

1

SCIENCE MUSEUM APPROVED

MECHANICS

Laboratory

MONSTER TRUCK

Models **1** to **3**

- 1 - Connecting rod and piston
- 2 - Monster truck
- 3 - Spider truck



V46612

Read and keep the instruction manual for future reference.

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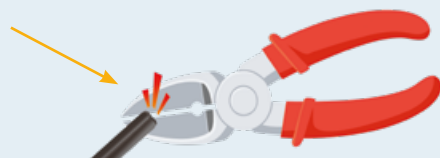
PARTS LIST

	Double beam 15 holes	2 pcs		Short collar	12 pcs		Cogwheel with 10 teeth	2 pcs
	Double beam 11 holes	2 pcs		Long collar	12 pcs		Cogwheel with 18 teeth	5 pcs
	Double beam 9 holes	2 pcs		Worm screw	1 pc		Cogwheel with 26 teeth	1 pc
	Double beam 7 holes	4 pcs		Differential cage	1 pc		Cogwheel with 41 teeth	1 pc
	Double beam 5 holes	4 pcs		Cogwheel with 32 teeth	1 pc		Right angle gearbox	1 pc
	Double beam 3 holes	4 pcs		Cogwheel with 24 teeth	1 pc		Rod 7 l 9.9 cm	1 pc
	Single beam 7 holes	2 pcs		Cogwheel with 12 teeth	9 pcs		Rod 6 l 11.7 cm	1 pc
	Single beam 5 holes	2 pcs		Short double peg	32 pcs		Rod 5 l 8.1 cm	1 pc
	Single beam 3 holes	2 pcs		Short single peg	8 pcs		Rod 4 l 7.2 cm	1 pc
	Angled beam (top)	2 pcs		Short free peg	32 pcs		Rod 3 l 5.4 cm	5 pcs
	Angled beam (bottom)	2 pcs		Long double peg	8 pcs		Rod 2 l 3.6 cm	2 pcs
	Single beam 7 holes	4 pcs		Long free peg	16 pcs		Rod 1 l 2.7 cm	1 pc
	Single beam 5 holes	4 pcs		Beam with pegs	2 pcs		Universal joint	2 pcs
	Single beam 3 holes	4 pcs		Beam with pins	4 pcs		Elastic band	2 pcs
	Angled beam (top)	4 pcs		Hook	1 pc		Rectangular light	2 pcs
	Angled beam (bottom)	4 pcs		Crank	2 pcs		Round light	2 pcs
	Single beam 4 holes	1 pc		Rack	1 pc		Siren	1 pc
	T-shaped beam	1 pc		Nail-like rod	2 pcs		RH "O" panel	1 pc
	Angled beam	2 pcs		Rim	4 pcs		LH "O" panel	1 pc
	Single beam 4 holes	2 pcs		Tyre	4 pcs		"P" panel	1 pc
	T-shaped beam	2 pcs					"Q" panel	1 pc
	Angled beam	4 pcs					RH "E" panel	1 pc
							LH "E" panel	1 pc

N.B.: ask an adult to remove the pieces from the plastic sprues. Any remaining sharp pieces must be thrown away immediately.



ASK AN ADULT TO HELP YOU!

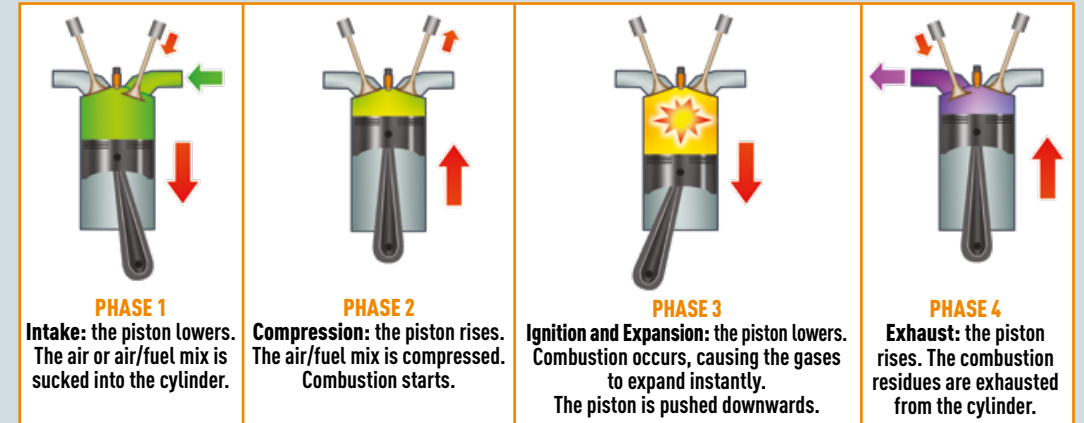


The internal combustion engine

The internal combustion engine is a machine that converts chemical energy into mechanical power. To generate mechanical power, we need:

- **Fuel:** gas, petrol or diesel
- **Oxidant:** oxygen
- **Combustion chamber:** the metal body of the engine in which the reaction takes place

How does it work? Combustion occurs in 4 phases:



Each cycle causes two rotations of the engine shaft, which then transmits motion to the other mechanical parts of the vehicle.

The differential

The differential is a mechanical device that transfers power generated by the engine to the drive wheels.



1. **Pinion:** it transfers power from the engine to the crown wheel and, ultimately, to the drive wheels.
2. **Crown wheel:** it is attached to the differential cage and permanently coupled with the pinion.
3. **Differential cage:** box that houses the gears.
4. **Spider gears:** gears attached to the cage.
5. **Side gears:** gears attached to the axle shafts.
6. **Axle shaft:** axle that connects the drive wheels to the side gears.

The limited-slip differential

Off-road vehicles are equipped with a limited-slip differential. The action of the differential may be inefficient if one of the two wheels loses grip: in this case, the wheel with more grip tends to remain still while the other one slips. Thanks to electrically-controlled mechanisms, the limited-slip differential allows for distributing engine power equally to the two wheels, thus increasing the motive power whenever there is poor grip.



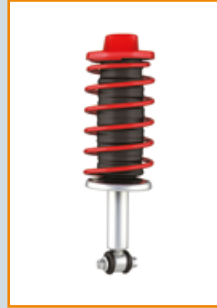
Suspensions and shock absorbers

All vehicles currently commercialised are fitted with a suspension system to ensure maximum comfort during the journey. Without the suspensions, all forces acting on the wheels would be transmitted directly to the passenger compartment and the driver might not be able to control the vehicle.



The terms **suspension** and **shock absorber** are often used inappropriately. There is indeed a functional difference between the two:

- As mentioned above, the suspensions connect non-suspended parts (wheels) with suspended parts (passenger compartment, engine, etc.) by means of elastic elements that guarantee passenger comfort. In the adjacent image, the spring and the internal guide (in black) make up the suspension.
- On the other hand, shock absorbers are components associated with the suspensions that slow down the movement of the latter. If we compress the spring, it will return to its initial state forcefully, thus neutralising the effect of the suspensions. Thanks to clutch systems based on gas or fluid, the shock absorbers guarantee a softer return of the spring to its initial state.



The monster trucks

Giant tyres, 4-wheel drive with 4-wheel steering, suspensions capable of withstanding landings from great heights and powerful motors. The monster truck is an extreme vehicle capable of delivering plenty of thrills to both the driver and the public attending the show.



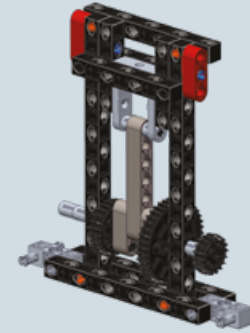
The technical features of a monster truck are as follows:



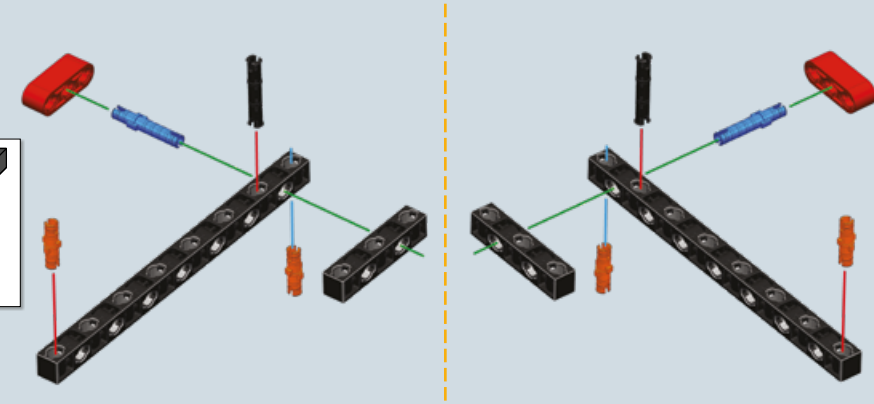
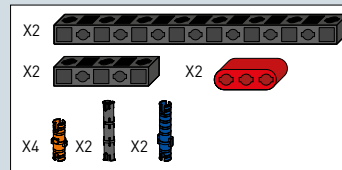
- **TYRES:** up to 1.60 m high, they can weigh up to 400 kg.
- **SHOCK ABSORBERS:** each wheel is connected to a suspension system equipped with 4 gas shock absorbers (adjacent image).
- **WHEELS:** all 4 wheels are steering and allow the vehicle to curve in tight spaces.
- **DIFFERENTIAL:** the self-locking differential transfers the engine power to all 4 wheels. This type of differential enables the vehicle to accelerate even if only a single wheel touches the ground.
- **ENGINE:** is mounted centrally to stabilise the vehicle. It uses special fuels to develop incredibly high power levels, similar to those of a dragster.
- **CHASSIS:** extremely resistant, it is made of steel tubular elements that protect the driver.
- **BODYWORK:** extremely light and flexible. It can be derived from common used car bodyworks, to better define the vehicle.

1 Connecting rod and piston

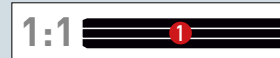
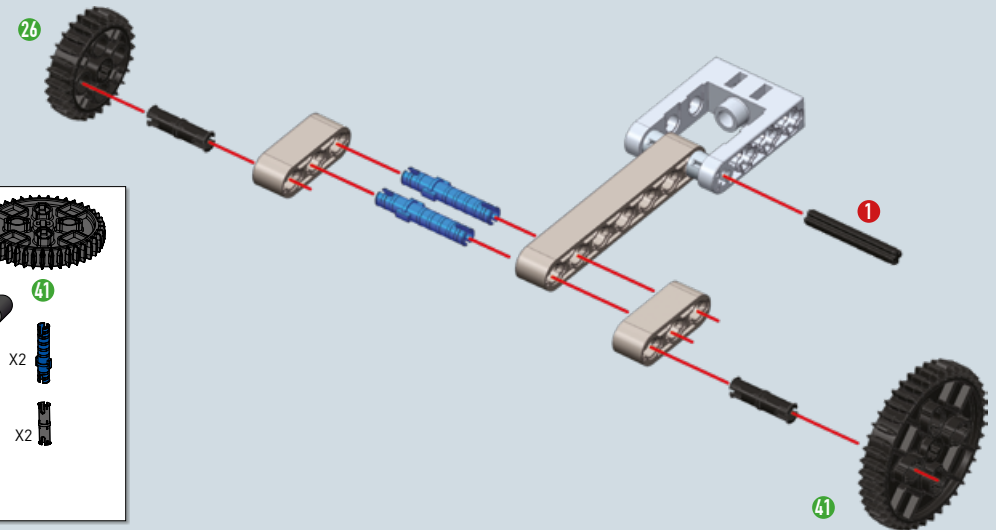
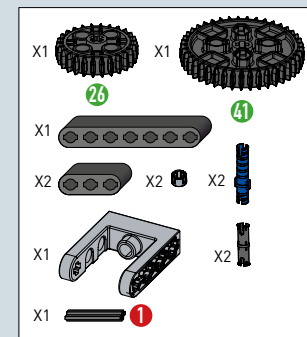
INTERACTIVE 3D INSTRUCTIONS IN THE MECHANICS LABORATORY APP



1



2



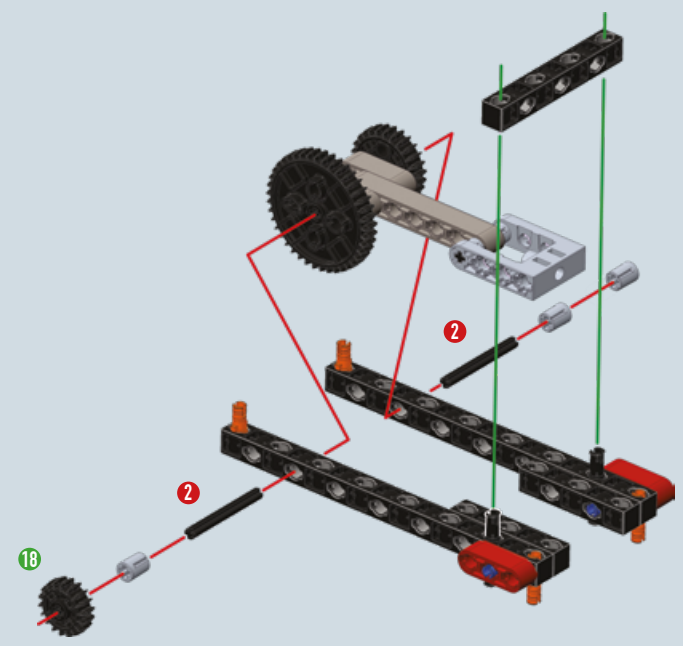
1 Monster truck



INTERACTIVE 3D INSTRUCTIONS IN THE MECHANICS LABORATORY APP



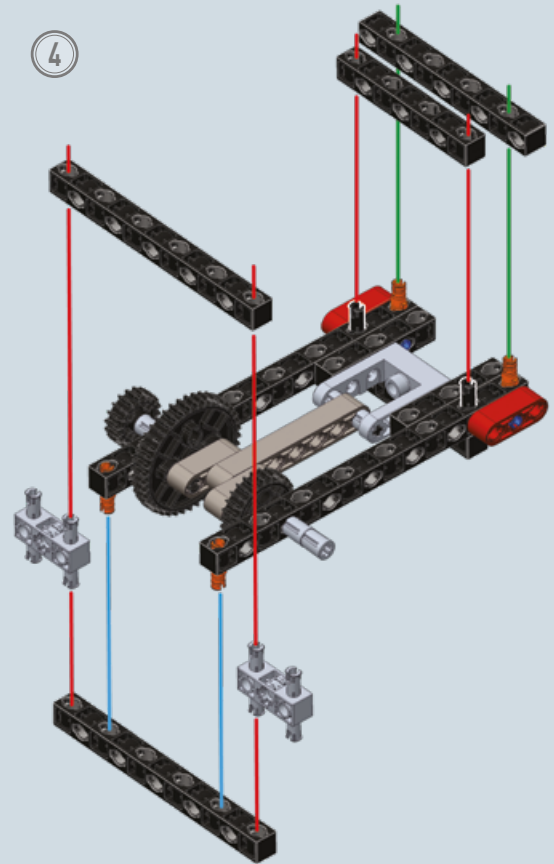
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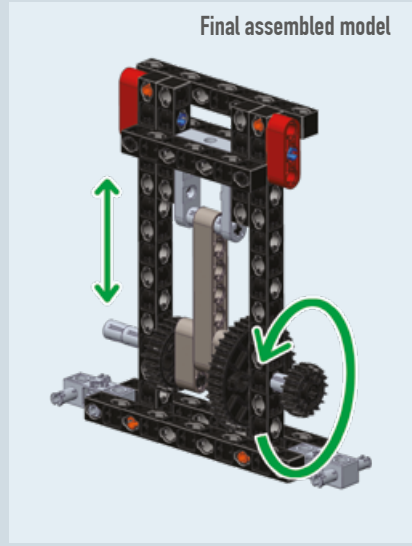
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- X2 X3



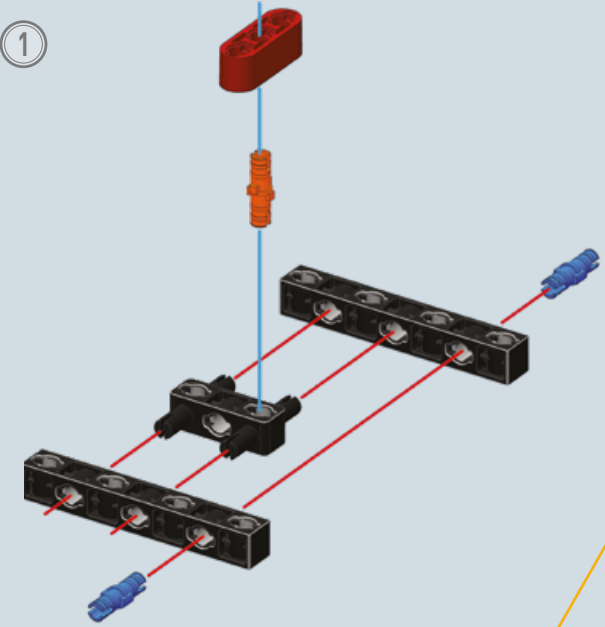
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- X1
- X1
- X2



