

# 1

ciência  
e jogo

TECHNOLOGIC

# Laboratório de MECÂNICA

## MONSTER TRUCK

Construções de **1 a 3**

- 1 - Biela e pistão
- 2 - Monster truck
- 3 - Spider truck



V46597

Ler e conservar o manual  
para consultas futuras.

**Clementoni S.p.A.**  
Zona Industriale Fontenoce s.n.c.  
62019 Recanati (MC) - Italy  
Tel.: +39 071 75811  
[www.clementoni.com](http://www.clementoni.com)

**Filial em Portugal:  
Clementoni Portugal**

Edifício Alfacinha  
Rua Manuel da Silva Leal n.º 1C,  
escritório 2  
1600-166 Lisboa  
Telef.: +351 21 093 77 12

 **Clementoni**®

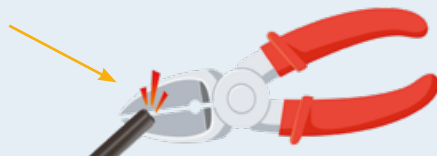
# LISTA DE PEÇAS

	Barra dupla 15 furos	2 pçs.		Anel curto	12 pçs.		Roda de 10 dentes	2 pçs.
	Barra dupla 11 furos	2 pçs.		Anel comprido	12 pçs.		Roda de 18 dentes	5 pçs.
	Barra dupla 9 furos	2 pçs.		Parafuso sem-fim	1 pç.		Roda de 26 dentes	1 pç.
	Barra dupla 7 furos	4 pçs.		Caixa porta-satélites	1 pç.		Roda de 41 dentes	1 pç.
	Barra dupla 5 furos	4 pçs.		Roda de 32 dentes	1 pç.		Módulo de transmissão	1 pç.
	Barra dupla 3 furos	4 pçs.		Roda de 24 dentes	1 pç.		Haste 7 c. 9,9 cm	1 pç.
	Barra simples 7 furos	2 pçs.		Roda de 12 dentes	9 pçs.		Haste 6 c. cm. 11,7	1 pç.
	Barra simples 5 furos	2 pçs.		Cavilha curta dupla	32 pçs.		Haste 5 c. cm. 8,1	1 pç.
	Barra simples 3 furos	2 pçs.		Cavilha curta simples	8 pçs.		Haste 4 c. cm. 7,2	1 pç.
	Módulo de canto alto	2 pçs.		Cavilha curta livre	32 pçs.		Haste 3 c. cm. 5,4	5 pçs.
	Módulo de canto baixo	2 pçs.		Cavilha comprida dupla	8 pçs.		Haste 2 c. cm. 3,6	2 pçs.
	Barra simples 7 furos	4 pçs.		Cavilha comprida livre	16 pçs.		Haste 1 c. cm. 2,7	1 pç.
	Barra simples 5 furos	4 pçs.		Barra com cavilhas	2 pçs.		Junta cardan	2 pçs.
	Barra simples 3 furos	4 pçs.		Barra com pernos	4 pçs.		Elástico	2 pçs.
	Módulo de canto alto	4 pçs.		Gancho	1 pç.		Farol retangular	2 pçs.
	Módulo de canto baixo	4 pçs.		Manivela	2 pçs.		Farol redondo	2 pçs.
	Barra de 4 furos	1 pç.		Cremalheira	1 pç.		Sirene	1 pç.
	Barra em T	1 pç.		Haste parafuso	2 pçs.		Painel O dto.	1 pç.
	Barra de canto	2 pçs.		Jante	4 pçs.		Painel O esq.	1 pç.
	Barra de 4 furos	2 pçs.					Painel P	1 pç.
	Barra em T	2 pçs.					Painel Q	1 pç.
	Barra de canto	4 pçs.					Painel E dto.	1 pç.
							Painel E esq.	1 pç.
							Pneu	4 pçs.

**N.B.:** pede a um adulto para remover as peças dos suportes de plástico. Os resíduos afiados devem ser imediatamente eliminados.



**PEDE AJUDA A UM ADULTO!**

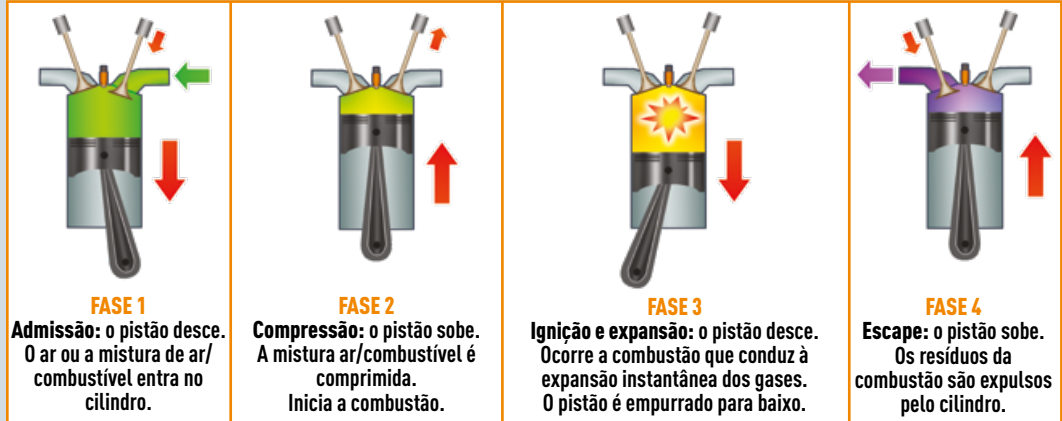


# Motor de combustão interna

O motor de combustão interna é uma máquina capaz de transformar a energia química em potência mecânica. Para gerar a potência mecânica, precisamos de:

- **Combustível:** gás, gasolina ou gasóleo
- **Comburente:** oxigénio
- **Câmara de combustão:** o corpo metálico do motor onde ocorre a reação

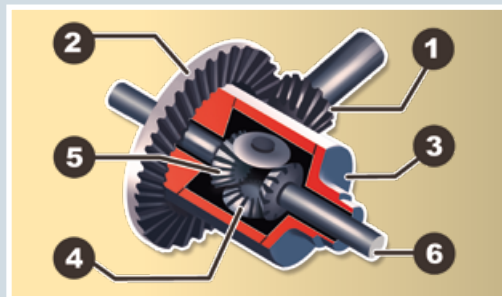
Como funciona? As fases que permitem a combustão são 4:



A cada ciclo correspondem duas rotações do eixo do motor, que conseqüentemente transmite o movimento aos outros órgãos mecânicos do veículo.

## Diferencial

Em mecânica, o diferencial é um órgão que permite transferir a potência desenvolvida do motor para o binário das rodas motrizes.



1. **Pinhão:** transfere a potência do motor para a coroa e, finalmente, para as rodas motrizes.
2. **Coroa:** ligada à caixa porta-satélites, está firmemente acoplada ao pinhão.
3. **Caixa porta-satélites:** é a caixa que reúne as engrenagens.
4. **Satélites:** engrenagens ligadas à caixa.
5. **Planetários:** engrenagens ligadas aos semieixos.
6. **Semieixos:** eixo que liga as rodas motrizes aos planetários.

### O diferencial autoblocante

Nos veículos todo-o-terreno, é montado um diferencial autoblocante. A ação do diferencial pode ser uma desvantagem se uma das duas rodas perder aderência: neste caso, a roda com maior apoio tende a ficar parada, enquanto a outra derrapa. Graças a mecanismos controlados eletronicamente, o diferencial autoblocante permite distribuir a potência do motor pelas duas rodas em partes iguais, aumentando assim a força motriz em situações de pouca aderência.



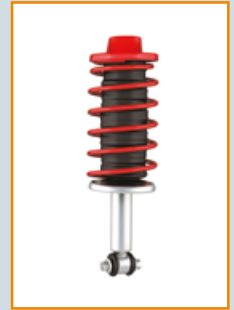
## Suspensões e amortecedores

Todos os veículos comercializados atualmente possuem um sistema de suspensões que garante o máximo conforto possível durante a viagem. Na verdade, sem as suspensões, todas as oscilações sentidas nas rodas seriam transmitidas diretamente para o habitáculo e o condutor teria sérias dificuldades em controlar o veículo.



Geralmente, os termos **suspensão** e **amortecedor** são utilizados indevidamente. Com efeito, existe uma nítida diferença entre ambos:

- As suspensões, como já referido, ligam as partes não suspensas (rodas) às partes suspensas (habitáculo, motor, etc.) através de componentes elásticos que garantem o conforto dos passageiros. Na imagem ao lado, a mola e a guia interna (em preto) compõem a suspensão.
- Os amortecedores, por sua vez, são componentes associados às suspensões que abrandam o movimento das próprias suspensões. Se comprimirmos a mola, esta regressa ao seu estado inicial de forma brusca, inviabilizando assim a função das suspensões. Através de sistemas por fricção, gás ou fluido, os amortecedores garantem um retorno mais suave da mola ao seu estado inicial.

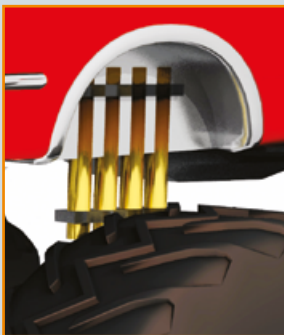


## Monster truck

Pneus gigantes, tração integral às 4 rodas, suspensões com capacidade para suportar aterragens de alturas vertiginosas e motores potentes. O Monster Truck é um veículo extremo, capaz de proporcionar emoções fortes tanto aos condutores como ao público que assiste aos espetáculos.



Analisemos as características técnicas de um Monster Truck:



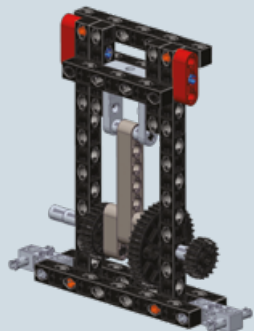
- **PNEUS:** com uma altura máxima de 1,60 m, podem pesar até 400 kg
- **AMORTECEDORES:** cada roda está ligada a um sistema de suspensões equipado com 4 amortecedores a gás (imagem ao lado).
- **RODAS:** todas as 4 rodas são direcionais para permitir que o veículo faça as curvas em espaços confinados.
- **DIFERENCIAL:** o diferencial autoblocante transfere a potência do motor para todas as 4 rodas. Este tipo de diferencial permite que o veículo acelere mesmo que apenas uma única roda toque no chão.
- **MOTOR:** é montado no centro para estabilizar o veículo. Utiliza combustíveis específicos para desenvolver potências incríveis, semelhantes às de um dragster.
- **CHASSIS:** extremamente resistente, é composto por tubos de aço que protegem o piloto.
- **CARROÇARIA:** ultraleve e flexível. Pode ser obtida a partir de carroçarias comuns de automóveis usados, para caracterizar melhor o veículo.



