EXPERIMENT MANUAL

Air-Power Turbo Racer

THAMES & KOSMOS

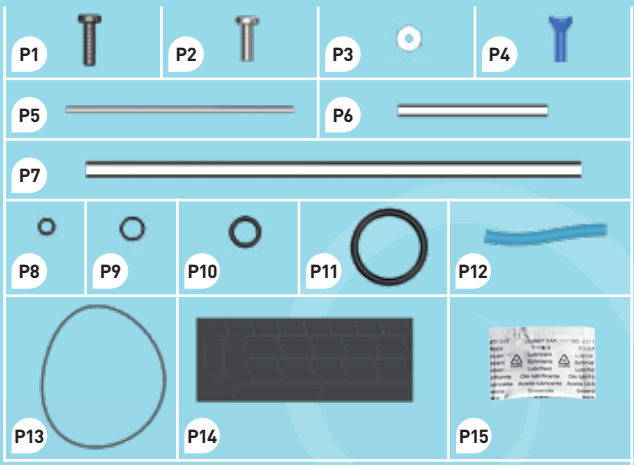
Franckh-Kosmos Verlags-GmbH & Co. KG, Pfizerstr. 5-7, 70184 Stuttgart, Germany | +49 (0) 711 2191-0 | www.kosmos.de
Thames & Kosmos, 89 Ship St., Providence, RI, 02903, USA | 1-800-587-2872 | www.thamesandkosmos.com

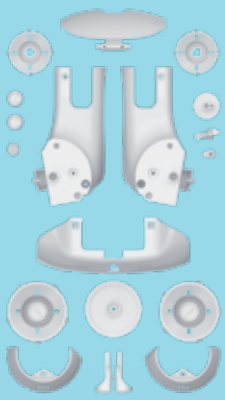
KIT CONTENTS

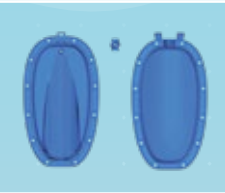
Good to know!

If you are missing any parts, please contact Thames & Kosmos technical support.

What's inside your experiment kit:







Checklist:

✓	No.	Description	Quantity	Part No.
○	P1	Screw, black	10	729630-1
○	P2	Screw, silver	12	729630-2
○	P3	Nut	12	729630-3
○	P4	Valve	2	729631-1
○	P5	Round metal rod	1	729630-4
○	P6	Hexagonal metal rod, short	1	729630-5
○	P7	Hexagonal metal rod, long	1	729632-1
○	P8	O-ring, small	2	729631-2
○	P9	O-ring, medium	1	729631-3
○	P10	O-ring, large	1	729631-4
○	P11	O-ring, extra large	1	729631-5
○	P12	Silicone tube	1	729631-6
○	P13	Rubber gasket	1	729632-2
○	P14	Foam sticker sheet	1	729633
○	P15	Non-toxic lubricant packet	1	723607
○	A	Frame A with parts A1 – A16	1	729626
○	B	Frame B with parts B1 – B17	1	729627
○	C	Frame C with parts C1 – C3	1	729628
○	D	Frame D with parts D1 – D4	1	729629

Wow!

So many parts!

TABLE OF CONTENTS

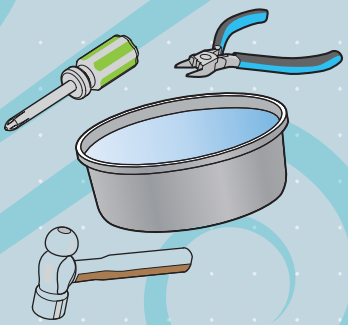
TIP

YOU WILL FIND ADDITIONAL INFORMATION IN THE CHECK IT OUT SECTION ON PAGE 23.

YOU WILL ALSO NEED:

Small magnetic Phillips-head screwdriver, diagonal cutter or scissors and nail file, paper towel, small hammer, bowl, water

Vrooom!
Let's go!



Do not throw away the lubricant packet. You will use it during assembly.

WARNING

Not suitable for children under 3 years. Choking hazard — small parts may be swallowed or inhaled. Store the experiment material and assembled models out of the reach of small children.

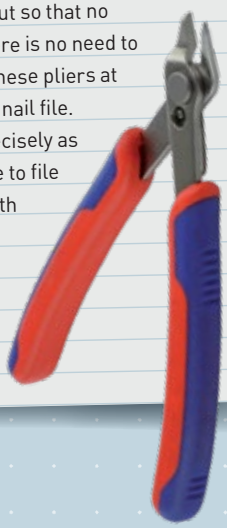
WARNING! This kit contains functional sharp edges or points. Do not injure yourself!

Keep the packaging and instructions as they contain important information.

The car may only be operated when fully assembled. Correct assembly must be checked by an adult before use.

THE RIGHT TOOL

The right tool can make assembling your model much easier and it can also make your model work better in the end. It is best to cut the plastic parts out of their frames with a small diagonal cutter (such as those used for electronics work) or model pliers. Using these tools, the parts can be precisely cut so that no burrs remain on the parts and there is no need to file them down. If you don't have these pliers at home, you can use scissors and a nail file. Normal scissors do not cut as precisely as a diagonal cutter, so you may have to file some of the rough edges down with the nail file.



IMPORTANT INFORMATION

Dear Parents and Supervising Adults,

Children want to be amazed, understand, and create new things. They want to try everything out and do it for themselves. They want to know! They can do all of this with Thames & Kosmos experiment kits. We hope you and your child have a lot of fun experimenting with Air-Power Turbo Racer.

— Before building and experimenting, read the instructions together with your child and discuss the safety information together. Stand by to assist your child with any challenging steps of assembly or usage.

— If your child is working on a table top, give them something to work on to prevent damage to the furniture.

— Particular care must be taken when cutting the plastic parts out of the frames, as sharp points can be created. These can be removed with the help of diagonal cutters or scissors and a nail file. Please supervise your child whenever they are using scissors or diagonal cutters until you feel they are ready to use the tools independently.

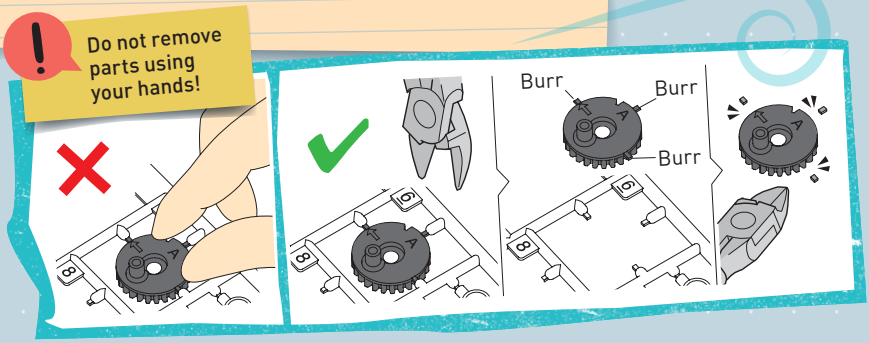
— Discuss with your child where they may use the Air-Power Turbo Racer to prevent damage to furniture. We recommend using it on smooth, clean, and dry floors.

And most importantly: Have fun with your Air-Power Turbo Racer!

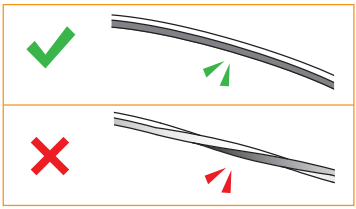
TIP

IMPORTANT:

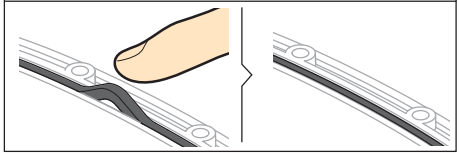
REMOVE THE PARTS FROM THE FRAMES ONLY WHEN THEY ARE NEEDED. REMOVE EXCESS MATERIAL (BURRS) BEFORE ASSEMBLY USING A DIAGONAL CUTTER OR A NAIL FILE.

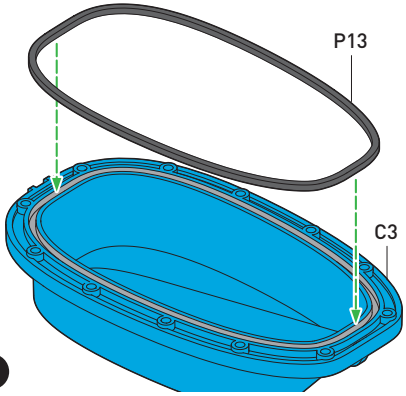


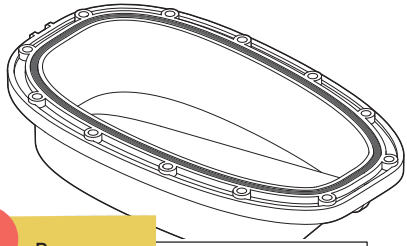
AIR TANK ASSEMBLY



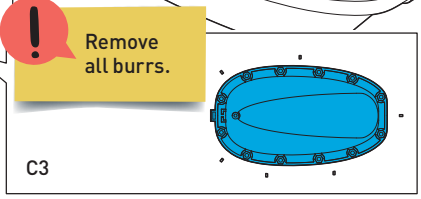
Push the gasket into the slot with your finger.





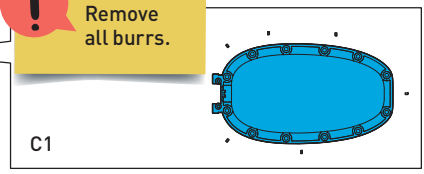


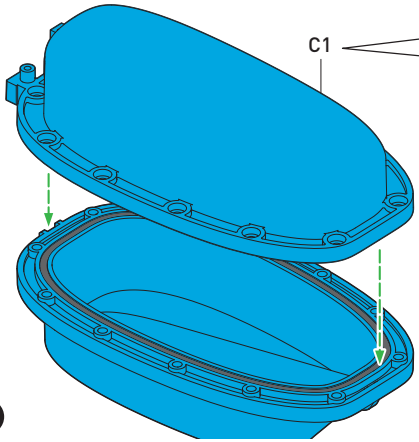
Remove all burrs.

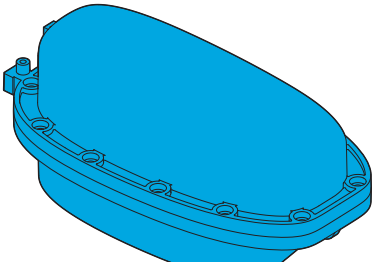


1

Remove all burrs.