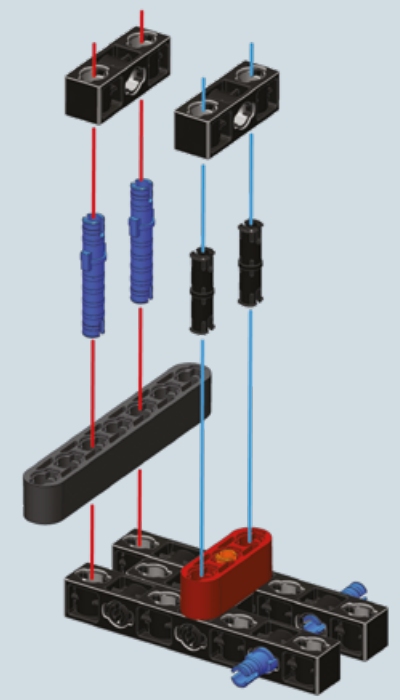
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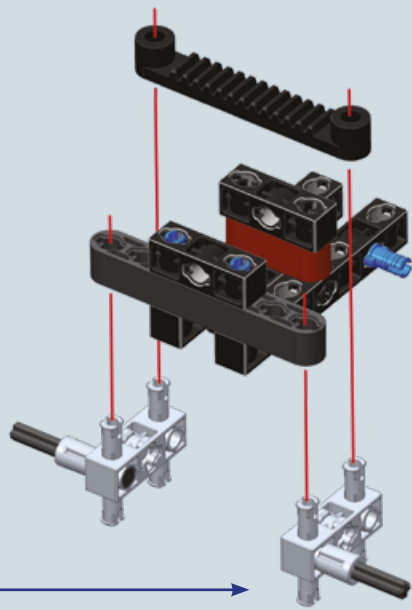
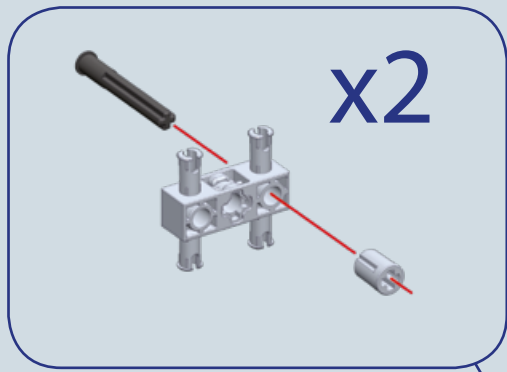


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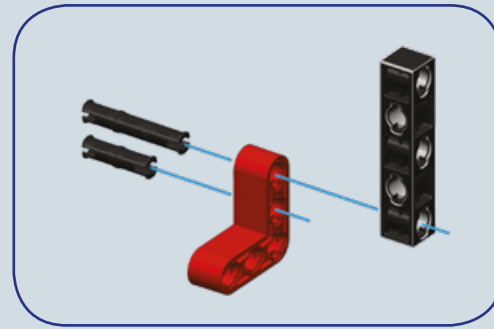
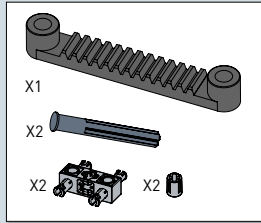
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- X2

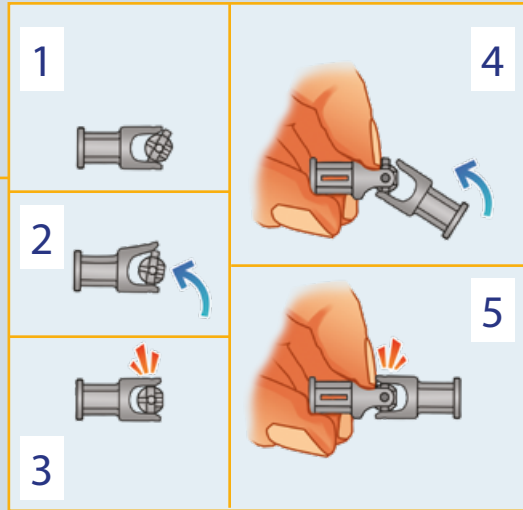
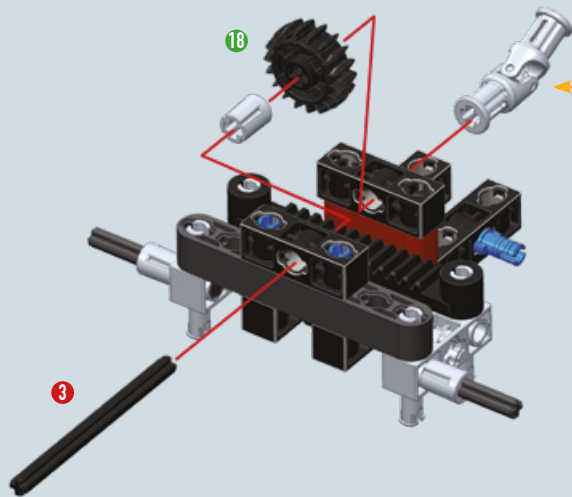
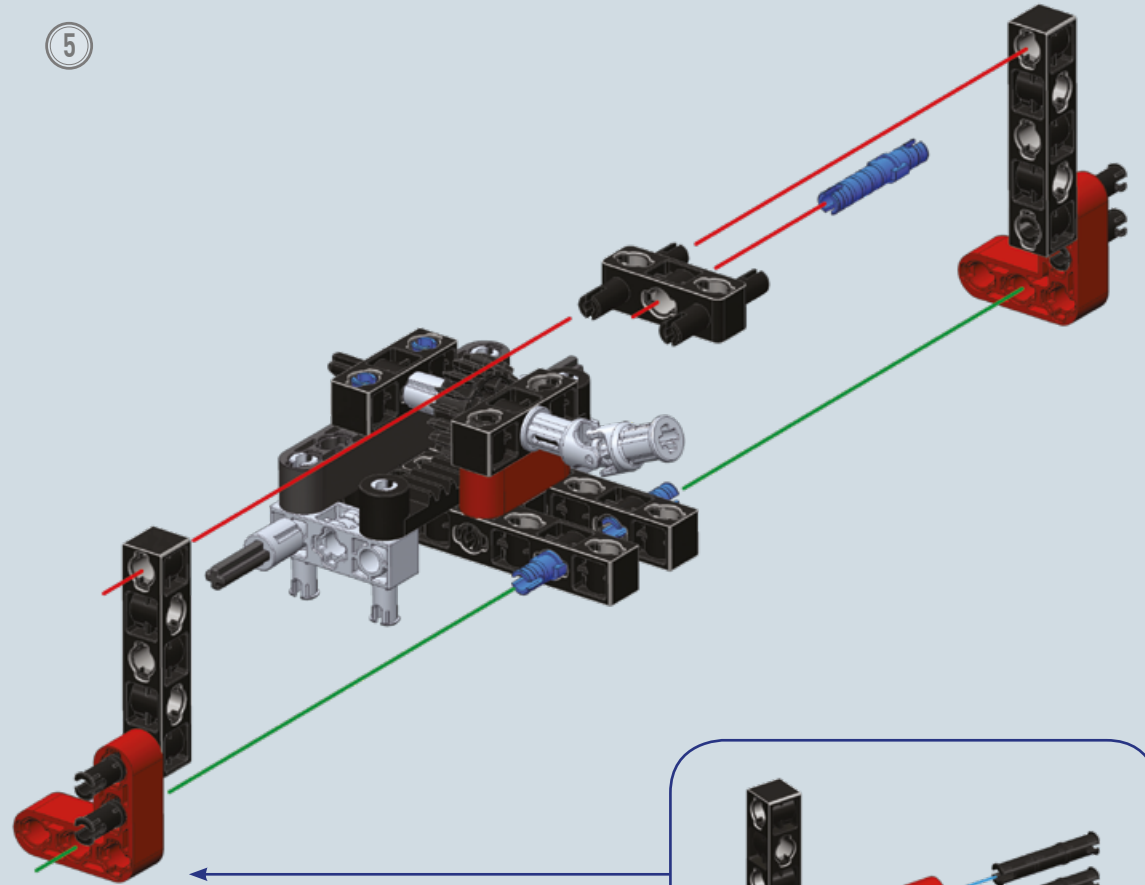




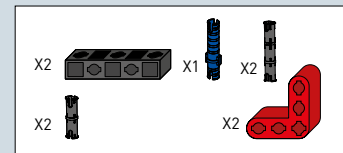
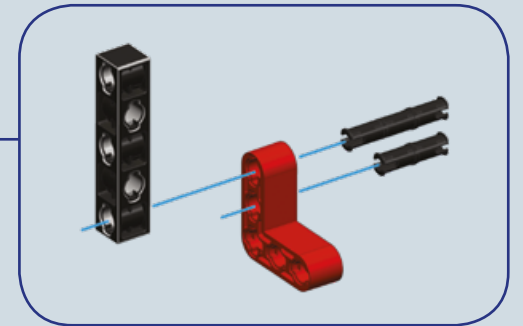
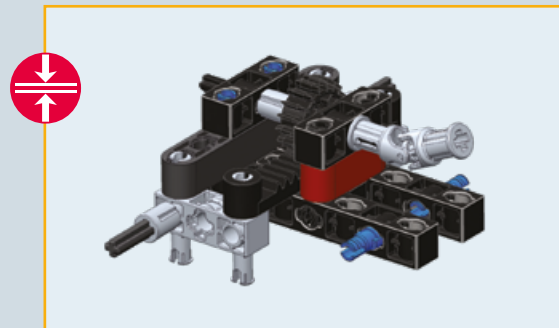
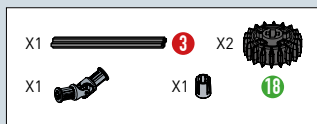
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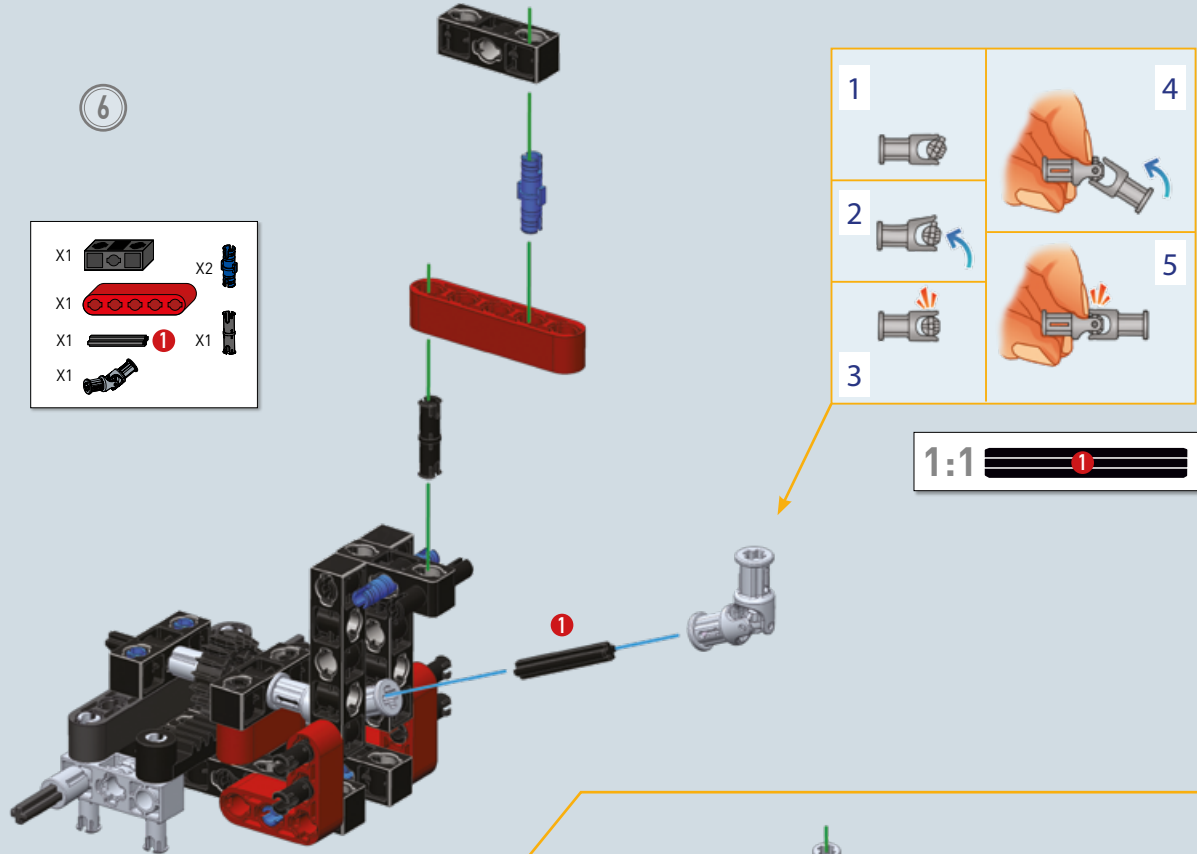


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- X1
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- X1
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- X1

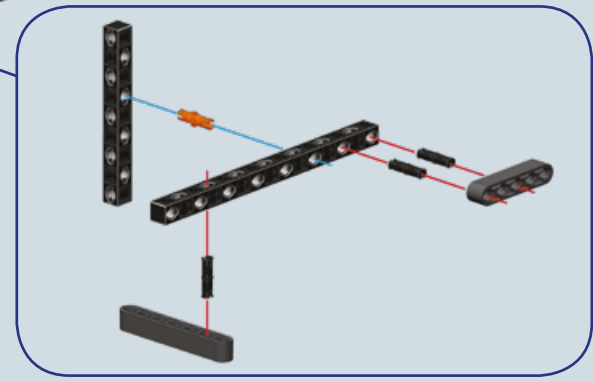
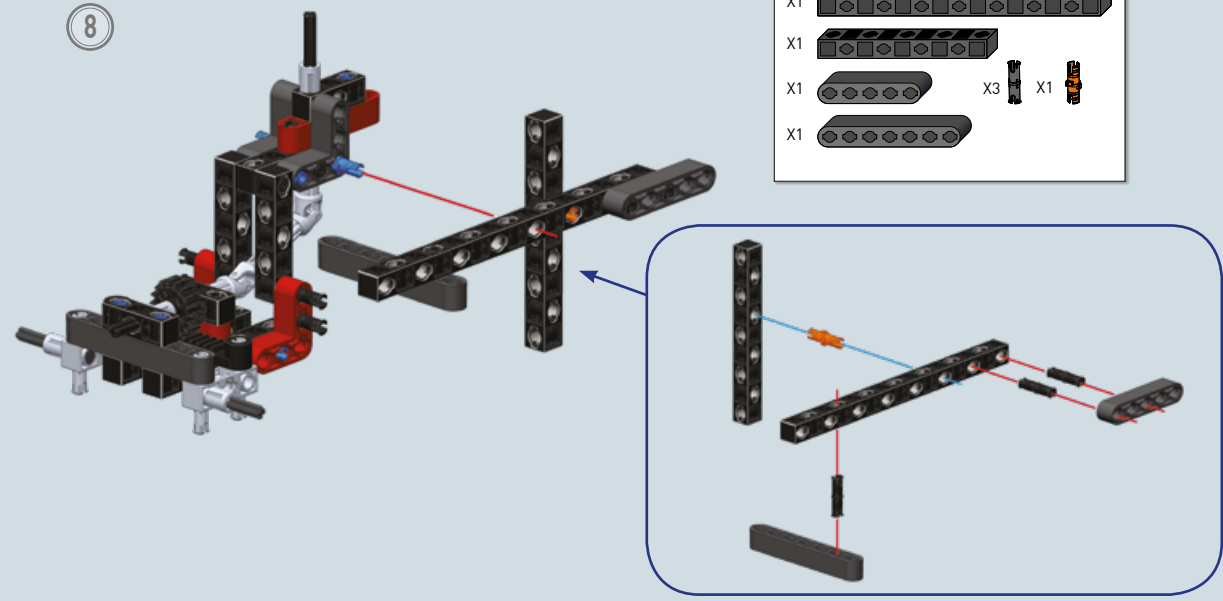


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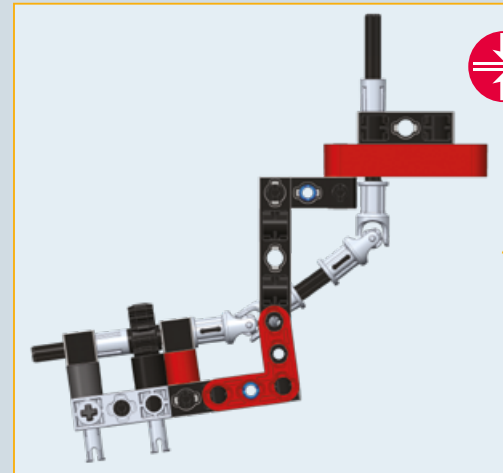
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- X1
- X1
- X1
- X1
- X3
- X1

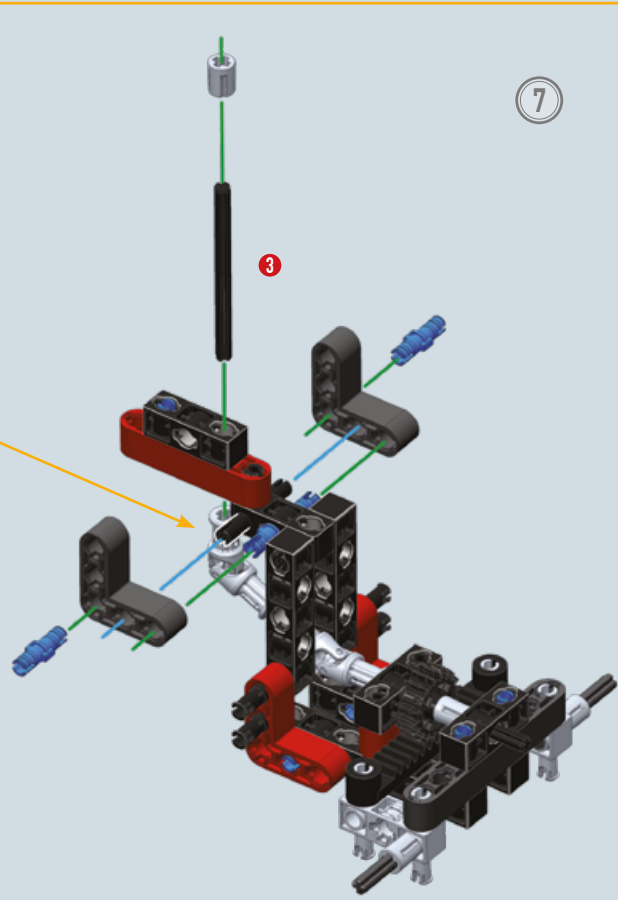


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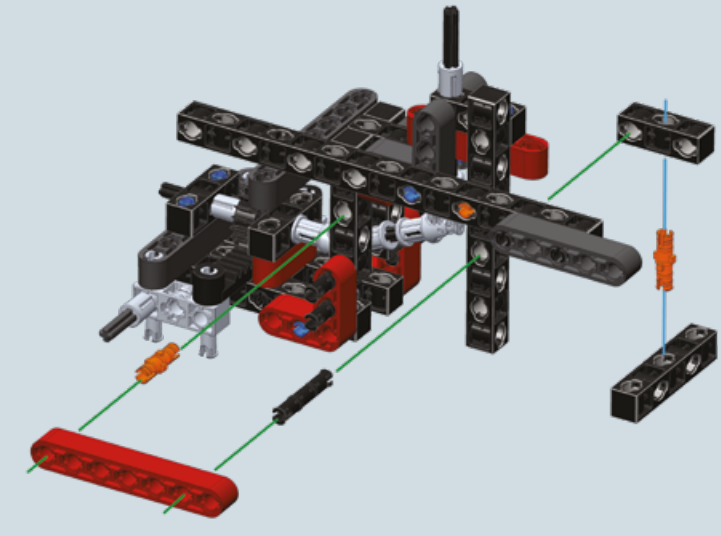
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- X2
- X1
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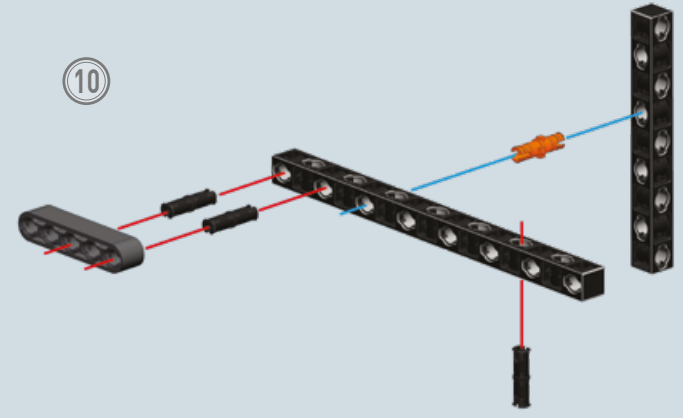
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- X1
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- X1
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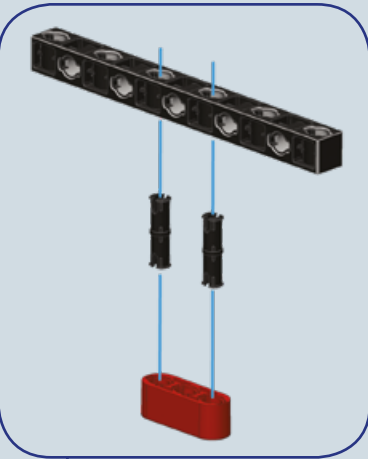
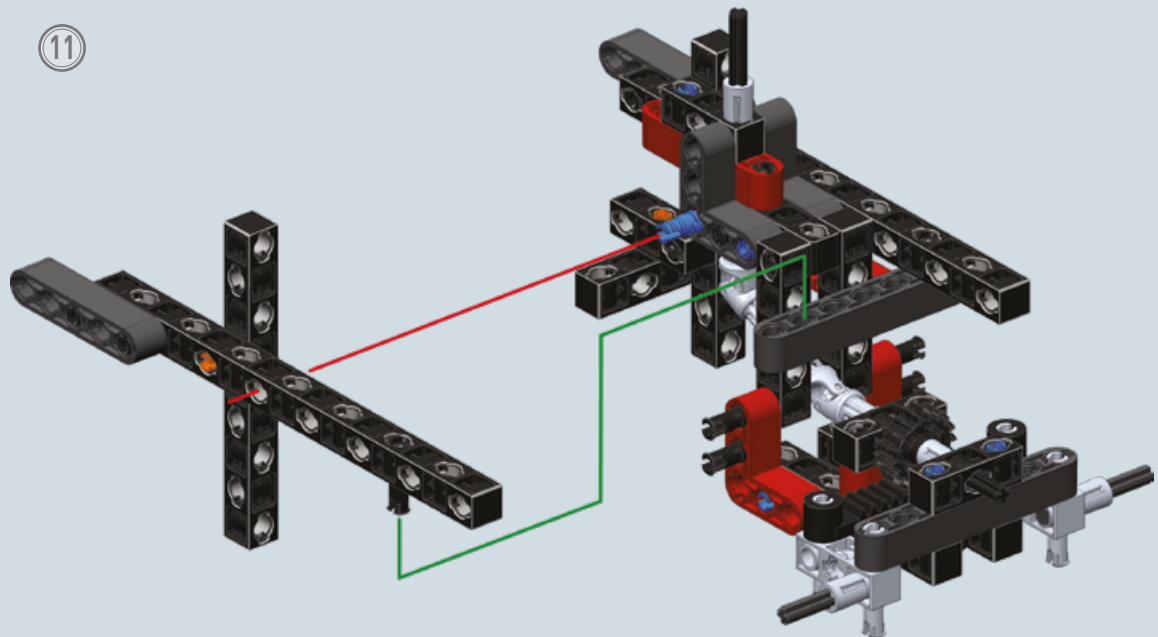


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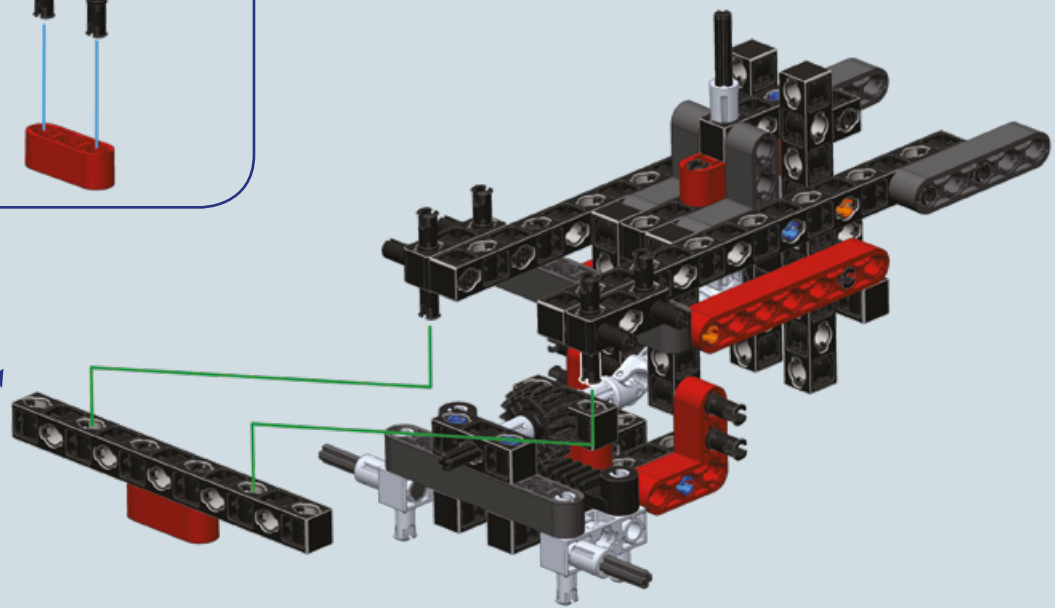
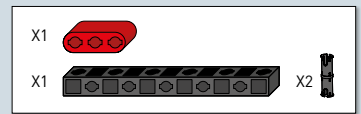
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- X1
- X1
- X3
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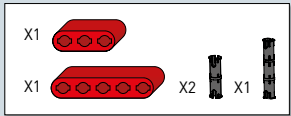
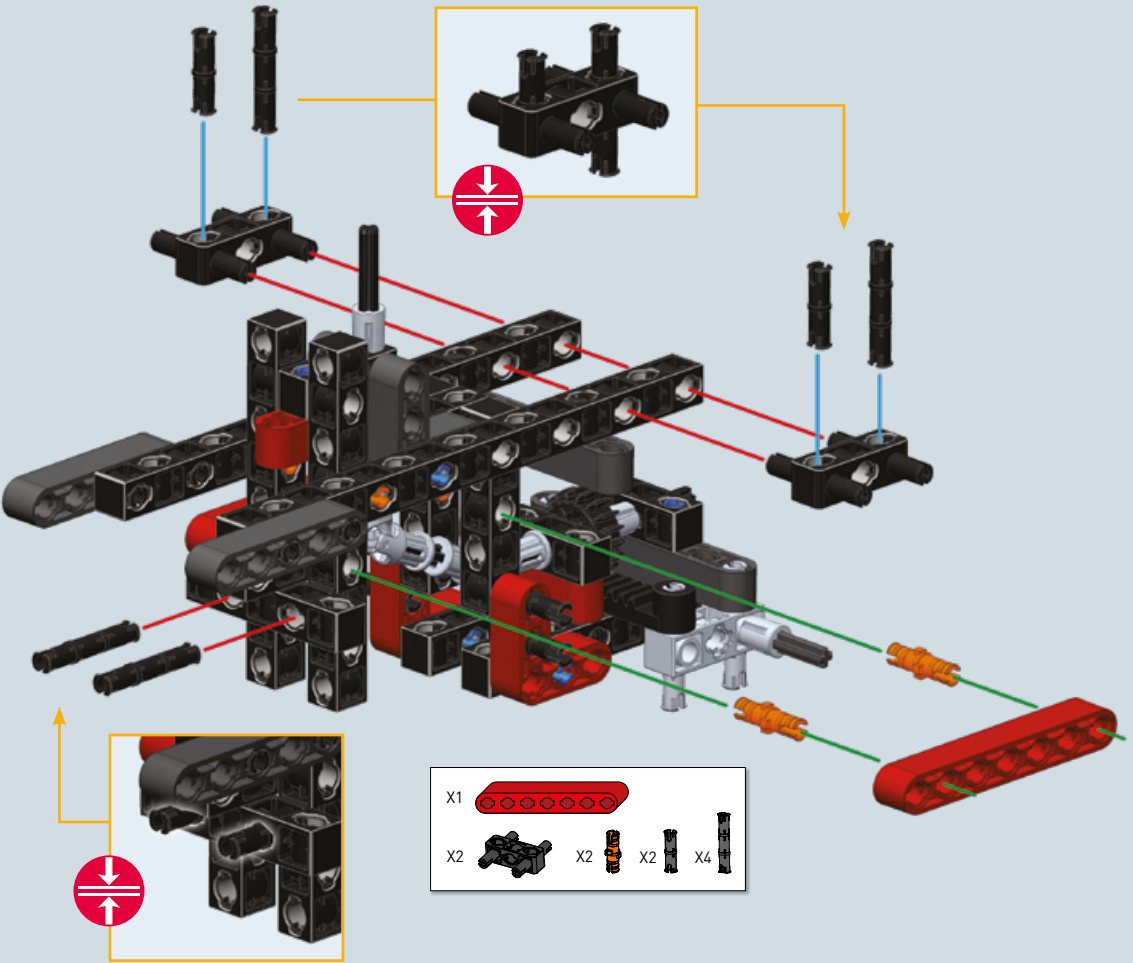
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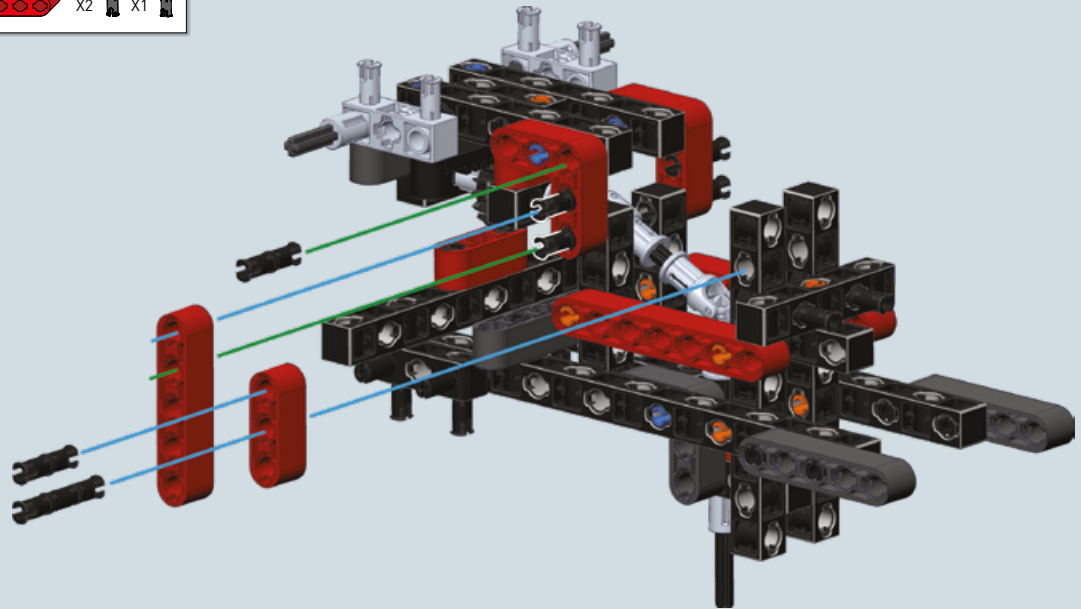
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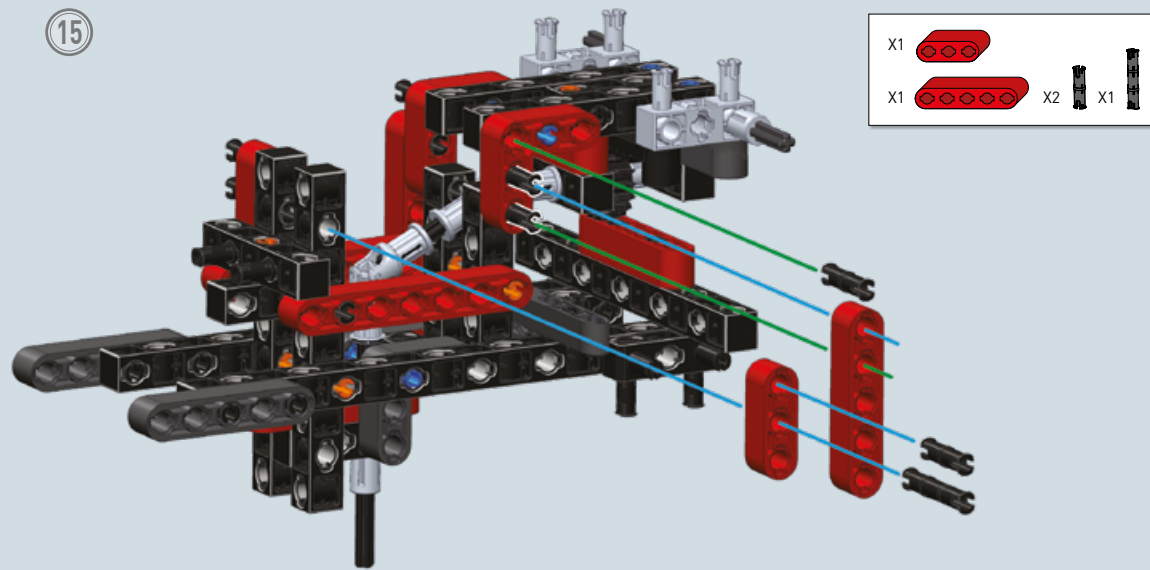
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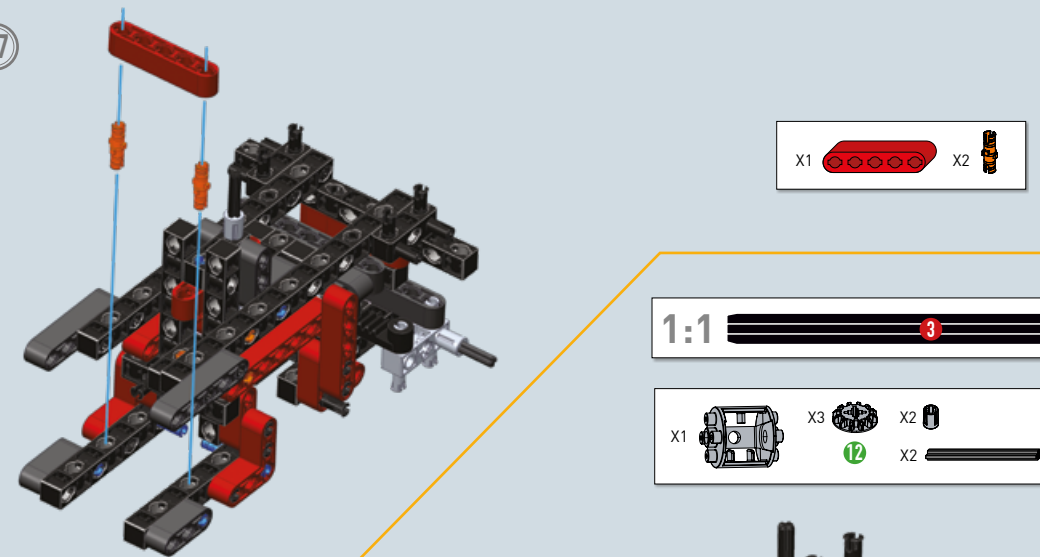
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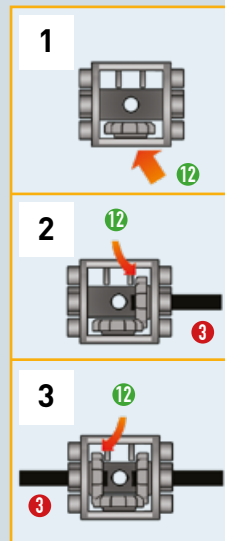
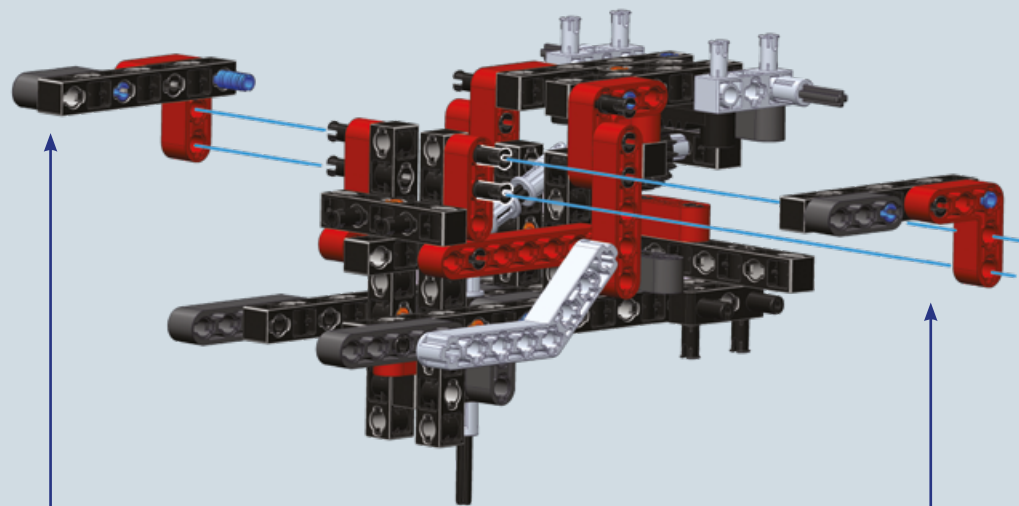
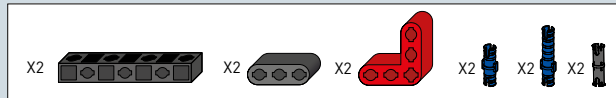
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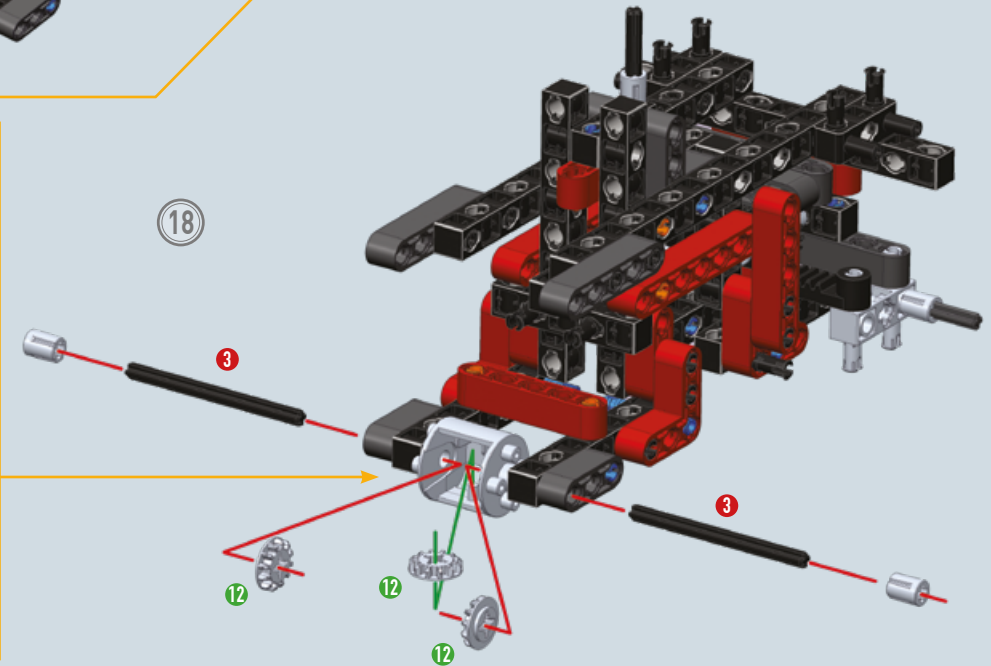
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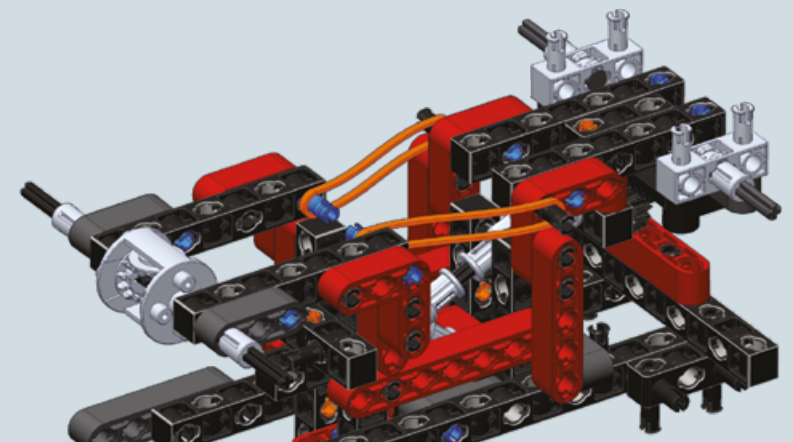
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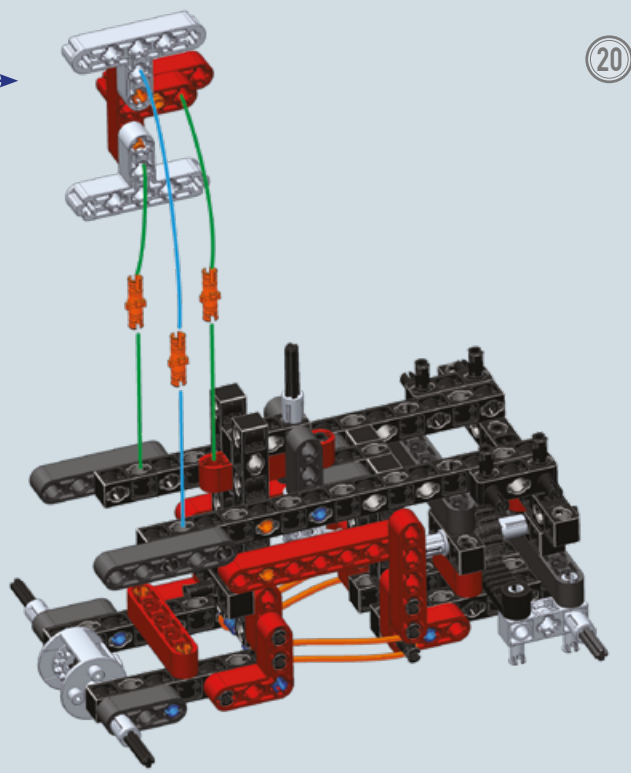
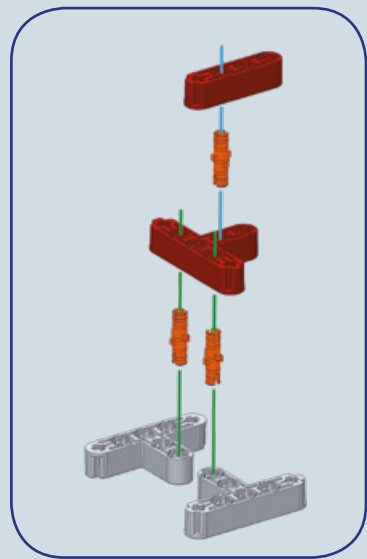


