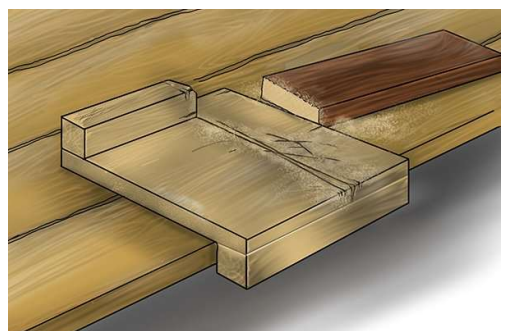
Step 3

Keeping the wood steady, carefully push the saw forward, and pull it back in a steady motion.



Step 4

Repeat until the wood has been cut through.





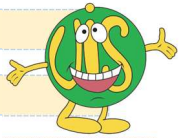
Examples of Vehicles





Examples of Vehicles





How do brilliant mechanics evaluate their work?



How successful was your vehicle?

Date:

I have developed these skills:

Appearance: Does my creation look like my design?



Wheels: How did I attach the wheels? Did the wheels turn?



Strength: Was my vehicle strong? Why?



Things I changed:

Things I would do differently: