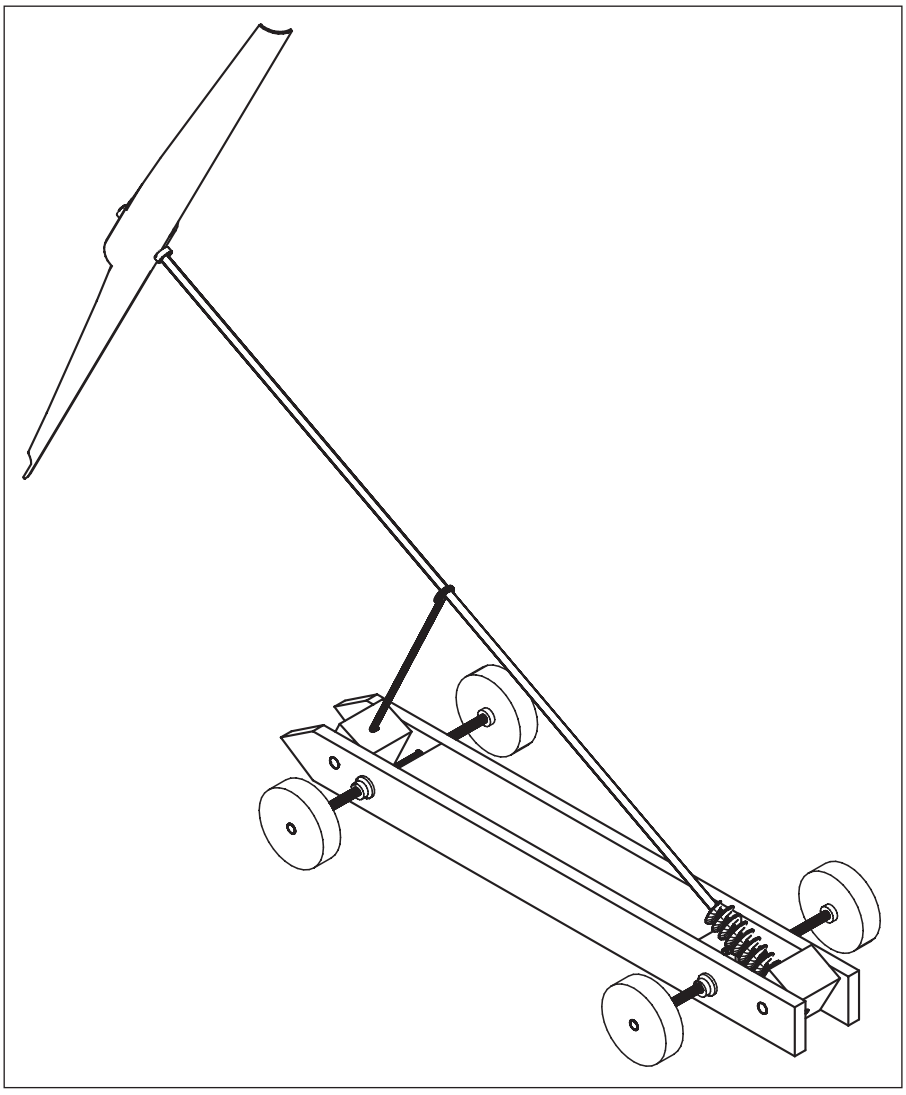
101.773

Wind driven vehicle (wood model)



Please Note

The OPITEC range of projects is not intended as play toys for young children.They are teaching aids for young people learning the skills of Craft, Design and Technolo- gy.These projects should only be undertaken and tested with the guidance of a fully qualified adult. The finished projects are not suitable to give to children under 3 years old. Some parts can be swallowed. Dan- ger of suffocation!

1. Product information:

Article Working model made from wood

Use: Design and Technology, Key stage 3

2. Material Information:

2.1. Material: Pine (conifer) softwood
Beech (deciduous) hardwood

Working: All woods can be sawn, planed, drilled, shaped and polished.

Joining: Slotting together and gluing (PVA white glue)

Finish: Use wax (liquid or solid)
Varnish or paint
Stain with water soluable colour then varnish

2.2. Material: Welding rod (steel)

Working: Bending

Finish: None necssary

2.3. Material: Plastic tube (PVC) thermo-plastic

Working: Drilling and sawing

Finish: None necessary

3. Tools:

Sawing: Use a **fretsaw** for all round shapes and curves

Note! Fretsaw blades should be inserted with the teeth facing forward.

Use a proper fretsaw sawing board and saw using smooth slow strokes.

Use a **fine saws** for dowel and small strip

Note! Clamp the work to be a sawn

Rasps / files: Choose the correct grade of rasp or wood file according to the work

Note! files only cut on the forward stroke

Sanding: Use a block and glasspaper for all flat surfaces and straight edges.
Use loose paper for other shapes.

Drilling: Use a pillar drill

Note! Be careful to take the correct safety precautions e.g
Tie all long hair back, wear safety glasses and an apron.
Do not wear jewellery or rings and loose clothing. Ensure the work is held tight.

Use the correct drills and make sure they are sharp

3. Tools:

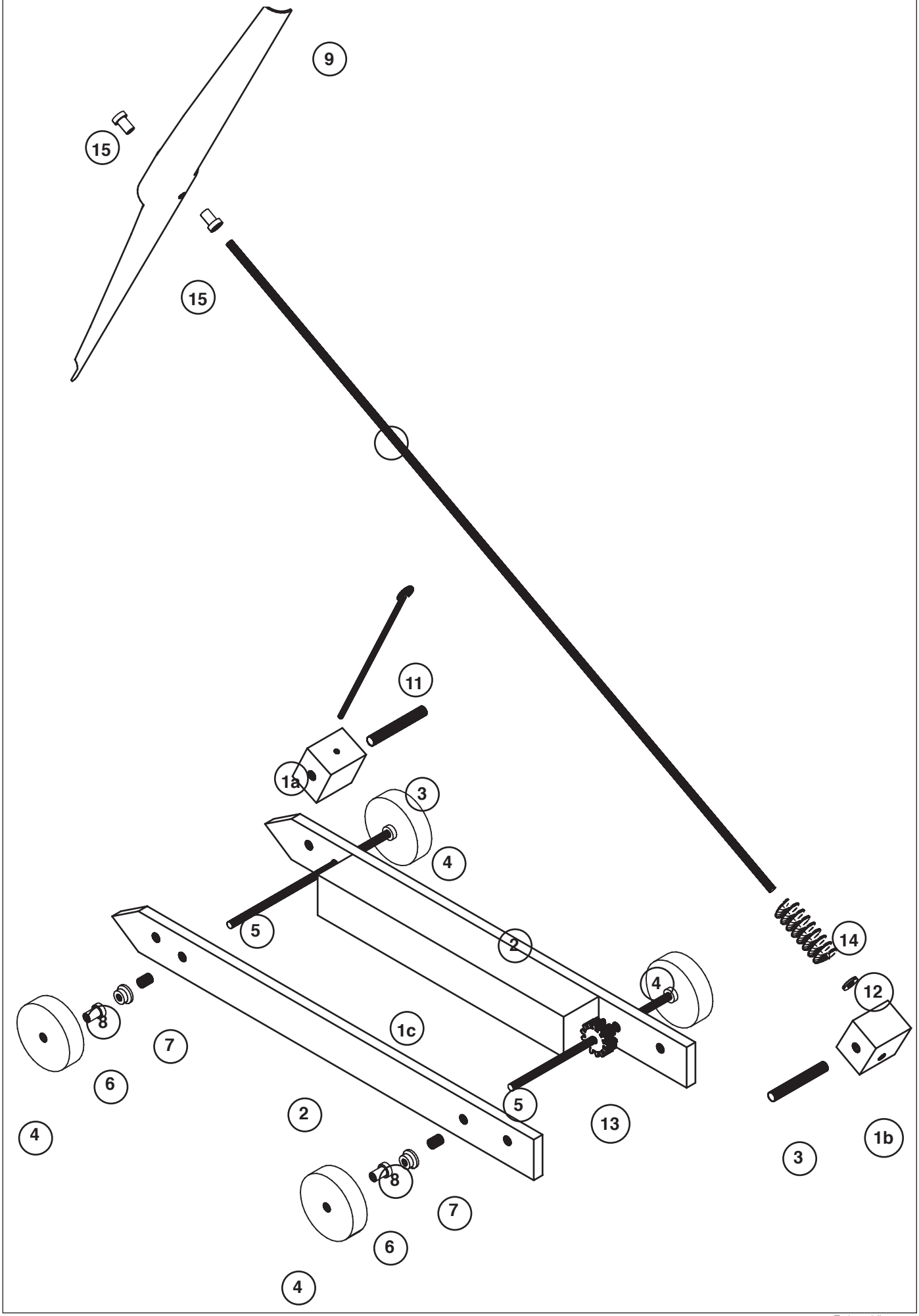
Holding: Use only good quality clamps for holding the wood whilst glue is drying

Bending: Use a jig to ahieve the correct bend

4. Parts list

Part	Material	Quantity	Size	Diagram
Vehicle	Pine strip	1	20 x 20 x 200 mm	 1
	Pine strip	2	5 x 20 x 250 mm	 2
	Beech dowel	1	4 mm dia x 100 mm	 3
Axles/wheels	Beech wheels	4	30 mm dia x 8 mm	 4
	Metal axles	2	3 mm dia x 95 mm	 5
	Reducers	4	4/3 mm dia	 6
	Brass tube	4	4/0.4 x 5 mm	7
	Distance pieces	4		 8
Drive system	Plastic tube	1	20/17 x 275 mm	 9
	Welding rod	1	3 dia x 500 mm	 10
	Welding rod	1	2 dia x 100 mm	11
	Washers	1	3.2 mm	12
	Gears (13 T	1	Dia. 15 mm/hole 3mm	 13
	Worm wheel	1	Dia hole 3 mm	 14
	Reducers	2	4/3 mm	 15

5. Exploded diagram



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6. Planning overview

6.1 Making the chassis

6.2 Assembling the axles

6.3 Planning and making the drive system

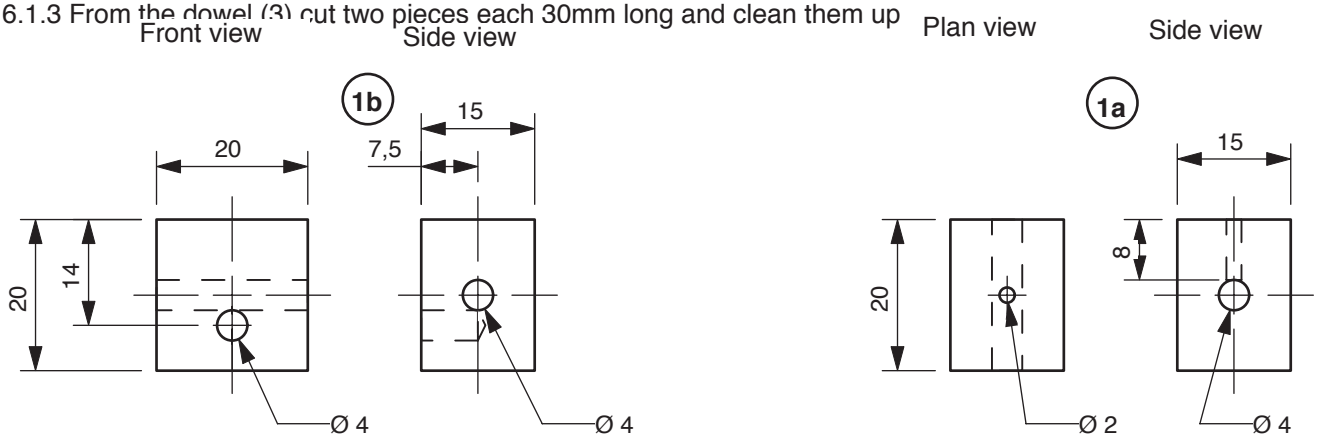
6.4 Testing and evaluating

6.1 Making the chassis

6.1.1 Saw a piece 140mm (lc) long and 2 pieces 15mm long from the pine strip (1) and clean them up

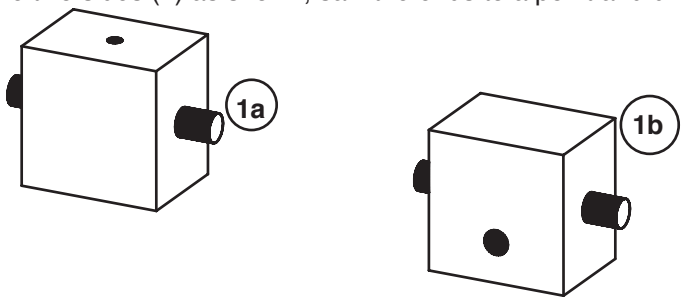
6.1.2 Drill parts (1a) and (1b) as shown in the plans

6.1.3 From the dowel (3) cut two pieces each 30mm long and clean them up

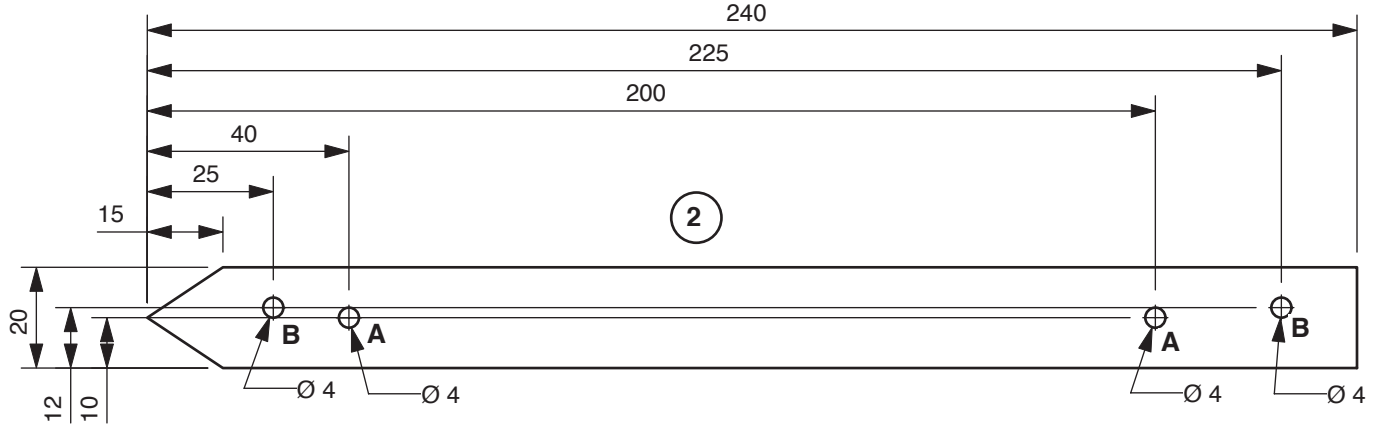


6.1.4 Then insert a dowel as an axle into each block (1a) and (1b).ensure that they are in the middle and then glue them in position.

6.1.5 Mark out and cut the two sides (2) as shown, saw the ends to a point and drill the holes.

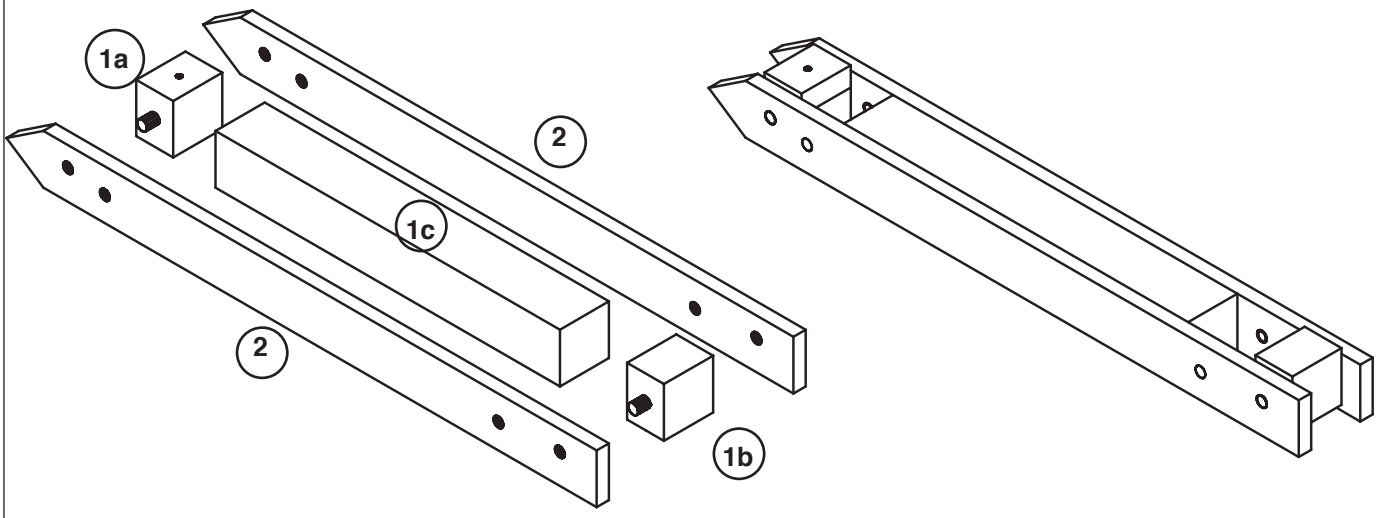


Note! Try to make both pieces at the same time



6.1.6 Set the parts 1a/1b/1c together as shown to make up the chassis

Note: Parts 1a 1b must not be glued! they are only pushed onto the holes, they need to be adjusted at a later stage

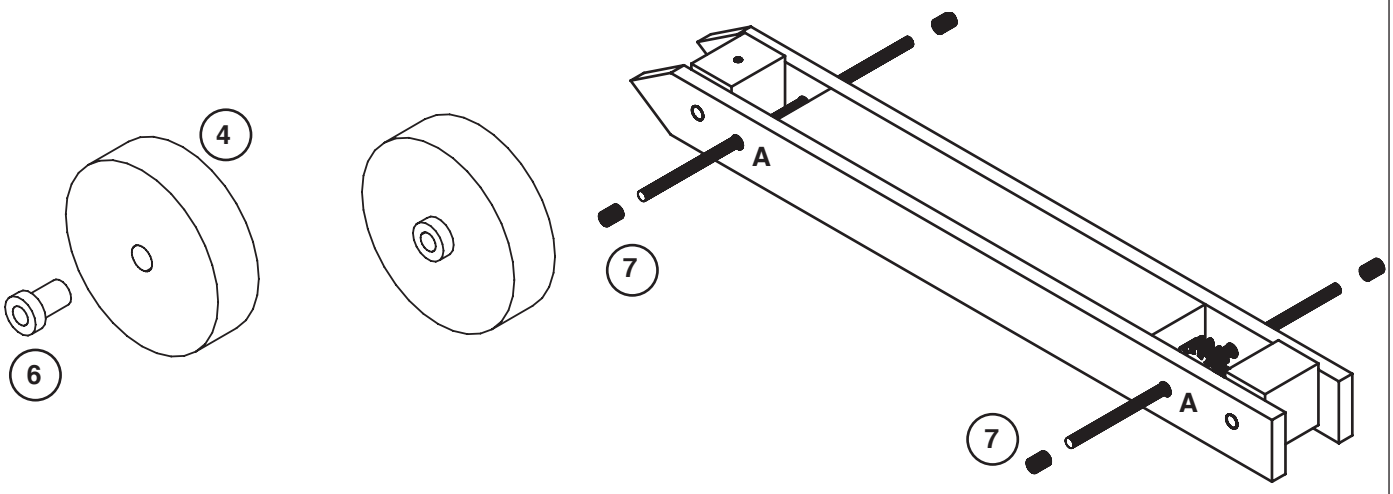


6.2 Assembling the axles

6.2.1 Insert a reducer (6) in the centre of each beech wheel (4).

6.2.2 Check that the ends of the axles (5) are free of burr and then insert them through hole ‘A’ in the chassis

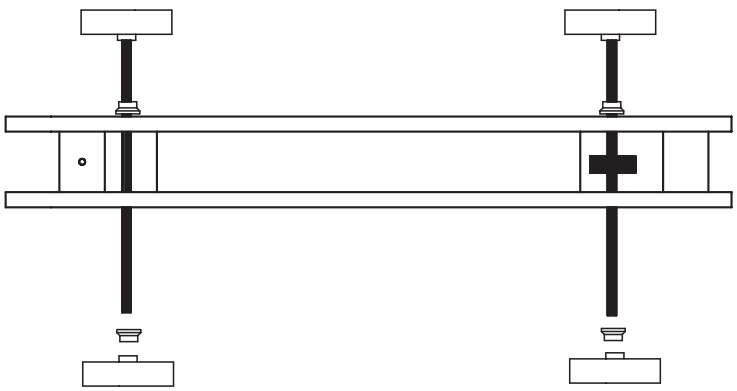
Note: The drive gear (14) in the middle of the rear axle is added at the same time.x



6.2.3 Insert and glue a brass bearing tube in each hole marked ‘A’ in the chassis side (2).

Note: Make sure that no glue spills into the inside of the brass tubes.

6.2.4 Add distance spacers (8) to the axles so that all the wheels are equally spaced from the chassis.



6.3 Planning and making the drive system

6.3.1 Cut the welding rod (10) to 350mm long and clean up any burr at the ends.

6.3.2 Remove any burr from the other welding rod (11) use the pattern on page to bend it

Note The eye (bearing) must be formed in the welding rod so that the other rod (10) turns freely inside.

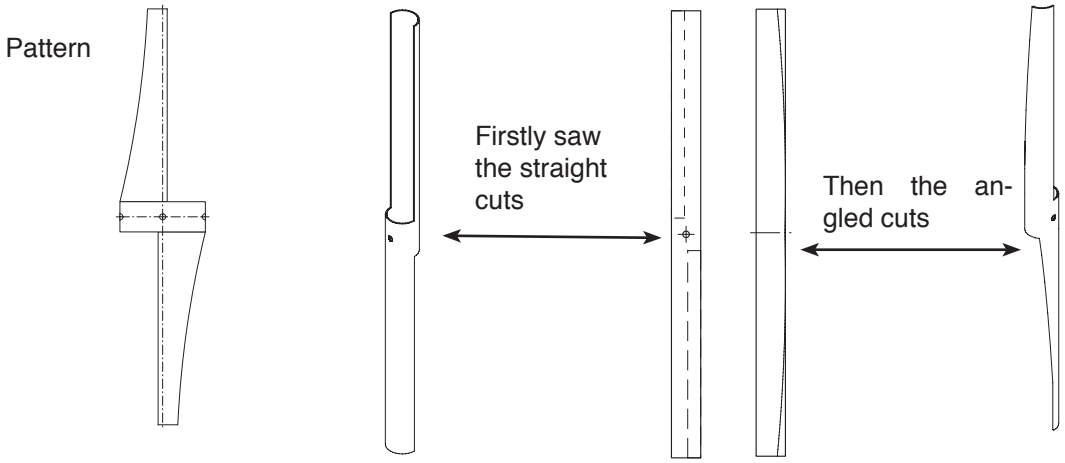
6.3.3 Cut out the pattern on page 9 and glue it to the plastic tube (9)

Note : Make sure that the gluing is accurate to ensure that the propellor runs true at a later stage

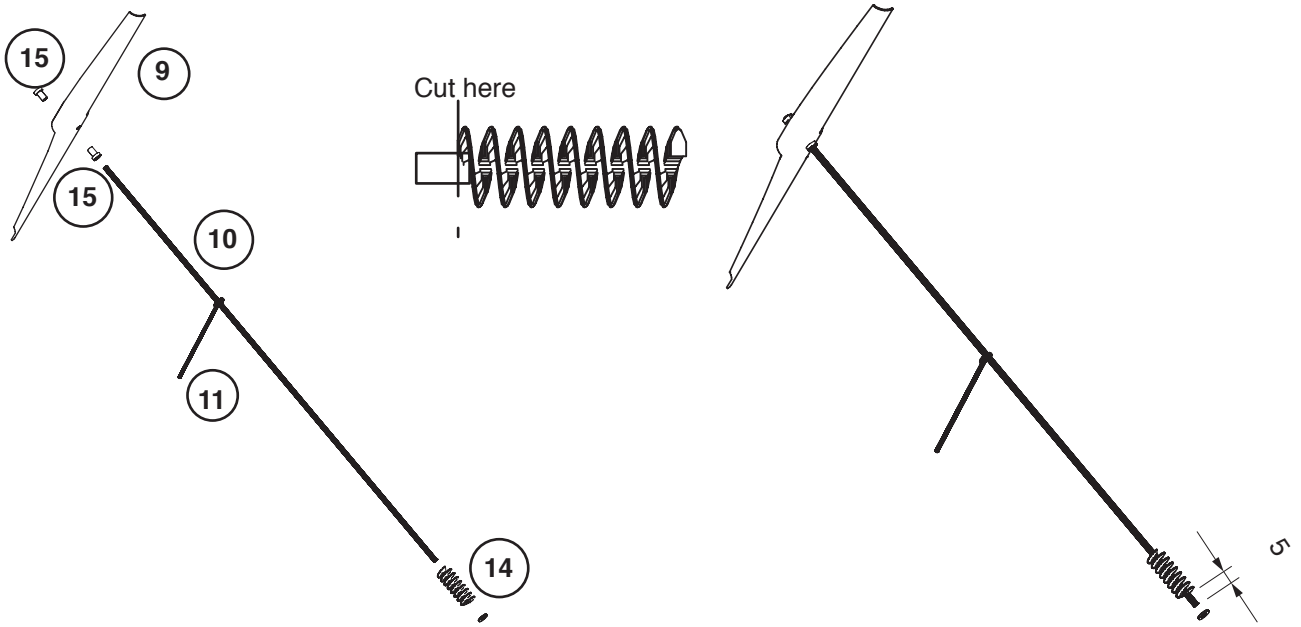
6.3.4 Drill the 4mm centre hole through the plastic tube and then cut out the blade shapes with a fret saw or scroll saw. Clean up all the sawn edges..

Note: To help hold the tube whilst sawing insert an offcut of dowel (3) into the vice and push the propellor tube over it. To ensure that the propellor stays stable insert a piece of dowel 15/17 mm dia. into the end.

First make the straight cuts and then the angled cuts

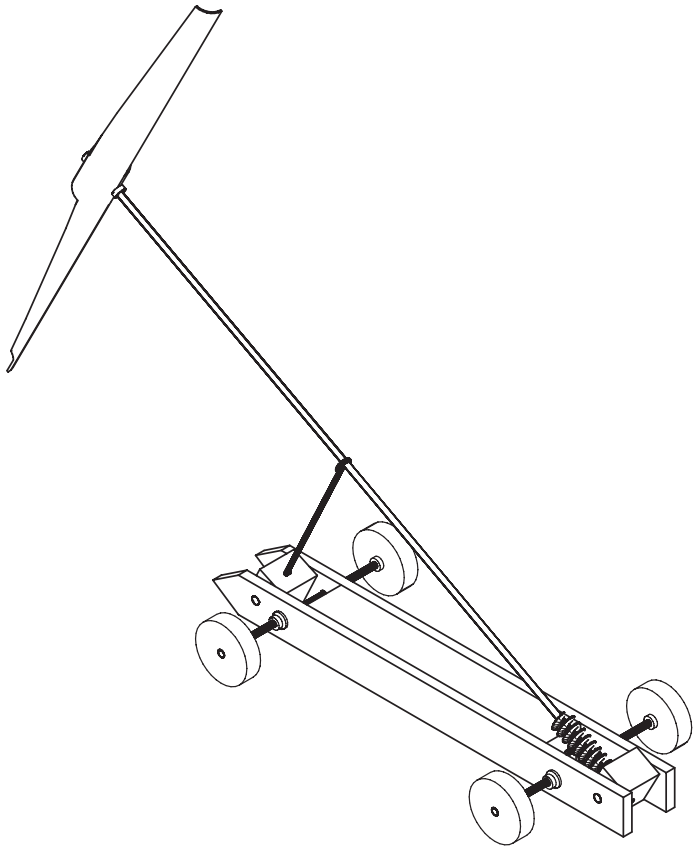


6.3.5 Glue the reducer (15) into the central hole in the propellor and push the propellor on to the end of the shaft. (see diagram)
Slide the support bearing (11) on to the shaft (10)
Remove the extra end from the worm gear (10) and push it on to the end of the shaft. Leave a gap of 5mm between the worm and the end of the shaft.