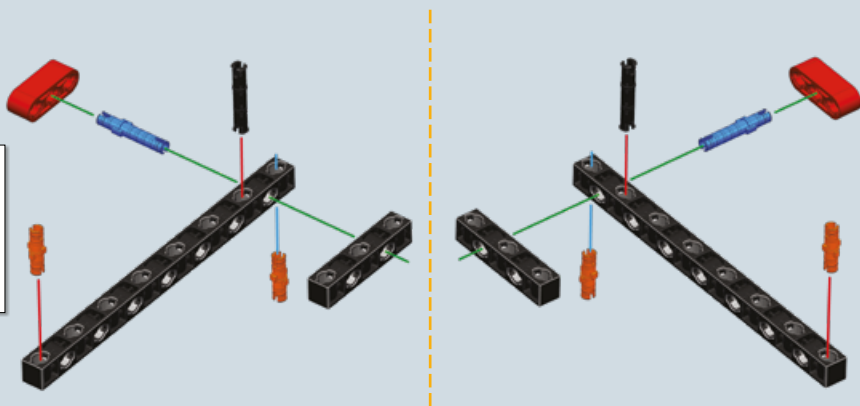
# 1 Biela e pistão



INSTRUÇÕES 3D INTERATIVAS NA APLICAÇÃO  
LABORATÓRIO DE MECÂNICA

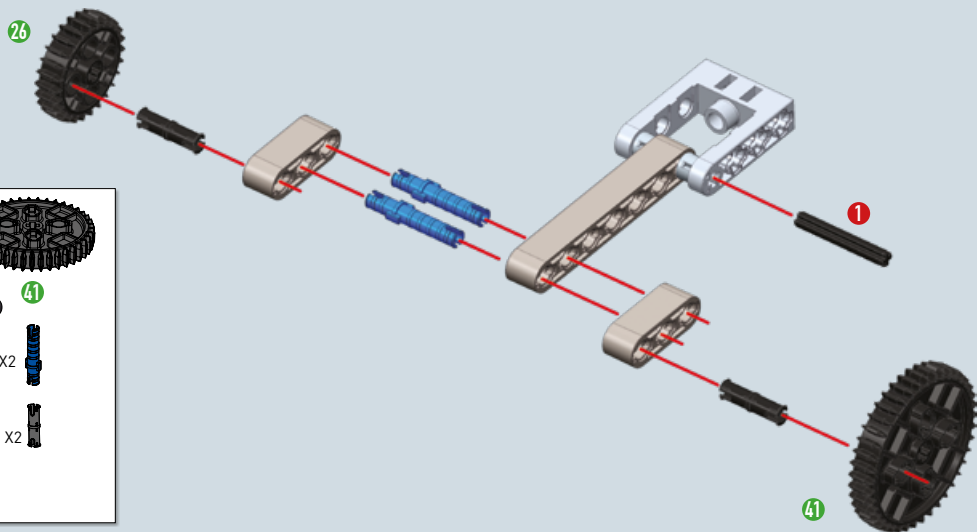


1



- X2
- X2 X2
- X4 X2 X2

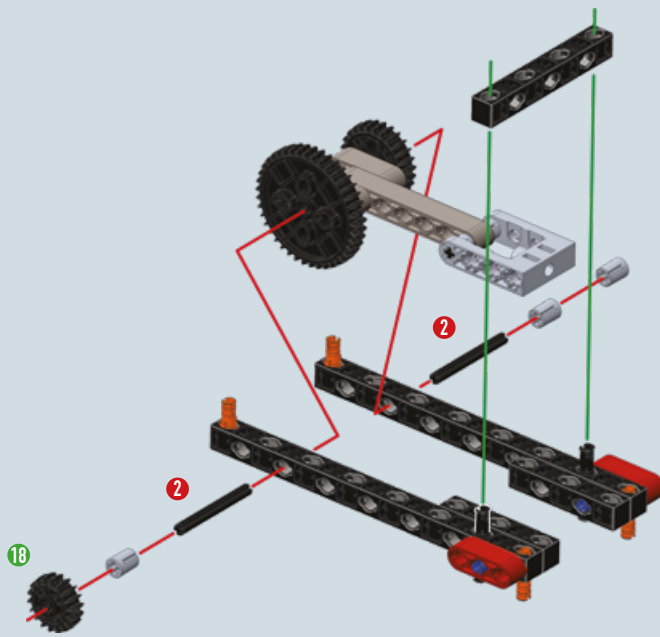
2



- X1 X1
- X1
- X2 X2 X2
- X1
- X2
- X1



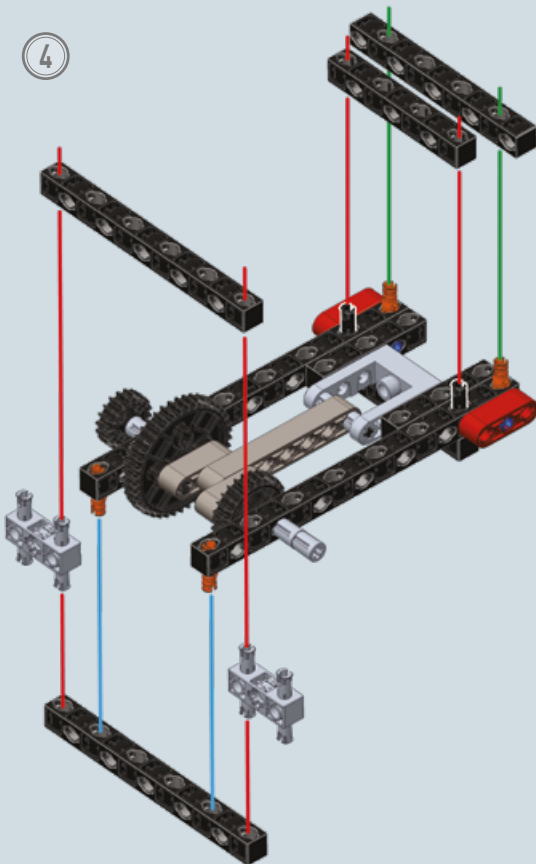
3



X1		X1	
X2		X3	
	<b>2</b>		<b>18</b>

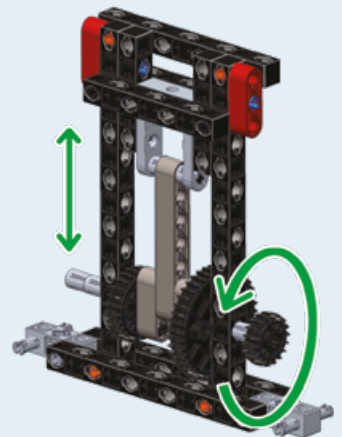
1:1

4



X2	
X1	
X1	
X2	

Modelo final



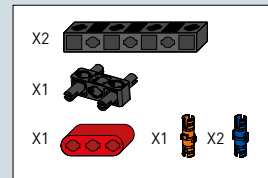
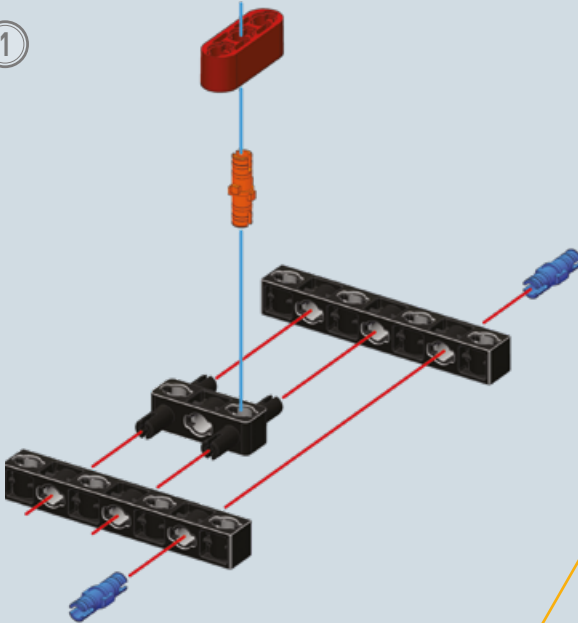
## 2 Monster Truck



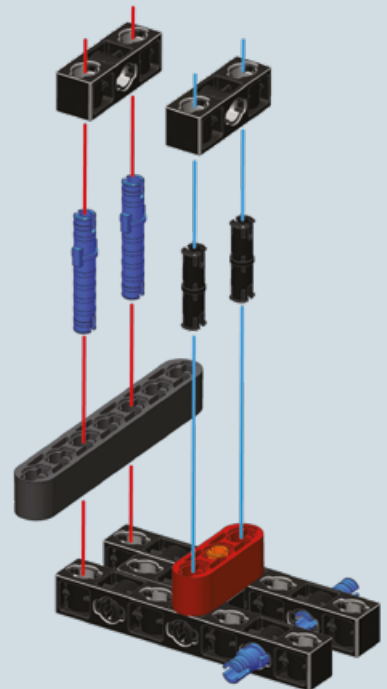
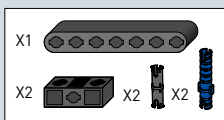
INSTRUÇÕES 3D INTERATIVAS NA APLICAÇÃO  
LABORATÓRIO DE MECÂNICA

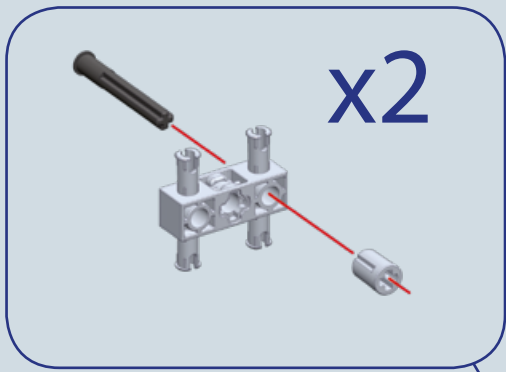


1

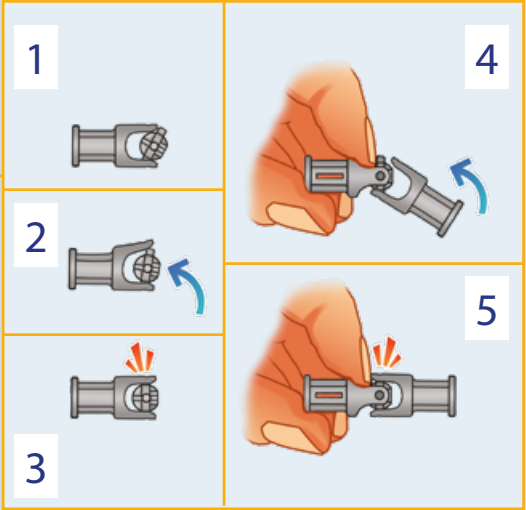
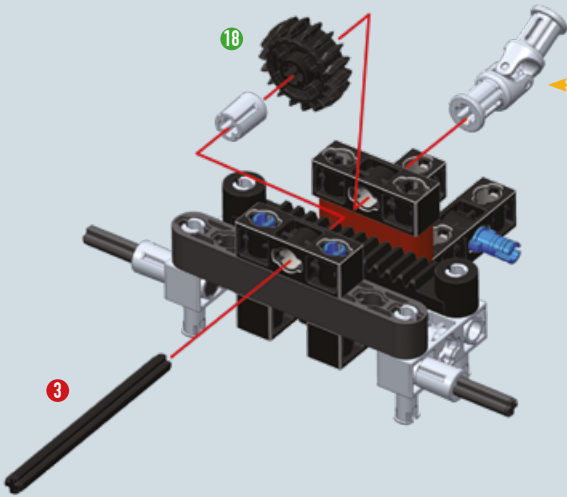
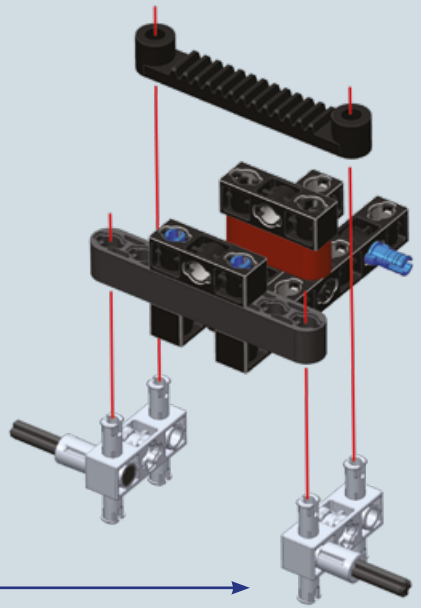
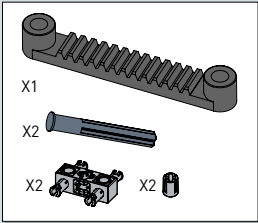