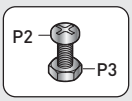


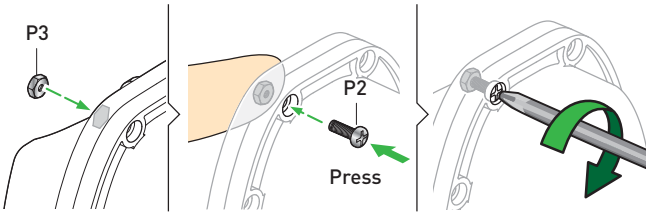




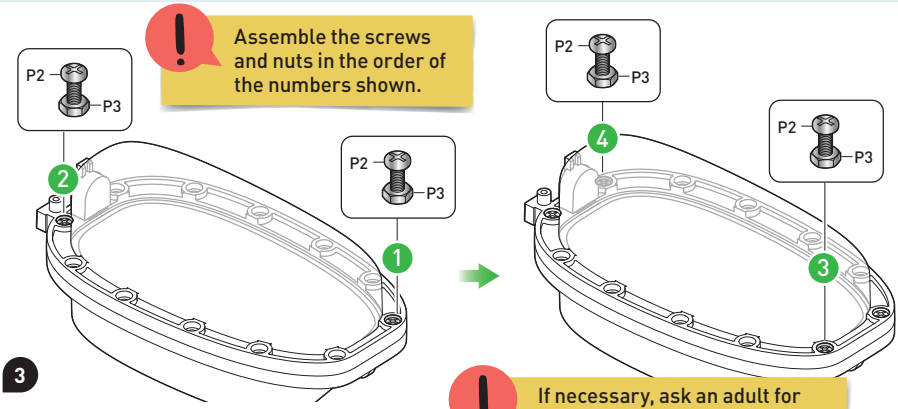
2

Follow the procedure here whenever this screw symbol appears.

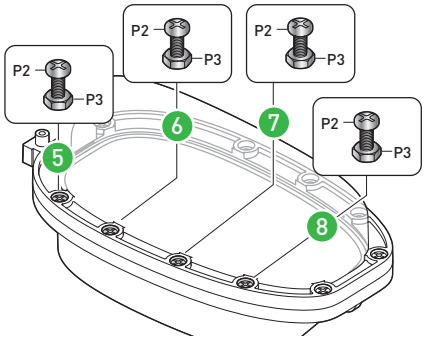




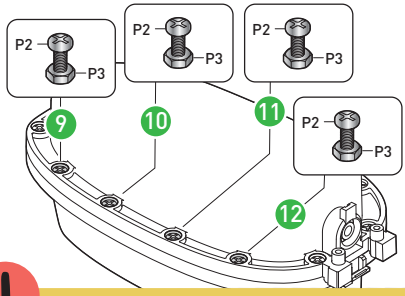
Assemble the screws and nuts in the order of the numbers shown.



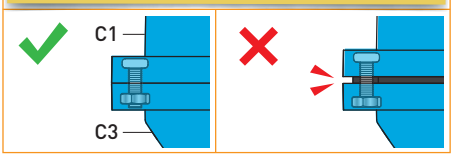
3



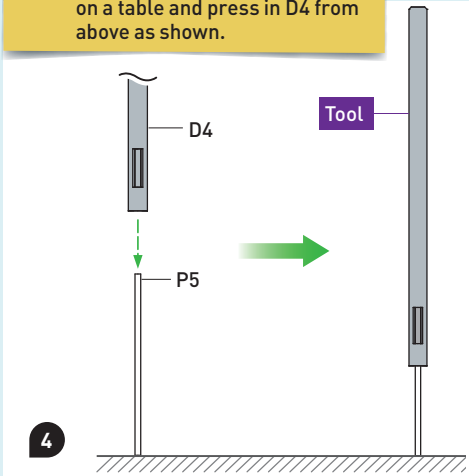
180°



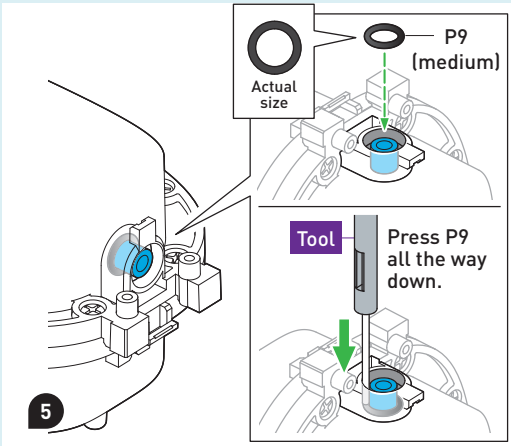
Make sure there is no gap between C1 and C3.



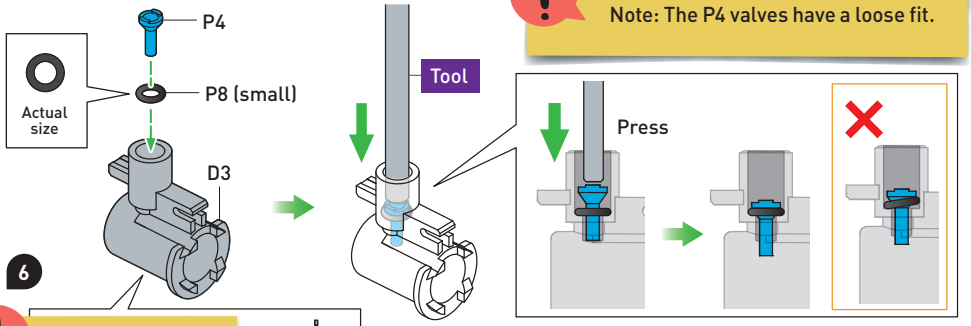
If necessary, ask an adult for help with this step. Place P5 on a table and press in D4 from above as shown.

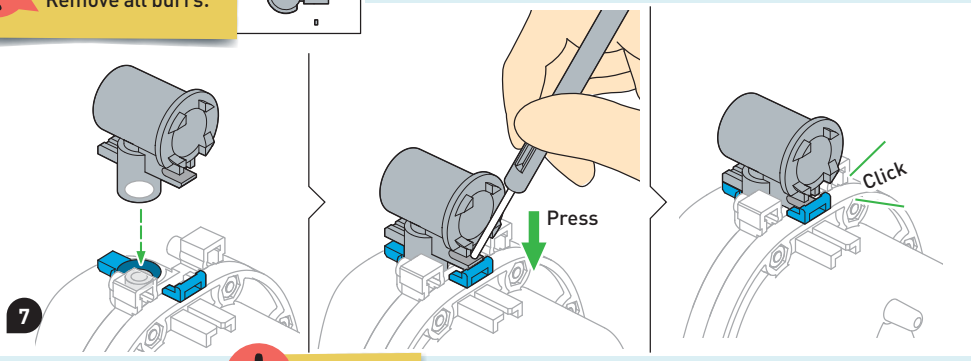


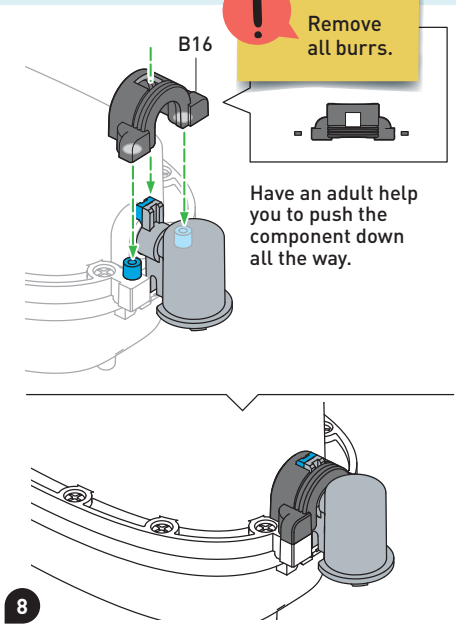
4

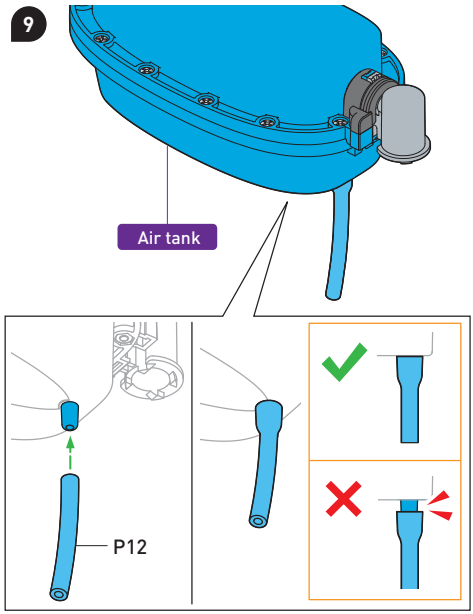


5

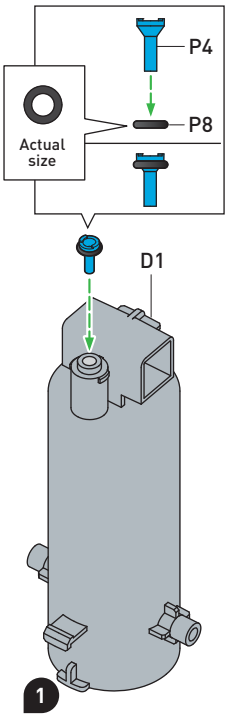

P4
Actual size
P8 (small)
D3
Tool
Note: The P4 valves have a loose fit.
Press
6
Remove all burrs.

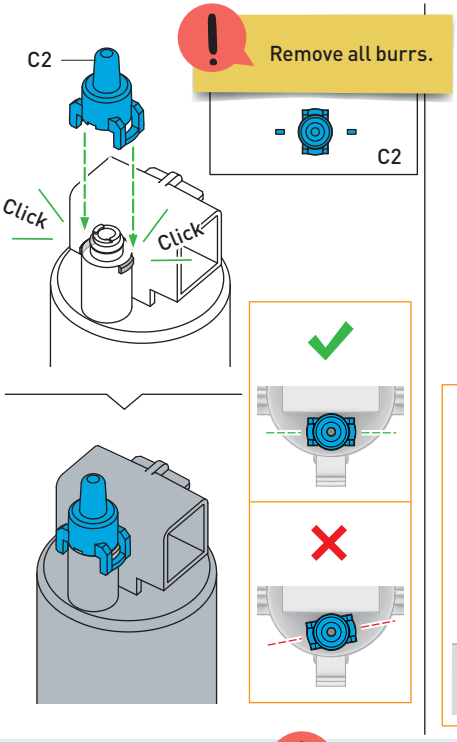

Press
Click
7

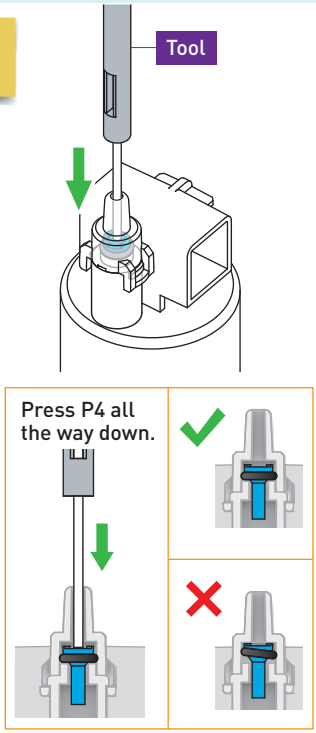

B16
Remove all burrs.
Have an adult help you to push the component down all the way.
8

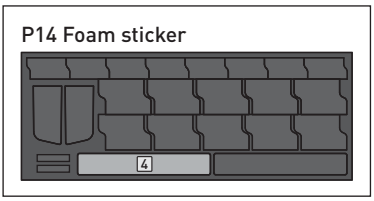

9
Air tank
P12

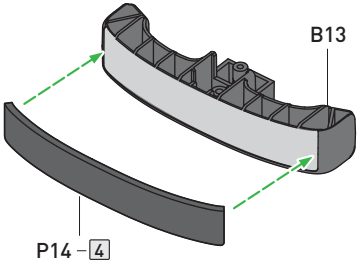
AIR PUMP ASSEMBLY

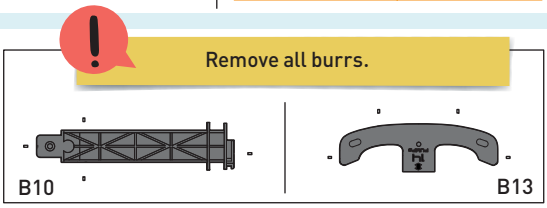


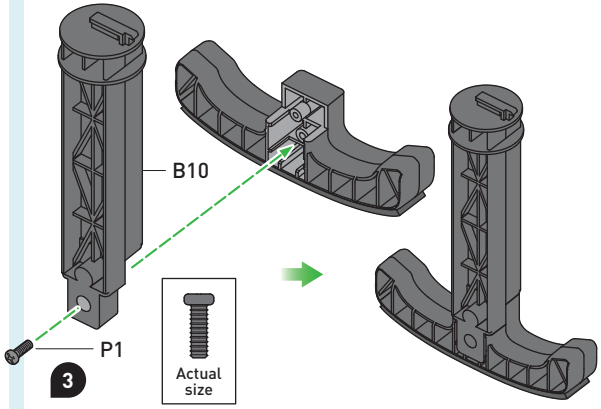


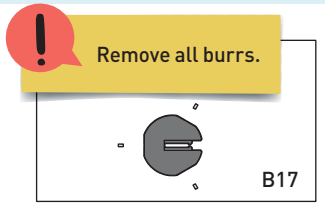


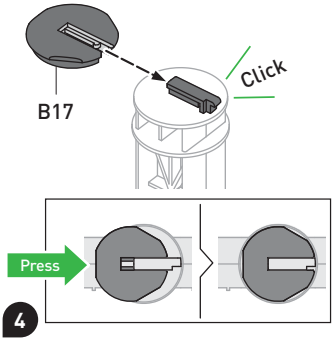


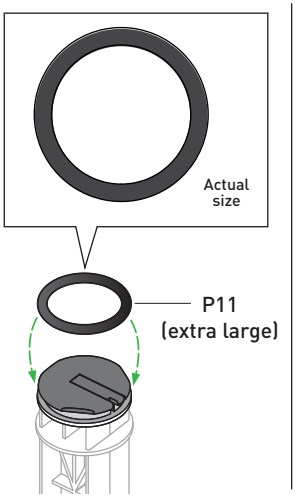


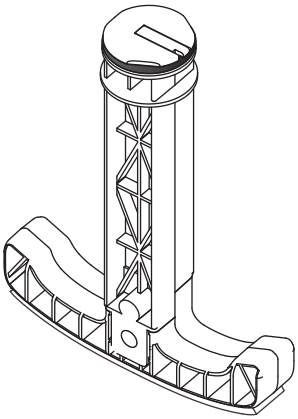




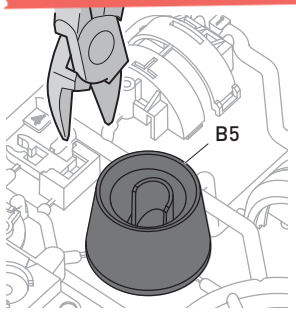


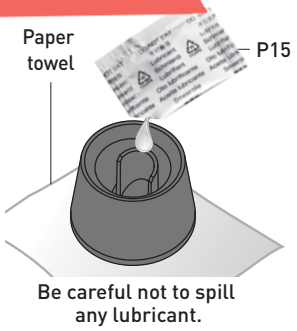


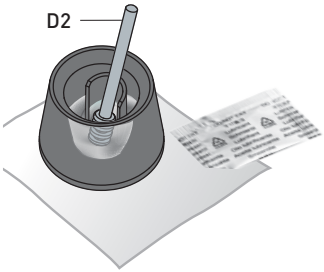




HANDLING THE LUBRICANT



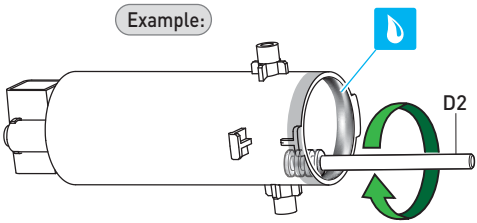


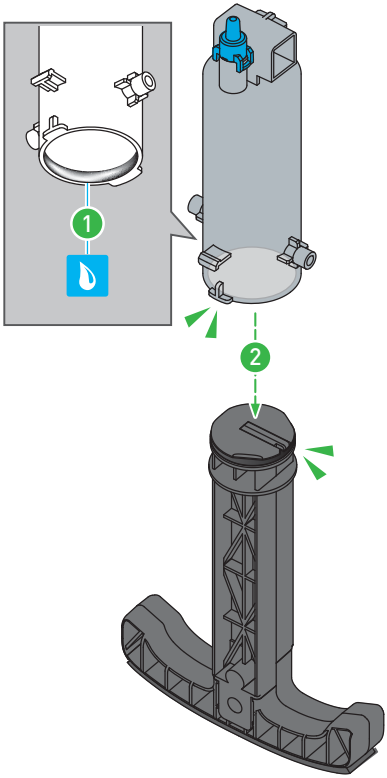


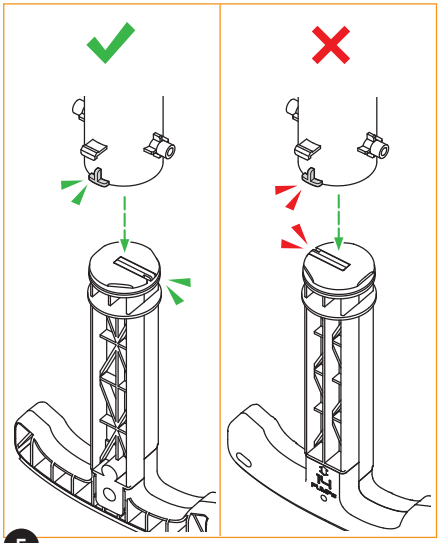
= Lubricant	When you see this symbol, lubricate the part.

Lubricate only the area marked in gray. The lubricant is non-toxic, but work carefully and do not touch the lubricant with your hands or get it into your eyes. (It can stain clothes and irritate eyes).

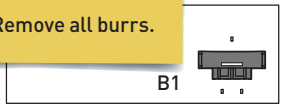
Dispose of leftover lubricant in the household trash after assembly. Do not pour it down the drain.



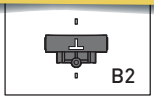


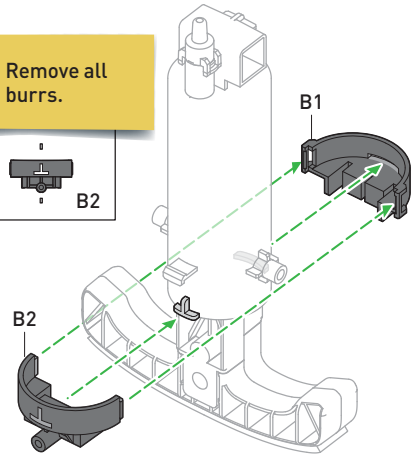


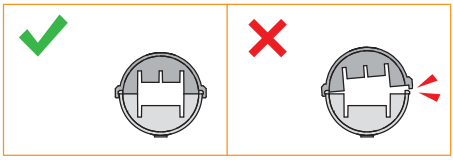
Remove all burrs.



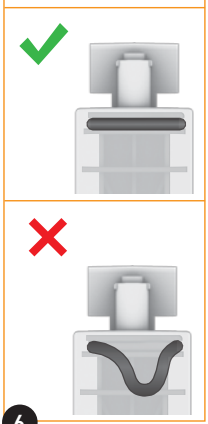
Remove all burrs.

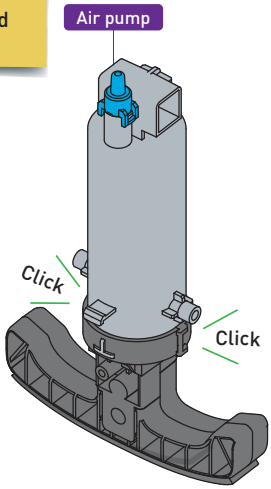






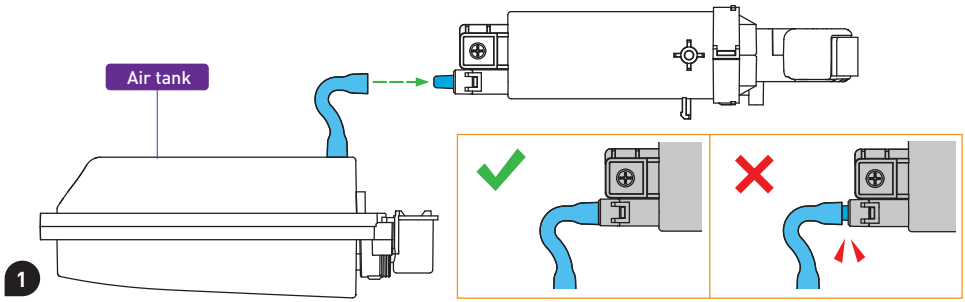
Make sure the O-ring is installed correctly.

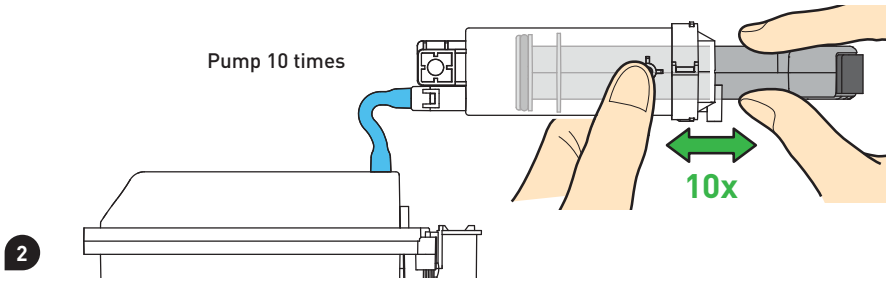




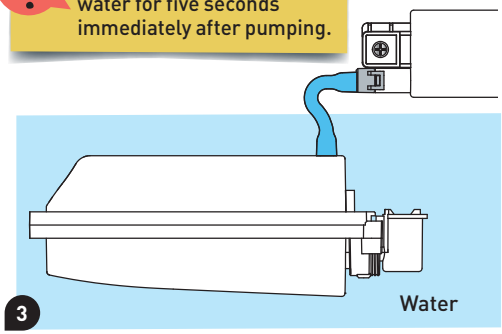
6

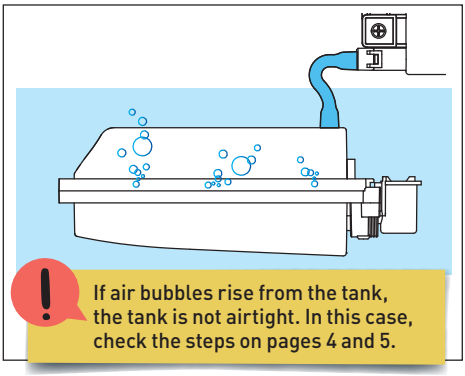
TESTING THE AIR TANK





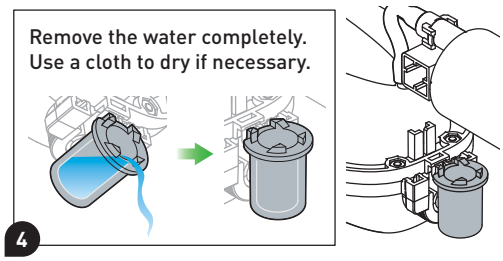
Immerse the air tank in water for five seconds immediately after pumping.

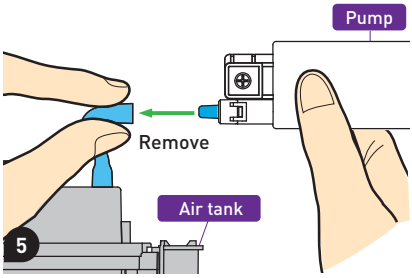




If air bubbles rise from the tank, the tank is not airtight. In this case, check the steps on pages 4 and 5.

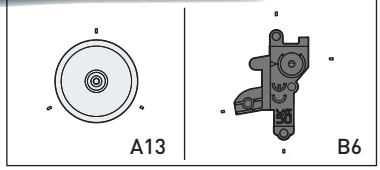
Remove the water completely. Use a cloth to dry if necessary.



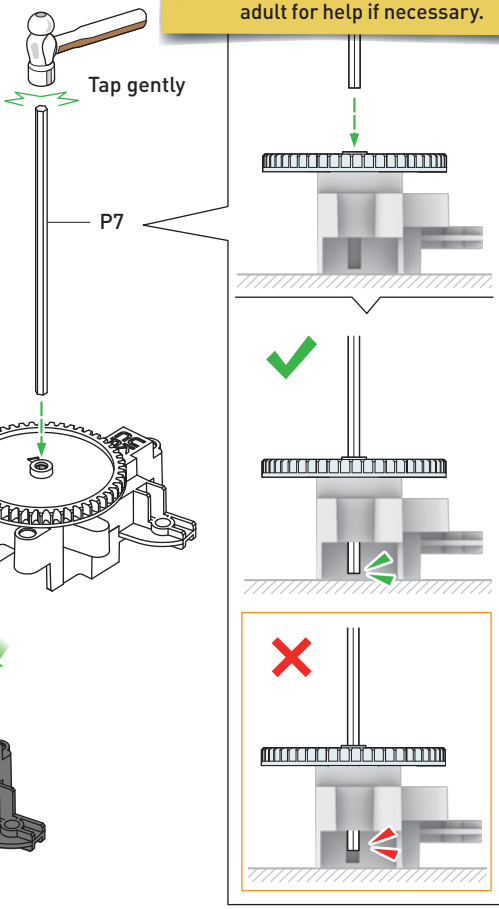


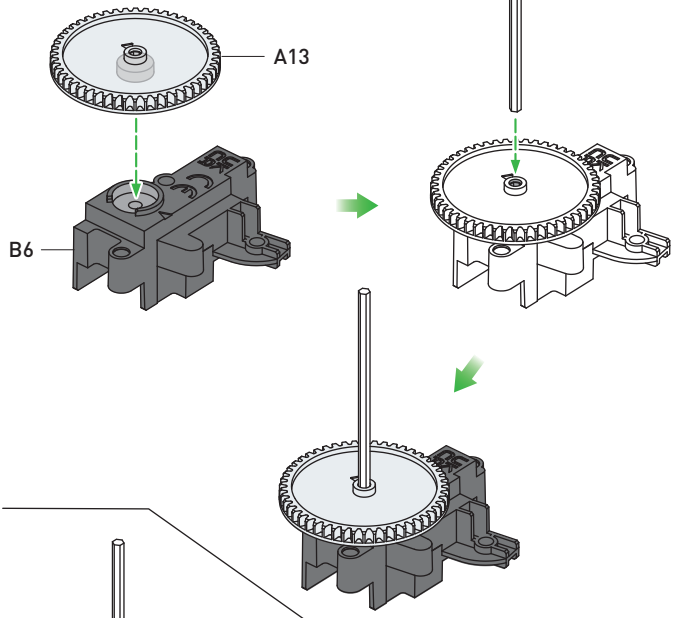
TRANSMISSION ASSEMBLY

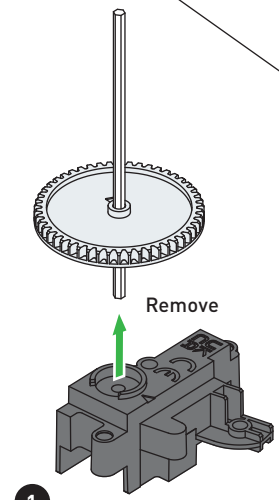
Remove all burrs.

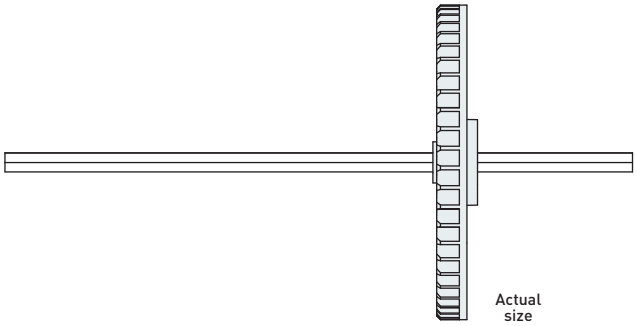


Tap gently with a small hammer or other suitable tool. Ask an adult for help if necessary.



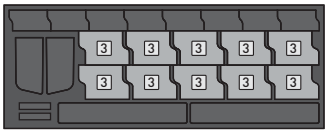




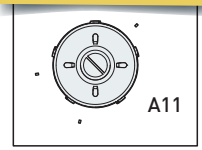


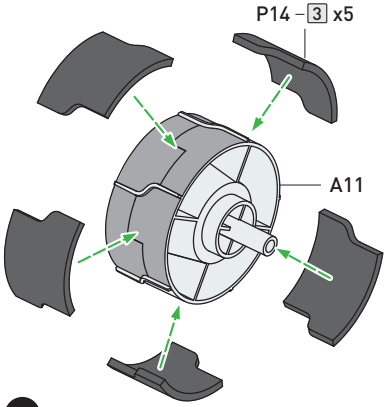
1

P14 Foam sticker

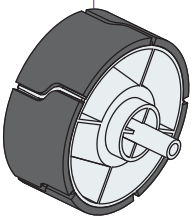


Remove all burrs.





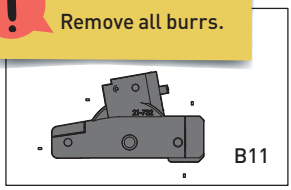
Rear wheel

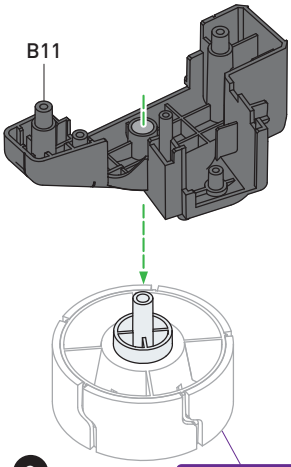


x2

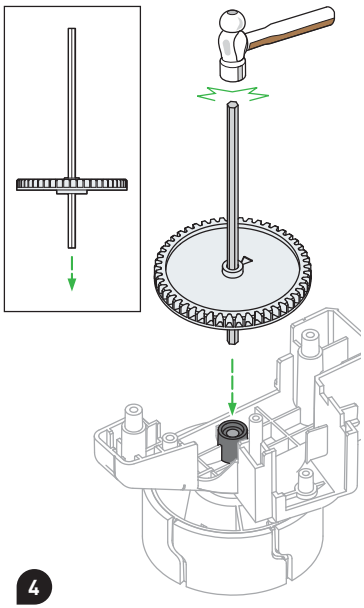
2

Remove all burrs.

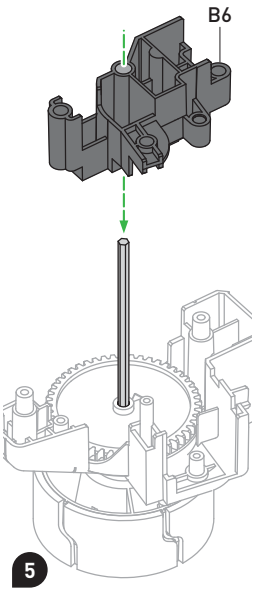




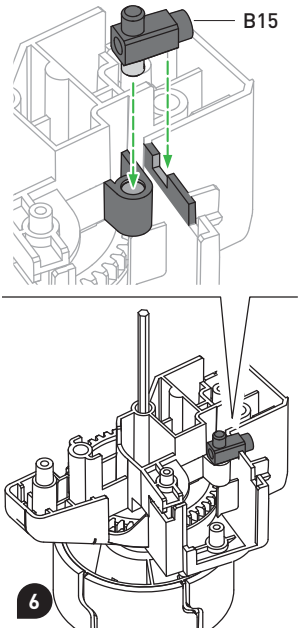
3



4

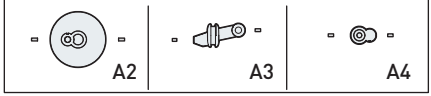


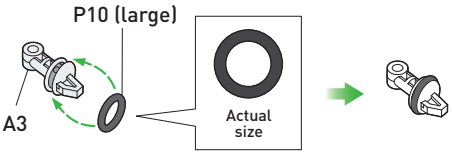
5

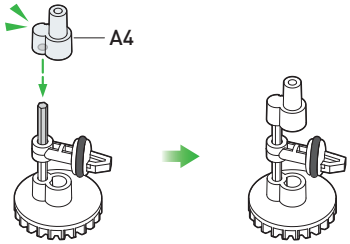


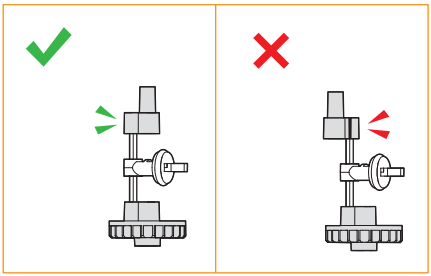
6

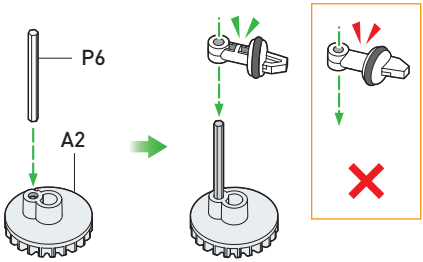
Remove all burrs.