6.3.6 Place a washer (12) on the end of the shaft (10) after the worm (14) and then insert the end of the shaft and the support into the holes in parts 1a and 1b (both of these blocks should be moveable)

Note: Insert the support (11) into the 2mm dia hole in block 1a and at the same time turn parts 1a and 1b so that the main 4mm dia.shaft can be guided into the hole in 1b. Adjust the propellor and shaft so that the worm and gear wheel on the vehicle interlock and the propellor turns smoothly.



6.4 Testing and evaluation

General: The vehicle is designed to drive into the wind

6.4.1 Face the the vehicle into the wind and let it go

Note: The propellor can also be driven by a hair fan

As soon as the propellor starts to turn the vehicle will move forward.

6.4.2 If after several tries you are not satisfied that it is working correctly check the following points :

- That the wheels turn freely in the brass bearings
- That you have put the washer on the end of the shaft between the worm and part 1b (this reduces friction)
- That the propellor is properly made

Note: Once everthing has been checked and is working well, parts 1a and 1b can be glued in position

6.4.3 The model can be trimmed for different weather or track conditions.

Weather

-Add a second propellor (No 869.031)

- - Add weight to part 1b

Track

-Glue strips of rubber to the wheels for extra grip (included in pack)

-Insert small nails (No 280.059) into the wheels

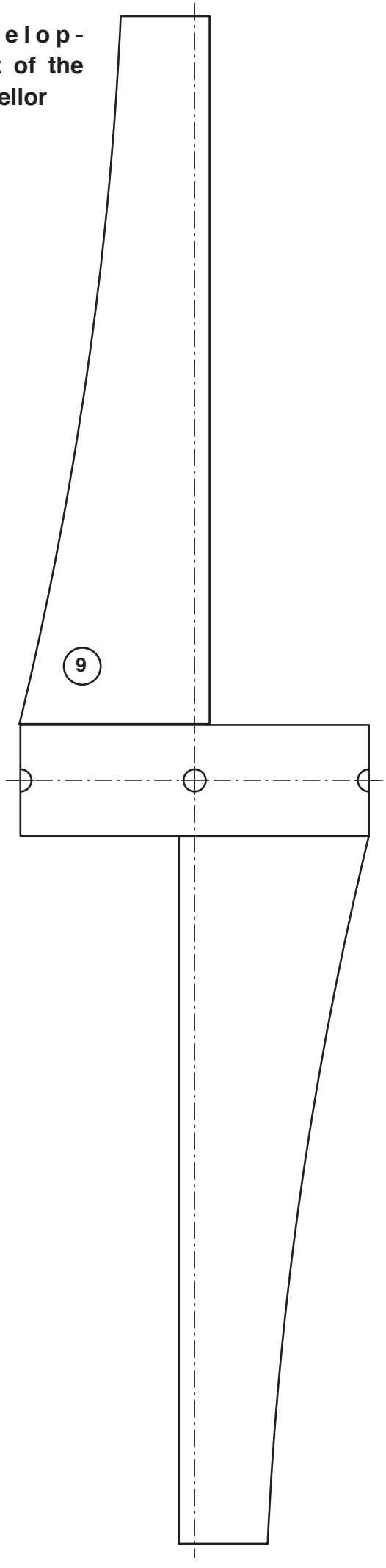
-Paint the wheels with granite paint colour(No 463.139)

-Replace the wheels with larger plastic ones (No 844.239/ No 844/033) or wooden ones (No 601.032 No 601.146)

Patterns

Scale 1 : 1

Development of the propellor



Support

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