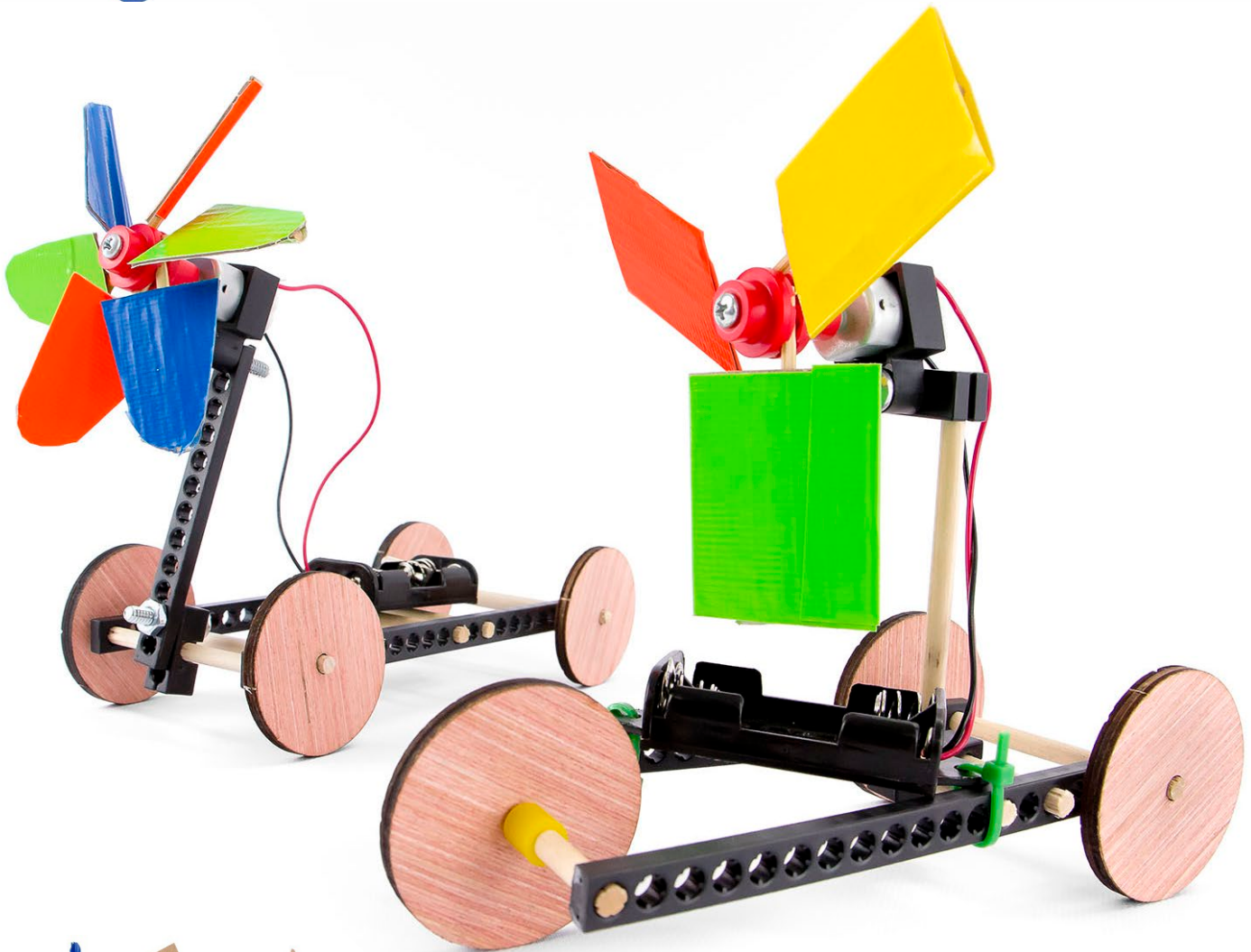




Air Racer Go Guide



Start by building the example racer, then turn it into your own unique design.

You Are Here

Go Guide

Start here! Build your example racer, evolve your design, and begin the Drag Race Challenge!

Choose how you would like to complete this activity.

Download documents & videos at teachergeek.com/airracer

Optional Lab

-Blade Design Lab
(Ages 8+)

Optional Challenges

-Drag Race Challenge*

*See Page 12



Air Racer Go Guide



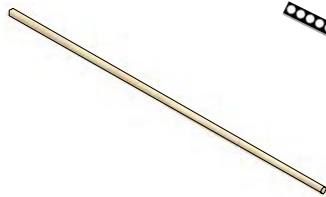
TeacherGeek Components

For One
Air Racer

These are the TeacherGeek components for the example Air Racer, to turn it into your own unique design.

