

e×tensor™

CONSTRUCTION KIT

Instructions



Welcome to extensors

An *extensor* is an extending and retracting beam based on a scissor-like mechanism. Extensors can be connected together at nodes to build larger expanding structures and networks. Adding springs to extensors makes self-activated mechanisms!

This set contains:

12×A

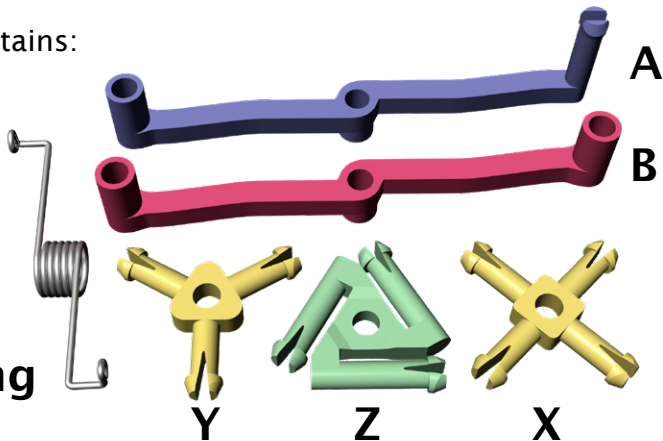
12×B

4×X

8×Y

4×Z

2×Spring



In this booklet the parts are colored according to their type; your set comes with a variety of colors for each part.

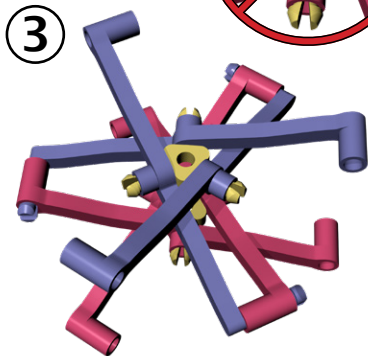
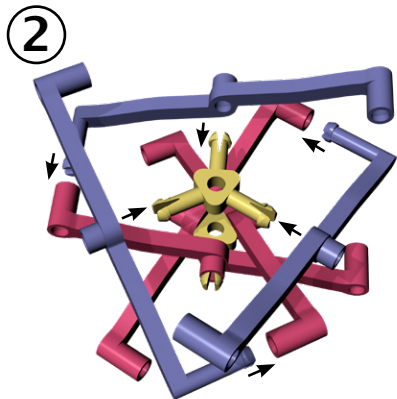
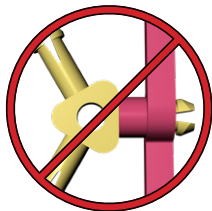
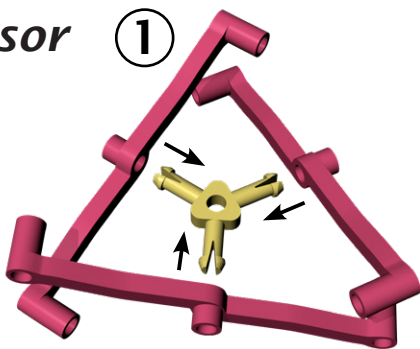
Check out MathMechs.com for video instructions.

Y-extensor

3×A

3×B

2×Y



Connect parts as shown in steps ① and ② to make a length-two ***Y-extensor***. Repeat step ② to make longer extensors. Replace the Y parts with X parts to make an ***X-extensor***.

Extensor Slinger

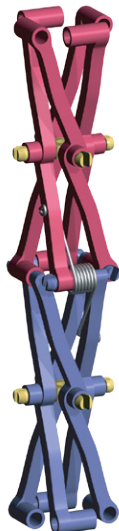
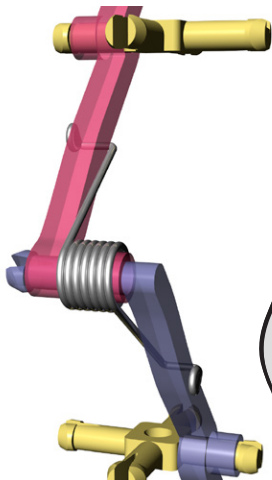
4×A