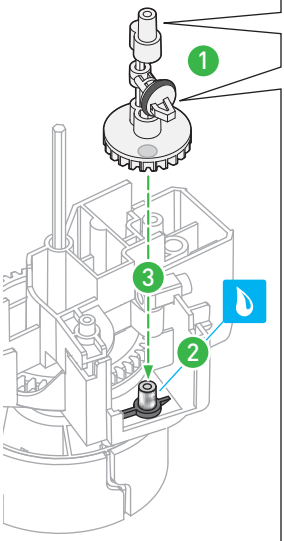


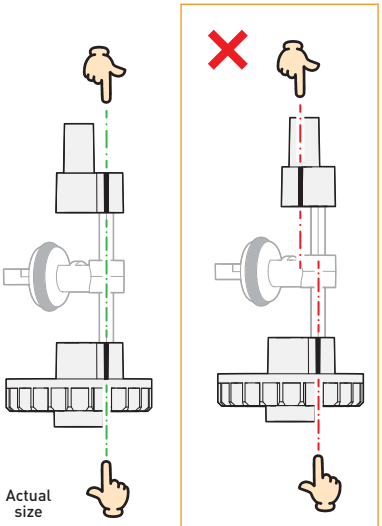


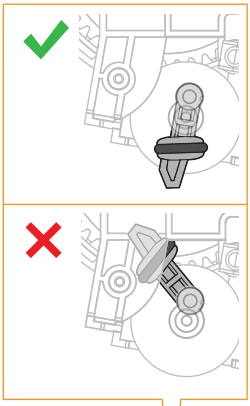


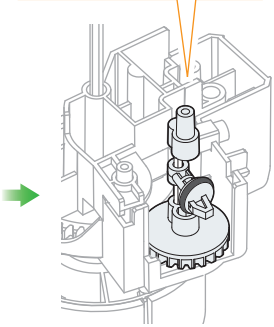
7

Make sure to line up the markings on A2 and A4.

