RC Tractor Pull Challenge

Student Quick Start Guide

Use the interactive RC Tractor Pull Challenge to explore tractor systems and structures and experiment with force, motion, friction, gravity, and other STEM concepts. Students can assemble each of the five tractors and experiment with variables for different pulling outcomes. The downloadable CAD drawing enables students to 3D print their own tractor cover.

Product includes:

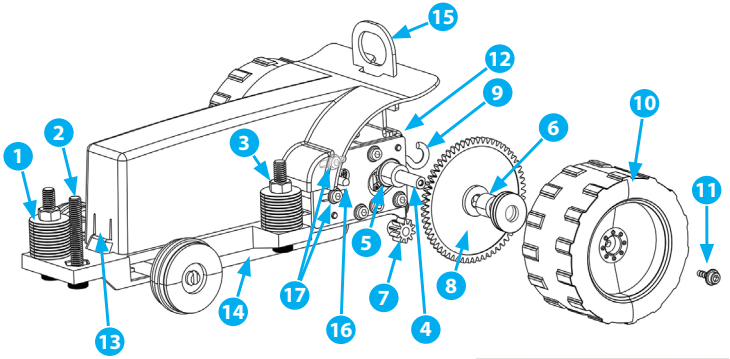
- Pulling sled
- 12 sled weights
- 5 tractor packages each containing:
  - 60 washer weights
  - 2 pinion gears (12 teeth and 10 teeth)
  - 3 spur gears (50, 55, and 60 teeth)
  - Pair of large tires
  - Pair of small tires
  - Removable tractor cover
  - Battery pack
  - Battery charger
  - RC remote (separated into 2 pieces)
  - Wrench
  - Hex key
  - Allen hex screwdriver
- Downloadable curriculum, presentation slides, tractor cover CAD drawing, track setup instructions, and student completion certificate
- 1-year limited warranty

WARNING: CHOKING HAZARD - Small parts. Not for children under 3 years. **This is not a toy!**

Parts identification:

Tractor

1. Washer weights
2. Weight post
3. Weight post nut
4. Adjustable rear axle
5. Axle bushing
6. Axle locking collar
7. Pinion gear
8. Spur gear
9. Tow hitch
10. Rear tire
11. Rear tire bolt and washer
12. Tractor on/off switch
13. Tractor cover removal button
14. Battery location
15. Handle
16. Motor rod
17. Motor mount adjustment screw



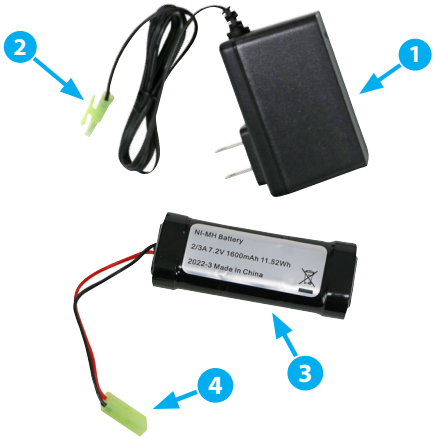
RC remote

1. Throttle trigger
2. Handle/battery holder
3. Color-coded sticker
4. Lock tab
5. Steering wheel
6. Battery cover

Note: Color-coded stickers indicate which remote is paired with which tractor.

Power system

1. Battery charger
2. Charger connection
3. Battery pack
4. Battery connection



Pulling sled

1. Hitch rope
2. Weight box
3. Weights (12)

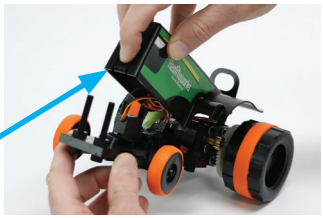
Adjustment tools

1. Hex key
2. Allen hex screwdriver
3. Wrench

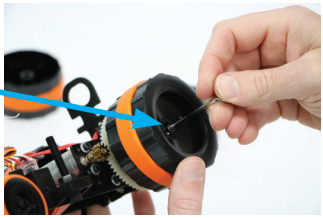
Assembly instructions:

Change tires and add weights to the axle

1. Remove the tractor cover by pushing the cover removal button and lifting the cover off the tractor.



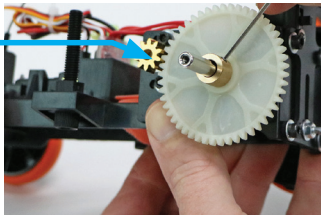
2. Remove the rear tire bolts and washers from the rear tires with the large hex key.



