Robot Design Pre-Season Building Challenges
Super Powered

A common question teams have is how do you build attachments to solve challenges. *FIRST* LEGO League challenges have common activation methods: push, pull, lift, lower, collect, deliver, etc. Learning some basic building technical can help your team become better builders to solve these challenges. You can apply these ideas to your competition robot. For each mechanism, we have a video linked to show you how it can be used.

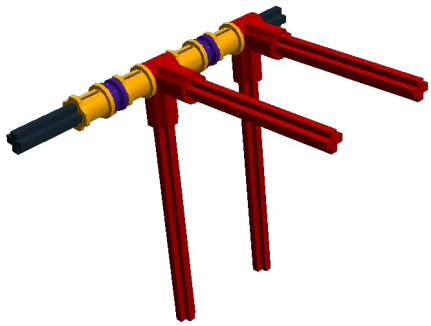
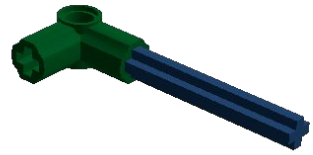
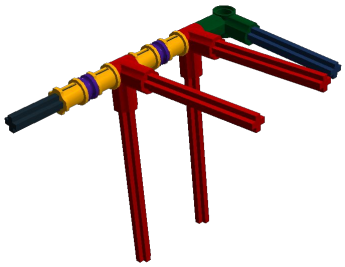
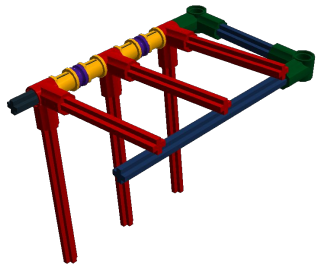
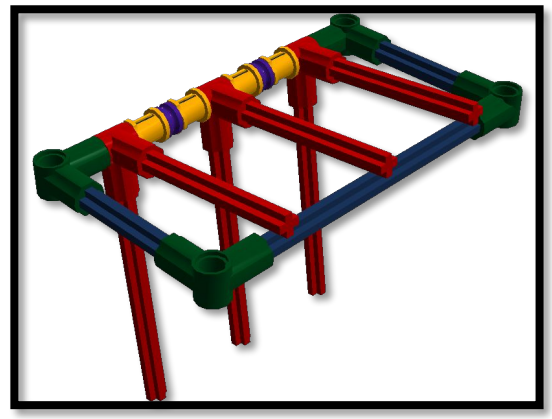
Where can you learn these skills?

Follow the guides in this document. Look at the the LEGO Technic Idea Books and the EV3 Idea Book by Yoshihito Isogawa. Build different models from the book and see how they work. When you begin your CARGO CONNECT challenge in August, think about which models/mechanisms might apply.

"This book is full of little seeds for ideas. It is you who will cultivate those seeds so they grow into wonderful masterpieces." - Yoshihito Isogawa

Lesson 1: One Way Curtain

Build

Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/2P1EREM1Yzc?t=47

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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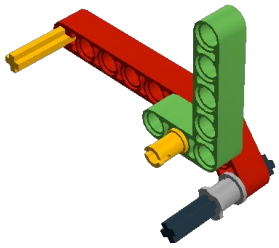
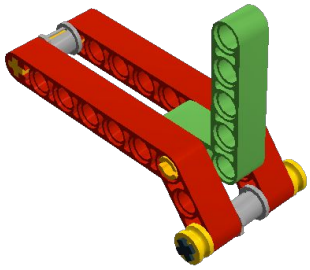
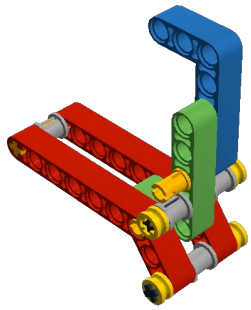
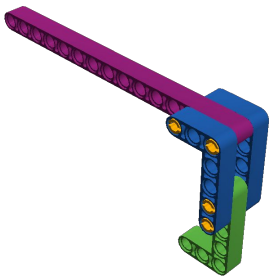
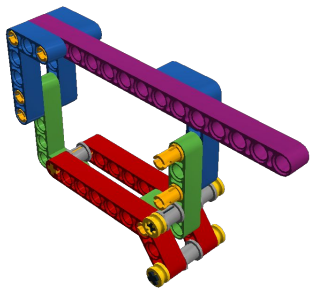
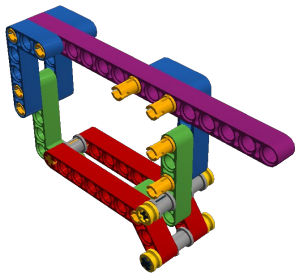
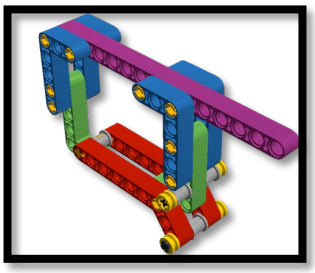
Lesson 2: Carabiner

Build

Add rubber bands on bushings

Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/Mjp9holZ0dY?t=35

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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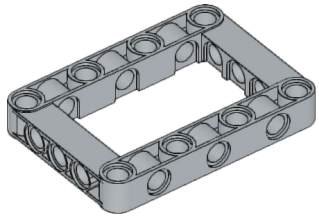
Lesson 3: Gearbox

Build

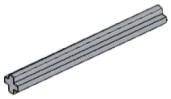
1x
32270, 11

2x
87083, 85



1x
64179, 86

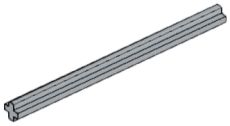
1x
87408, 11



1x
32073, 86

3x
3713, 5

1x
32498, 11



1x
44294, 86

2x
6589, 2

1x
4265c, 3

Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/2P1EREM1Yzc?t=23

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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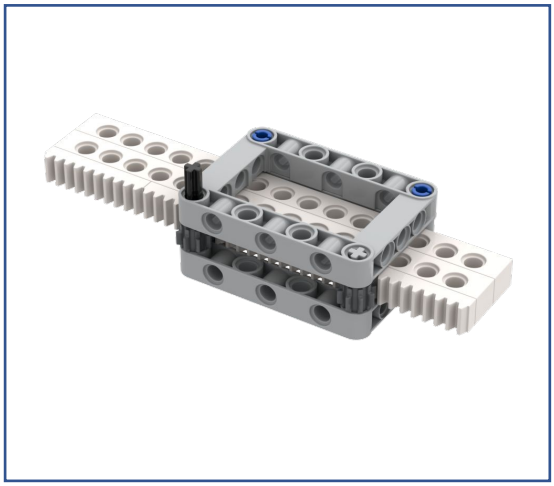
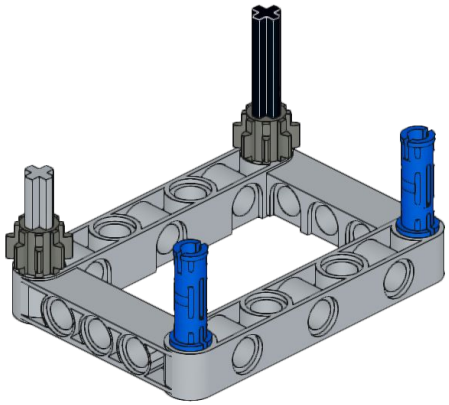
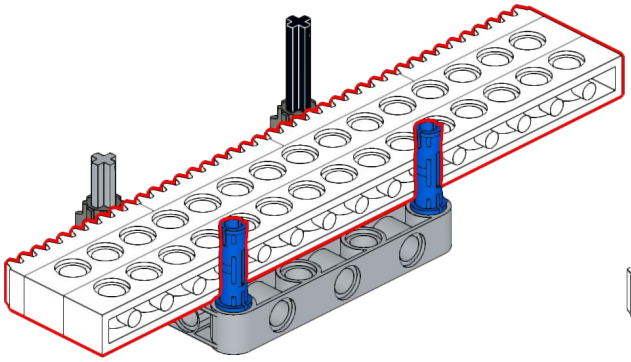
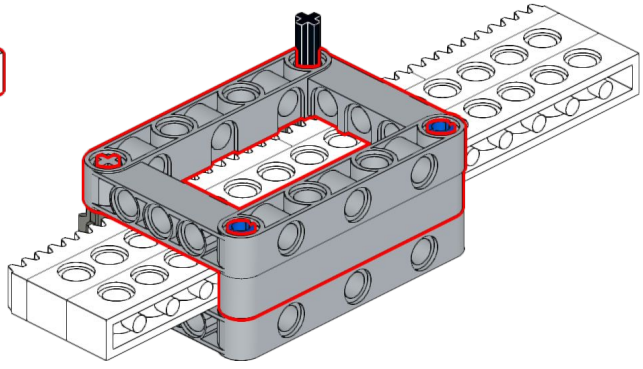
Lesson 4: Rack Gear