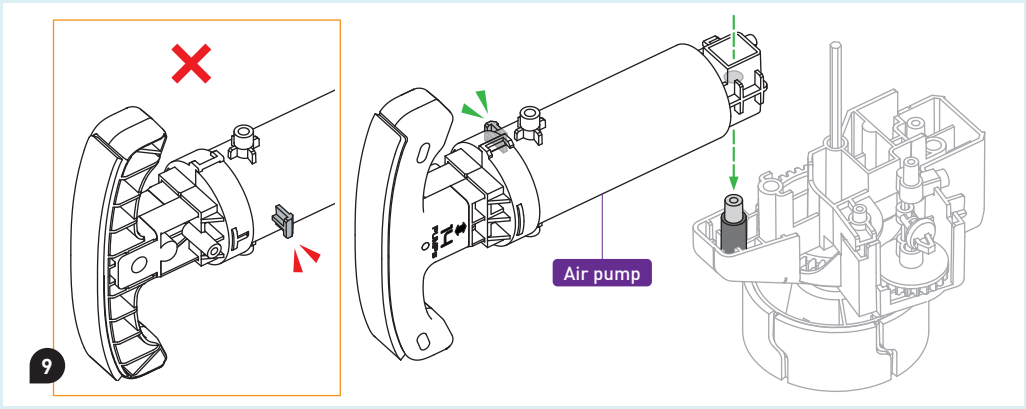


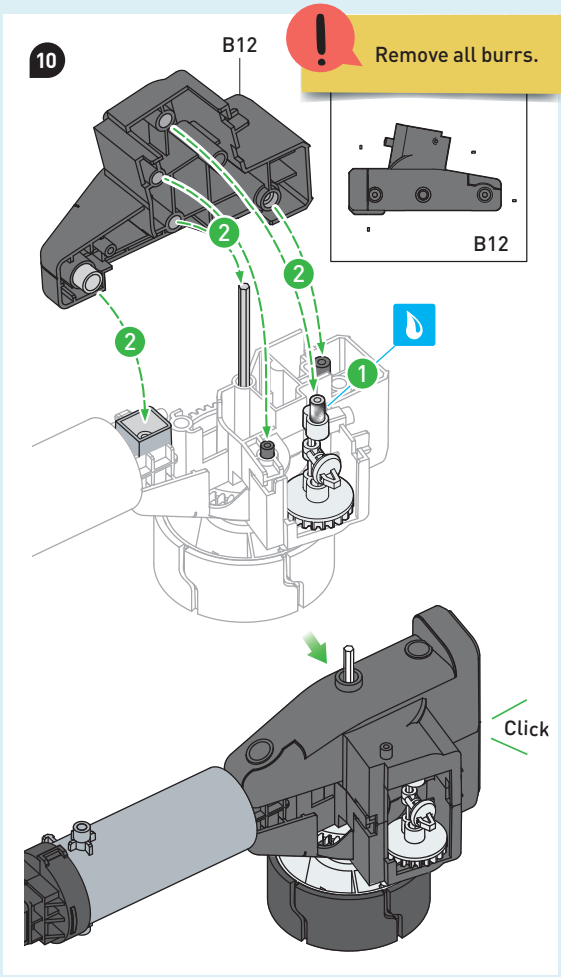


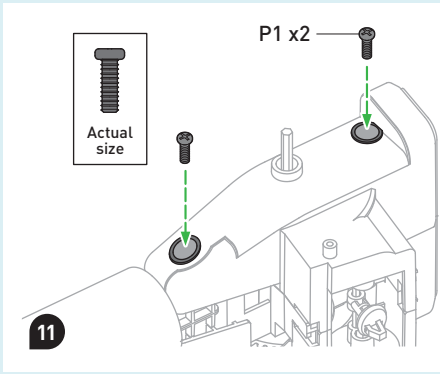


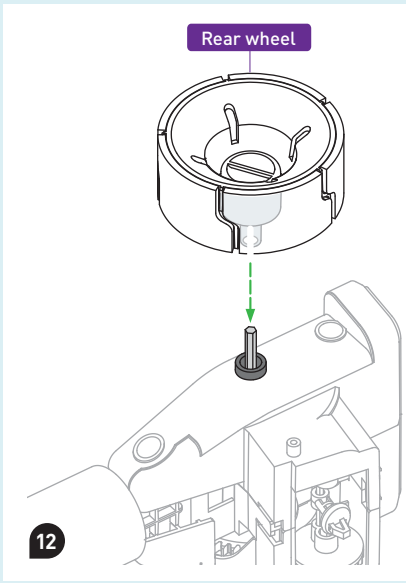


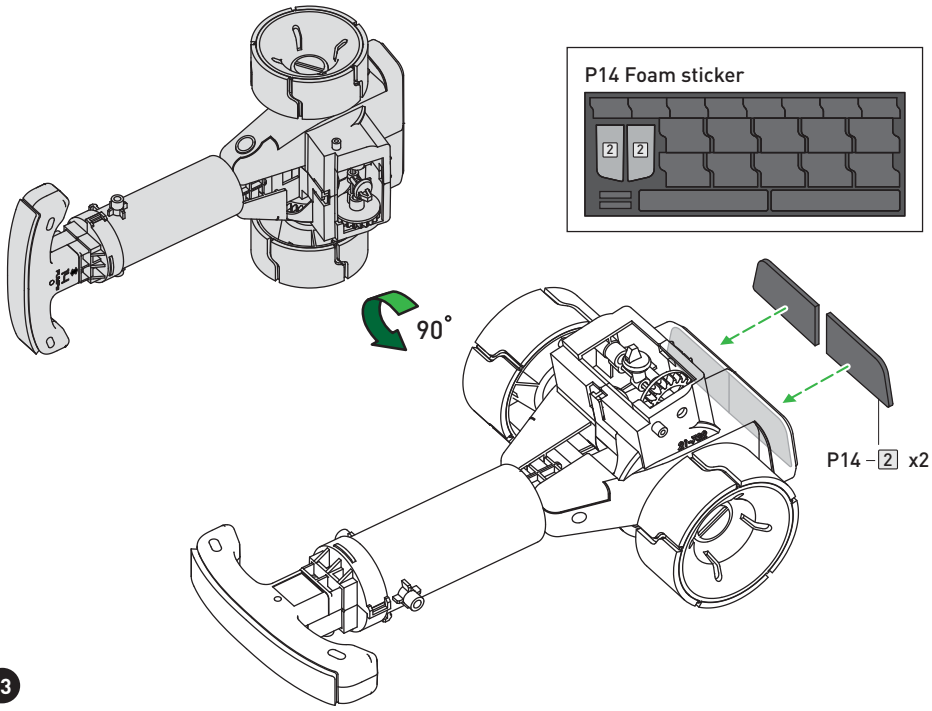
8


9
Air pump

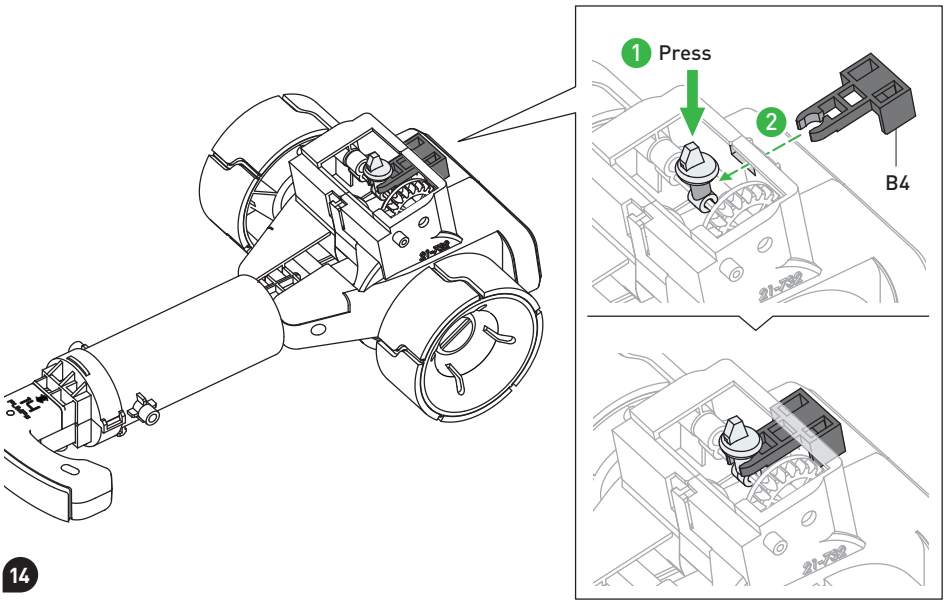

10
B12
Remove all burrs.
B12
2
2
2
1
Click


Actual size
P1 x2
11

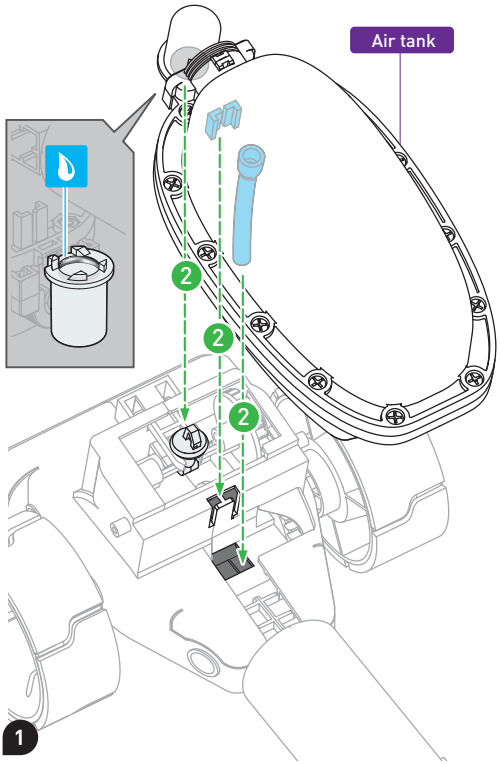

Rear wheel
12



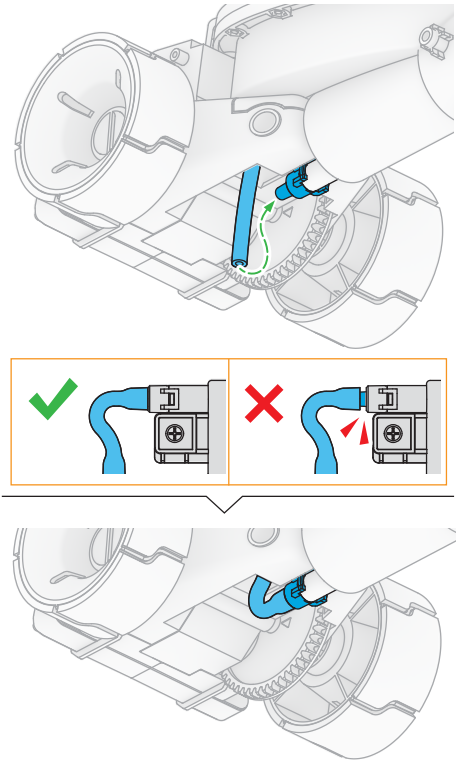
13

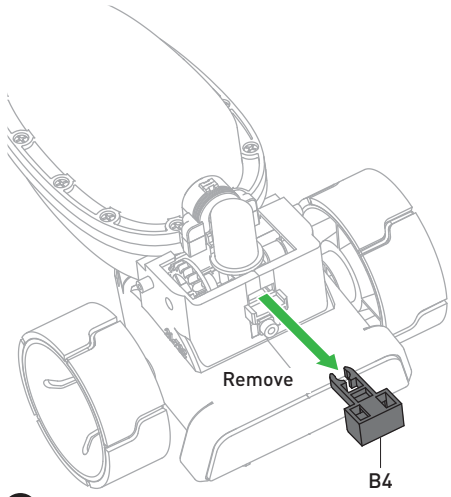


14


Air tank
2
2
2

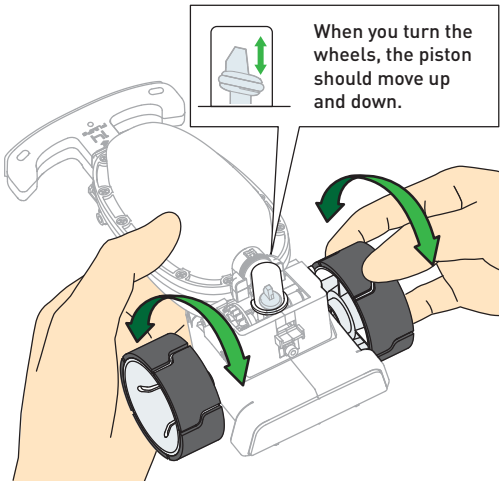
1

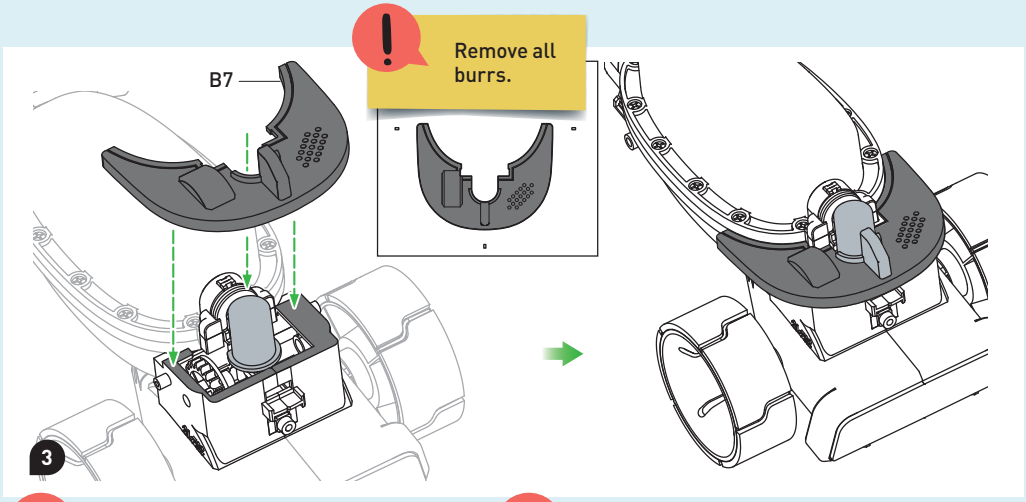


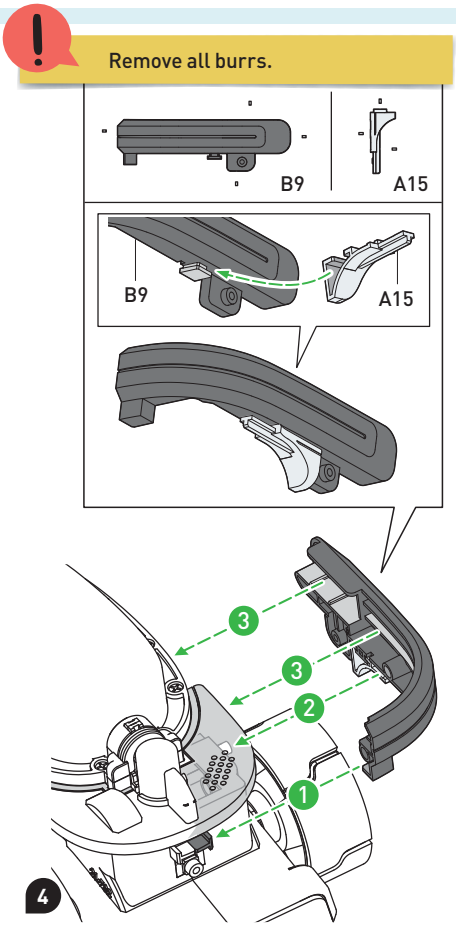

Remove
B4

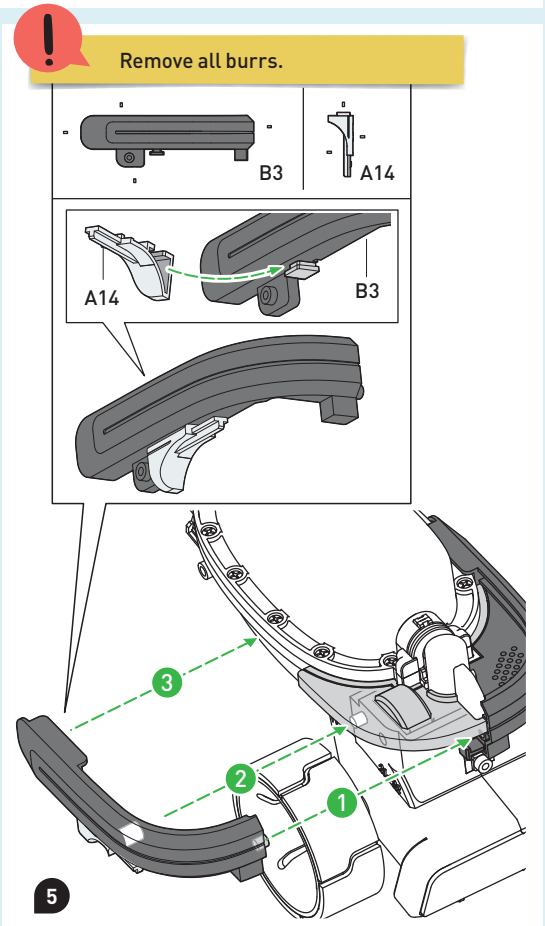
2

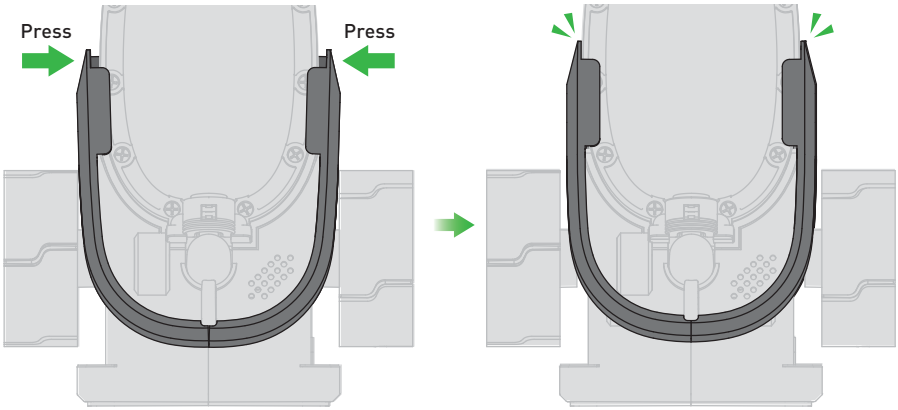
Test


When you turn the wheels, the piston should move up and down.