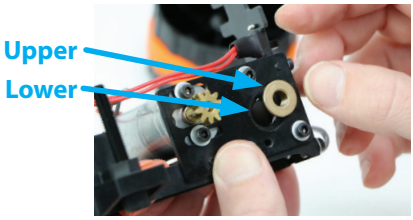
3. Pull the tires straight off the axle.

   NOTICE: Do not twist the tires while removing them from the axle.

4. Use the Allen hex screwdriver to loosen the set screws on the locking collars.



5. Pull the locking collars and spur gear off the axle.
6. Remove the axle from the tractor.
7. Remove the brass bushings on both sides of the tractor using your hands to push them out. If using the **smaller** tires, place the bushings in the **lower** positions. If using the **larger** tires, place them in the **upper** positions.



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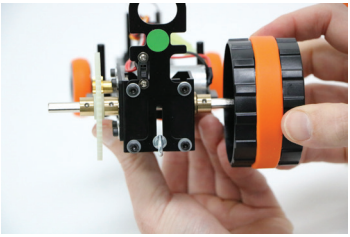
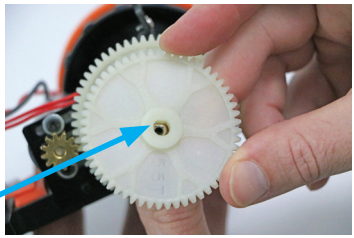
Assembly instructions:

Change tires and add weights to the axle

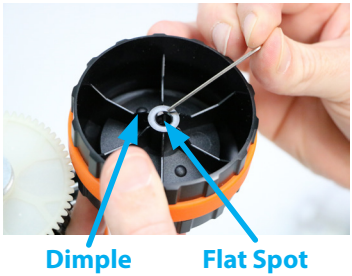


8. Place the axle through the bushings and reattach two of the locking collars to hold it in place. Leave a gap about the width of a piece of paper or a hair between the collars and the bushings. If you spin the axle now, it should rotate freely. If you encounter any resistance, you need more space between the collar and the bushing on one or both sides of the axle.

   Note: Make sure there are no wires in the axle's way.



9. Push the spur gear onto the axle, aligning the flat spot on the axle with the flat spot on the spur gear.
10. Use the large hex key to loosen the screws above and below the pinion gear. Adjust the pinion gear's placement by moving the motor back and forth, ensuring the teeth of the spur gear fit between the teeth of the pinion gear
11. Reattach the final locking collar to the axle.
12. Slide weights onto the axle if you wish. The side of the axle with the spur gear will fit about five weights; the other side will fit about 10.
13. Attach the tires to the axle by aligning the flat spot on the tire with the flat spot on the axle and pushing the tire on. You can find the tire flat spot inside of the tire's axle opening. It will be near one of the two small dimples in the tire.
14. Push the tire onto the axle and secure it in place with the rear tire bolt and washer.



Change the gears

1. Remove the tractor cover by pushing the cover removal button and lifting the cover off the tractor.

   See image in Step 1 of the "Change tires and add weights to the axle" section.

2. Using the large hex key, remove the tire bolts and washers from the rear tire on the geared side of the tractor.

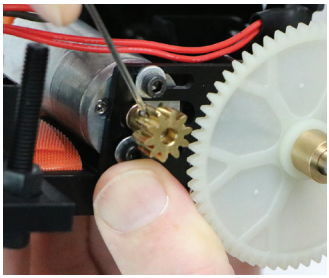
3. Pull the tire straight off the axle.

   NOTICE: Do not twist the tire while removing it from the axle.

4. Use the Allen hex screwdriver to loosen the set screws on the locking collar.

   See image in Step 4 of the "Change tires and add weights to the axle" section.

5. Pull the first locking collar and the spur gear off the axle.



6. Loosen the set screw on the tractor's current pinion gear with the Allen hex screwdriver and pull the gear off the motor rod.
7. Use the large hex key to loosen the screws above and below the motor rod so you can adjust the motor position.
8. Push the pinion gear on the motor rod and tighten the gear's set screw with the Allen hex screwdriver.
9. Push your spur gear of choice onto the axle by aligning the flat spot on the axle with the flat spot on the spur gear. Adjust the motor placement by moving it back and forth to ensure the teeth of the spur gear fit between the teeth of the pinion gear.

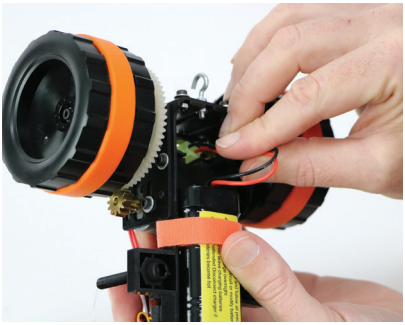
   See image in Step 9 of the "Change tires and add weights to the axle" section.