2

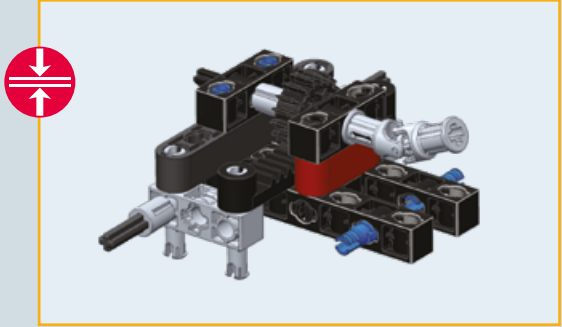
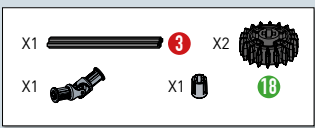




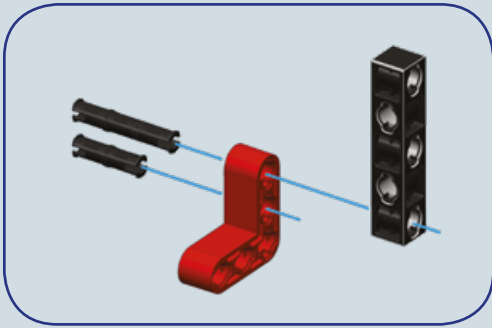
3



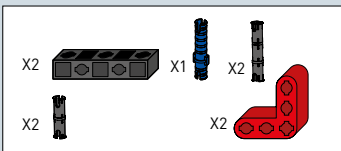
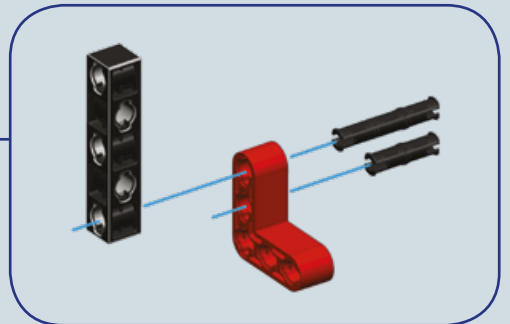
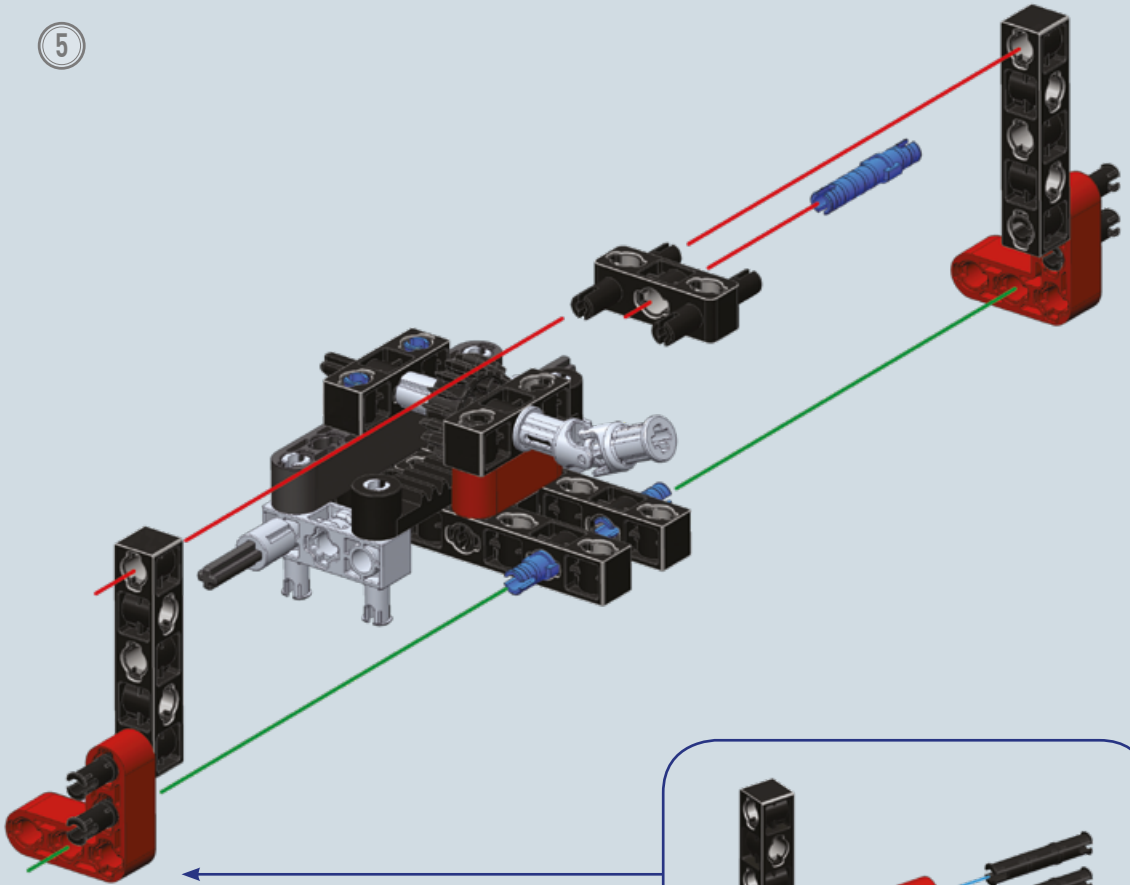
4



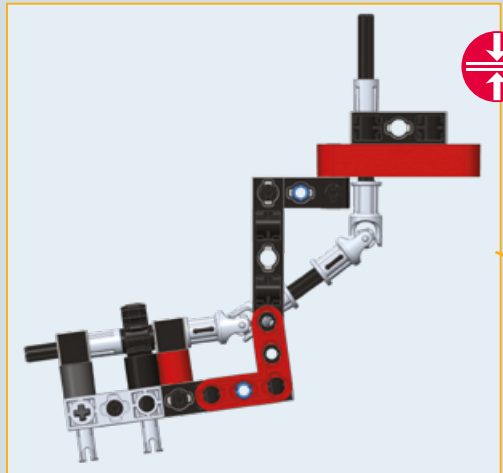
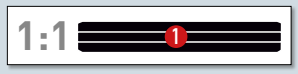
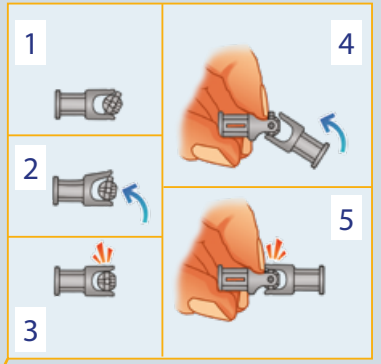
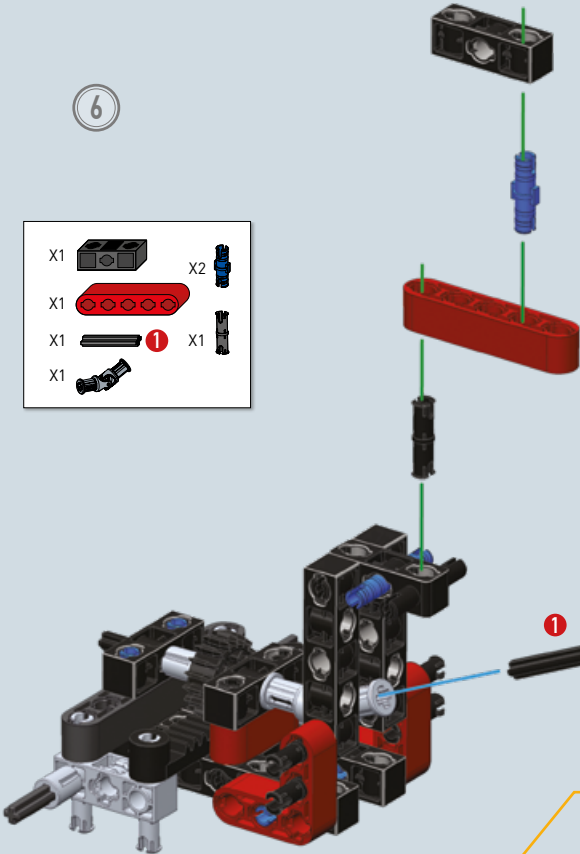
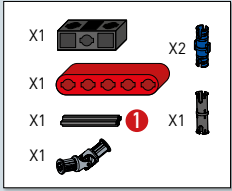




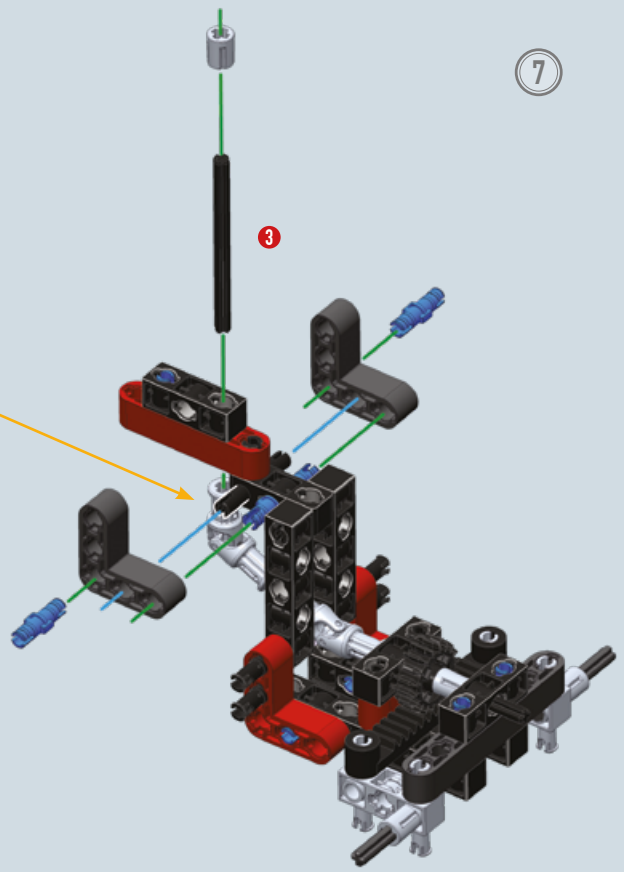
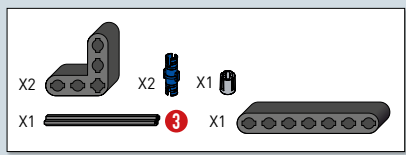
5



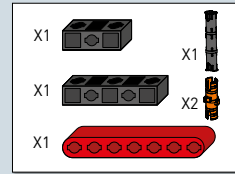
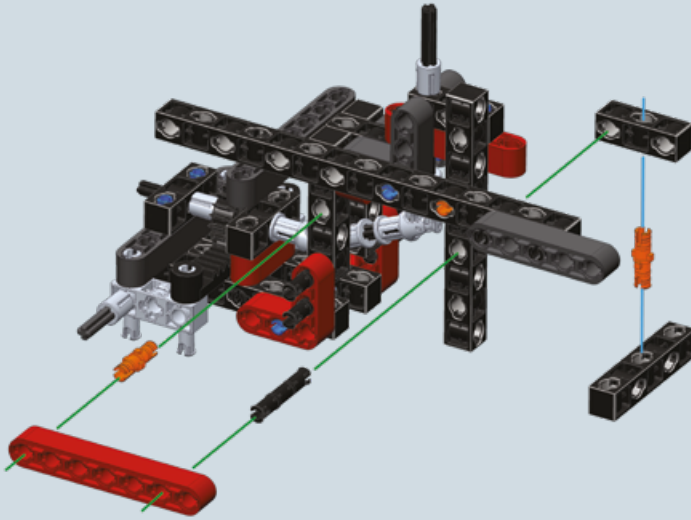
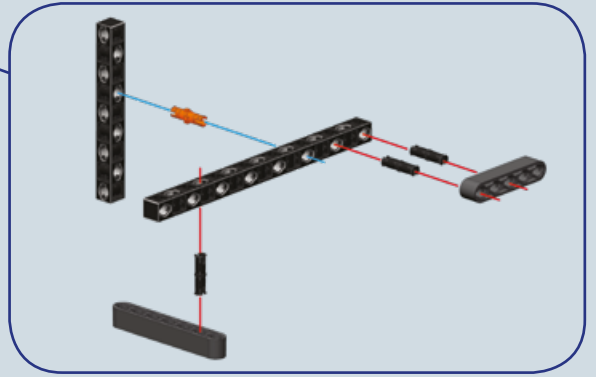
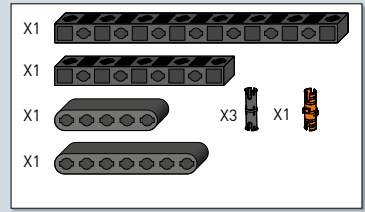
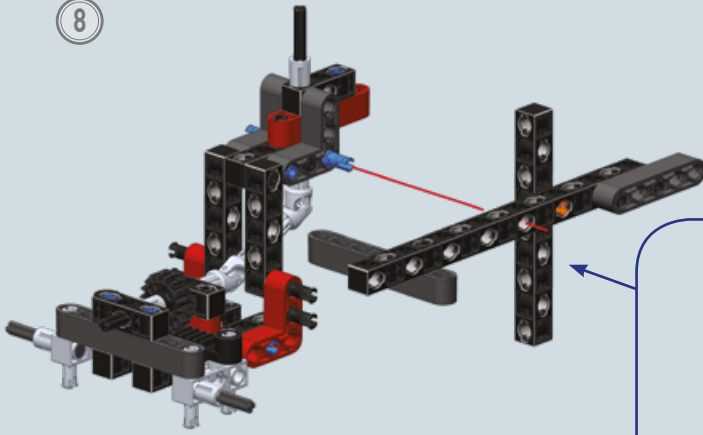
6



7

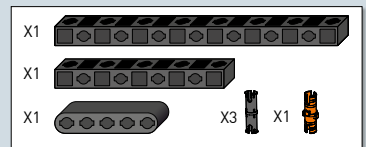
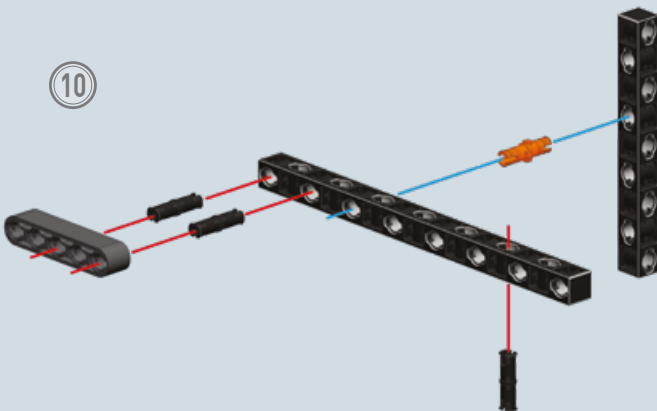


8

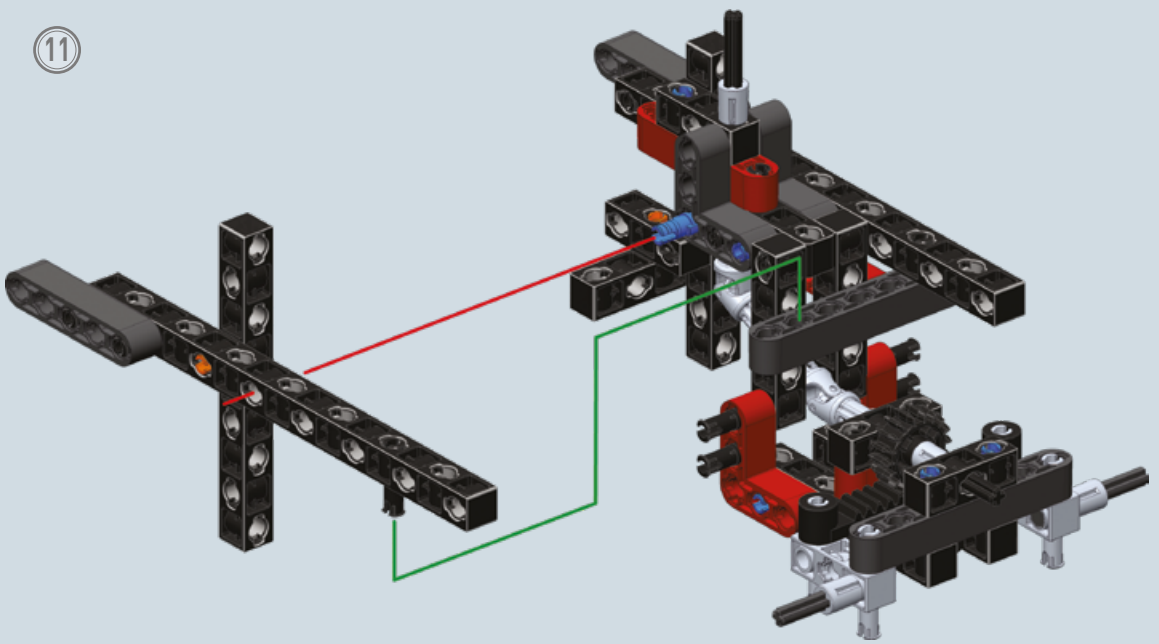


9

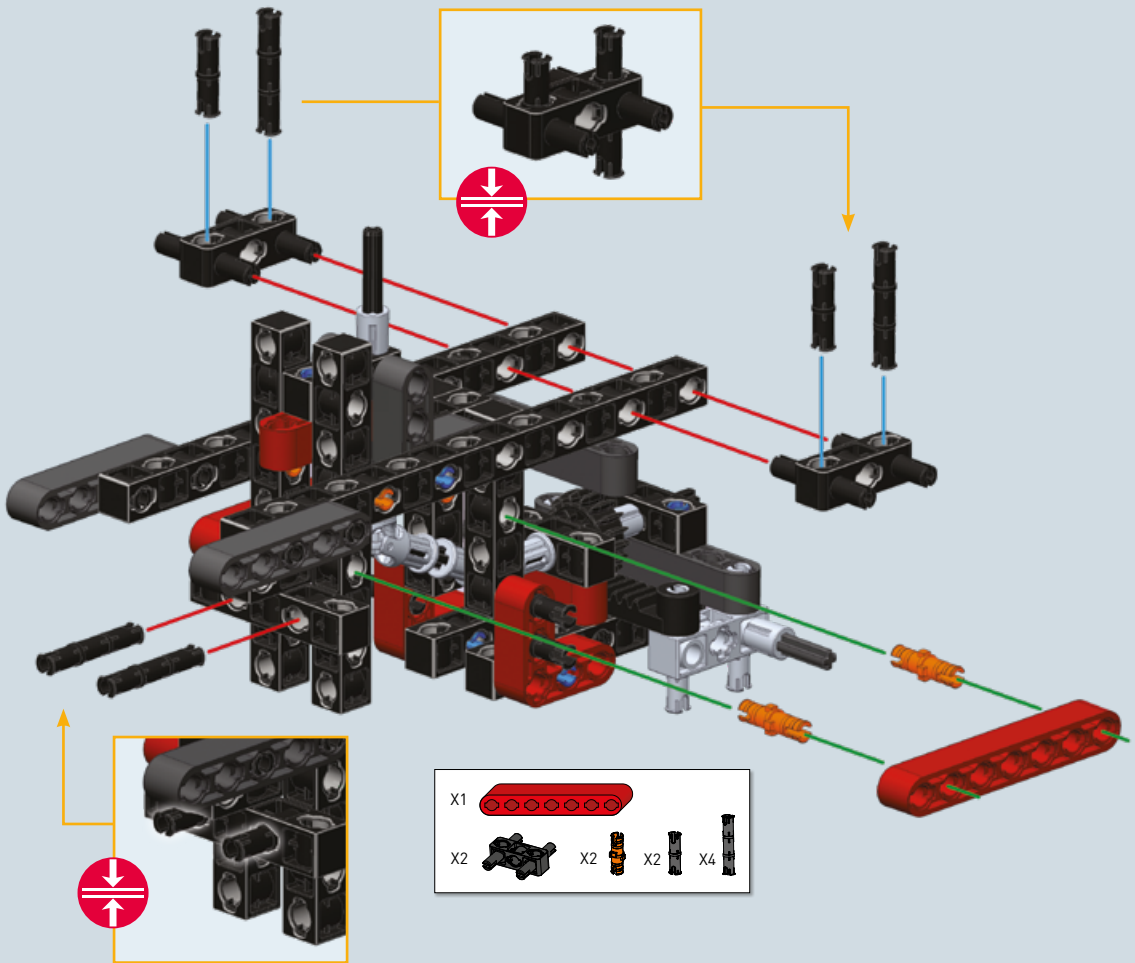
10



11



12



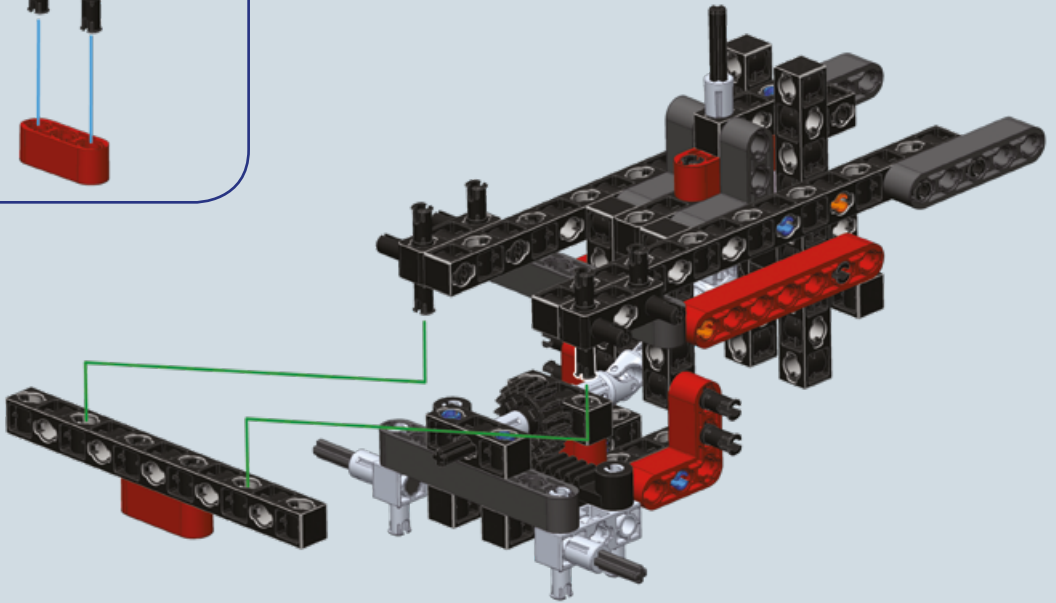
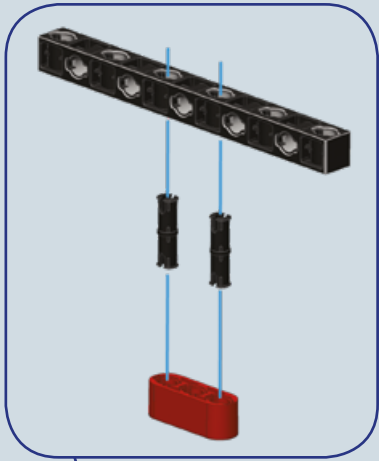
- X1
- X2
- X2
- X2
- X4