4×B

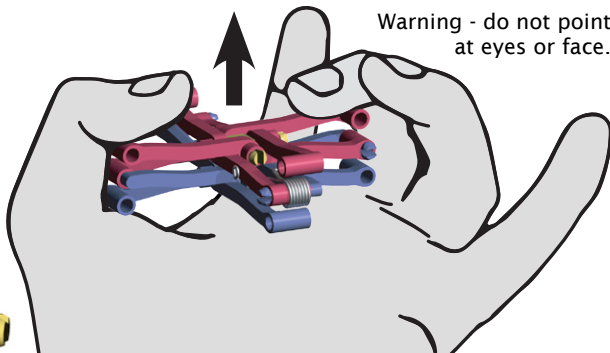
2×X

1×Spring

Add a spring to an extensor where two **A** and/or **B** parts connect.



Hold the extensor slinger closed with the thumb and middle finger of one hand. Release your grip to make it jump out of your palm!



Warning - do not point at eyes or face.

Caltrop

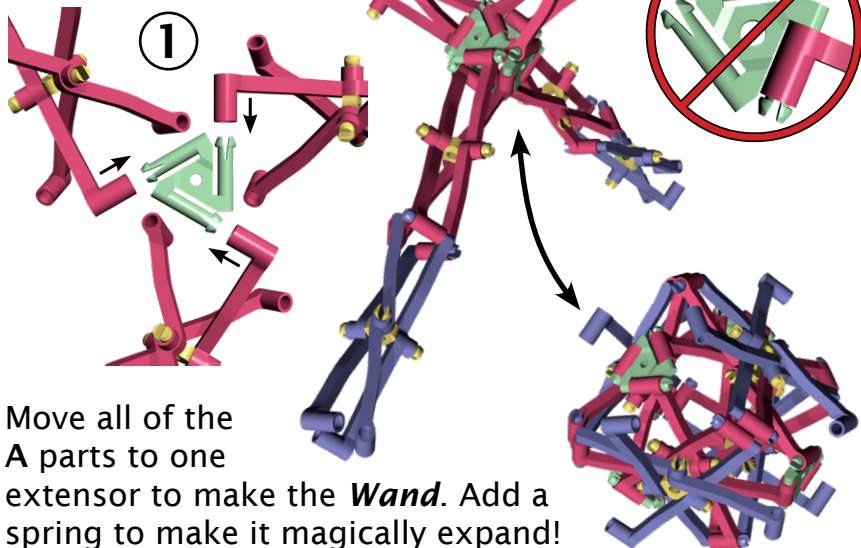
12×A

12×B

8×Y

4×Z

Connect four length-two
Y-extensors together
with four Z parts.



Elbow

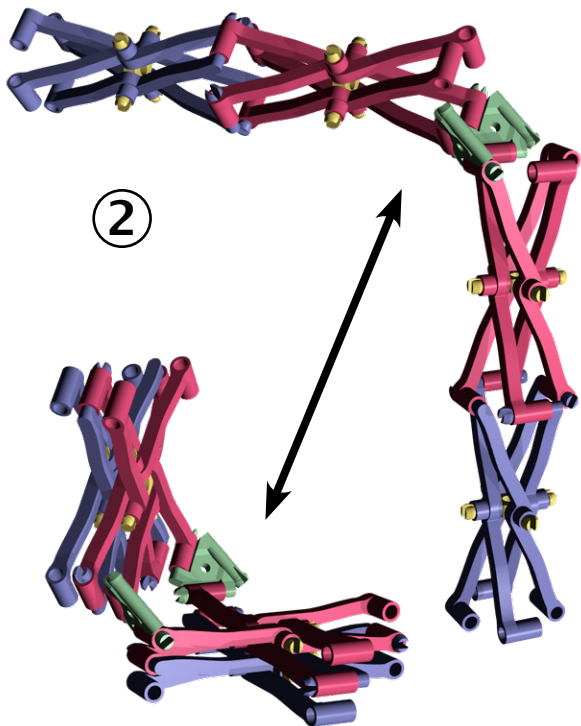
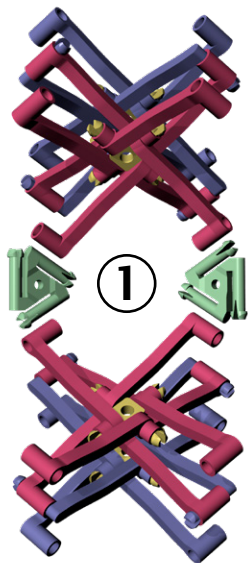
8×A

8×B

4×X

2×Z

Connect two length-two *X-extensors* together with two Z parts.



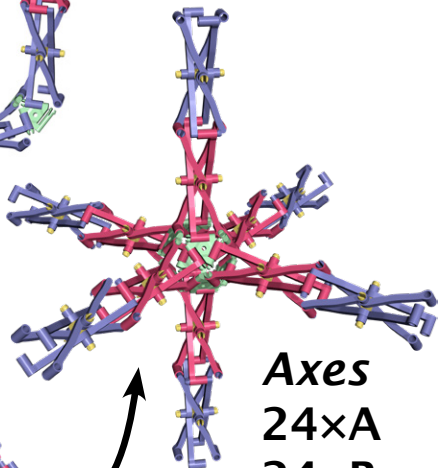
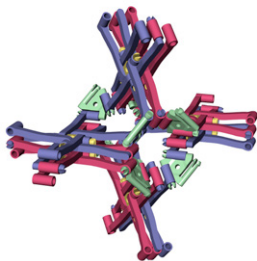
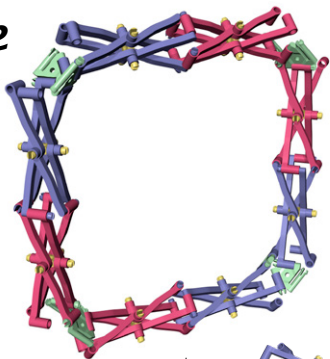
Square

16×A

16×B

8×X

8×Z



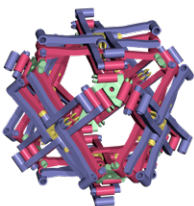
Axes

24×A

24×B

12×X

8×Z



With more parts you can build bigger structures.
Further examples are shown on the following pages.

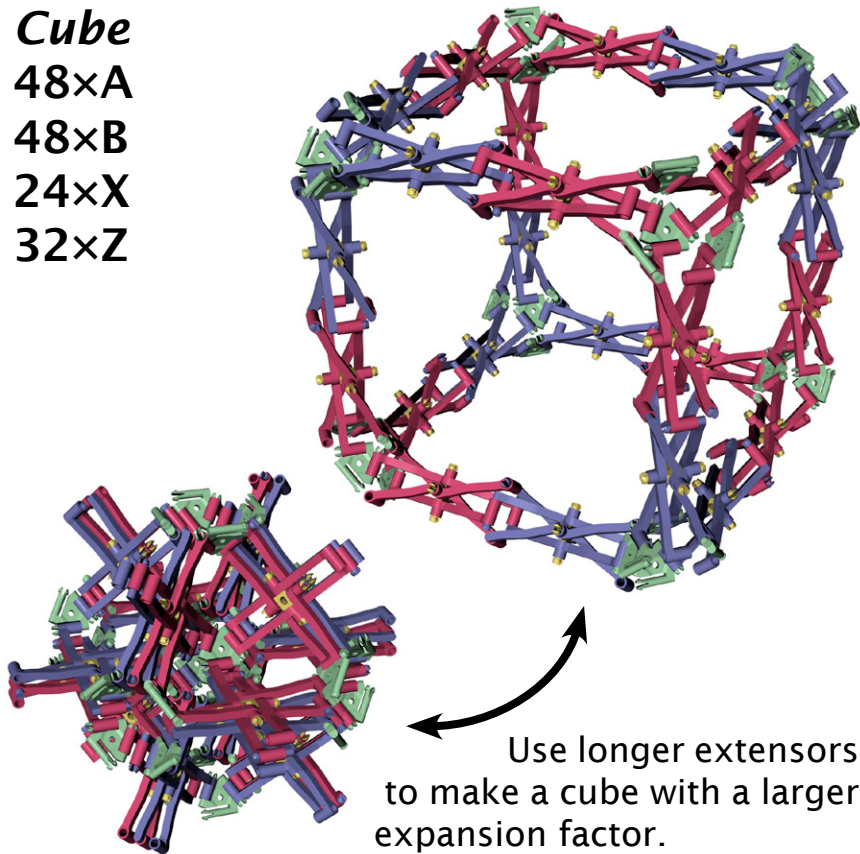
Cube

48×A

48×B

24×X

32×Z



Use longer extensors
to make a cube with a larger
expansion factor.