10. Tighten the screws above and below the pinion gear with the large hex key.
11. Reattach the locking collar.
12. Attach the tire to the axle by aligning the flat spot on the tire with the flat spot on the axle and pushing the tire on. You can find the tire flat spot inside of the tire's axle opening. It will be by one of the small dimples in the tire.

    See image in Step 12 of the "Change tires and add weights to the axle" section.

13. Push the tire onto the axle and secure it in place with the rear tire washers and bolts.

Connect the battery pack

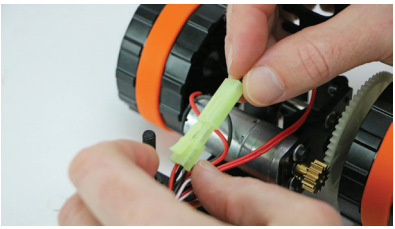


1. Attach the battery pack to the bottom of the tractor using the straps underneath the tractor. Make sure the wires are pointed toward the tow hitch.
2. When the brass bushings are in the lower position, thread the wires through the gap behind the axle. When the brass bushings are in the upper position, thread the wires through the gap in front of the axle.

Assembly instructions continued on next page –>

3. Attach the battery connection to the motor connection on the tractor's wires.

   Note: Remove the battery pack from the tractor when not in use.



Assembly instructions:

Adjust tractor hitch height

1. Use the wrench to loosen the nut at the base of the tow hitch.
2. Slide the tow hitch to your desired height.
3. Tighten the nut with the wrench to secure the hitch in place.

Attach tractor cover

1. Hook the back of the tractor cover beneath the tractor handle and snap the front of the tractor cover into place, making sure all wires are tucked underneath.

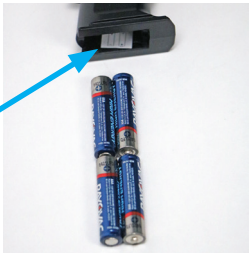
Add weights to weight posts

1. Unscrew the nut on one of the weight posts.
2. Slide the weights onto the post.
3. Screw the nut back on to secure the weights.

Assemble the RC remote

1. Remove the battery cover on the remote handle and place four AAA batteries in the remote as shown on the image inside the handle.
2. Replace the battery cover and pull up the lock tab on the top piece of the remote.
3. Slide the handle into place.

   Note: The remote will emit a chirping sound when the batteries are dying.



Use instructions:

Operate the tractor

1. Turn on the remote.
2. Turn on the tractor via the switch on the back. You should hear three beeps. If you don't hear any beeps, make sure the handle and batteries are installed correctly.

   NOTICE: See the Troubleshoot trim issues section if the tractor moves by itself, the wheels are crooked, or the tractor makes a high-pitched noise.
3. Squeeze the remote trigger to accelerate and, while in motion, push the trigger forward once to brake and twice to reverse. See the image below for steering instructions.

   Note: Tractors should only be driven on flat surfaces.

Troubleshoot trim issues

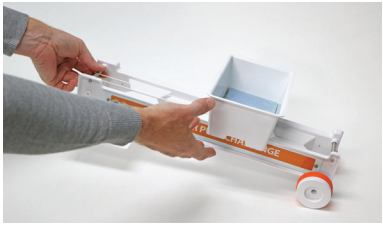
1. If the front tires look crooked, adjust them using the left-side plus (+) and minus (-) buttons on the remote.
2. If the front tires look straight but the tractor is making a high-pitched sound or moving backward or forward on its own, the issue is likely the back tires. Adjust them using the right-side plus (+) and minus (-) buttons on the remote.
3. The tractor will stop making the high-pitched noise when the trim is properly aligned. Once the noise stops, you can continue operating the tractor normally.

Use instructions continued on next page –>

NEED MORE HELP?

Use instructions:

Operate the pulling sled



1. Gently move the sled's weight box as close to the rear axle as possible by rolling the sled backward across a flat surface.
2. Place as many weights as you want in the box carefully to avoid damaging the weight box.

   Tip: Start with a minimum number of weights and add as more pulls are done.
3. Loop the hitch rope around the tractor's tow hitch.

Charge the battery pack

1. Connect the battery connection to the charger connection.
2. Plug the charger into an outlet. The light on the charger will flash red and green while charging. Once fully charged, the light will be solid green.

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