13

X1 

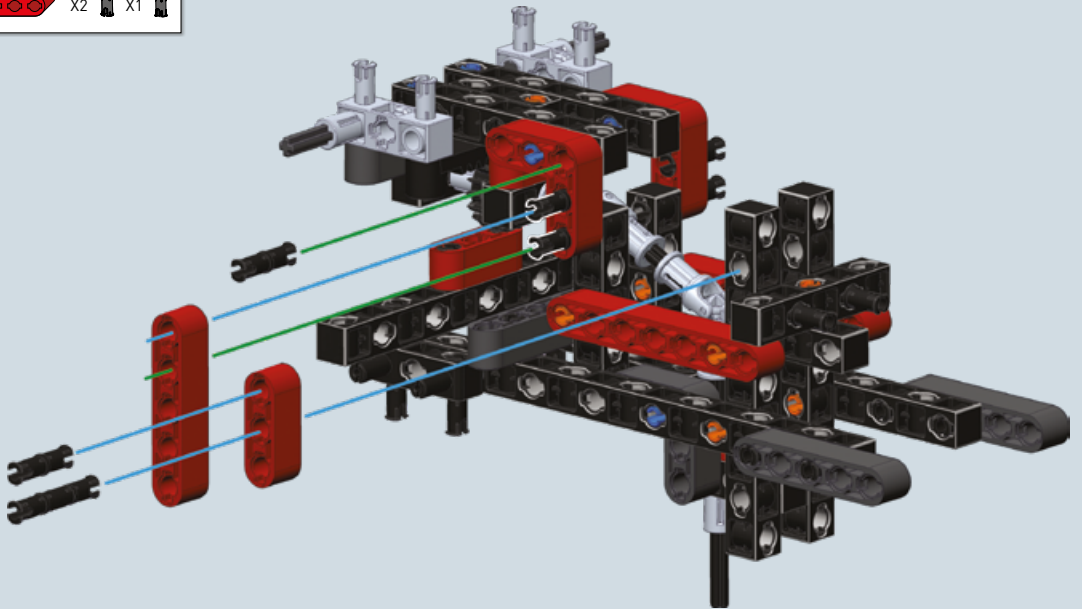
X1  X2 



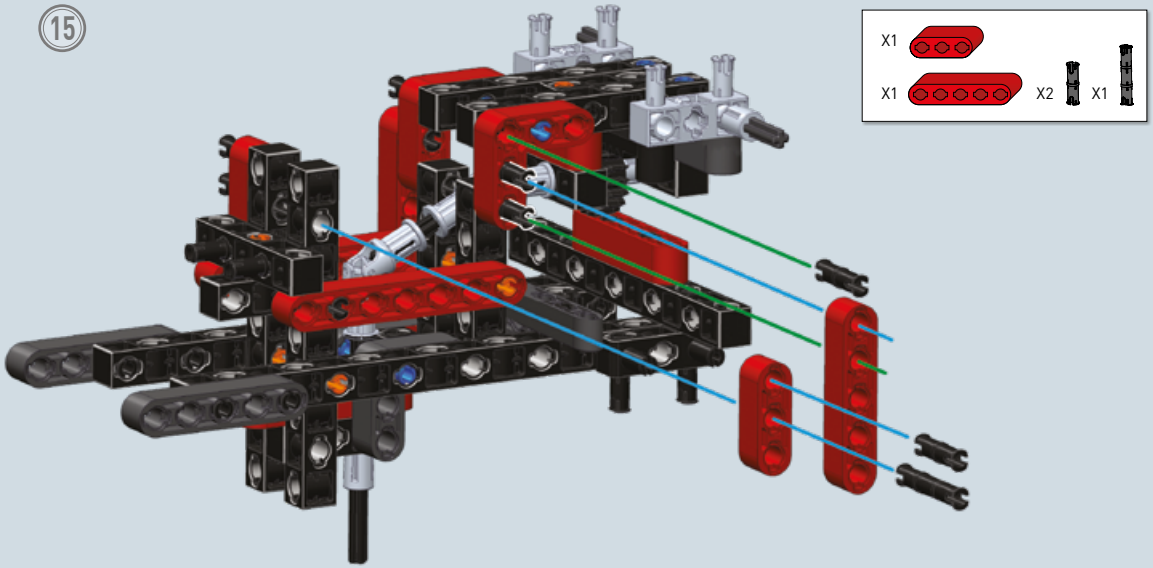
X1 

X1  X2  X1 

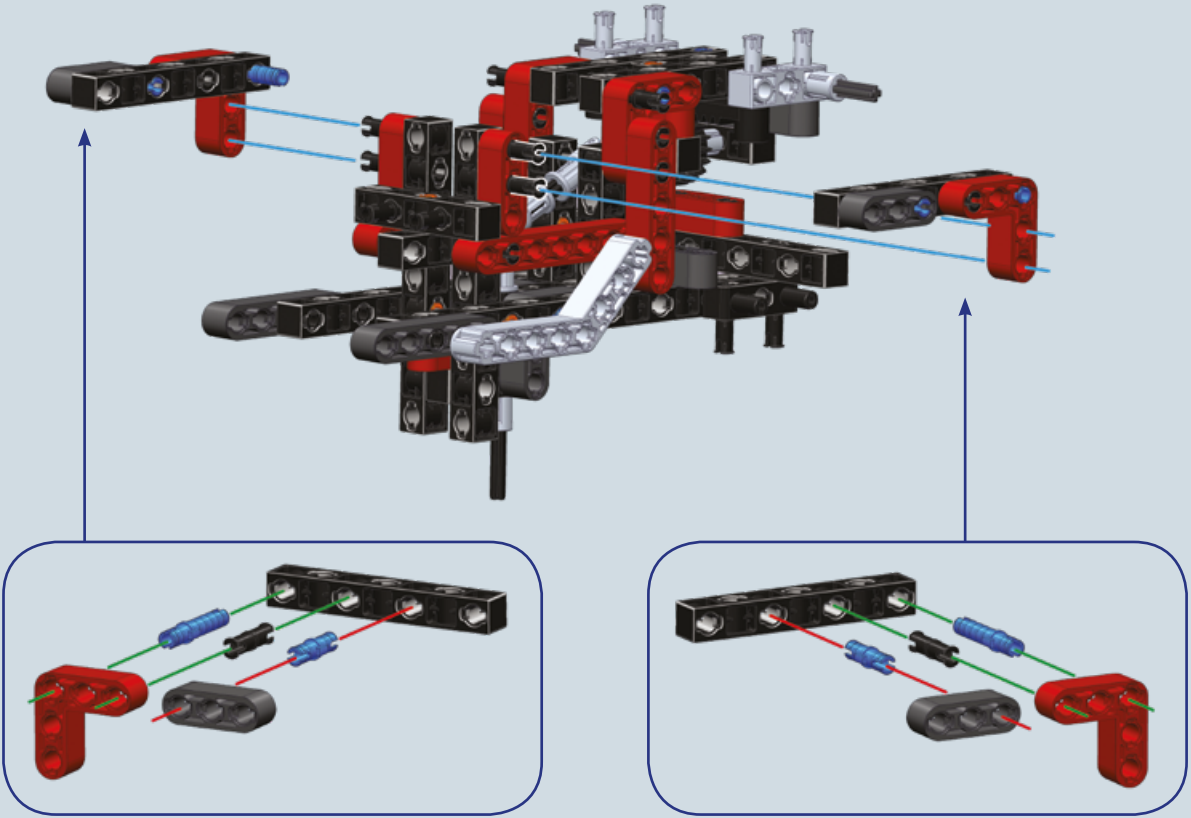
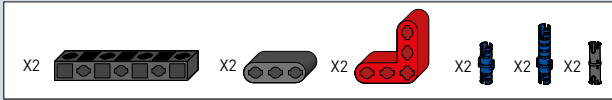
14



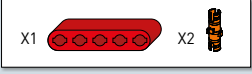
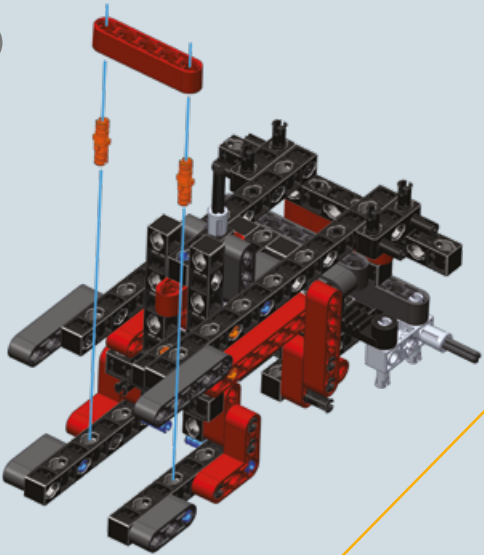
15



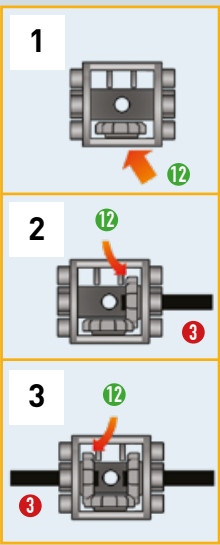
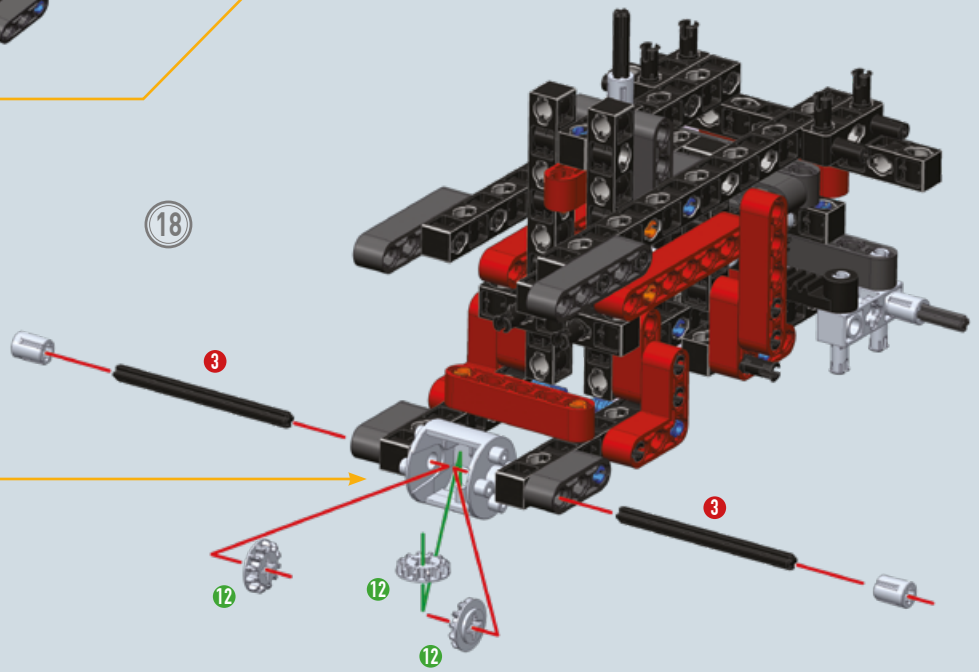
16



