

E. OPERATION

Test the motor before putting the Bottle Catamaran in water. Move the switch to the 'ON' position to make sure that the motor runs and that the propeller spins freely. Switch off again.

Test your Bottle Catamaran in a bath of shallow water. Lower your Bottle Catamaran into the water. It should float easily on its bottles. If the catamaran tilts forwards or backwards, adjust the position of the crossbeam as explained in step 1 to make it balance. Turn the motor on and allow the propeller to run up to maximum speed. Point the Bottle Catamaran in the direction you want it to go before releasing it. Your Bottle Catamaran will skim across the water, pushed by its propeller.

More fun

- You could try adding a little water in one of the bottles to increase its weight. Add water to the right-hand bottle to make the catamaran turn to the right. Add water to the left-hand bottle to make the catamaran turn left.
- Why not try as many different bottles as you can find. Your catamaran will look great with two 1.25-litre bottles installed.

Warning

- Always check the propeller is unbroken before each use (see note 6 in Safety Messages).
- Be careful not to drop the Bottle Catamaran into the water upside down, or let water splash into the battery case or motor. You could damage the motor or the battery case.

F. TROUBLE SHOOTING

If the motor does not run:

- Check that you are using fresh batteries.
- Check that the batteries are inserted the correct way round in the battery case.
- Check that all four wires are touching the metal terminal caps.
- Check if any water has been splashed into the battery or motor case. If so, take the battery case and motor case apart and let everything dry out.

If the fan turns the wrong way:

- you have connected the wires the wrong way round. See step 8.

G. FUN FACTS

How does it work? The batteries provide electricity to the motor, which turns the propeller at high speed. The propeller blades force air backwards. The laws of physics say that every force has an equal force that pushes in the opposite direction. So when the propeller pushes air backwards, the air pushes the propeller forwards. This pushes the Bottle Catamaran along. The model is quite light, which allows the propeller to accelerate it quickly. The floats sink only a little way into the water. This means they can slide easily through the water.

Catamarans A craft with two floats (or hulls) is called a catamaran (cat for short). Catamarans are faster than single-hulled boats (monohulls) because they cut more easily through the water. There are all sorts of catamarans, from super-fast sailing dinghies to giant, high-speed car ferries.

Trimarans A trimaran is a craft with three hulls - normally a large central hull and two smaller side hulls. In 2007, the trimaran yacht *Groupama 3* crossed the Atlantic at an average speed of 29.3 knots (54.3 kilometres per hour).

Propeller power A propeller has blades that push air along as the propeller spins. The blades are angled to push the air like a wedge. The blades are twisted because they move much faster at their tips than at their roots.

Air-powered craft Most water craft are driven by propellers under the water. Air propellers are used for craft that work in very shallow water, where a propeller would hit the bottom, or get caught in water plants. The two most common air-powered craft are hovercraft and airboats, such as the Bottle Catamaran.

Why the Bottle Catamaran floats Boats float in water because the water pushes up on them. Scientists call this push upthrust. The size of the upthrust depends on how much water the boat pushes out of the way as it sits in the water. As the Bottle Catamaran floats dip further into the water, they push more and more water aside, and so the upthrust get larger. When the upthrust becomes equal to the weight of the boat pushing down, the boat floats.

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BOTTLE CATAMARAN

GREEN SCIENCE

To Parents: Please read through these instructions before giving guidance to your children.