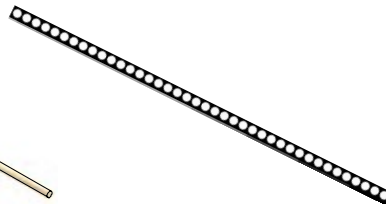


2 - Blocks

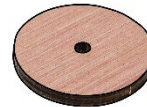


9 - Dowels

3x - 7.5 cm (3")
4x - 10 cm (4")
2x - 13 cm (5")



**3 - Connector
Strips**



**3 - Wooden
Wheels**



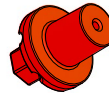
**2 - Nuts
#10**



**10 - Bamboo
Project Sticks**
10 cm (4")



1 - Hub Cover



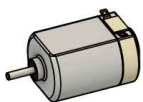
1 - Hub Base



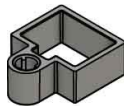
**1 - Mini Hub
Screw**
1/2" #6



**2 - 25mm
Screws**
25 mm (1") #10



1 - Motor
1.5V-3V



**1 - Motor
Mount**



**1 - Battery
Holder**
w/ switch & leads



4 - Zip Ties



1 - Slide Stop
100 mm (3")



1 - Chipboard
22 cm x 5 cm (8.5" x 2")

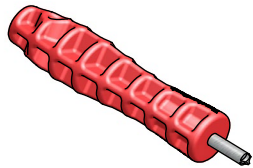


Air Racer Go Guide



TeacherGeek Tools You'll Need

*Easy to Share
in Groups*



Reamer



Screwdriver



Hammer
(optional)

Tools available at teachergeek.com

Materials You Supply

You will need these non-TeacherGeek supplies:



Tape

Masking, Painter's, Duct -
Any kind of tape will work.



Scissors

For cutting blade materials
out of recycling materials.



Safety Goggles

Should be worn during the activity.
Prop blades spin very fast.



Recycling Materials

Blades can be made from cardboard, chipboard,
clean food packaging, plastic, etc.

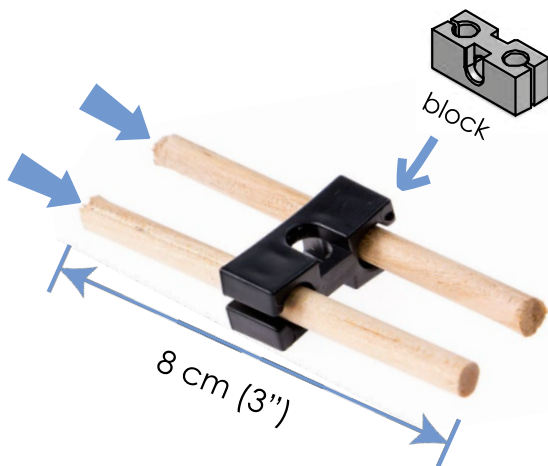
They should not be made from anything sharp or metal.



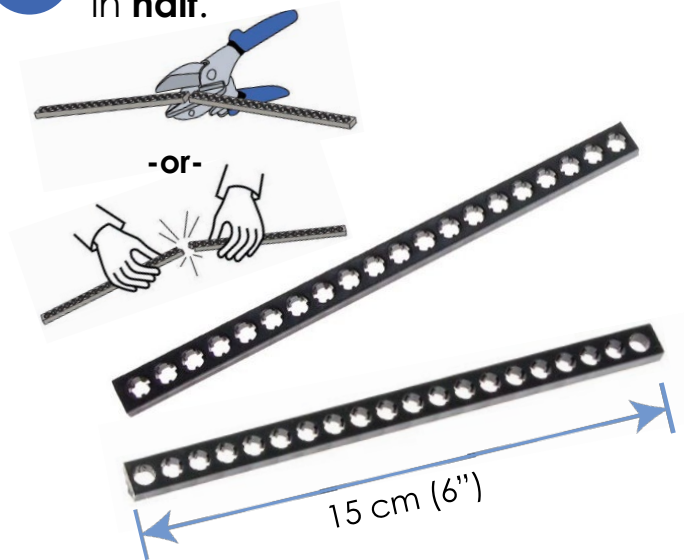
Air Racer Go Guide

Frame Build

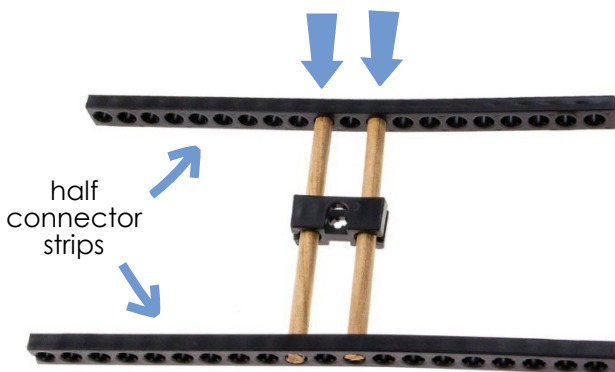
- 1 **Wiggle** or **tap** the 8 cm (3") dowels half-way through a block.



- 2 **Cut** or **snap** a connector strip in half.



- 3 **Push** or **tap** the connector strip halves onto the dowels from Step 1.



- 4 **Wiggle** or **tap** a 10 cm (4") dowel through the block.