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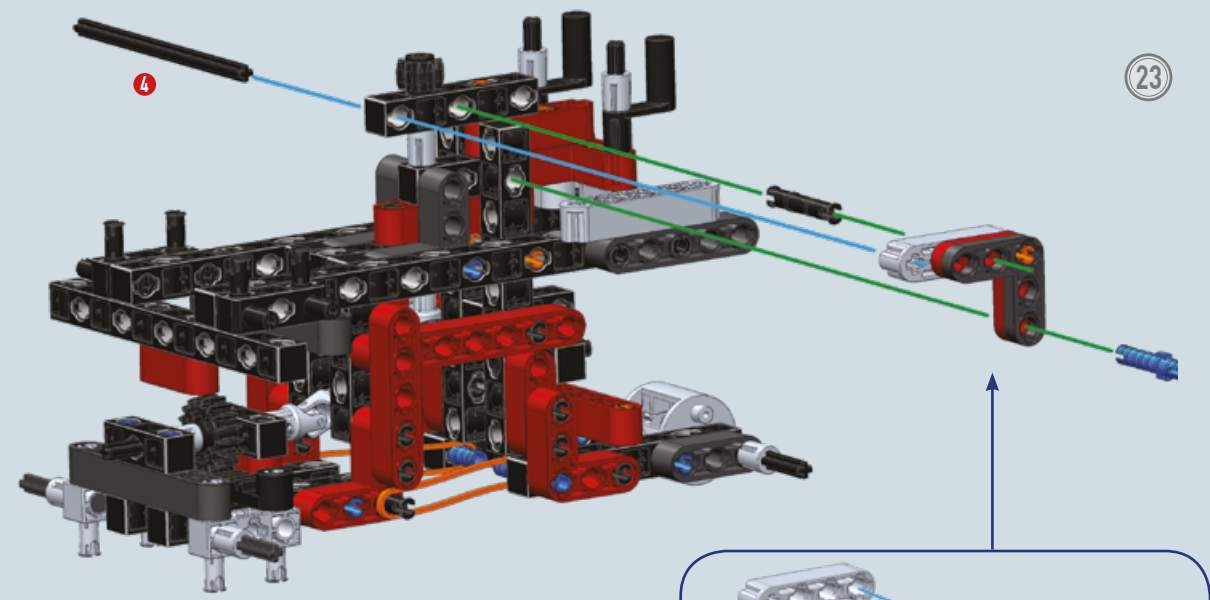
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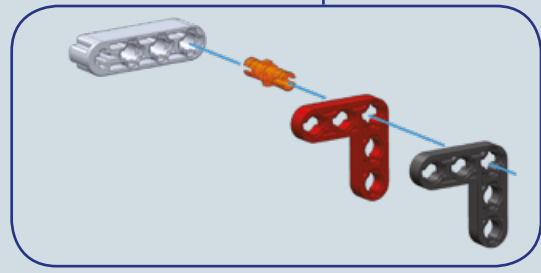
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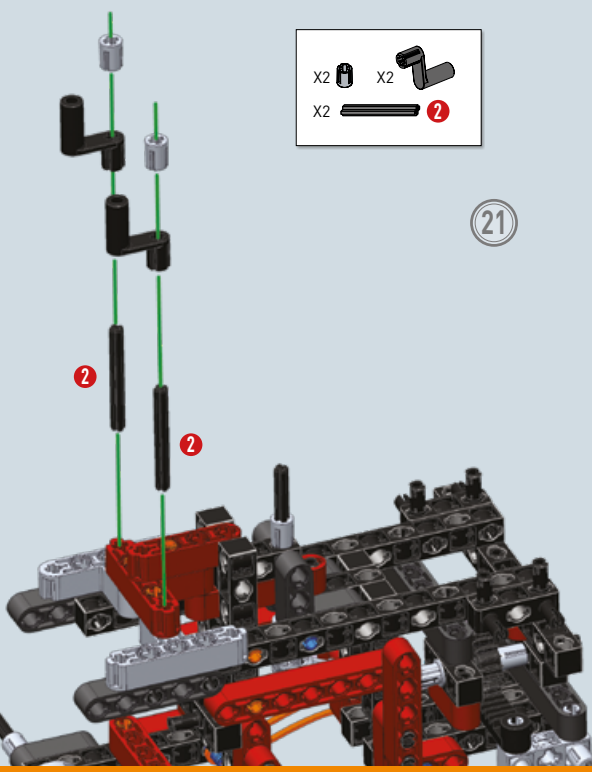
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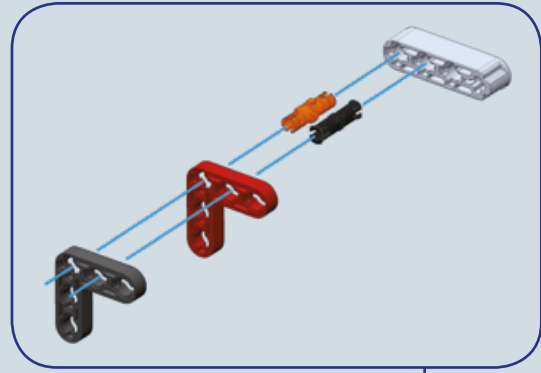
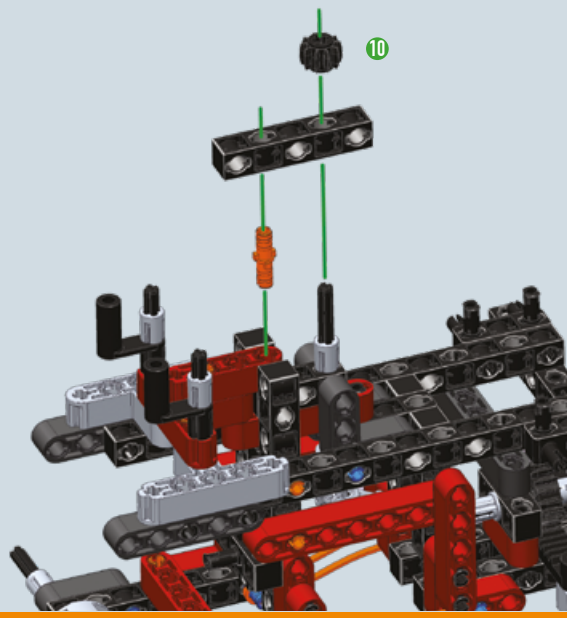


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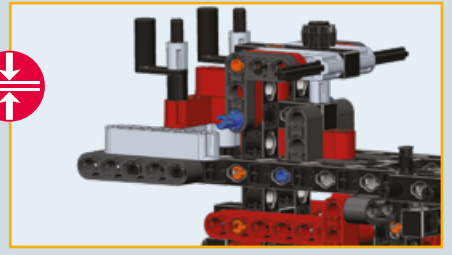
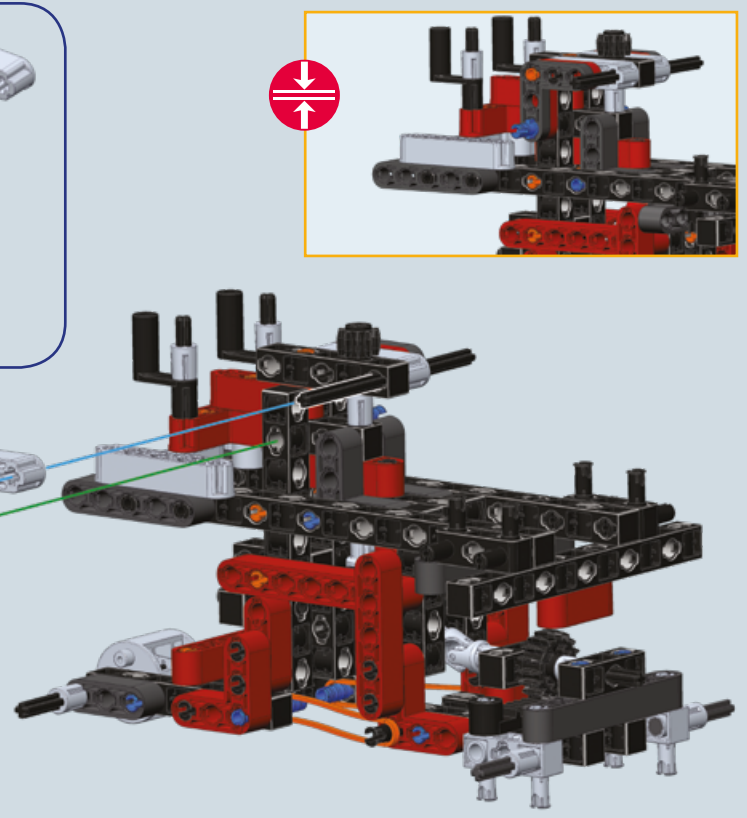
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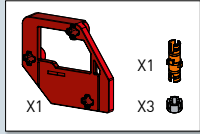
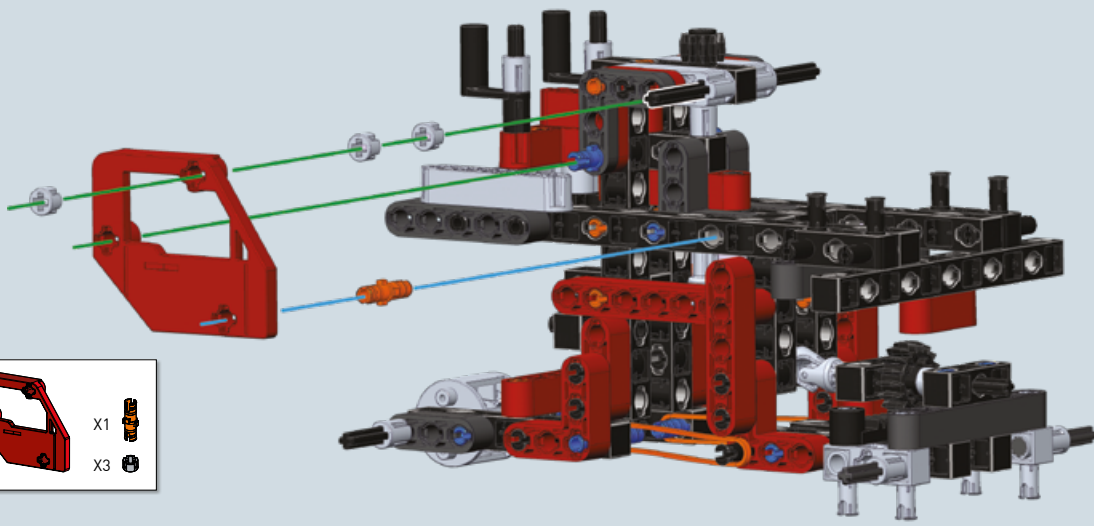