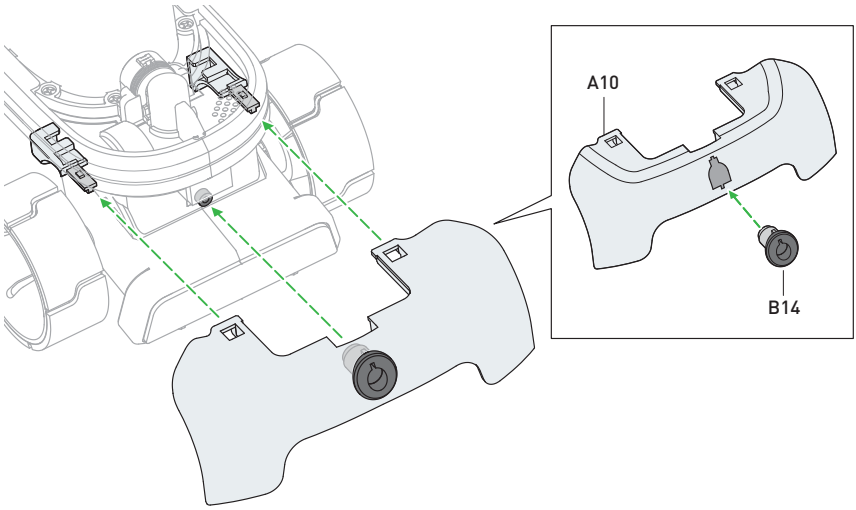

Remove all burrs.
B7
3

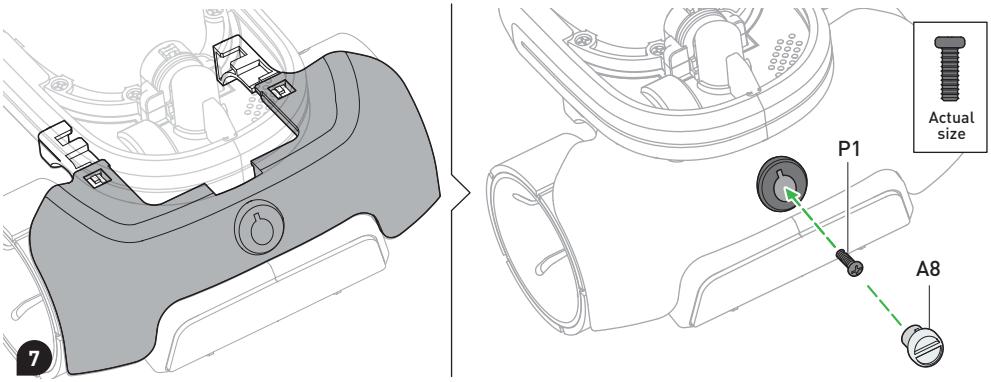

Remove all burrs.
B9
A15
B9
A15
3
3
2
1
4


Remove all burrs.
B3
A14
A14
B3
3
2
1
5



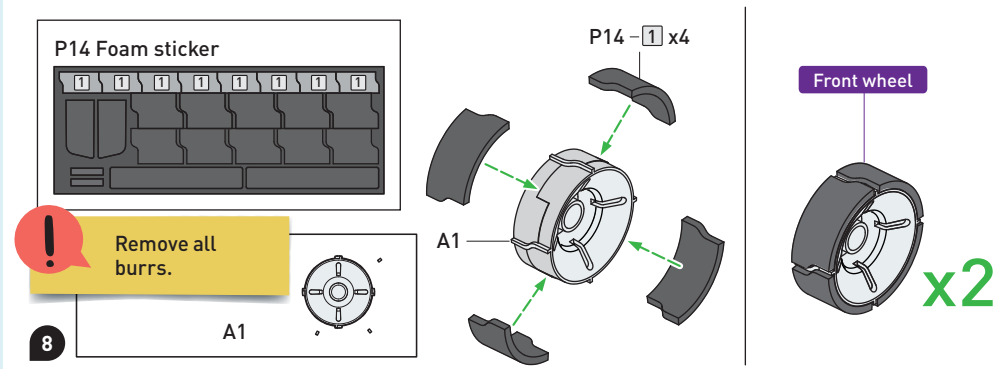
6



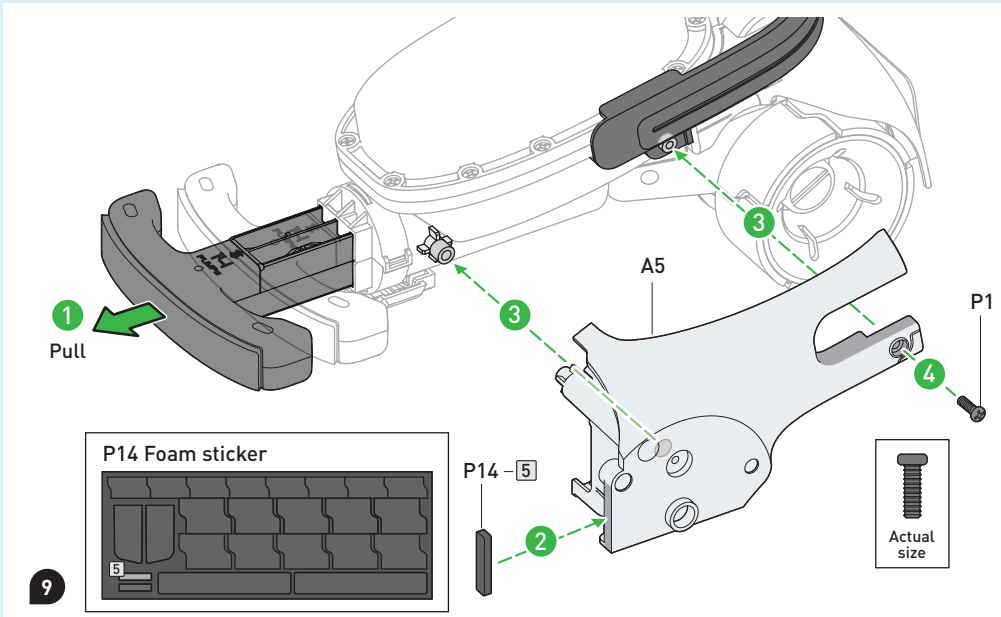


7

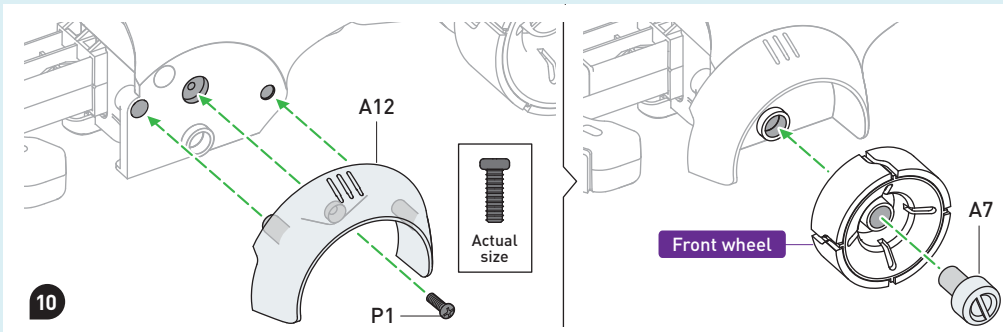
18


P14 Foam sticker
Remove all burrs.
A1
P14 – 1 x4
A1
Front wheel
x2

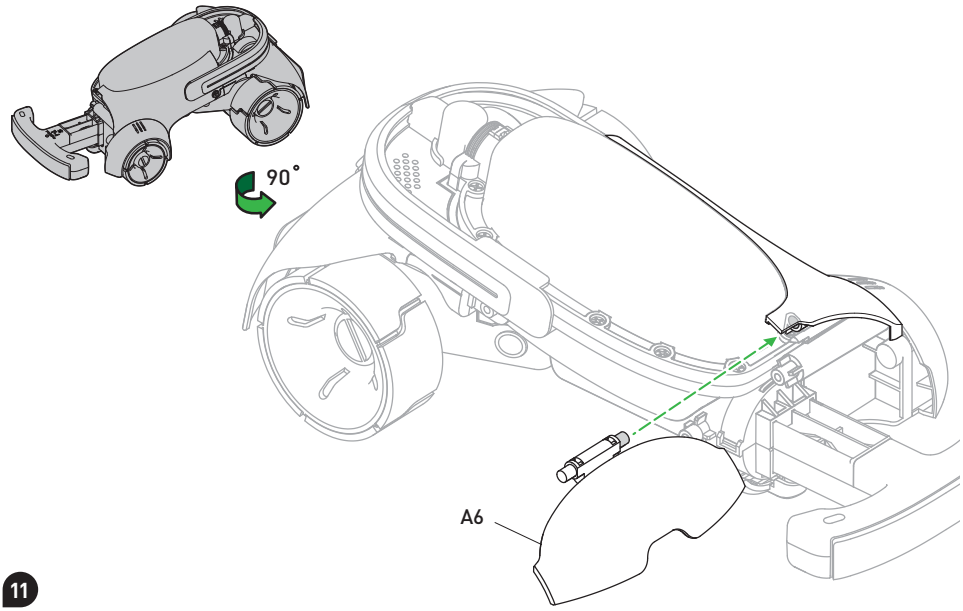
8


Pull
A5
P1
P14 Foam sticker
P14 – 5
Actual size

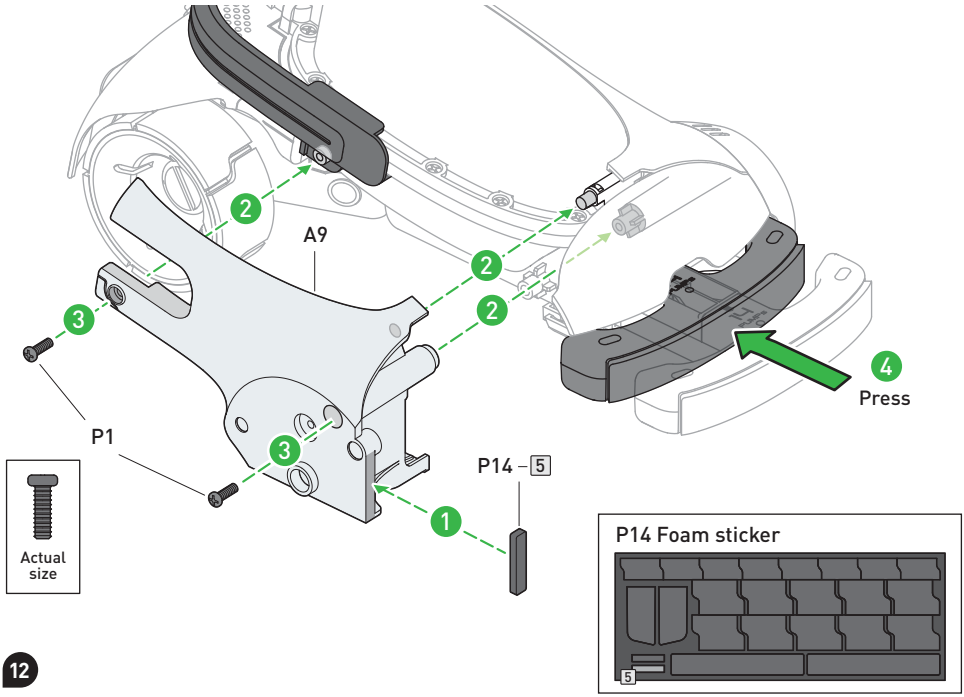
9


A12
Actual size
P1
Front wheel
A7

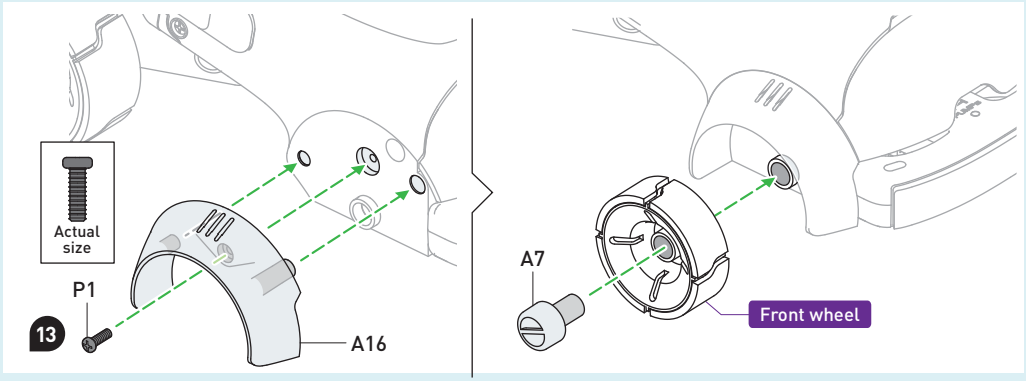
10

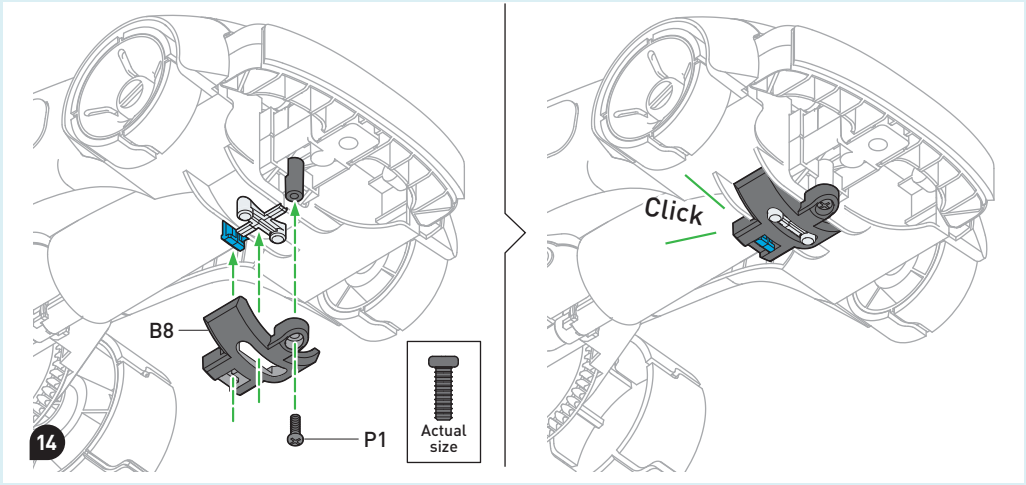


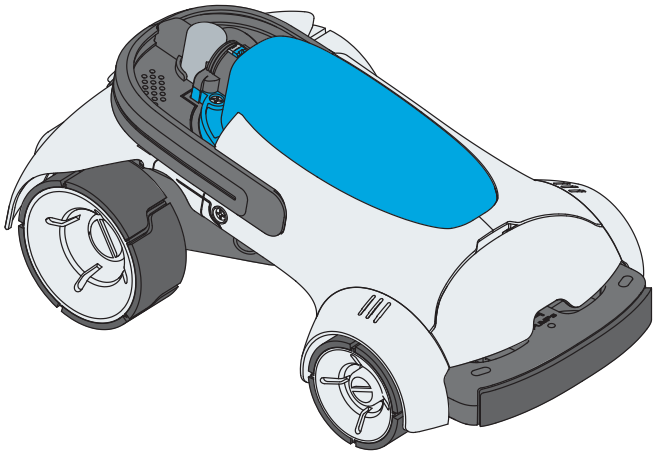
11



12


Actual size
P1
13
A16
A7
Front wheel

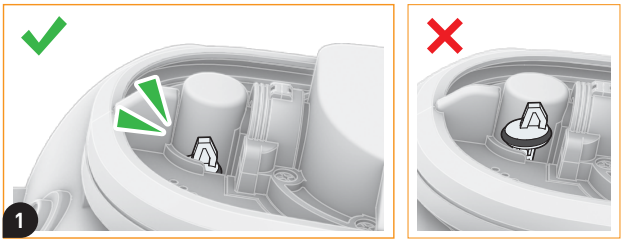

B8
14
P1
Actual size
Click



Done!

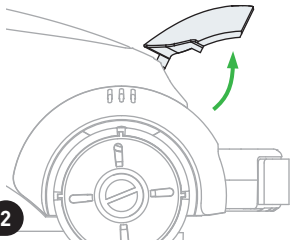
OPERATING INSTRUCTIONS

Turn the rear wheels so that the piston is as low as possible.



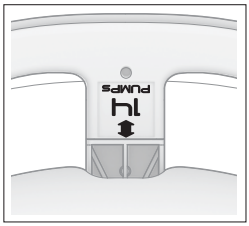
1

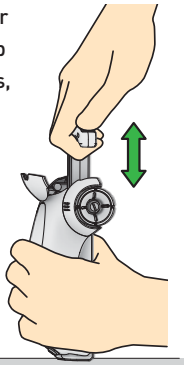
Open the hood.



2

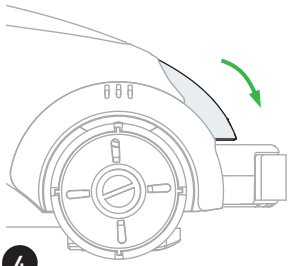
Turn the wheels to release any compressed air that may already be in the air tank. Then pump 12-14 times. (Do not pump more than 14 times, otherwise the hose may come loose or slip).





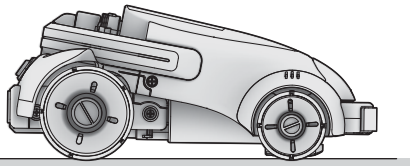
3

Close the hood.



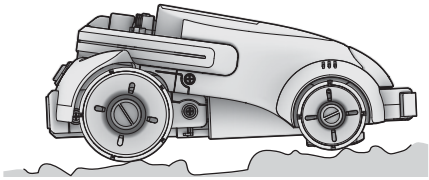
4

Place the car on a flat surface.



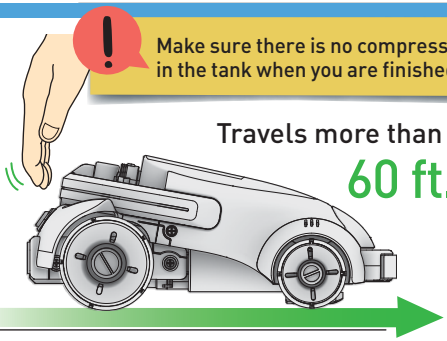
5

Avoid dusty, slippery or uneven surfaces.



To get going, push gently from behind. Your car can travel more than 60 feet and reach speeds of 13 feet per second.

Give it a tap



Make sure there is no compressed air left in the tank when you are finished playing.

Travels more than 60 ft.

6

The glass is always full

Air is not nothing! That's why a supposedly empty glass is not empty at all — it's full of air. It's the same with the air tank of your car. Every time you push the pump in, you add more air to the tank. You could even measure this using a very sensitive scale. Your car is a tiny bit heavier after you pump more air into it. Or as physicists would say: air has mass, so pumping air into the car increases its mass. Without this mass, the car wouldn't go anywhere.

Your car is powered by a **pneumatic** system, which transforms energy from pressurized air into motion. Pneumatics power many mechanisms in the real world, like jackhammers.

AIR PRESSURE MOTOR

What you have built here is a real piston engine. The mass of each tiny particle of air contributes to the pressure inside the tank. By forcing more mass into the tank, you increase the pressure — and therefore energy — that is stored in the tank. The pressurized air pushes on the piston, moving it downwards and driving the wheels forward.

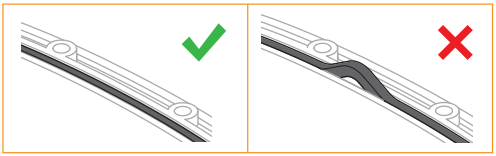
The same thing happens in cars with combustion engines. The only difference is that the pressure is generated by the combustion (burning) of fuel in a gas-powered engine.