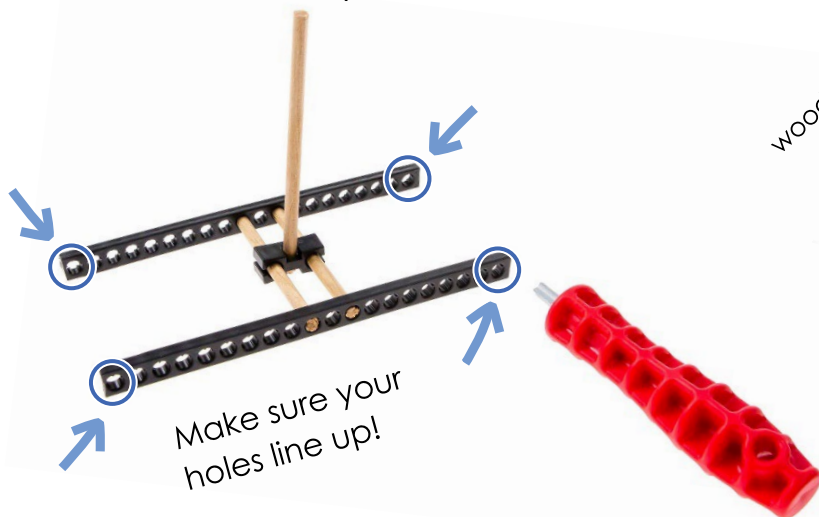




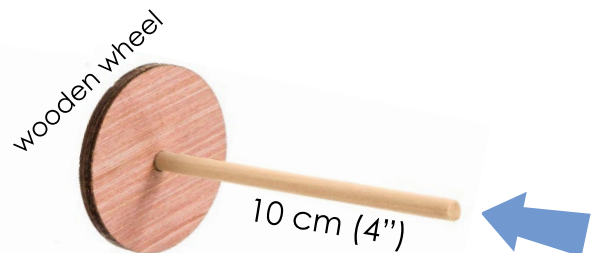
Air Racer Go Guide

Wheels On

- 5** **Ream** the four **outside holes** on the **frame**. This will allow the **dowels** to spin.



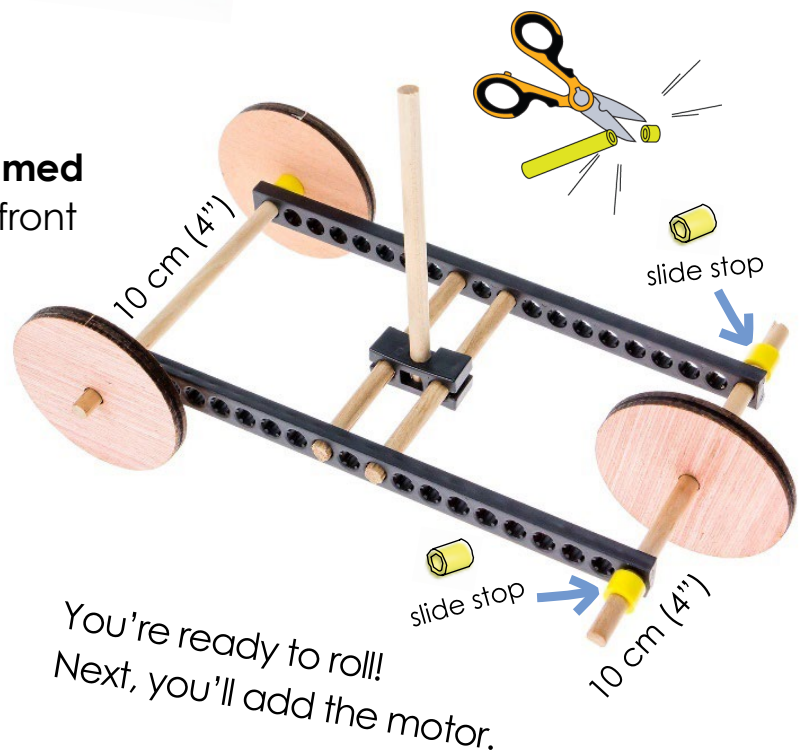
- 6** Tap or push one 10 cm (4") **dowel** into a **wooden wheel** to make an **axle**.



- 7** **Slide** the **axes** through the **reamed holes** and put on **wheels**. The front wheel will need **slide stop**.

Quick Tip

Use **slide stop** as **spacers** or to keep **wheels** from falling off. Make sure there is still space to spin!