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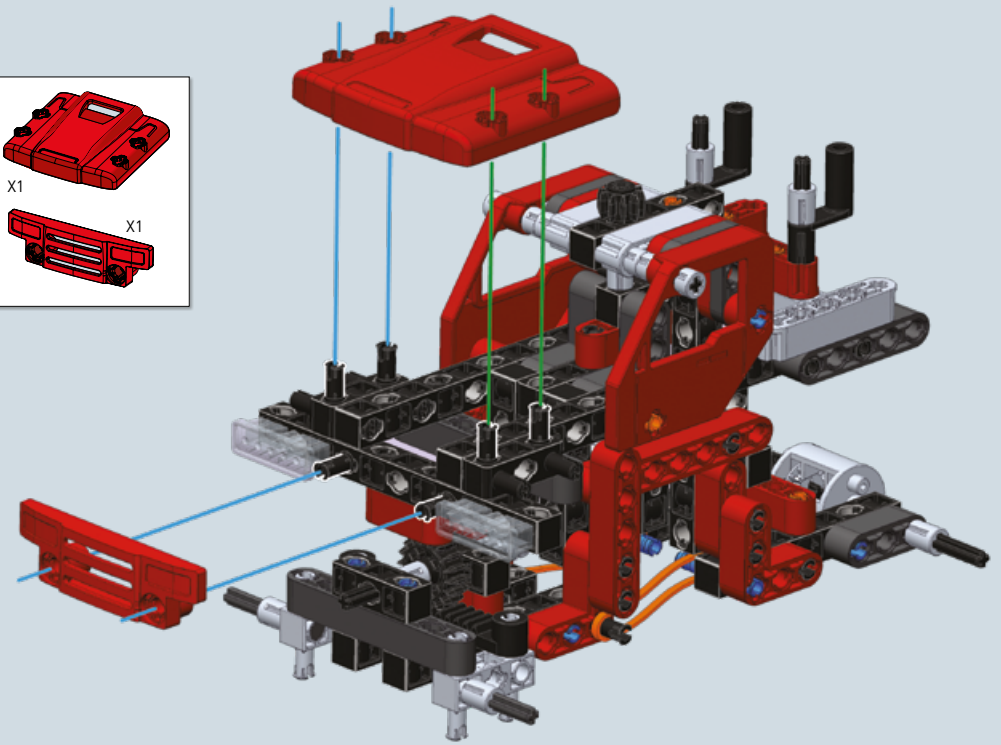
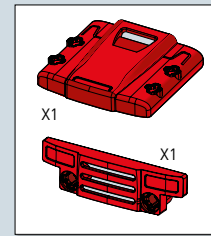
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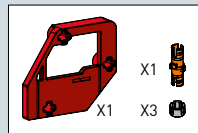
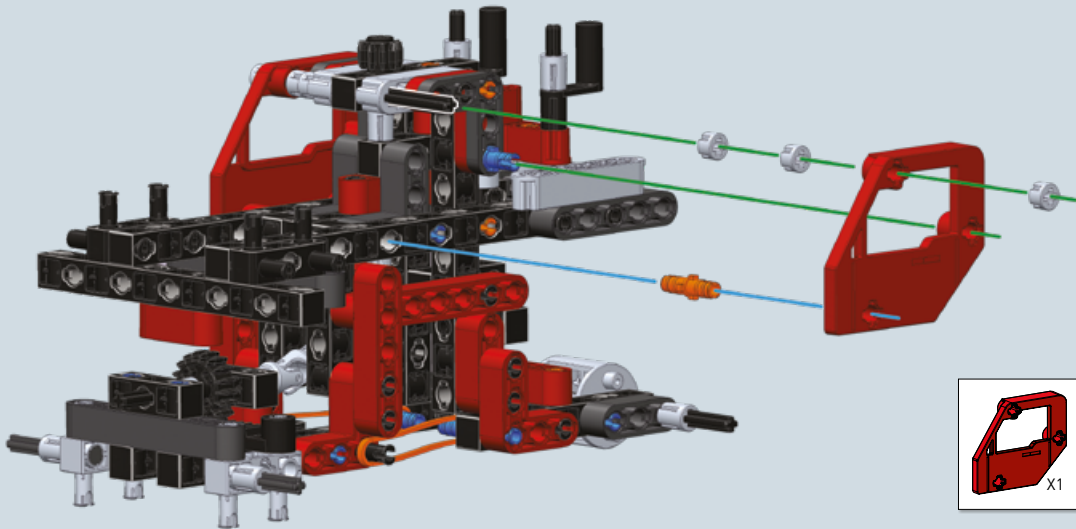
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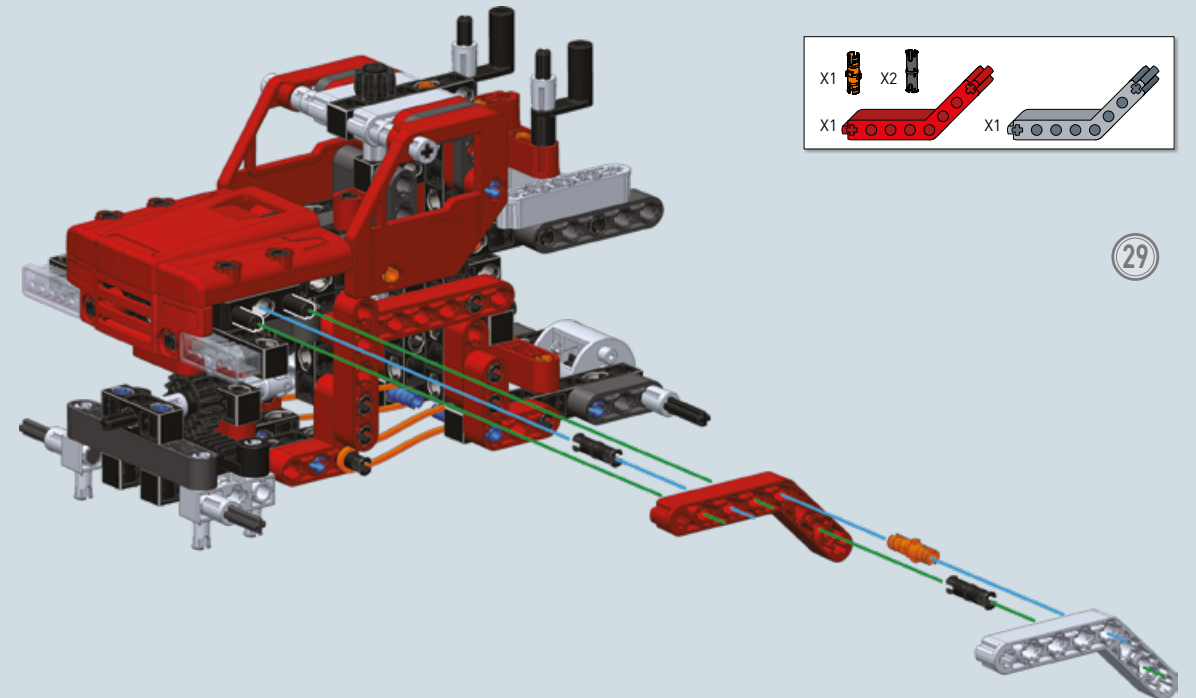
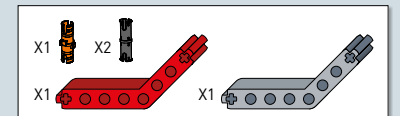
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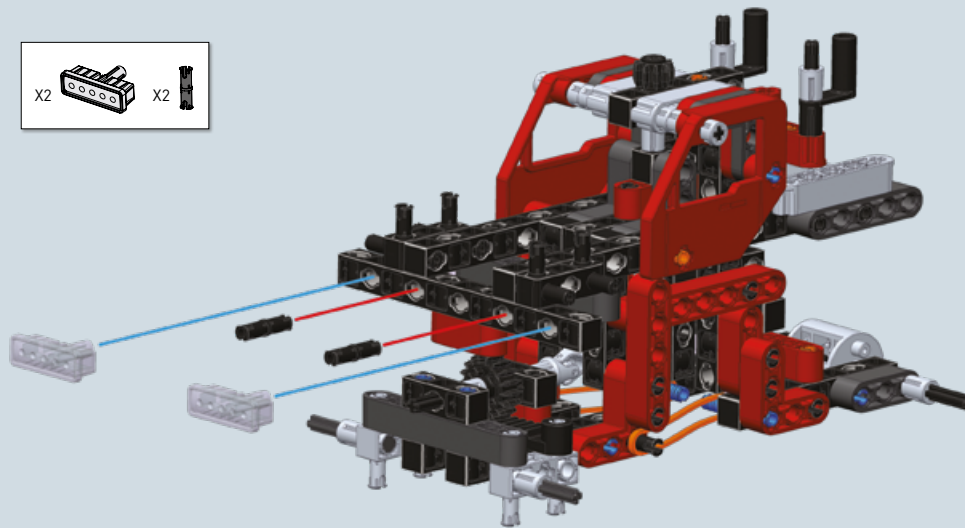
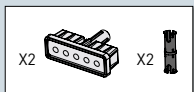
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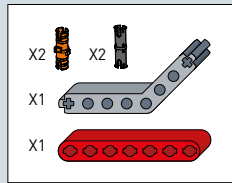
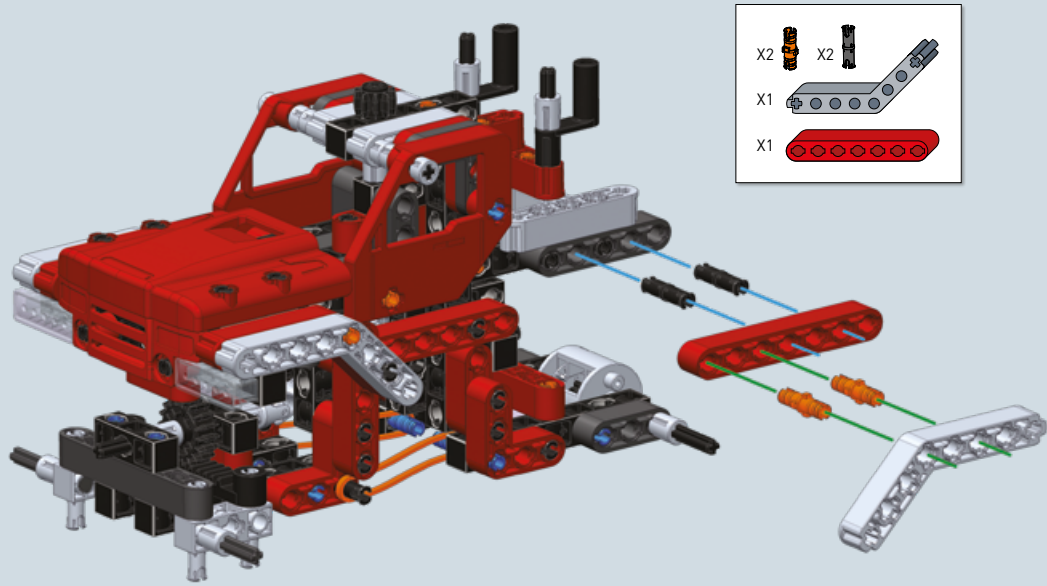


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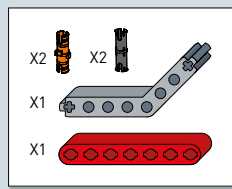


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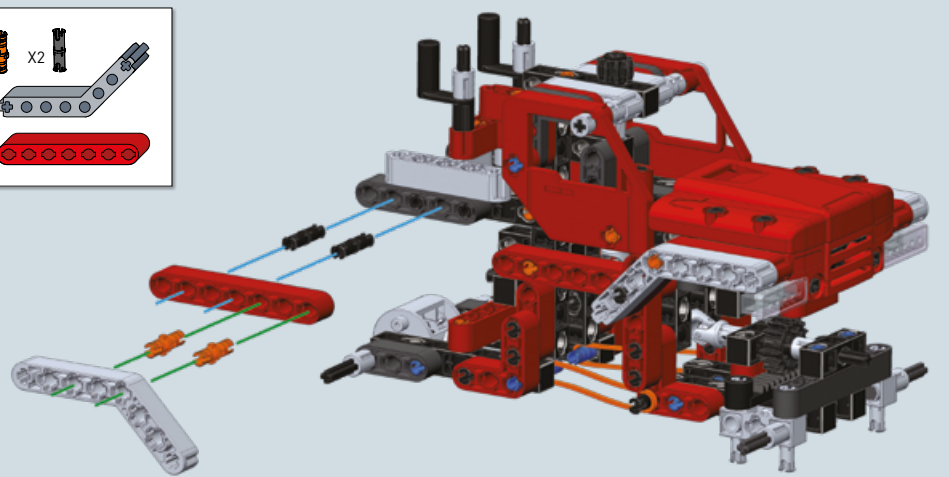