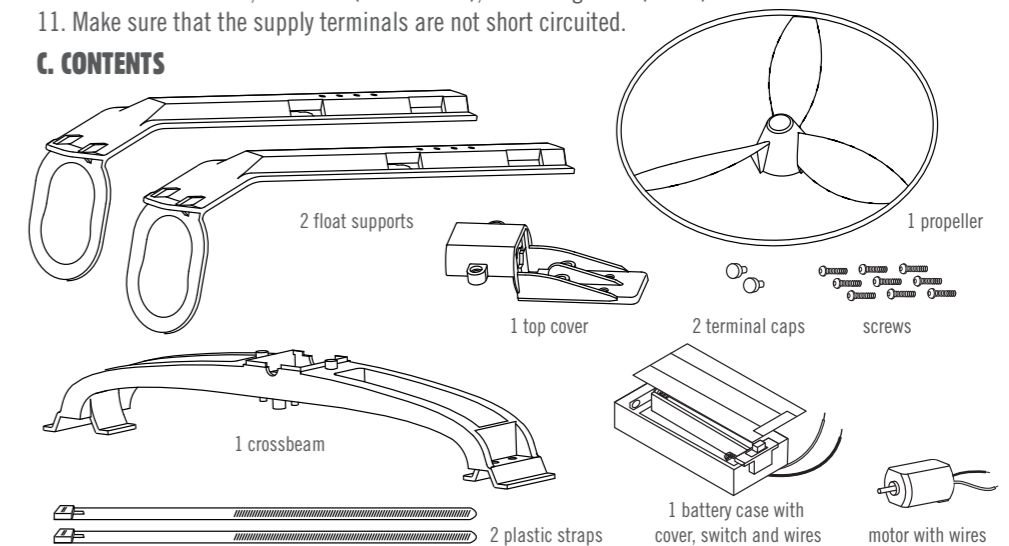
A. SAFETY MESSAGES

1. Please read carefully through all these instructions.
2. Adult supervision and assistance are required at all times.
3. This kit is intended for children over 8 years of age.
4. This kit and the finished product contain small parts which may cause choking if misused. Keep away from children under 3 years of age.
5. To prevent possible short circuit, never touch the contacts inside the battery case with any metal.
6. Examine the plastic propeller carefully before you put in on the motor spindle (step 11). If there are any breaks in the blades or the outer rim, do not run the motor. Contact our customer service for a replacement.
7. Do not touch the spinning propeller with your finger or any object.
8. The toy is to be operated in water only when assembled in accordance with the instruction.

B. USE OF THE BATTERY

1. This kit requires two 'AAA' 1.5 volt batteries (not included).
2. For best results, always use fresh batteries.
3. Make sure you insert the batteries with the correct polarities.
4. Remove the batteries from the Bottle Catamaran when not in use.
5. Replace exhausted batteries straight away to avoid possible damage to the Bottle Catamaran.
6. Rechargeable batteries must be removed from the kit before recharging.
7. Rechargeable batteries should be recharged under adult supervision.
8. Do not attempt to recharge non-rechargeable batteries.
9. Do not mix old and new batteries.
10. Do not mix alkaline, standard (carbon-zinc), or rechargeable (Ni-Cd) batteries.
11. Make sure that the supply terminals are not short circuited.

C. CONTENTS



Remarks: Also required but not included in this kit: 2 x 'AAA' 1.5 volt batteries, small crosshead screwdriver, and two 1-litre or 0.5-litre plastic drinks bottles, empty and cleaned.

D. ASSEMBLY

Follow these steps to assemble your Bottle Catamaran. Coloured numbers refer to the diagrams.

CROSSBEAM AND FLOAT SUPPORTS

1 Identify the crossbeam and study it carefully. In the centre, on the top, is a hole into which the motor fits. It has two cut-out slots in its edge. The front of the crossbar is the side with the smaller cut-out in it. Identify and study the two float supports. The front of each float support is the end with the loop on. Place a float support at one end of the crossbeam, and make sure the front of the crossbar faces the front of the float support. Attach the pieces together with two screws, which should be placed in the centre two holes of the four holes in the float support. (There are four screw holes on each of the float supports. You may screw the crossbeam to any two of them. After you have attached the bottles to the float supports, place the catamaran on water and check if it is floating in balance. If the catamaran is tilted to the front, it may overturn and submerge into the water when the propeller starts spinning in full speed. You need to balance the catamaran by moving the crossbeam to screw holes at the rear before you start using it.)