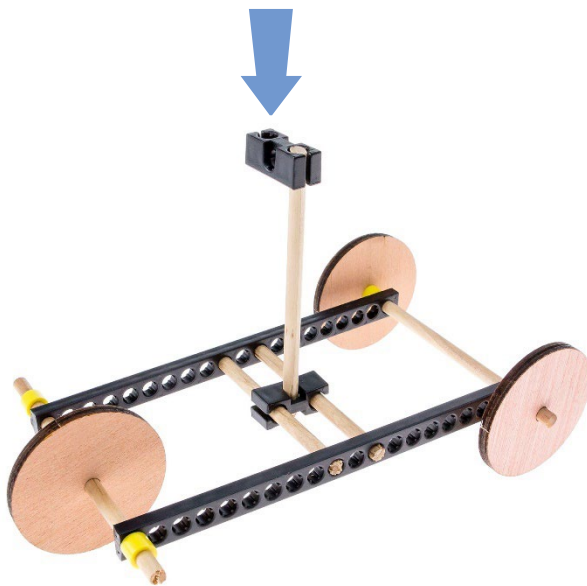




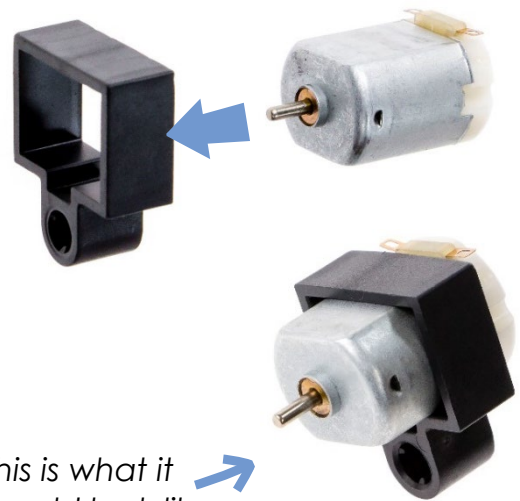
Air Racer Go Guide

Mount the Motor

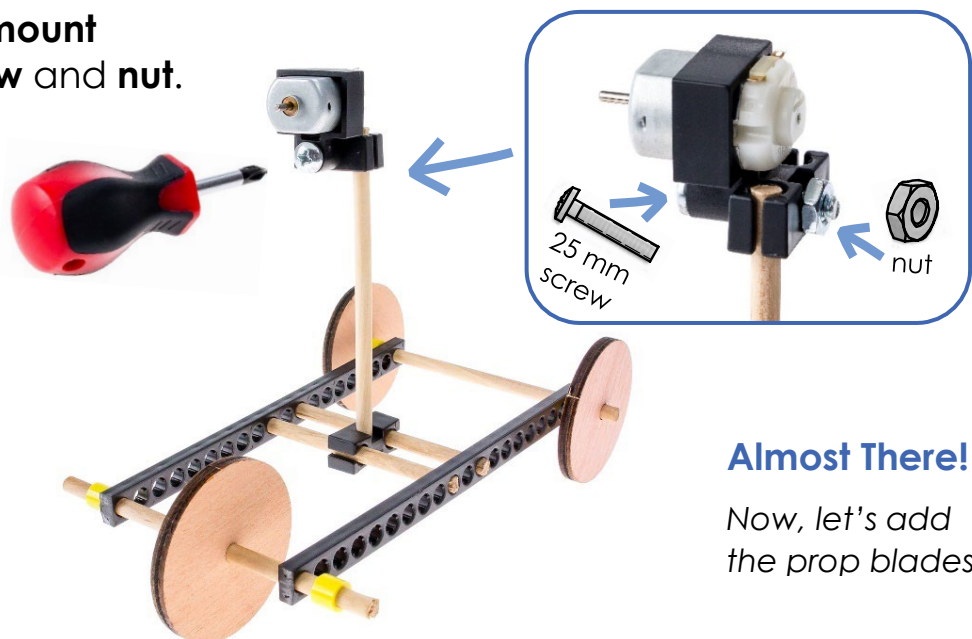
8 Push the **outside hole** of a **block** onto the **dowel**.



9 Push the **motor** into the **mount** as shown.



10 Attach the **motor mount** with a **25 mm screw** and **nut**.



Almost There!

Now, let's add the prop blades...

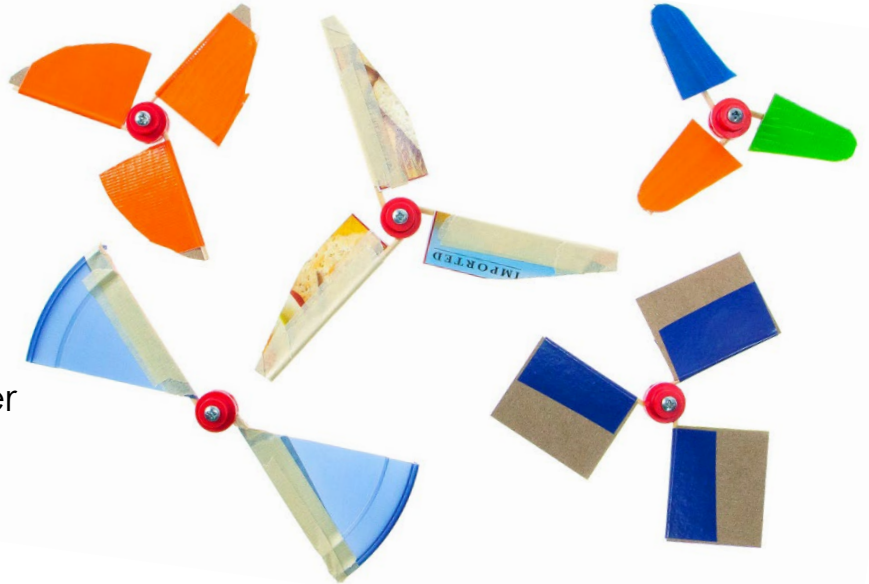


Air Racer Go Guide

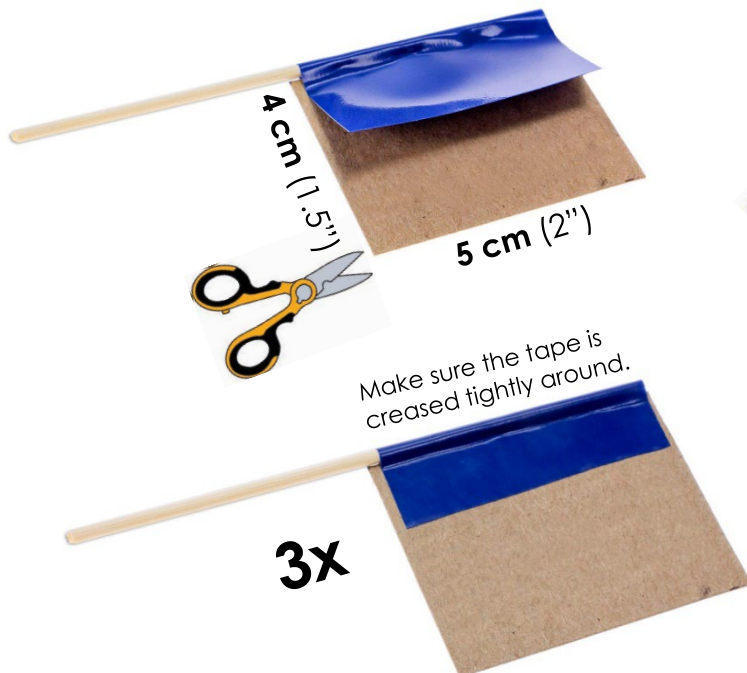
Make the Propeller

For this part of the build guide, you will need:

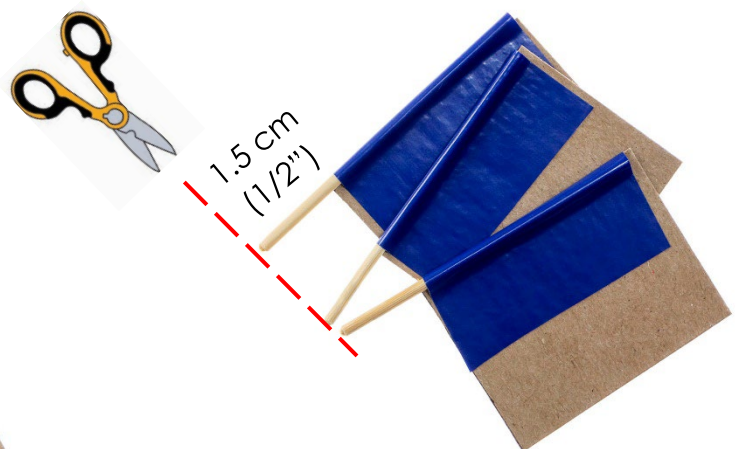
- Tape (any kind will work)
- Recycling Materials (optional)
- Mini Motor Hub Base & Cover
- Hub Screw
- Mini Project Sticks



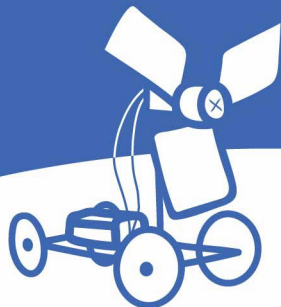
11 Make 3 propellers by cutting and taping chipboard to project sticks.



12 Cut the project sticks so that 1.5 cm (1/2") sticks out.



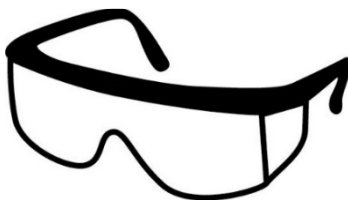
You're done with your prop blades! You should have 3 of them.



Air Racer Go Guide

Safety First

If you're not already, wear eye protection during these steps and when operating your Air Racer.



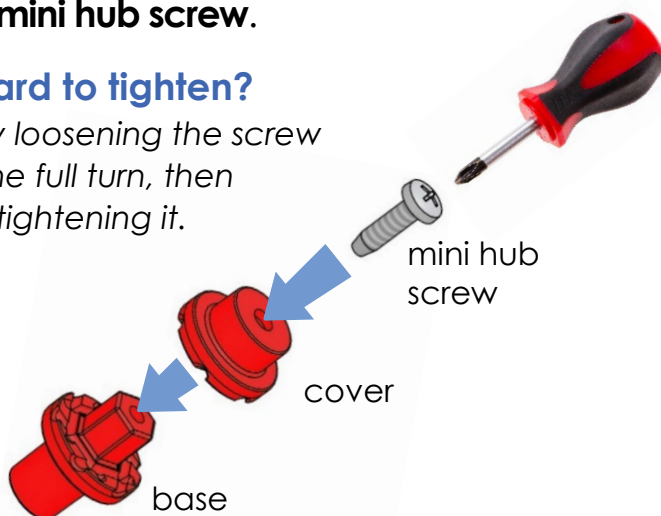
You should have
3 prop blades.



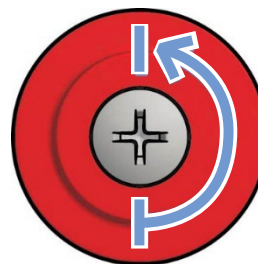
- 13** Screw the **cover** to the **base** using a **mini hub screw**.

Hard to tighten?

Try loosening the screw one full turn, then retightening it.

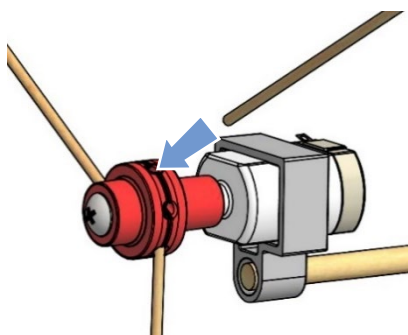


- 14** Loosen the **screw** just enough to insert the **project sticks**.