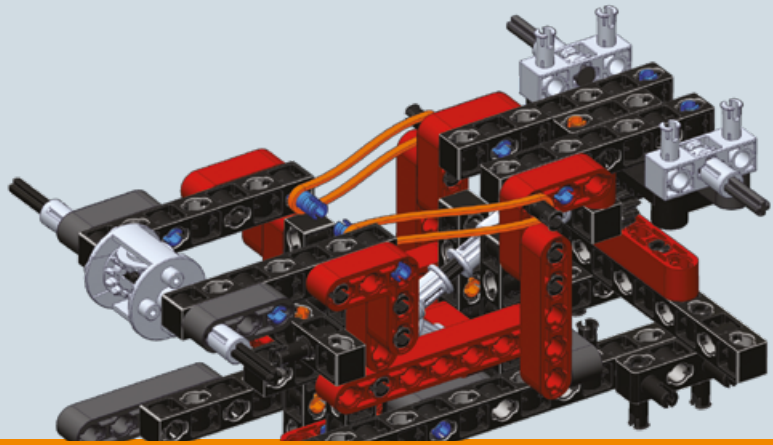
17



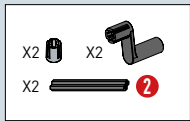
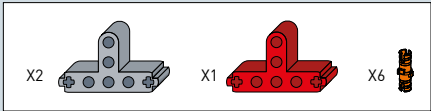
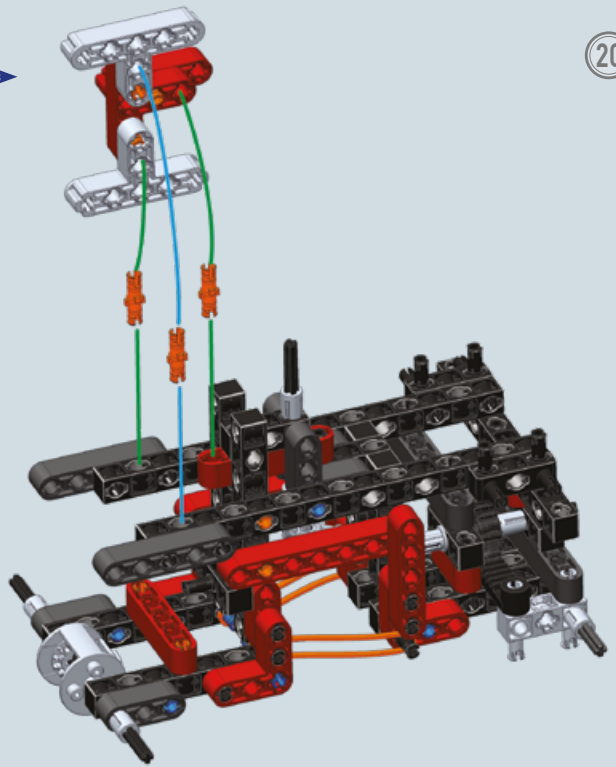
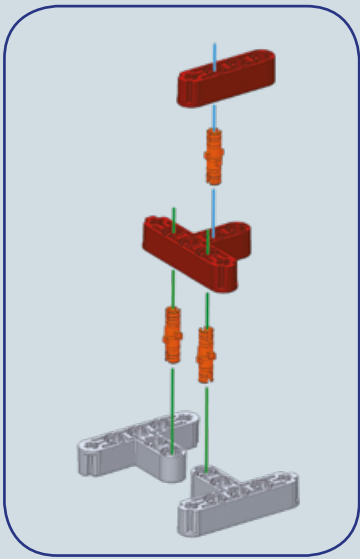
18



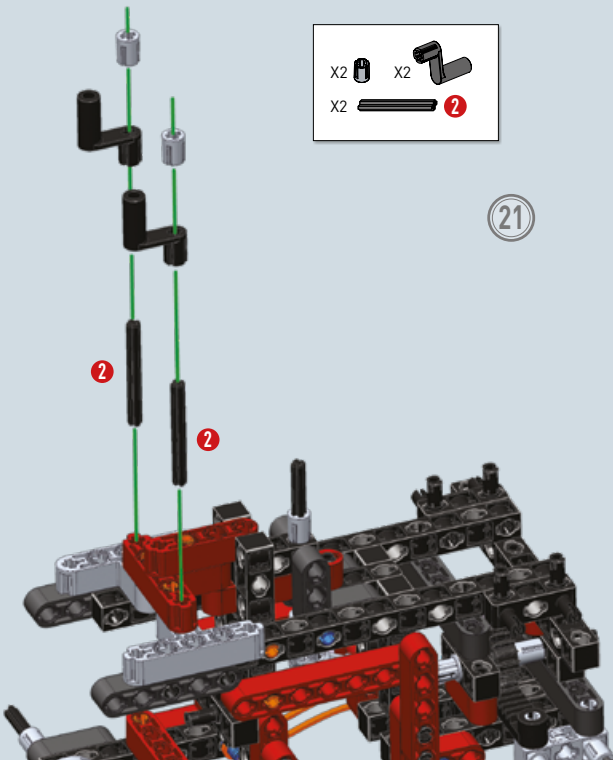
19



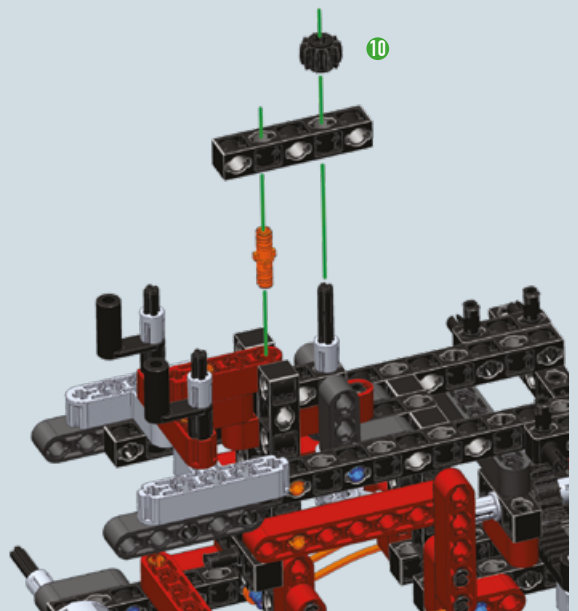
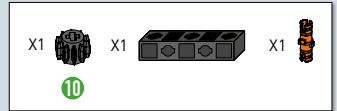
20



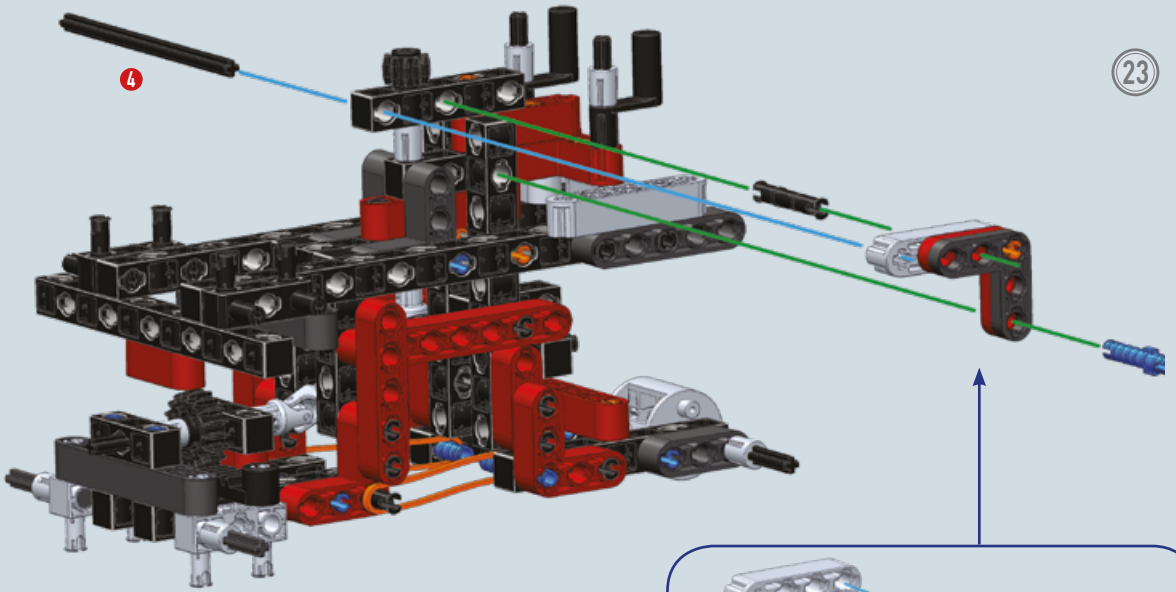
21



22

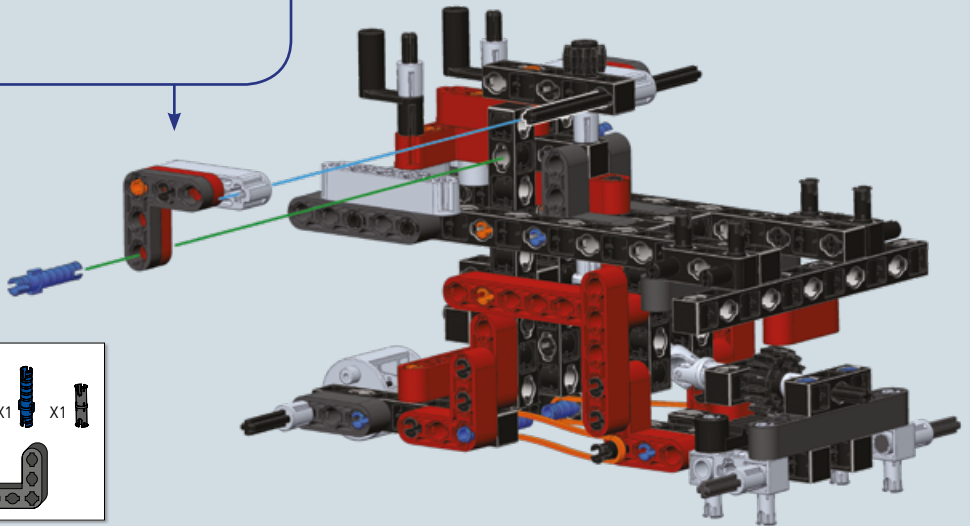
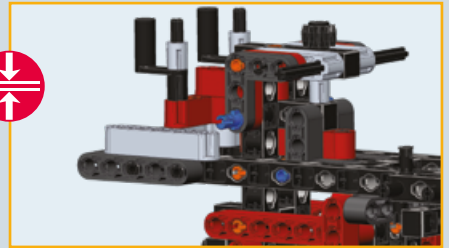
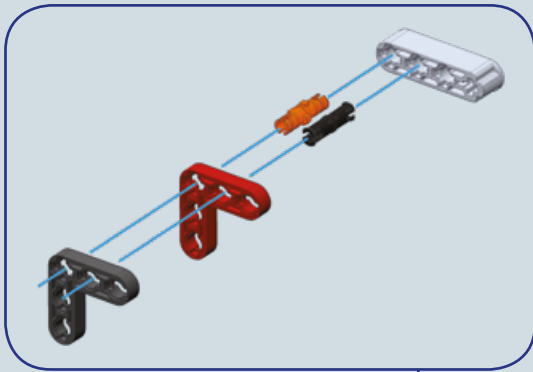
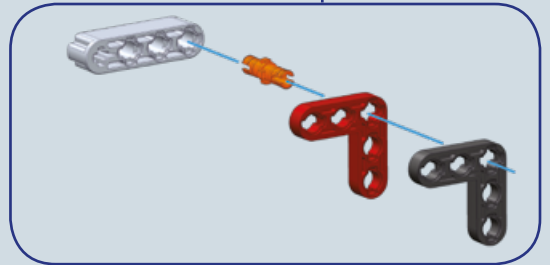