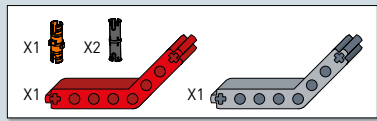
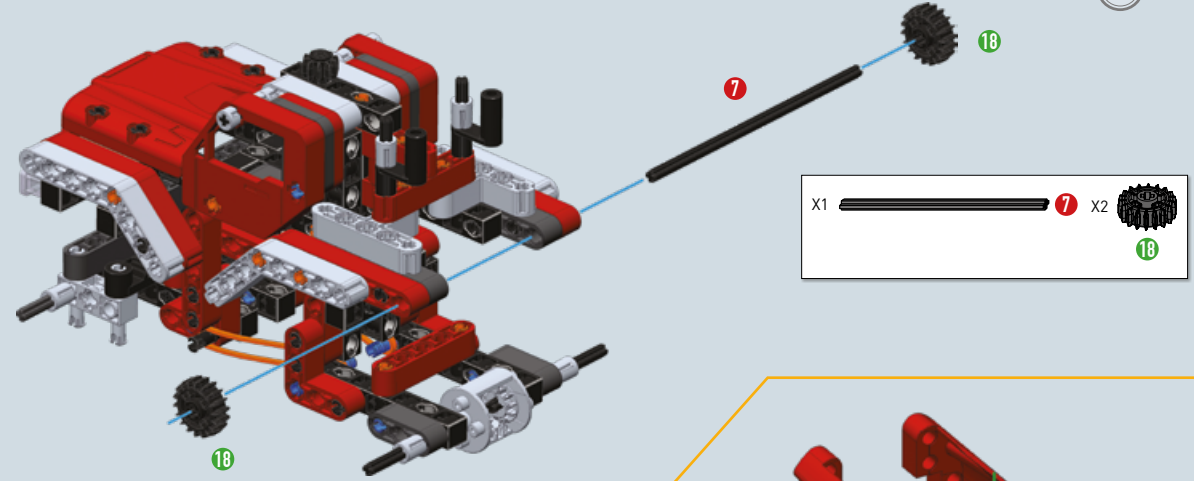
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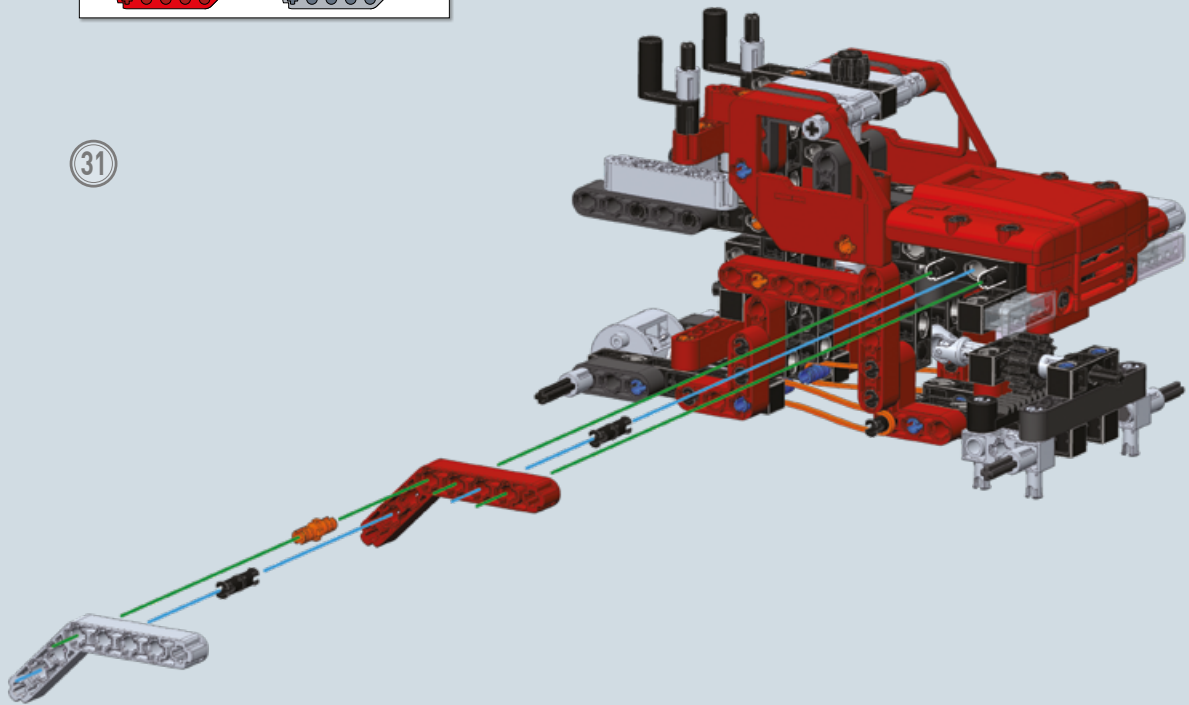
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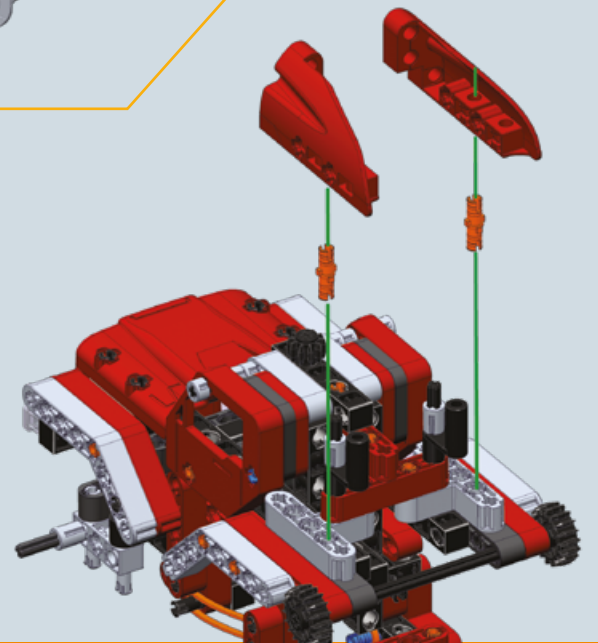
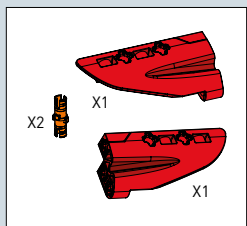
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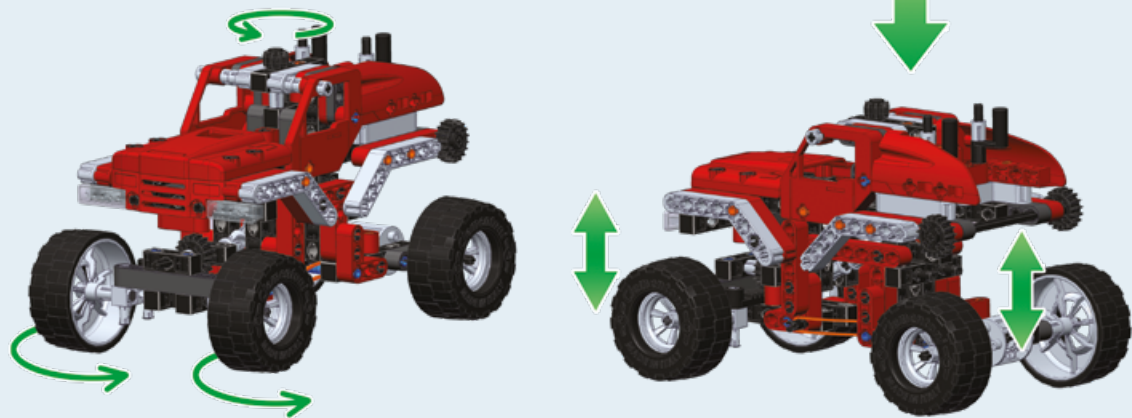
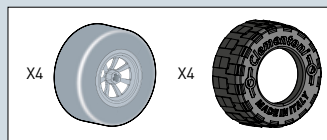
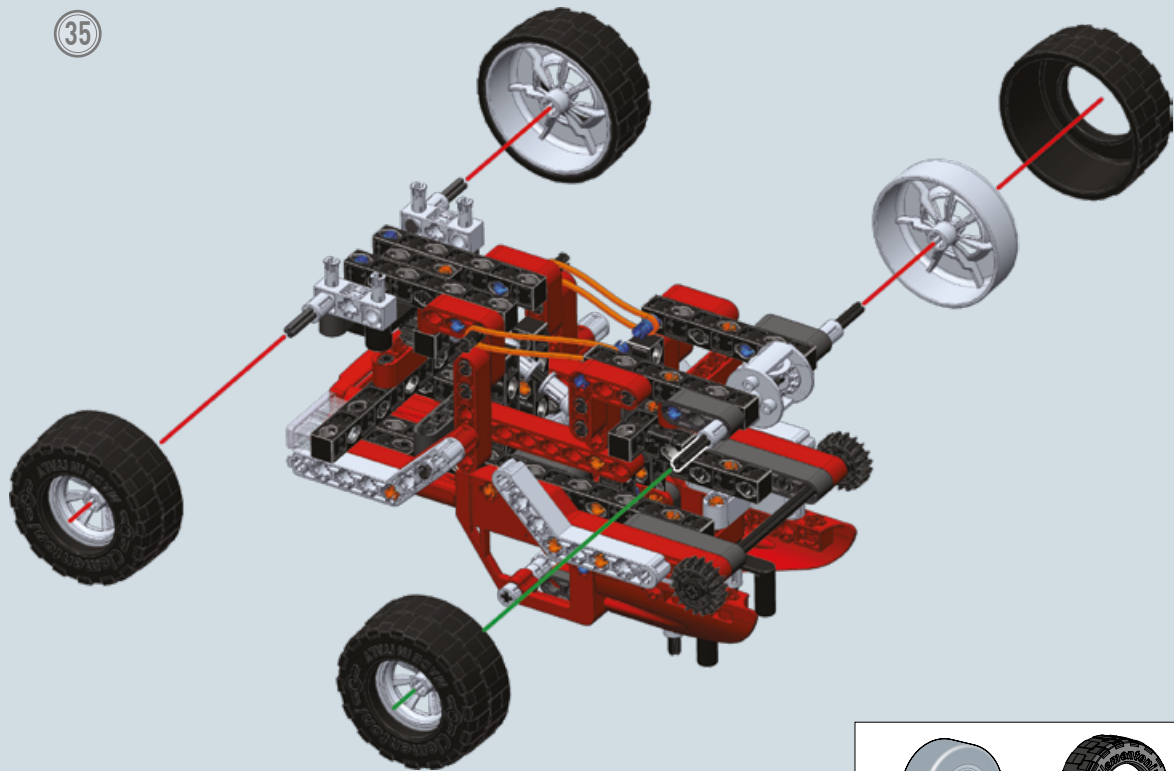


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34



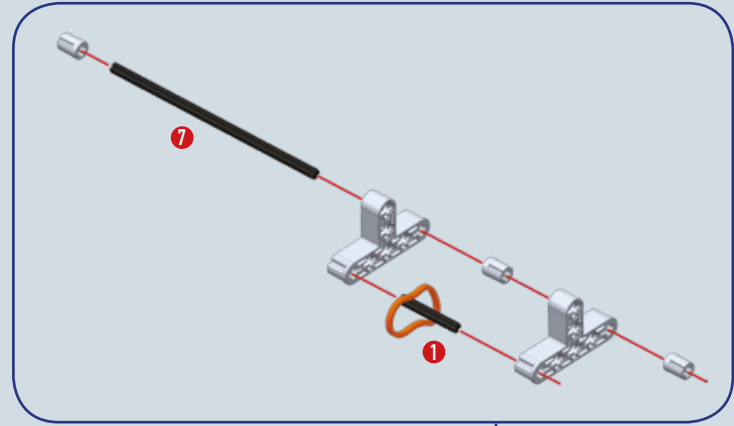
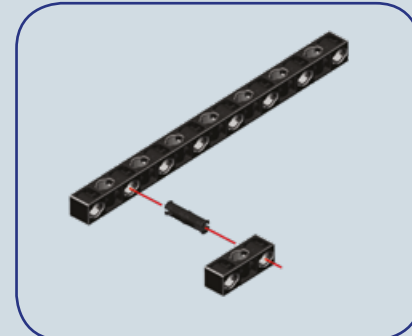


Final assembled model

1 Spider truck

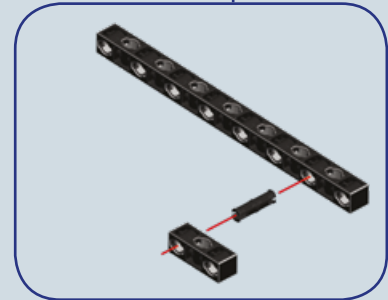
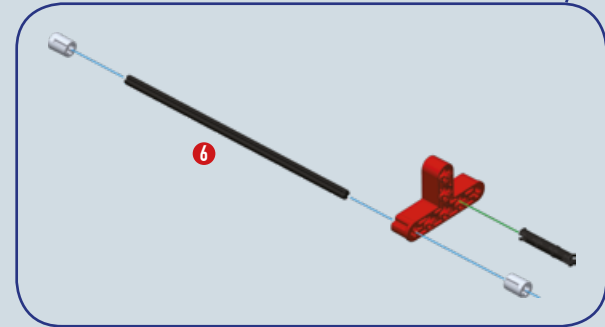
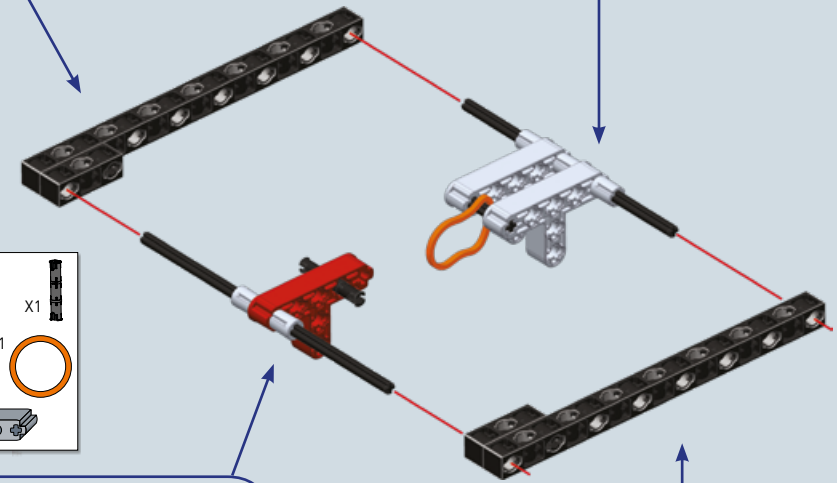


INTERACTIVE 3D INSTRUCTIONS IN THE MECHANICS LABORATORY APP

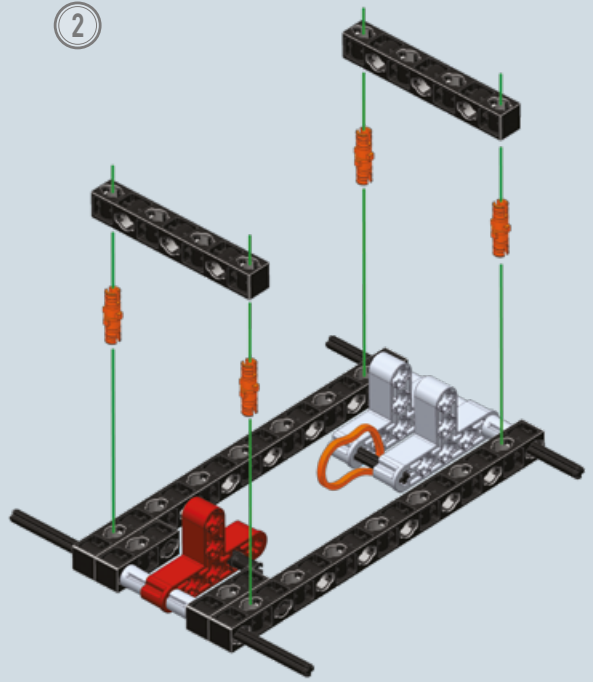


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- X2
- X2 X5 X2
- X1
- X1
- X1
- X1
- X1

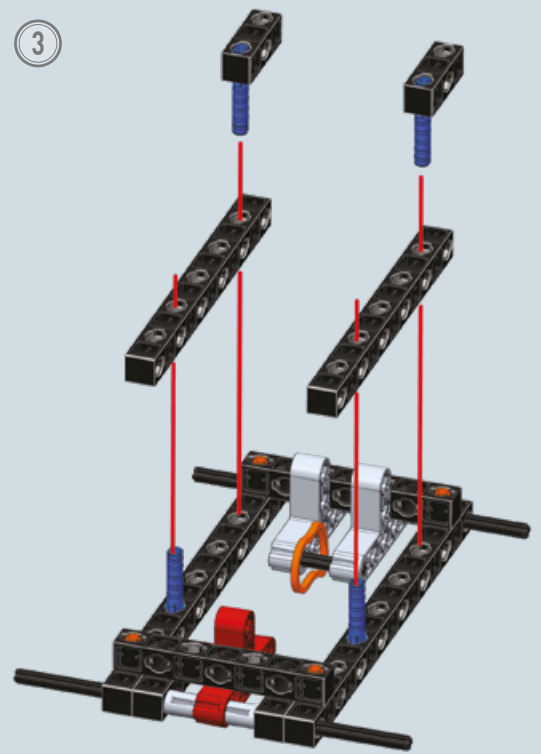


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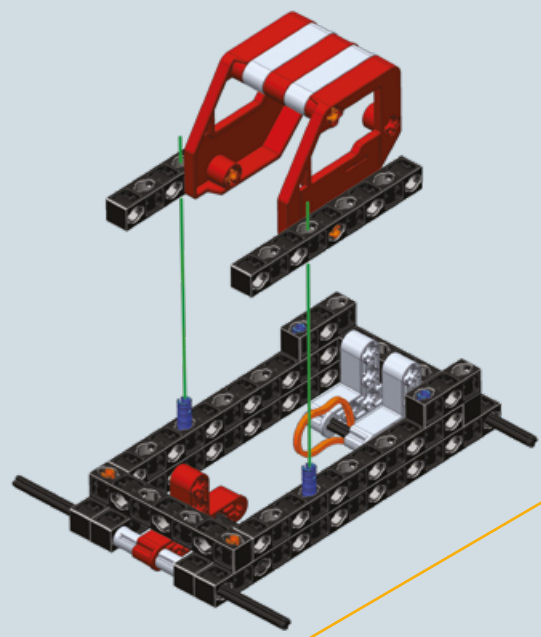
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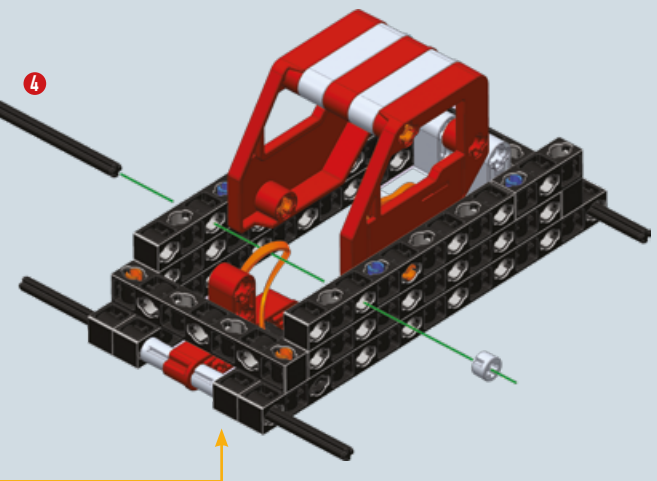
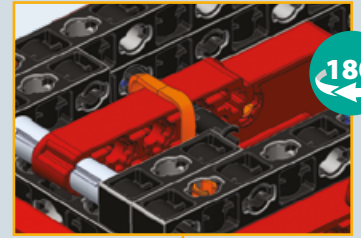
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- X4