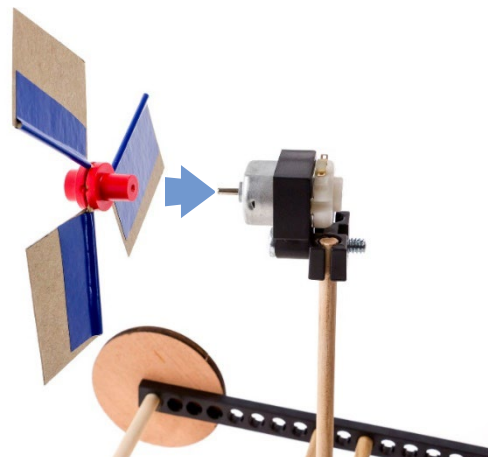


Front View

- 15** **A** Carefully **slide** the **project sticks** into **mini hub's** holes.



- B** When set, **retighten** the **screw**. **Push** the **hub** onto your **motor**.

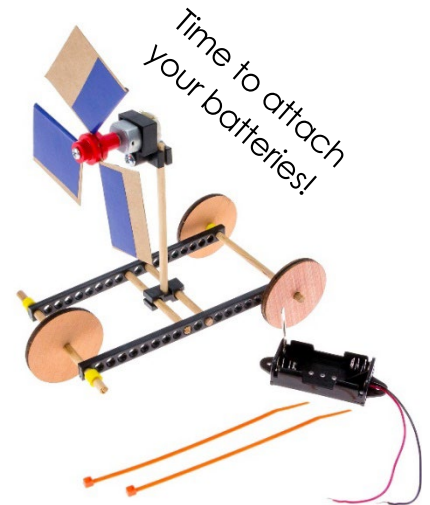
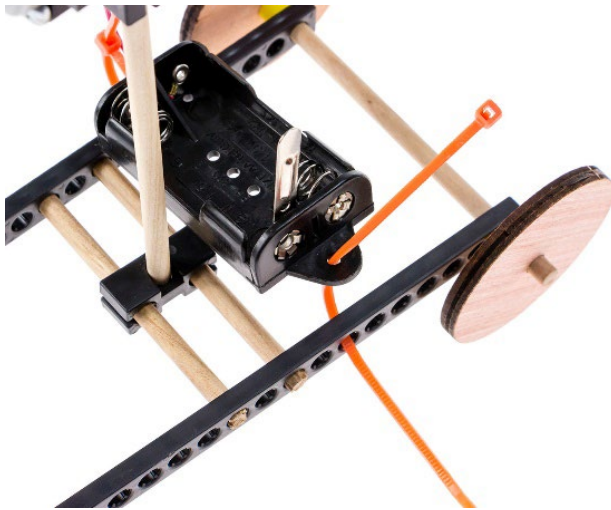




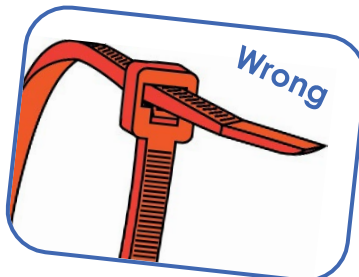
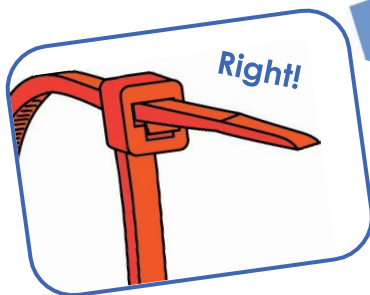
Air Racer Go Guide

Connect the Power

- 16 Put the **zip tie** through the **battery holder** and one of the **holes** on the **frame**.

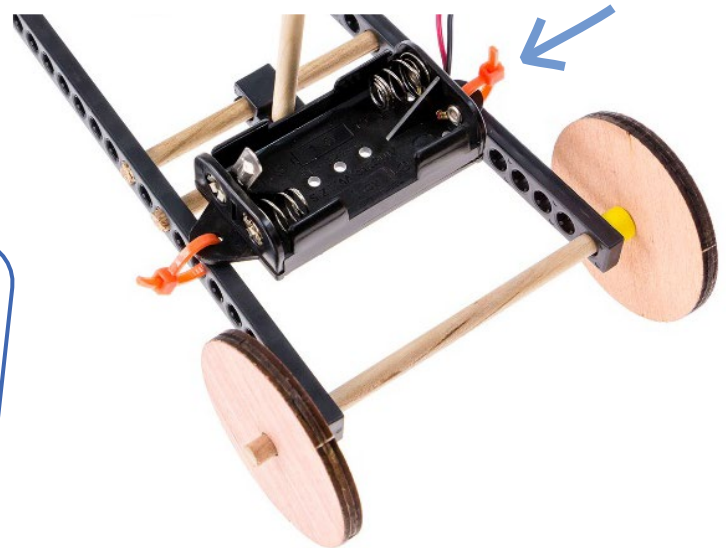


- 17 Tighten and trim zip ties.