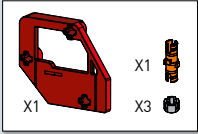
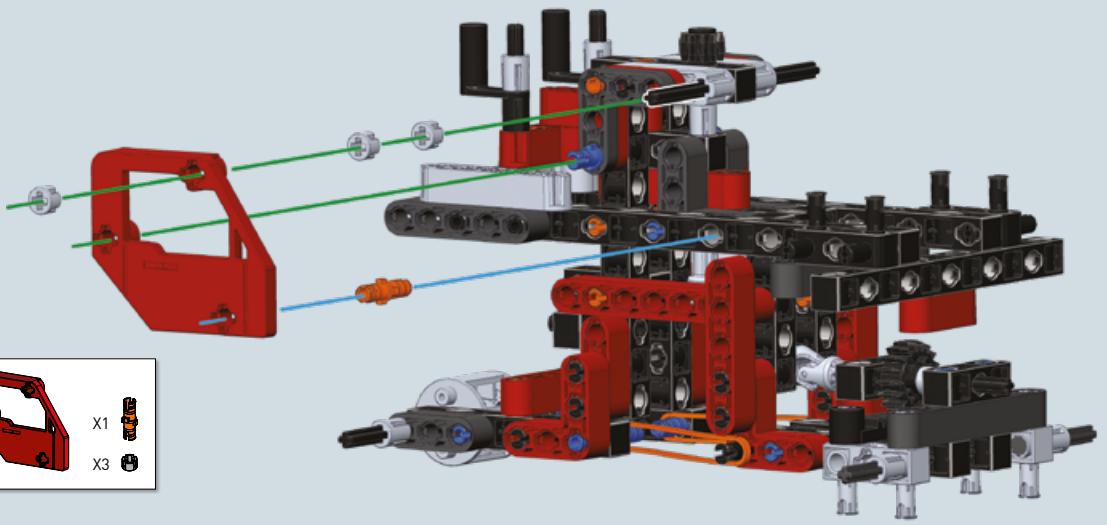
- X1
- X1 X1 X1 X1 X1

1:1

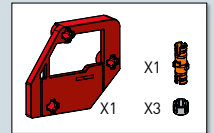
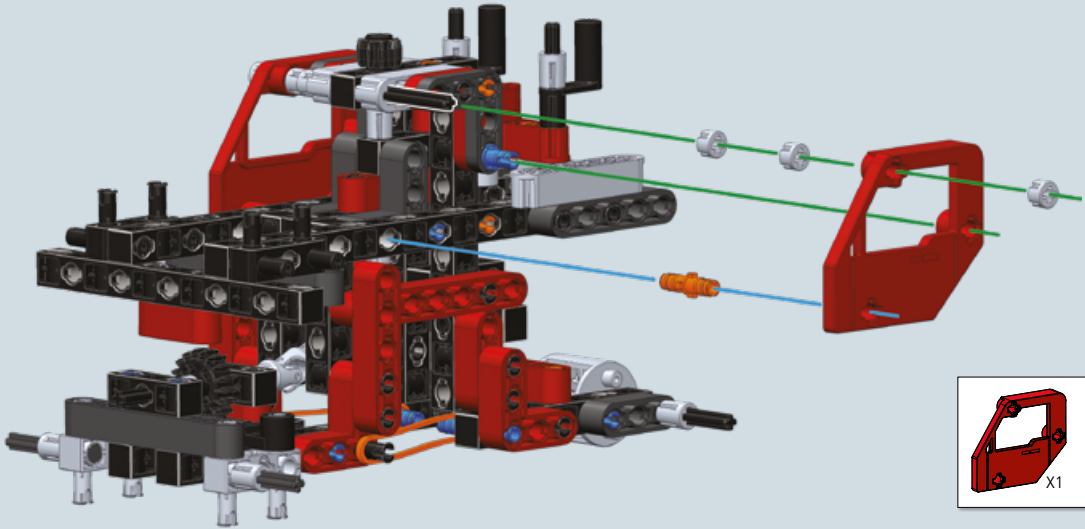


- X1 X1 X1 X1
- X1 X1

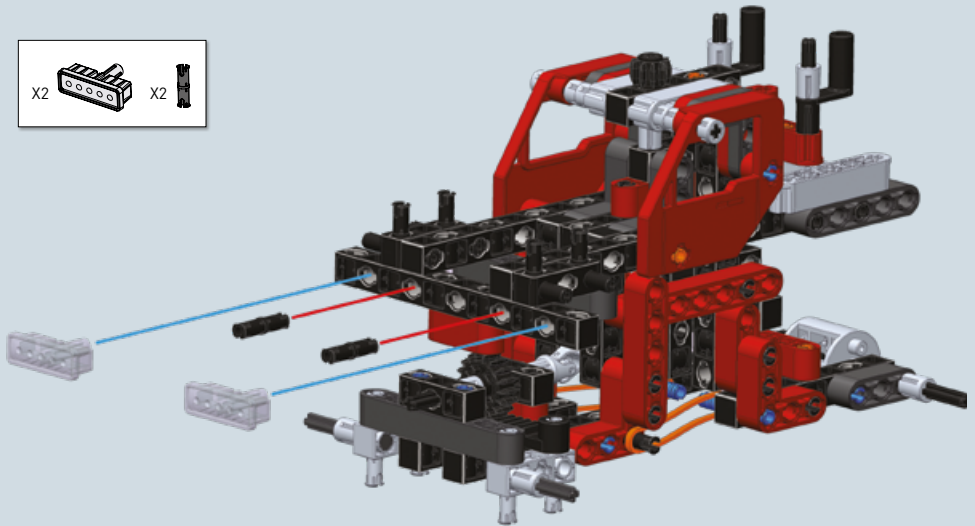
25



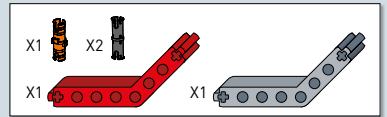
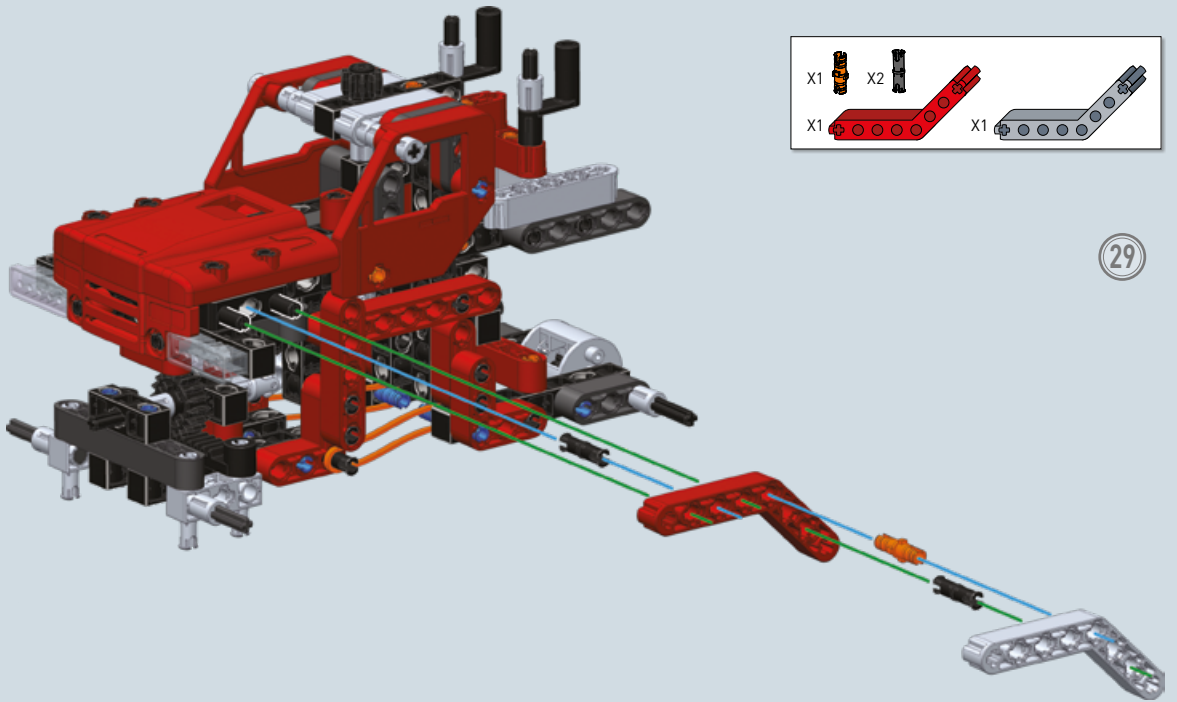
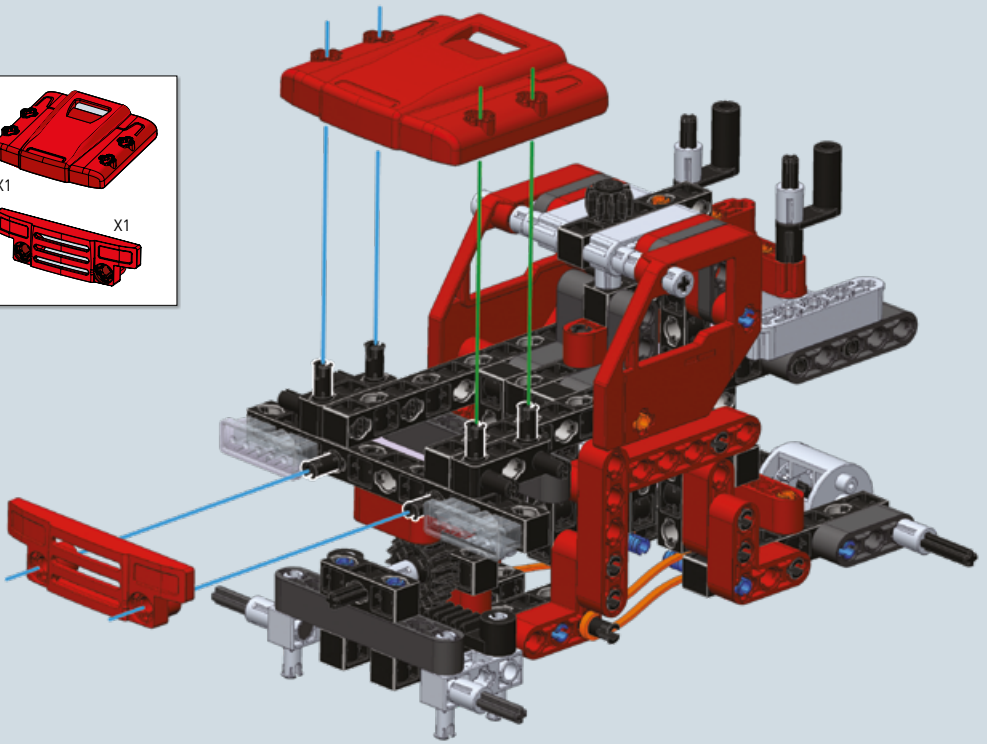
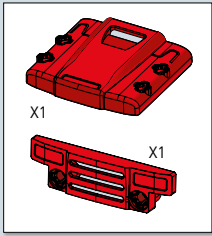
26