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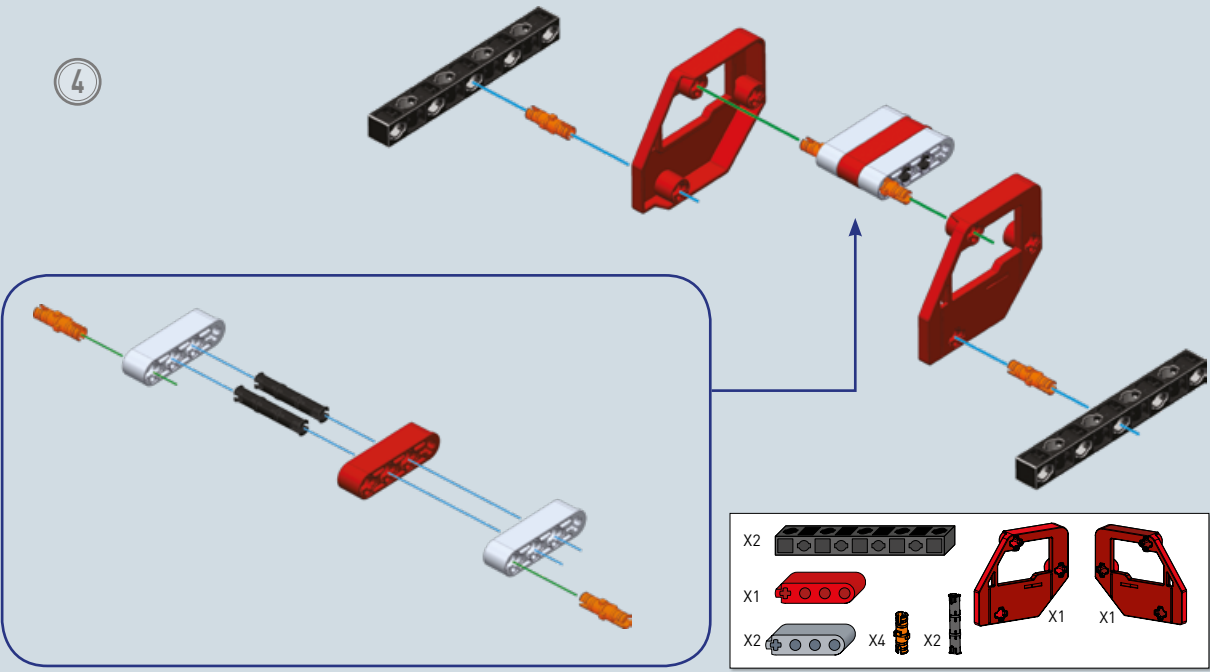


6

- X1
- X2
- X1

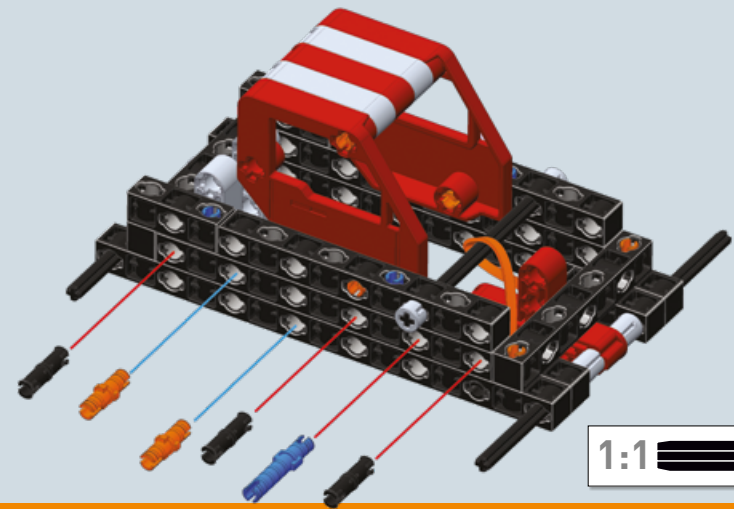


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- X2
- X1
- X2
- X4
- X2
- X1
- X1

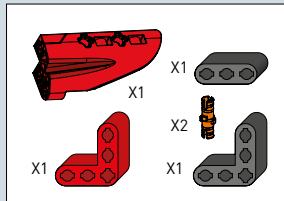
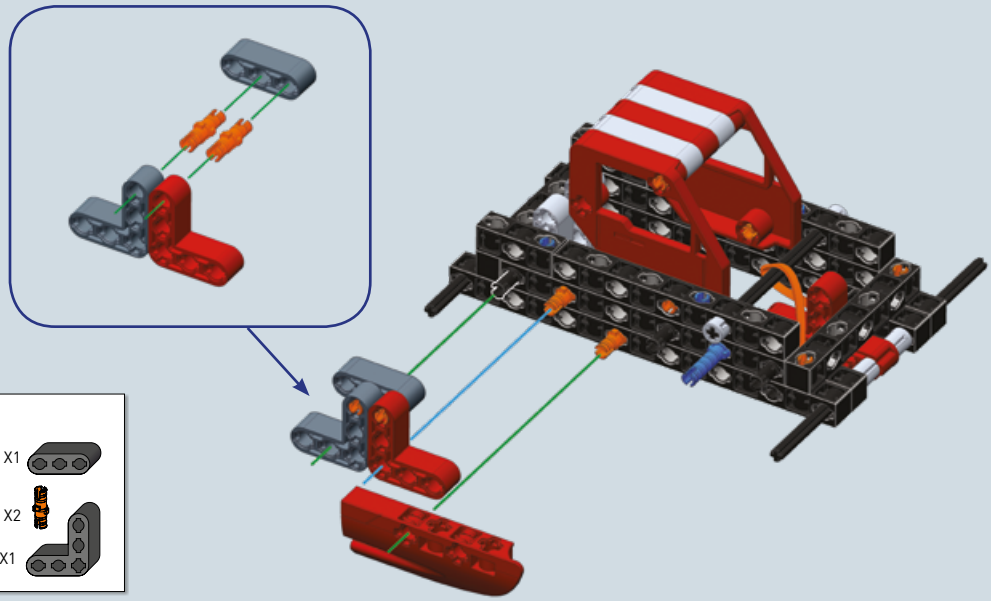
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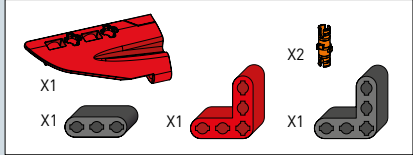
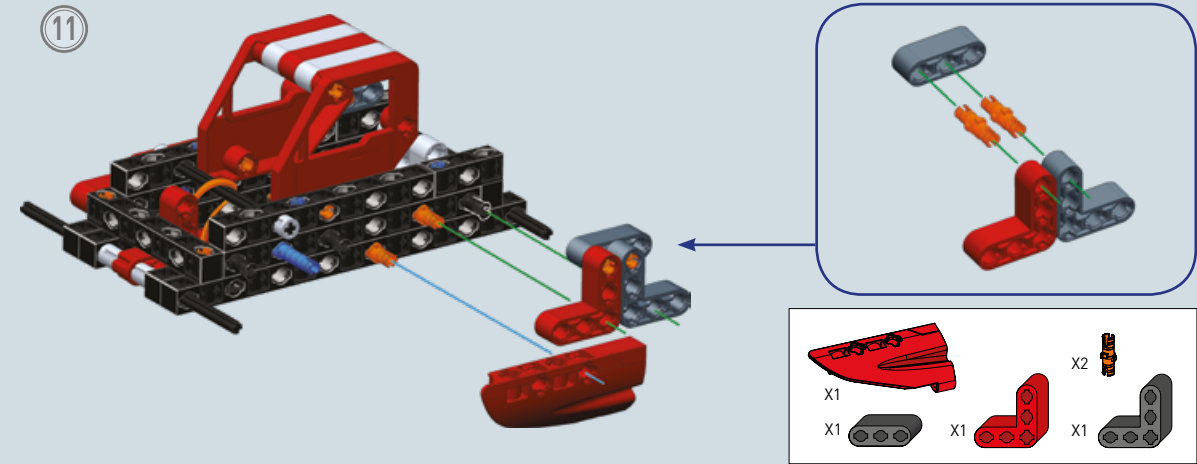
- X2
- X3
- X1