Quick Tip

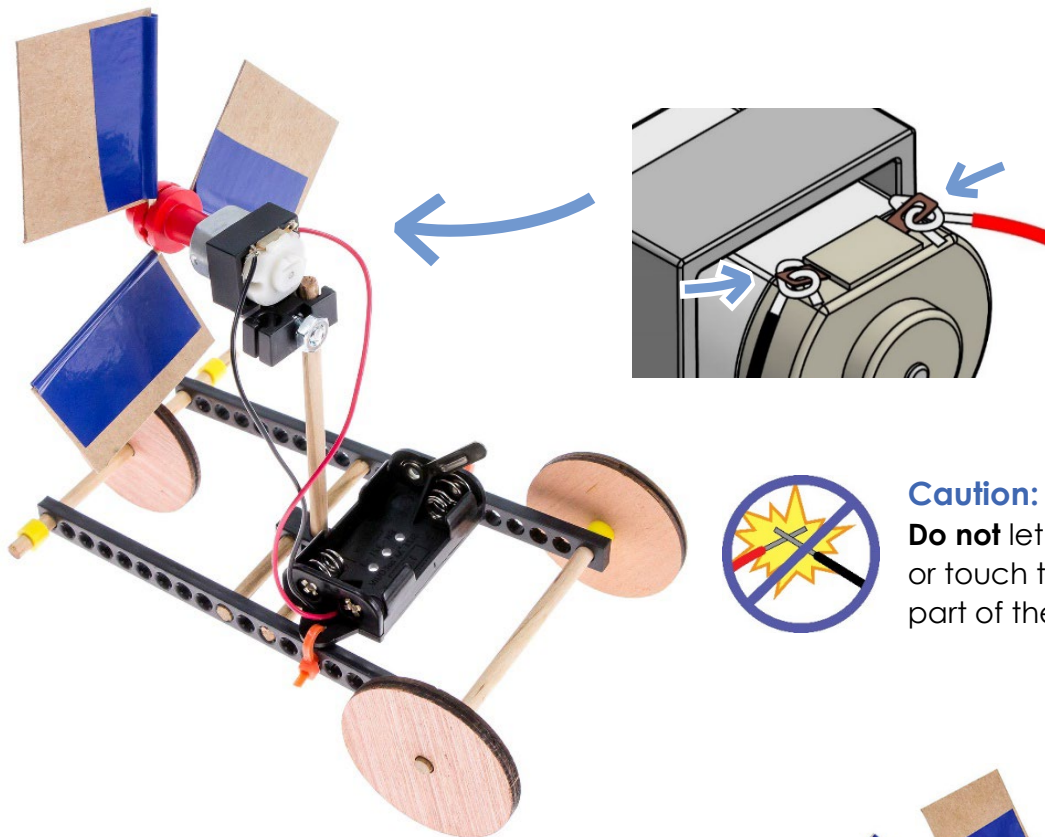
Zip ties can be tricky.
Make sure you put
them on the right way.





Air Racer Go Guide

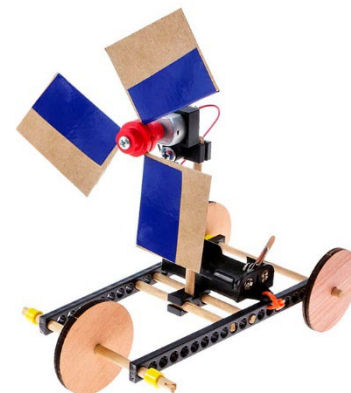
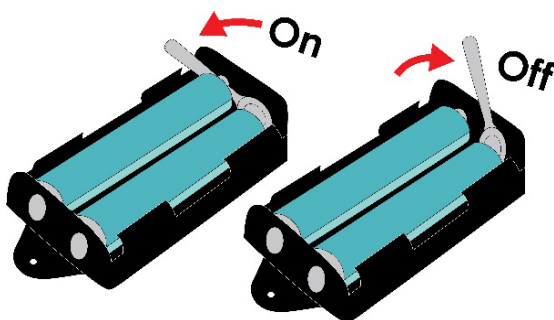
- 18** Connect the **battery holder** to the **motor**. Put the **battery holder wires** through and **wrap** them around the **motor** terminals.



Caution: No Short Circuiting

Do not let the wires cross or touch the silver metal part of the motor.

- 19** Insert two AA batteries in the **battery holder**. Use the **metal lever** to turn your Air Racer **on** and **off**.



It doesn't work!?

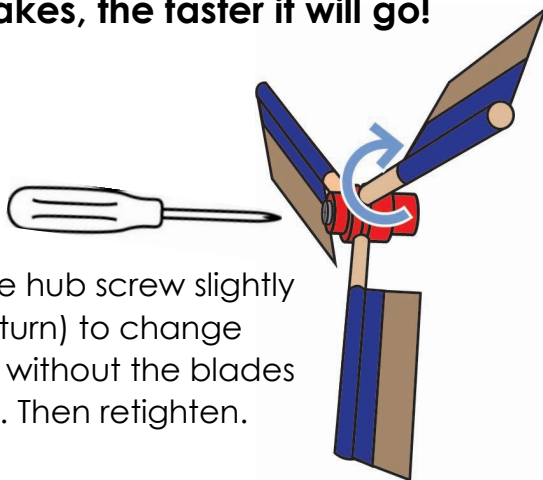
Go on – test your racer. The blades should spin, but it probably doesn't move. You still have to dial in the blade angle (next page) to get your racer racing!