2 Attach the other float support to the other end of the crossbeam in the same way.

MOTOR AND BATTERY

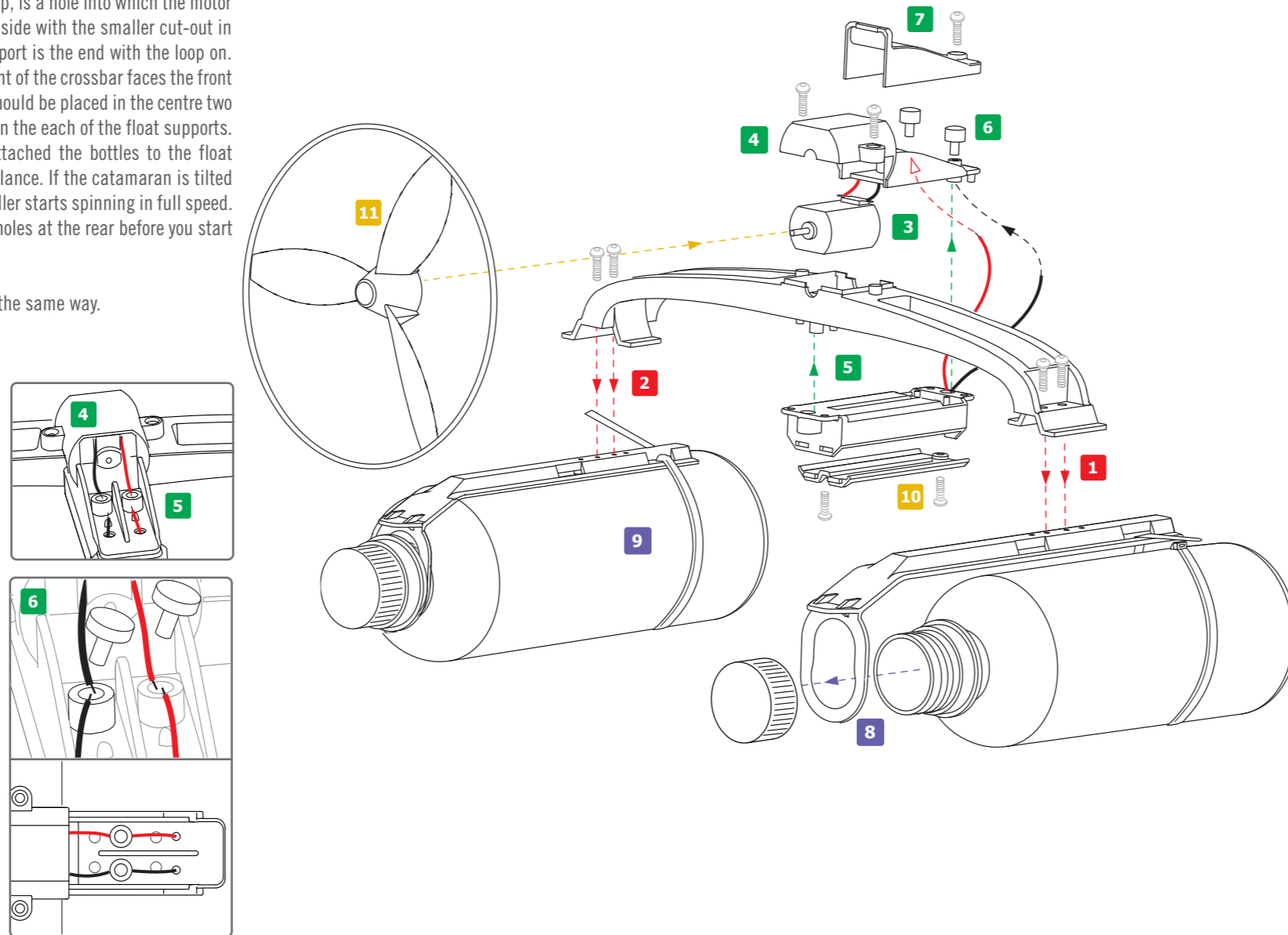
3 Carefully place the motor into the hole in the top of the crossbeam, with the spindle resting in the small slot at the front, and connections for the wires at the top.

4 Put the motor cover over the motor so that the wires go through the slots in the rear of the cover. Secure the cover with two screws.

5 Turn the model over. Now fit the battery case. Feed the wires from the battery case through the holes at the rear of the motor cover, and push the battery case into place. The holes at each end of the case fit over the pegs under the motor cover and crossbeam. Secure the battery case with two screws. Do not put batteries in yet.

6 You need to connect the wires from the battery to the wires from the motor. Push the bare end of a red wire from the motor and a bare end of a red wire from the battery case into one of the terminal holes in the motor case. Push in a terminal cap so that it touches both bare wires. Repeat with the other two wires.

7 Clip the top cover over the rear of the motor cover. Secure it with a screw.



FLOATS

8 The Bottle Catamaran floats are made from drinks bottles. These should not be shorter than 20 cm, otherwise they will be too short to fit the float supports and the assembled catamaran will not be balanced when it is floating. Remove the cap of the empty, clean drinks bottle. Push the neck through the loop in one of the float supports and refit the cap. Make sure the side of the bottle fits snugly against the float support before you tighten the cap.

9 Now strap the bottles in place with the straps provided. There is one strap for each bottle. Push the pointed end of a strap through the rear slots of one float support, from the centre of the model towards the outside. Pass it around the bottle and through the plastic connector on the other end of the strap. The loose tail of the strap should point outwards, away from the spinning propeller. Tighten the strap so that it holds the bottle firmly without crushing it. The straps provided are long enough to hold a 1.25-litre bottle. Repeat for the other bottle. Note: the loop on the float support fits most plastic bottles. However, if you cannot find bottles that fit the loops, you can simply tie your bottles to the float support with the plastic straps provided, without the necks poking through the loops.

FINAL ASSEMBLY

10 Set the switch on the battery case to 'OFF'. Insert two 'AAA' 1.5 volt batteries into the battery case. The negative terminal of each battery (the flat end) goes against one of the springs in the battery case. Cover the battery case.

11 Push the propeller onto the rotor shaft, leaving a gap of about 1 millimetre between the rear of the propeller hub and motor housing. Check that it spins freely. (Warning: Examine the plastic propeller carefully before you put it in on the motor spindle. If there are any breaks in the blades or the outer rim, do not run the motor. Contact our customer services for a replacement.)

Congratulations! Your Bottle Catamaran is now complete.