Build









Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/Gl5L2B2jTEI?t=19

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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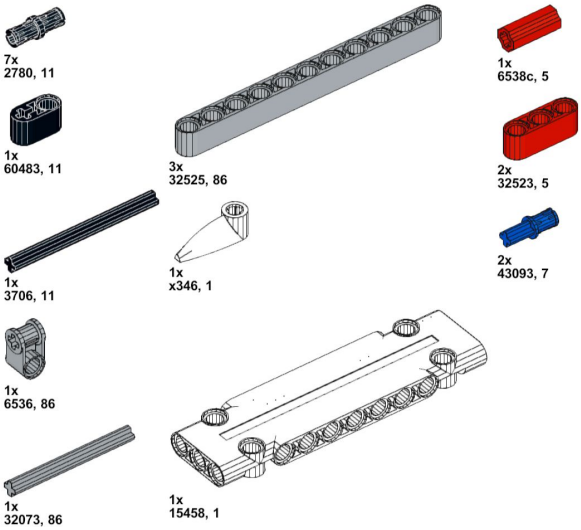
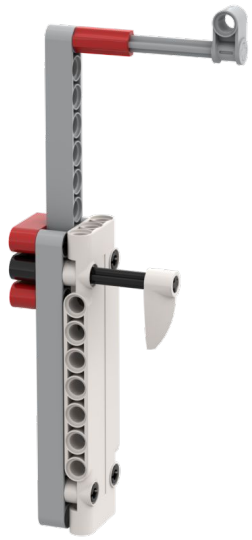
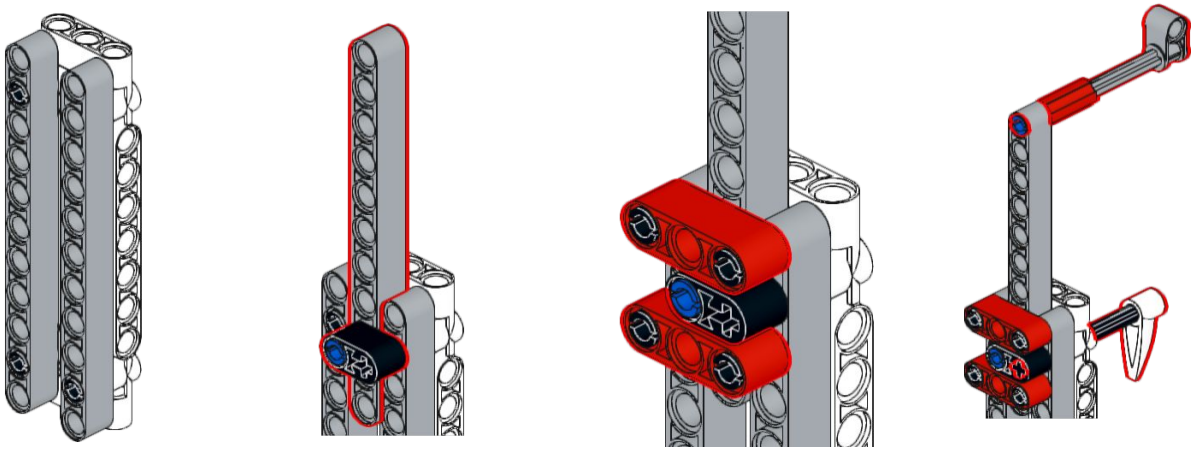
Lesson 5: Gravity