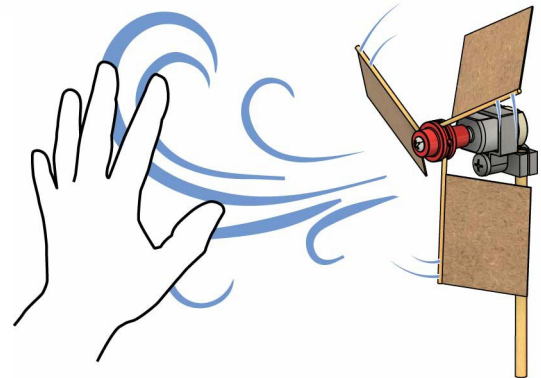
Air Racer Go Guide

Change Blade Angle

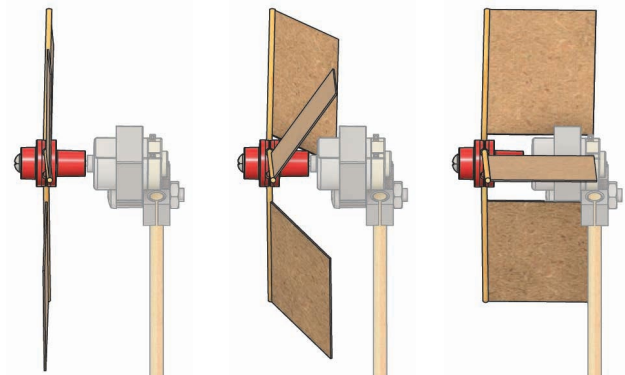
Try different angles to see which make the most wind. The more wind your racer makes, the faster it will go!



Loosen the hub screw slightly (about $\frac{1}{2}$ turn) to change the angle without the blades falling out. Then retighten.



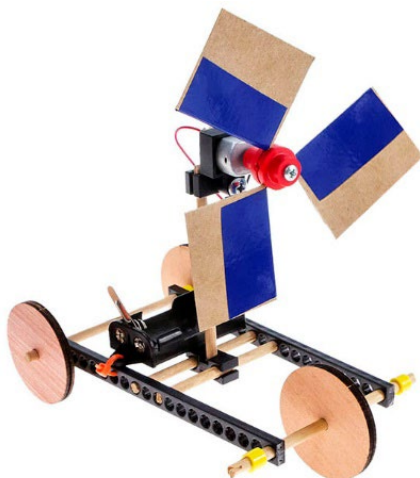
Which angle lets you feel the most wind?



Too Shallow ← Try angles in-between → Too Steep

Test Your Racer!

Does it work?



No

Make sure that:

You're testing on a **smooth, level surface**.
Your racer's **wheels spin freely**.
Your racer's **fan** is pushing lots of air (see above).

Yes!

Congratulations! Your example racer is done, but you're just getting started! It's time to start a **lab** or **challenge** and create your own **unique designs**.



Optional Blade Design Lab
(Ages 14+)

Get documents and more at
teachergeek.com/airracer



Air Racer Go Guide



Drag Race Challenge

Make the fastest Air Racer that you can!

Criteria:

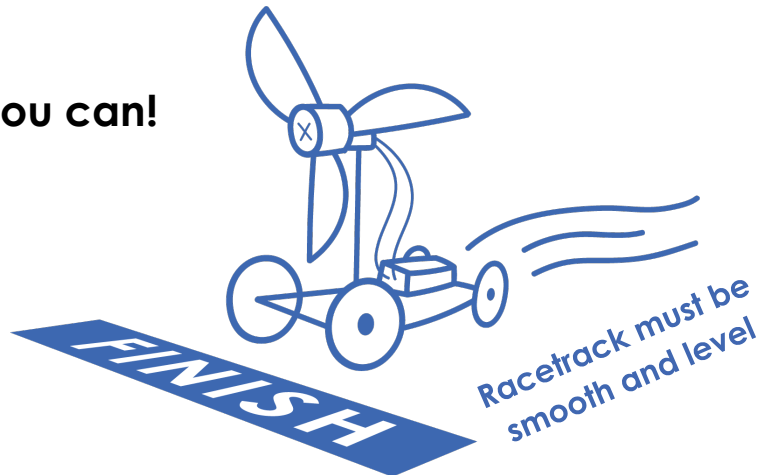
(what your design must do)

Your Air Racer must travel down the racetrack in the shortest time possible. **The fastest racer wins!**

Constraints:

(rules and limits for your design)

Your racer may only be powered by the small TeacherGeek motor and two AA batteries.



You may only use the TeacherGeek components listed on Page 1 and recycling bin materials.

There is no limit on recycling bin materials.

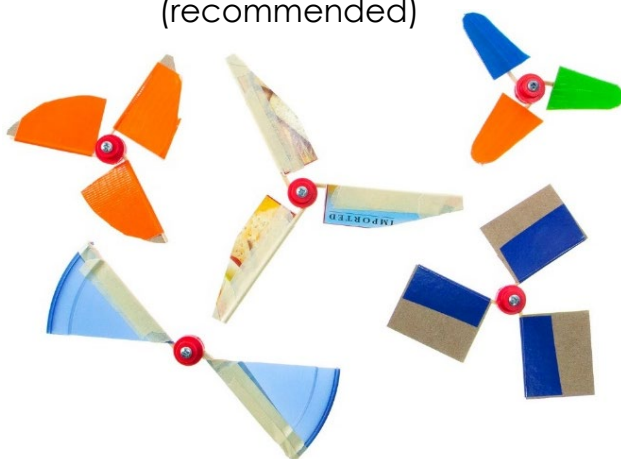


Improve the Design

Here are some ideas to make your Air Racer even faster!

Redesign the Blades

(recommended)



Redesign the Frame

(optional – less important than blades)