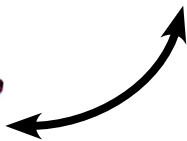
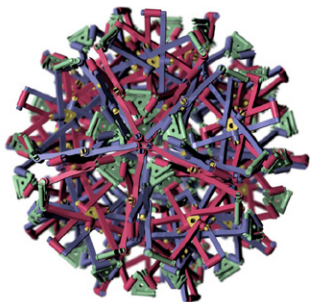
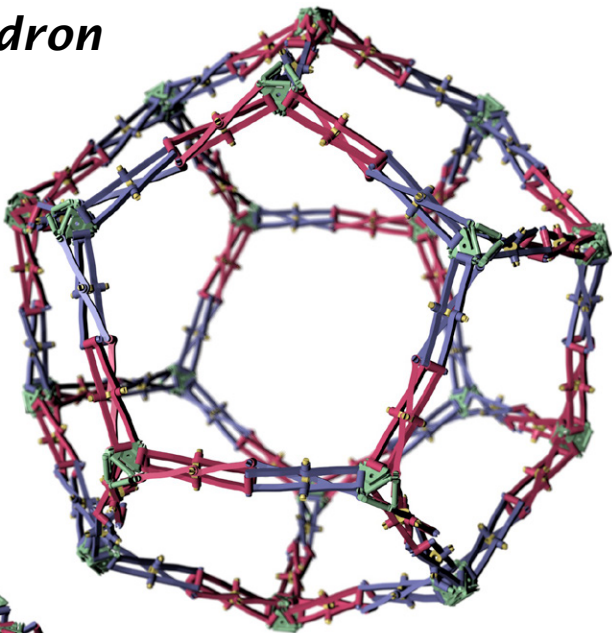
Dodecahedron

90×A

90×B

60×Y

80×Z



Note that the internal angle of the pentagons in *Dodecahedron* is 108° , which is close enough to the angle we designed Extensors to work at, $\text{ArcSec}(-3) \approx 109.5^\circ$.