Build







Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/dJSeMeAGmXE?t=113

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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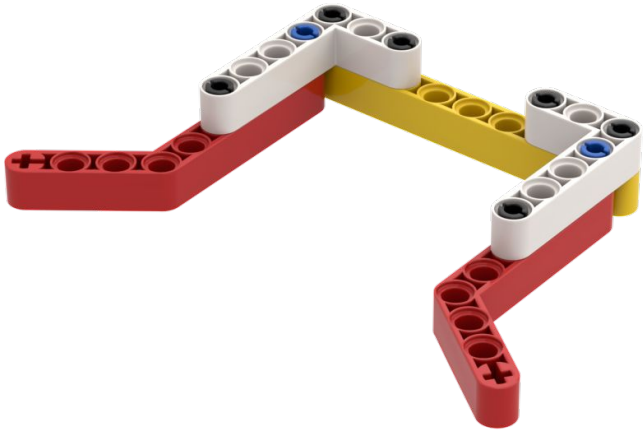
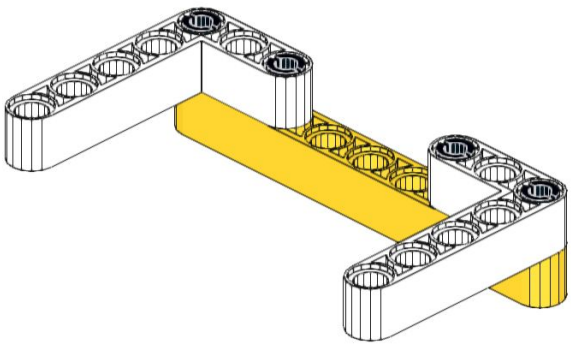
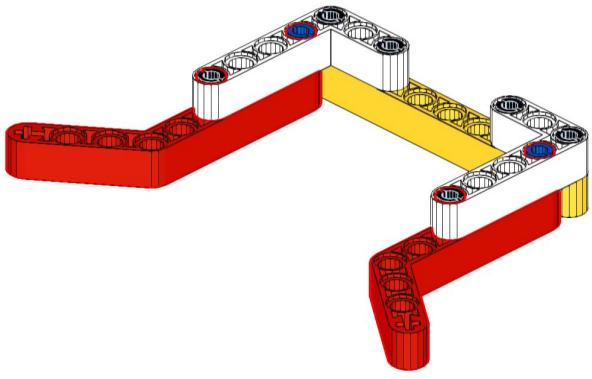
Lesson 6: Aligners

Build







Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch:
  https://youtu.be/Mjp9holZ0dY?t=75

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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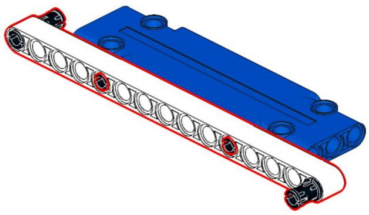
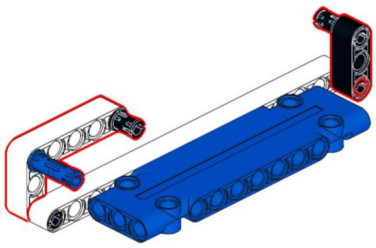
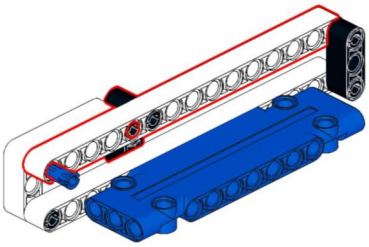
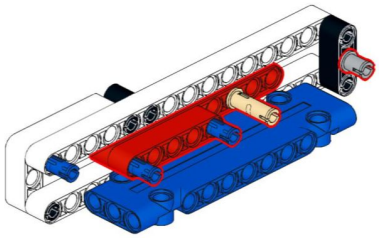
Lesson 7: Scissors

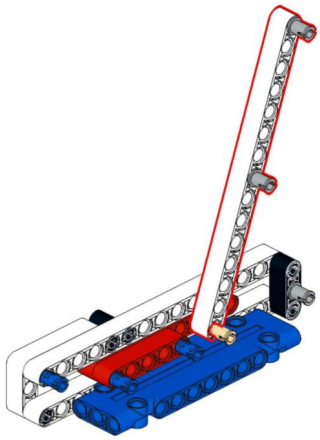
Build

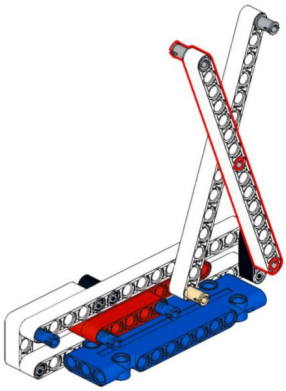


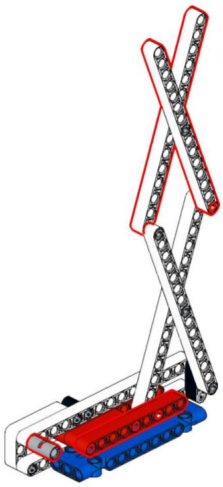


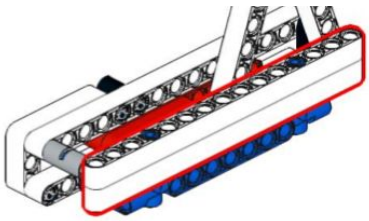












Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch: https://youtu.be/dJSeMeAGmXE?t=113