- 1:1

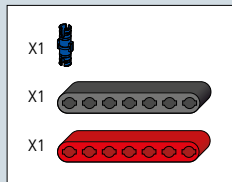
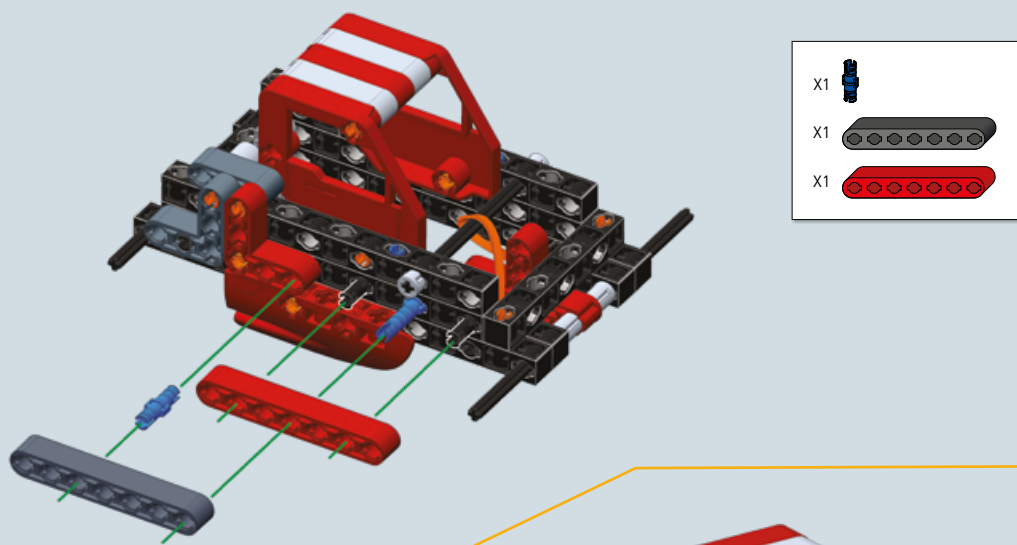
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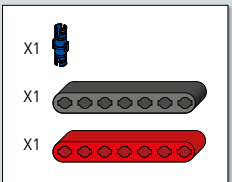
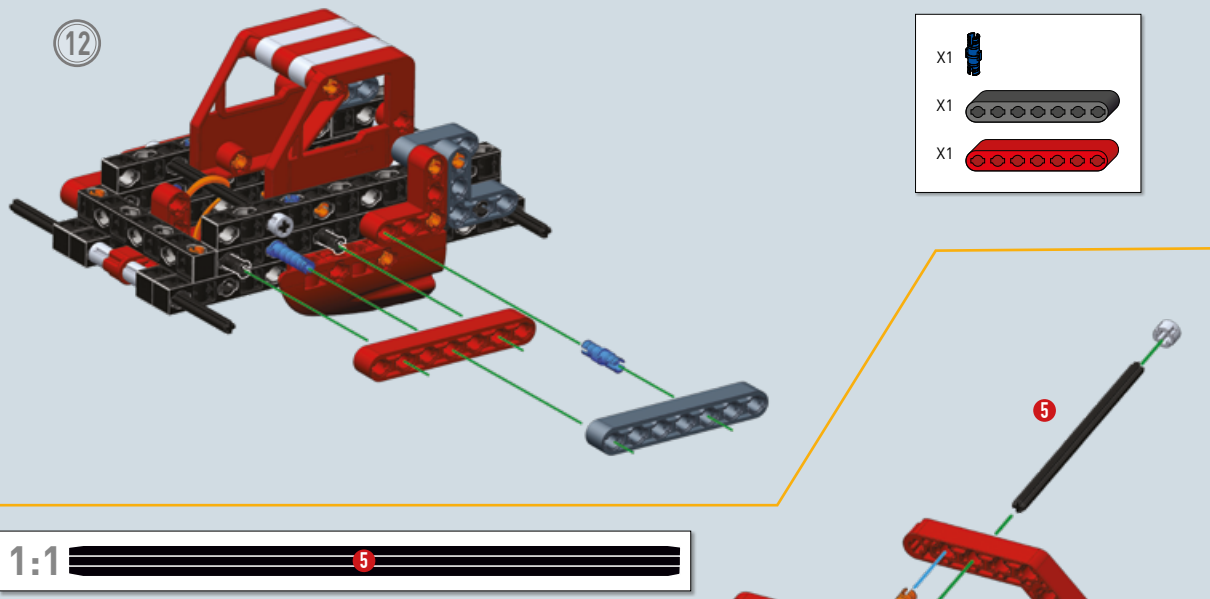
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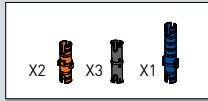
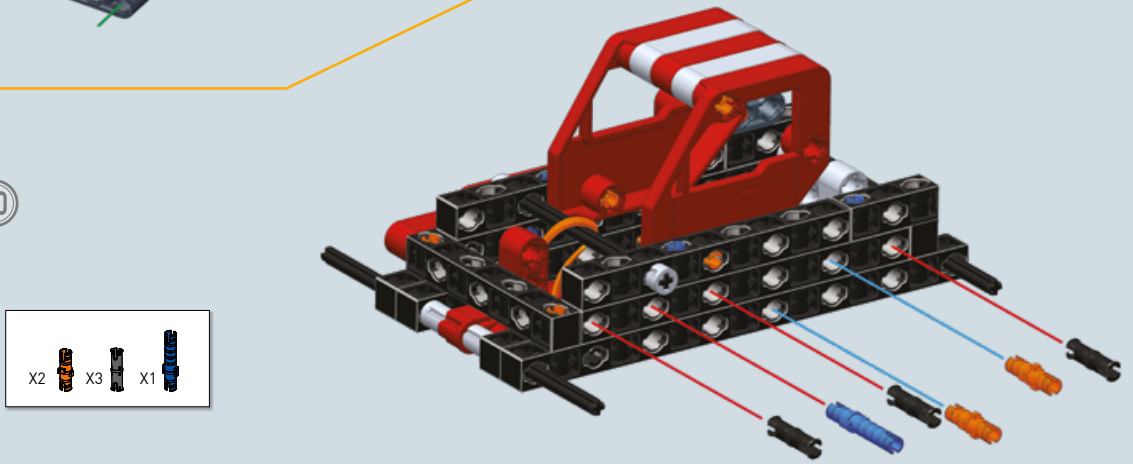
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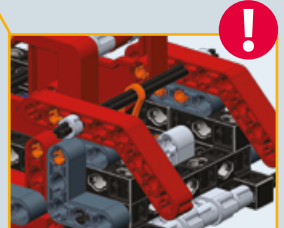
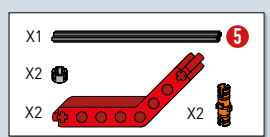
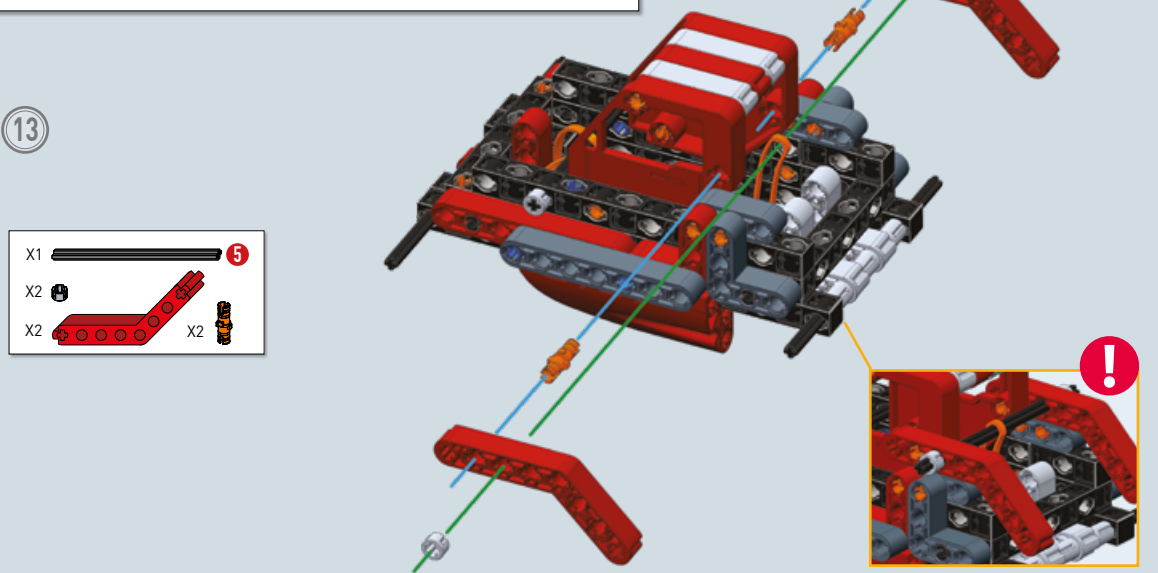
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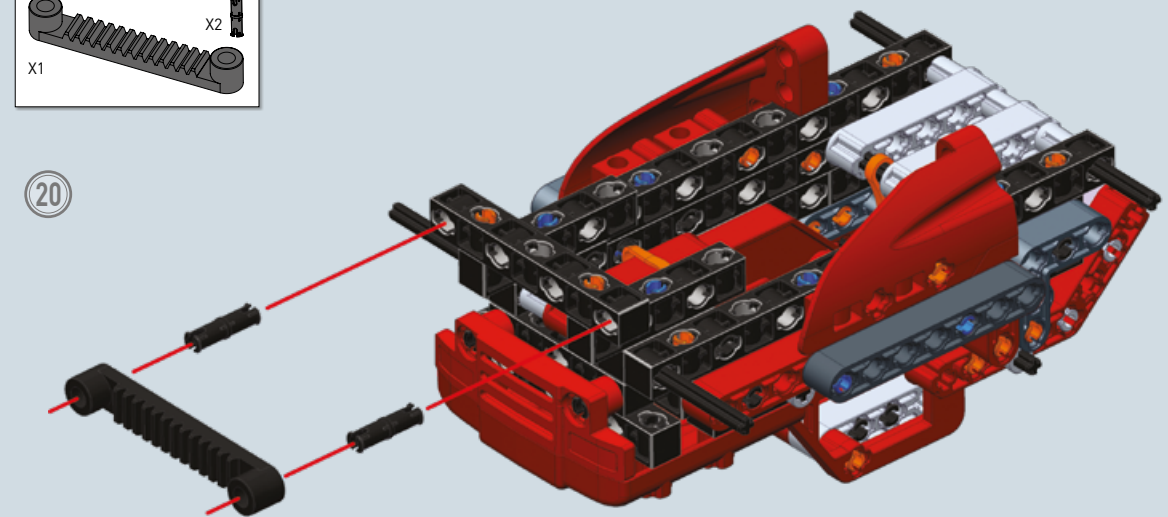
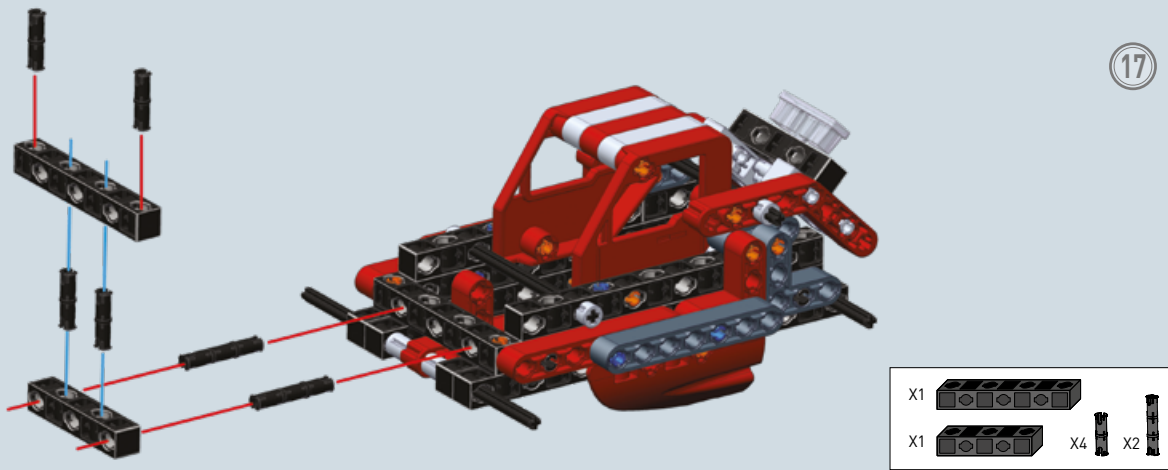
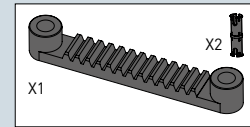
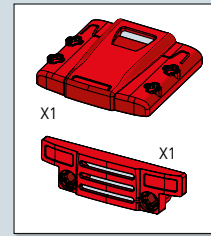
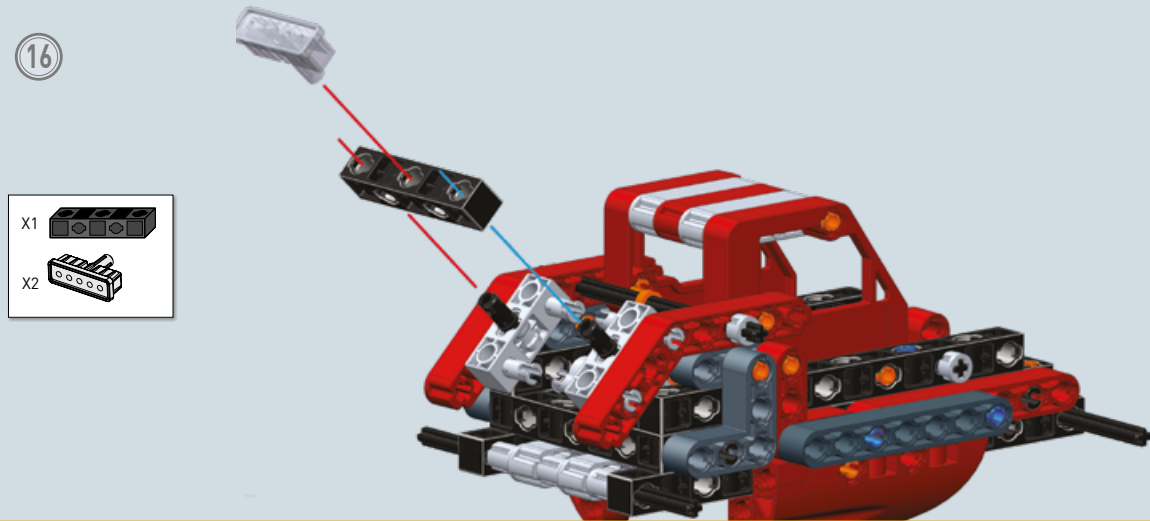
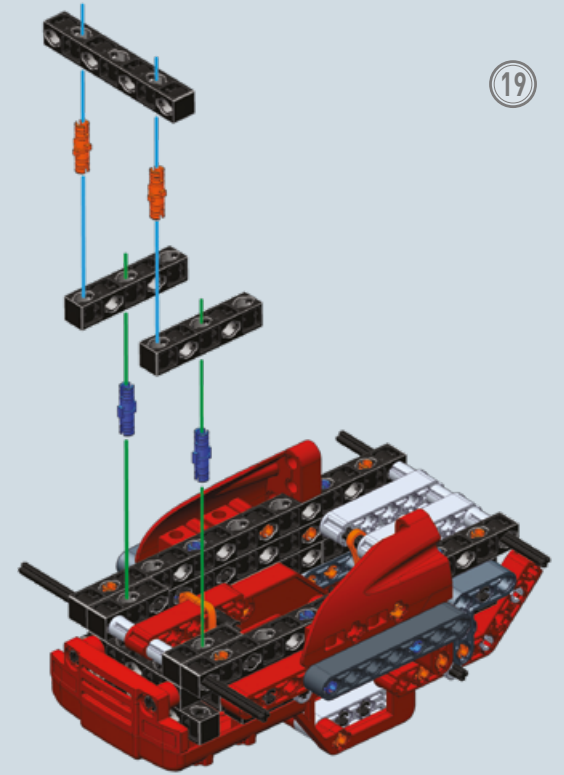
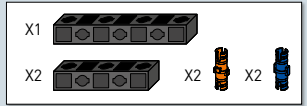
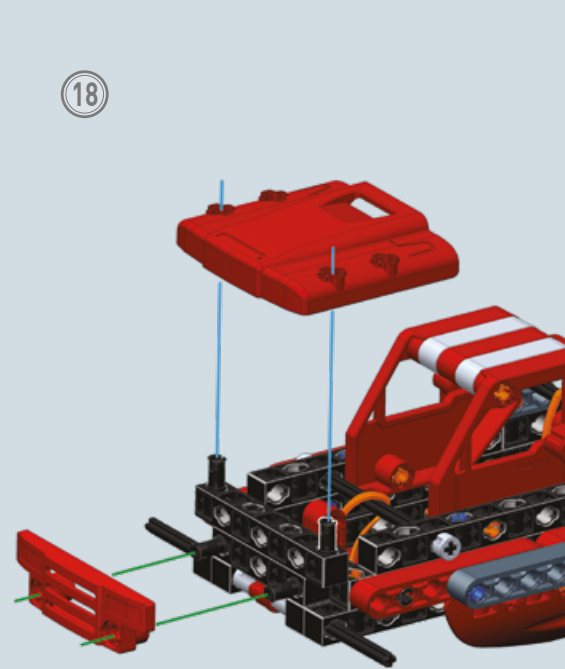
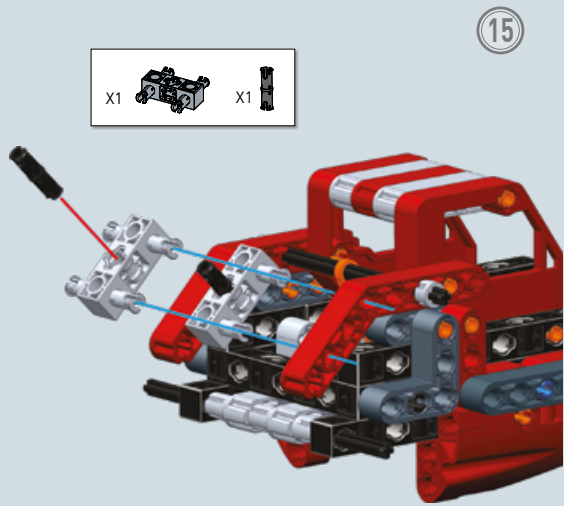
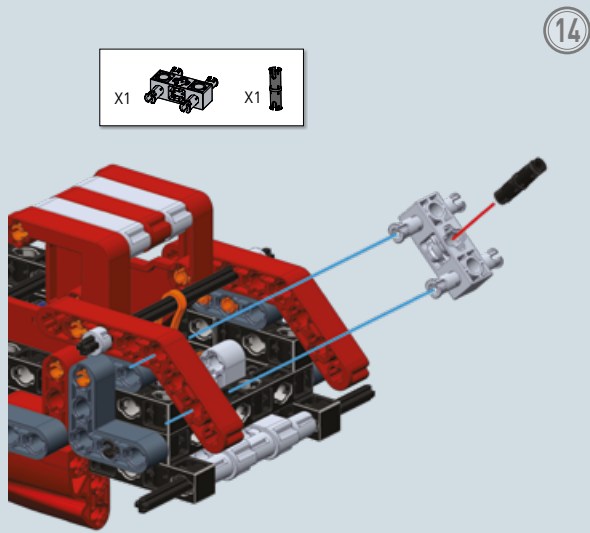


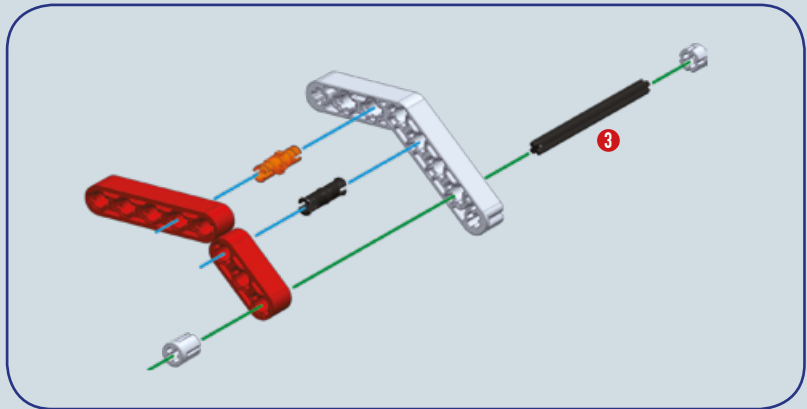
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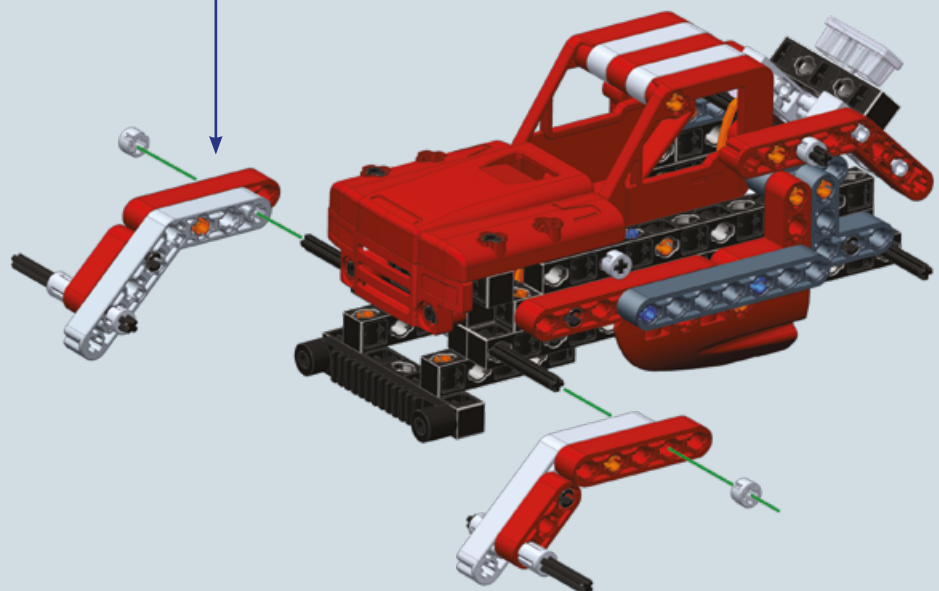
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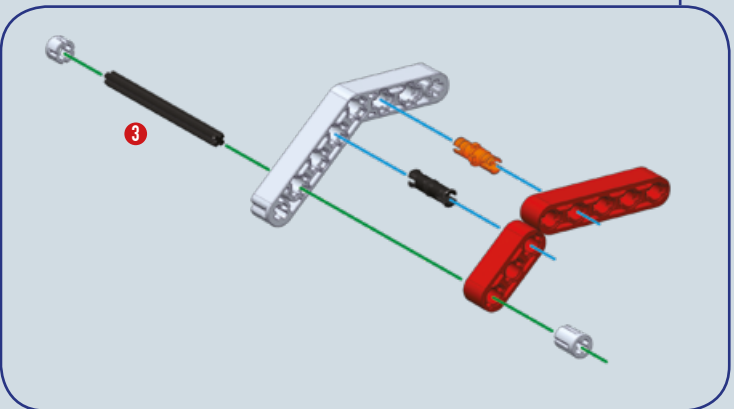




- X2
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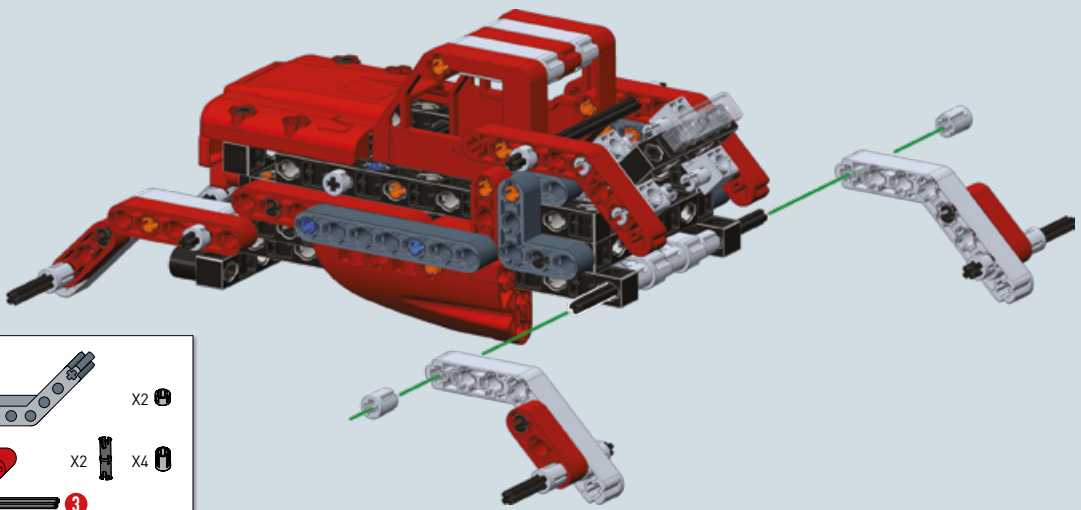


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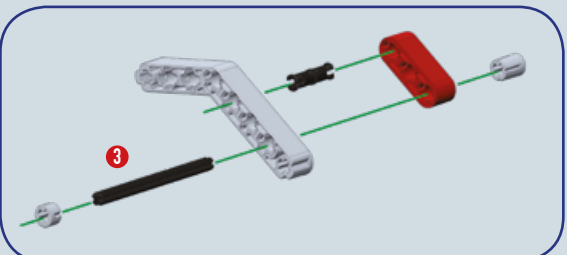
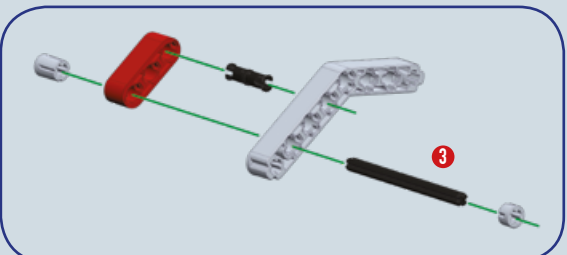


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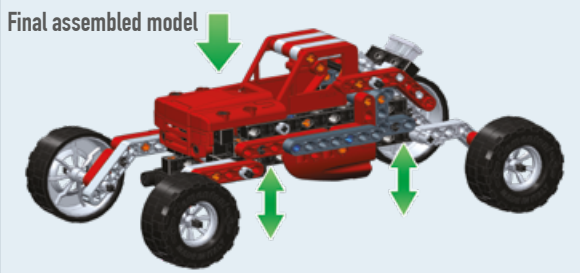


- X2
- X2
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- X2
- X2
- X4
- X2
- X2



1:1

23



- X4
- X4

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