The concept of air-powered cars is as old as that of conventional cars. Even though the technology has never really caught on, research is still being carried out on it today. New automobile models with compressed air drives are constantly being developed, and the technology has actually been used in trains.

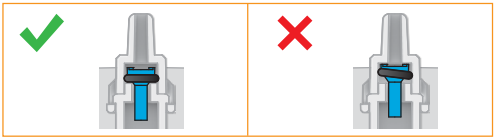
A

Problem:
You hear a whistling sound.

1. Check that all the screws on the air tank are tight.
2. Check if the rubber ring has slipped out of the groove somewhere.



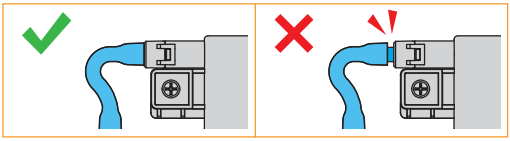
3. Check that both small O-rings are properly seated (level and pressed as far in as possible).



B

Problem:
The hose comes loose when pumping.

1. Make sure no lubricant has gotten on the hose or connections.
2. Make sure the hose is pushed firmly into place.

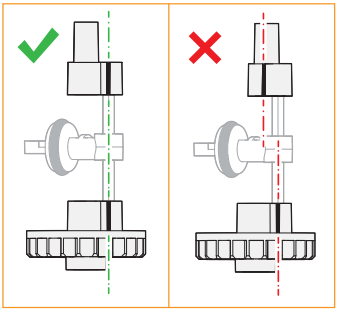


3. Do not pump more than 14 times.

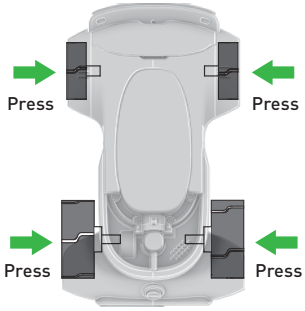
C

Problem:
The car doesn't go.

1. Check that the piston and gears are installed correctly.



2. Make sure that the front and rear wheels are pressed firmly into place.



© 2024 Franckh-Kosmos Verlags-GmbH & Co. KG • Pfizerstrasse 5–7 • 70184 Stuttgart, DE

This work, including all its parts, is copyright protected. Any use outside the specific limits of the copyright law is prohibited and punishable by law without the consent of the publisher. This applies specifically to reproductions, translations, microfilming, and storage and processing in electronic systems and networks. We do not guarantee that all material in this work is free from other copyright or other protection.

Project manager and text: Jonathan Felder
Technical product development: Deryl Tjahja, CIC Components Industries Co., Ltd., Taiwan
English manual editing: Hannah Mintz, Ted McGuire

Manual design concept: Atelier Bea Klenk, Berlin
Manual layout: Olaf Peters, Freitag van Geigk, Hannover
Material images: CIC Components Industries Co., Ltd., Taiwan
Manual photos: Jamie Duplass (all adhesive strips); ELG21, p. 23 t; El monty, p. 23 tr; wpaphotomotorsport, p. 23 b; Lucky-G, p. 23 tl (© Adobe Stock) (all previous © pixabay)

Design concept & packaging design: Peter Schmidt Group, Hamburg
Packaging layout: Dan Freitas
3D images for packaging: CIC Components Industries Co.

The publisher has made every effort to identify the owners of the rights to all photos used. If there is any instance in which the owners of the rights to any pictures have not been acknowledged, they are asked to inform the publisher about their copyright ownership so that they may receive the customary image fee.

1st English Edition © 2024 Thames & Kosmos, LLC, Providence, RI, USA
Thames & Kosmos ® is a registered trademark of Thames & Kosmos, LLC.

Distributed in North America by Thames & Kosmos, LLC. Providence, RI 02903
Phone: 800-587-2872; Web: www.thamesandkosmos.com

We reserve the right to make technical changes.

Printed in Taiwan/Imprimé en Taïwan

Do you have any questions?
Our technical support team would be glad to help you!

Thames & Kosmos US
Email: support@thamesandkosmos.com
Phone: 1-800-587-2872

550057-03-071024