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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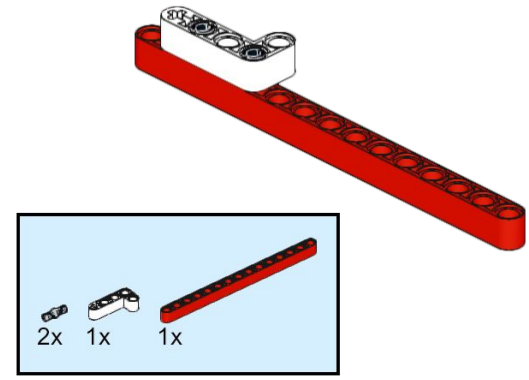
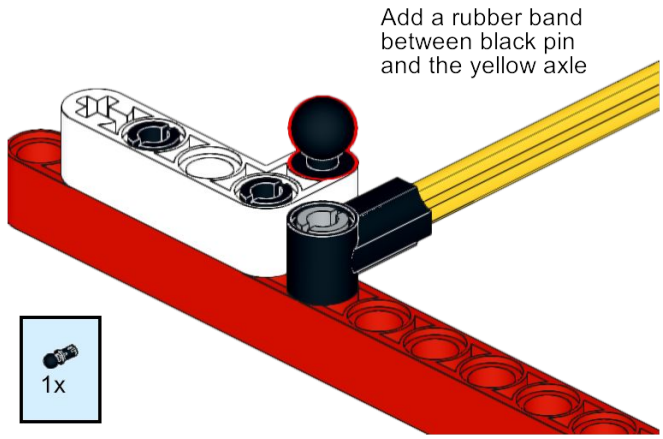
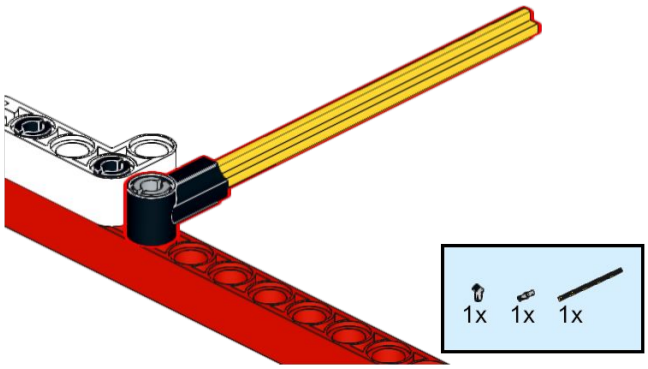
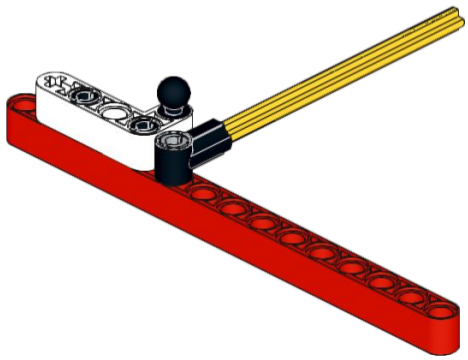
Lesson 8: Auto-Retracting Lever

Build









Discuss

- How does this work? Can it work without the rubber band?
- How can it be useful?
- Where could we apply this technique?
- Watch:
- https://youtu.be/Mjp9holZ0dY?t=73