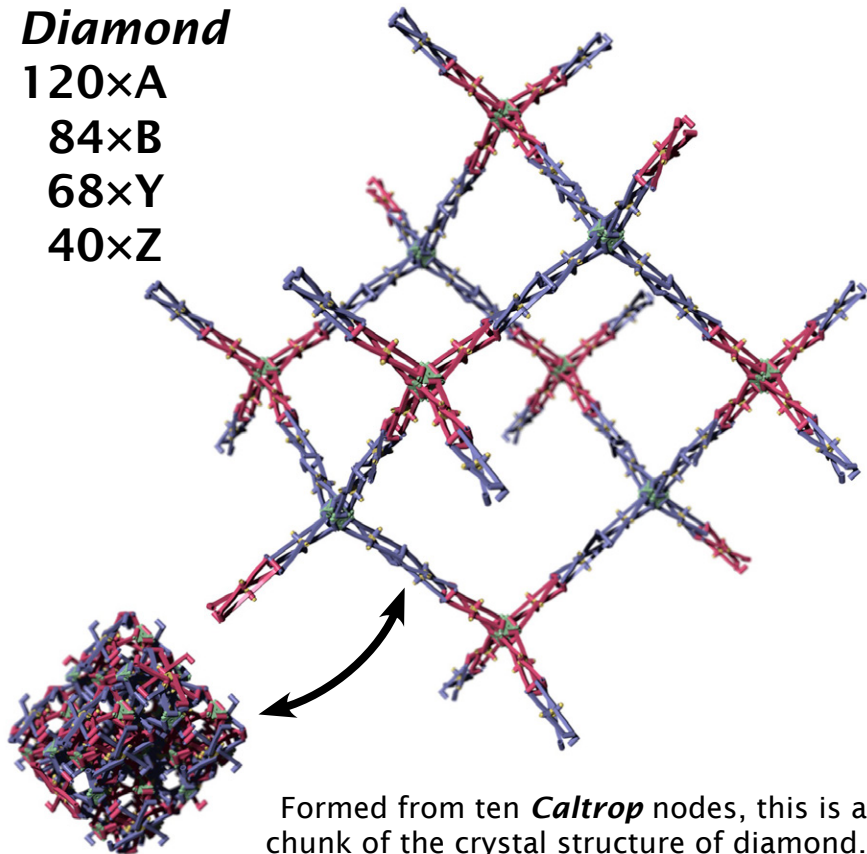
Diamond

120×A

84×B

68×Y

40×Z



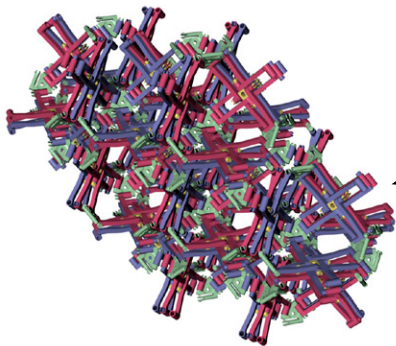
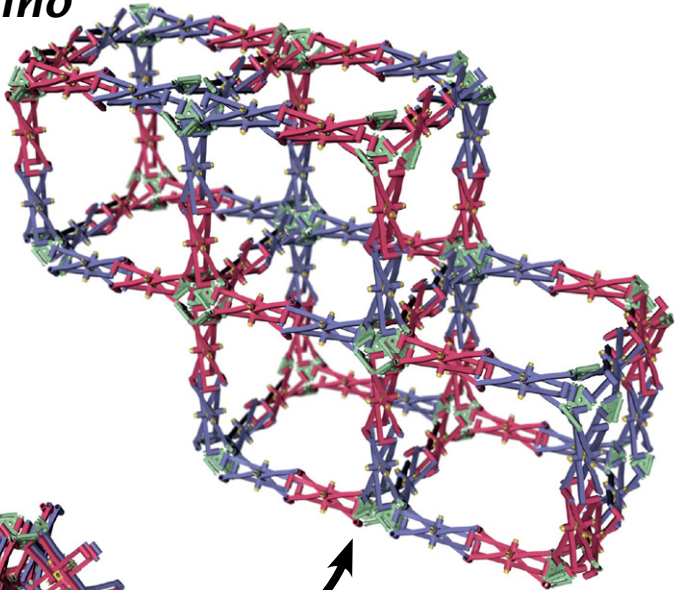
Tetromino

144×A

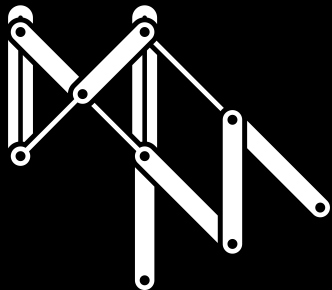
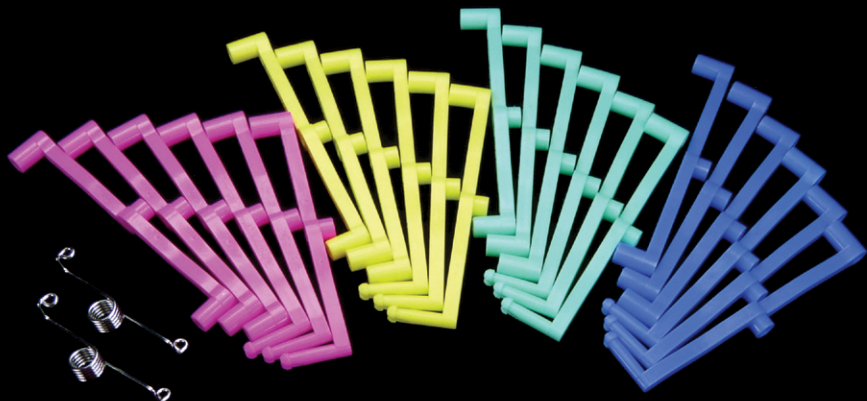
144×B

72×X

104×Z



Using similar designs you can build the other tetrominoes, and other structures based on the cubic lattice.



MathMechs.com

Patent pending
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