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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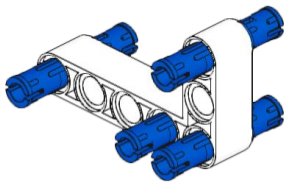
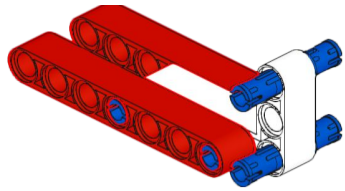
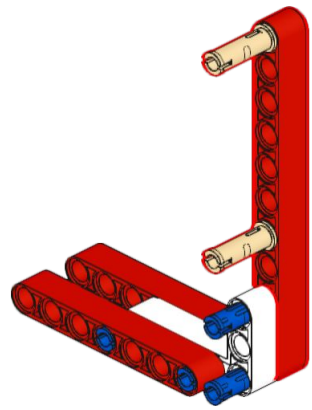
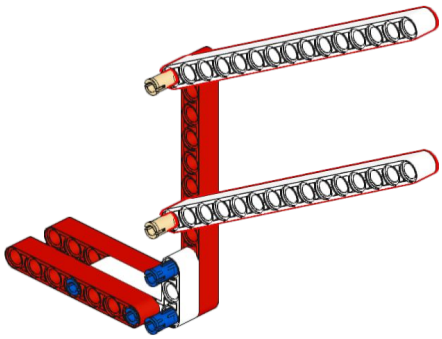
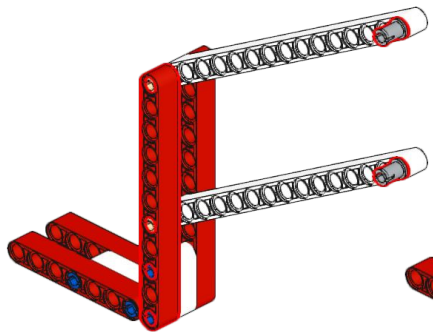
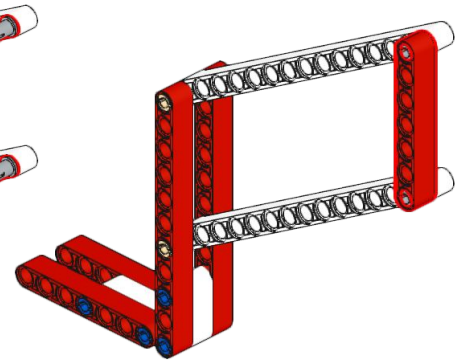
Lesson 9: Parallel 4 Bar Linkage

Build

Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch:
- https://youtu.be/Gl5L2B2jTEI?t=115

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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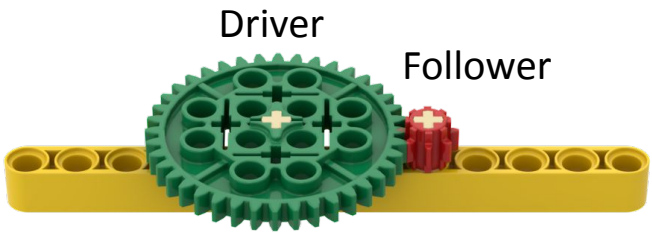
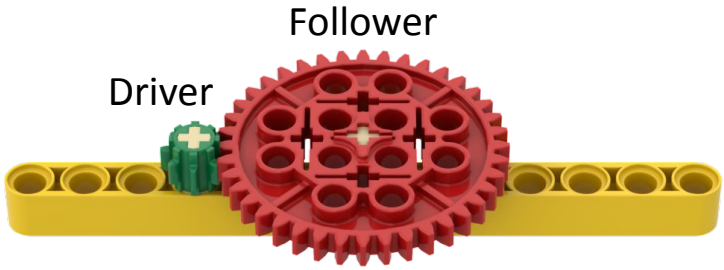
Lesson 10: Gearing Down

Build

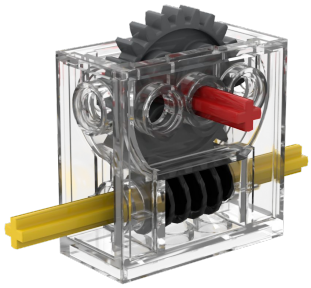
Gearing Up



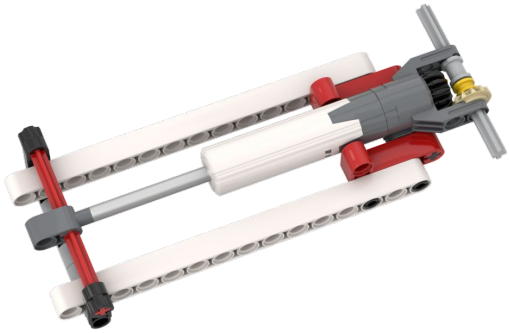
Gearing Down



Gearing Down: This is used to slow down the motion of the follower gear. This creates more torque but reduces the speed.



Gearing Down with a gear box and worm gear - 6588



Gearing Down with a Linear Actuator - 61927c01

Discuss

- How does this work?
- How can it be useful?
- Where could we apply this technique?
- Watch:
- https://youtu.be/dJSeMeAGmXE?t=78

Apply

- Now build a full mechanism that uses this concept
- Modify the concept to fit your needs

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