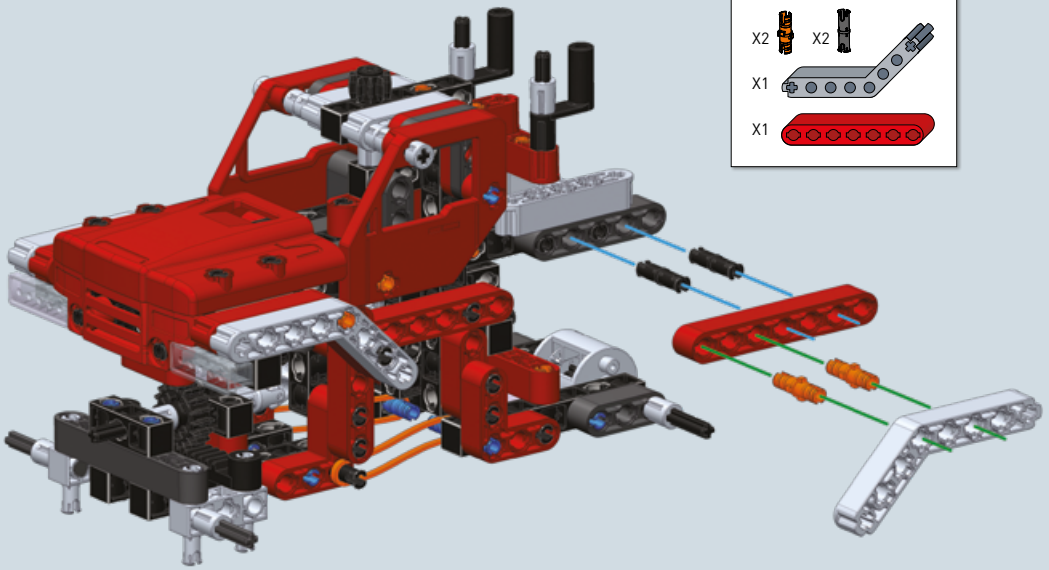
27



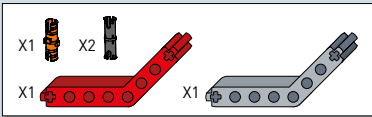
28



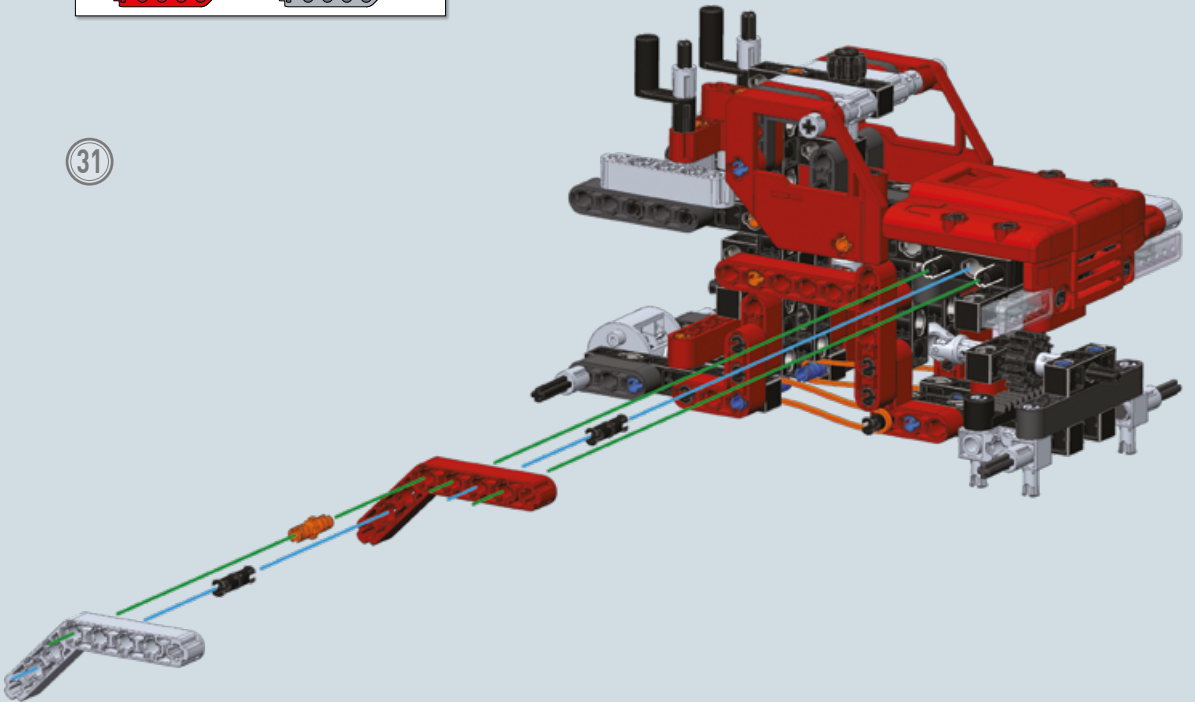
29



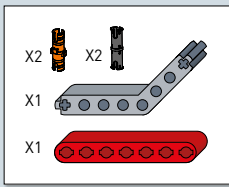
30



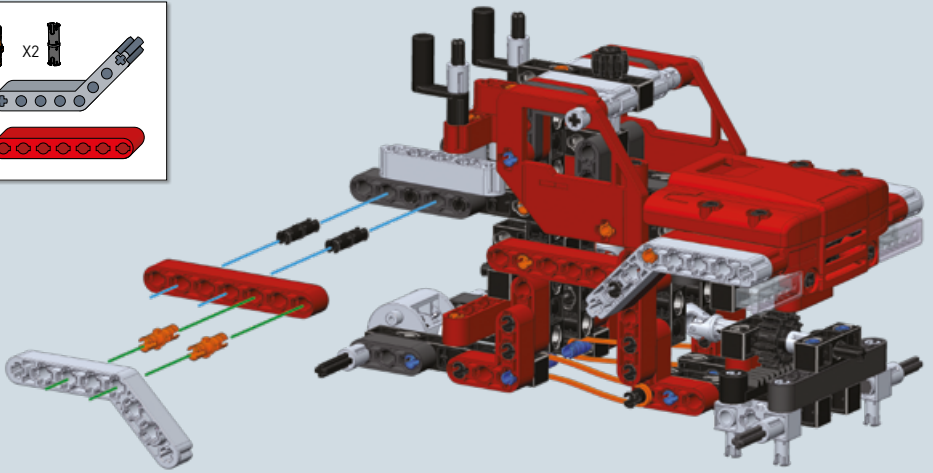
31



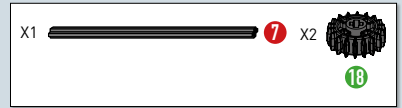
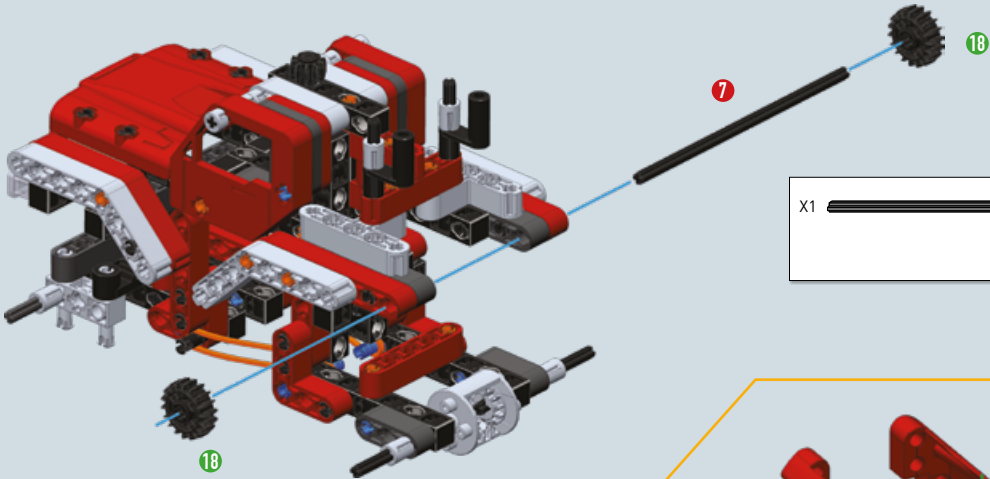




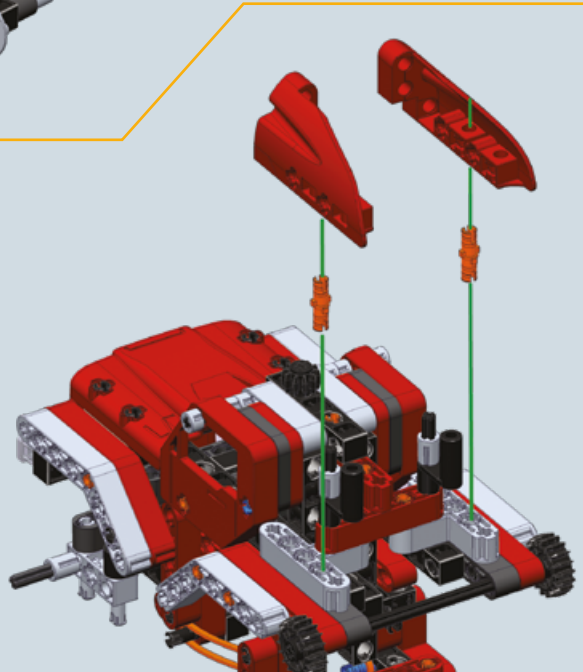
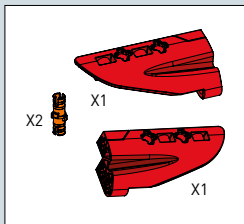
32



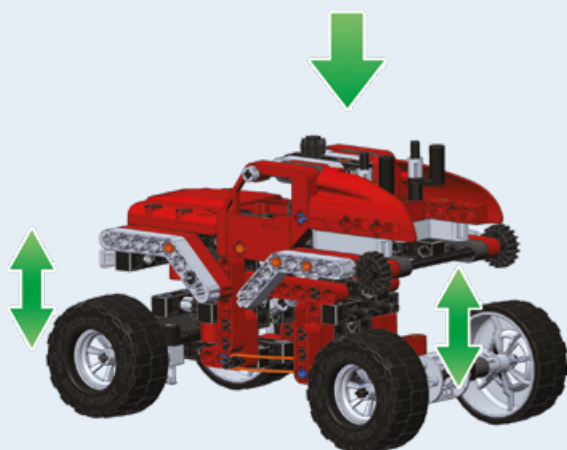
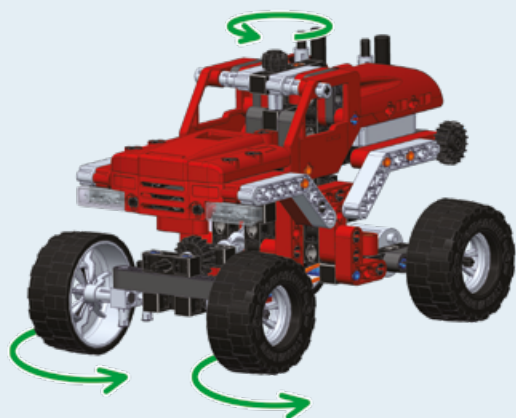
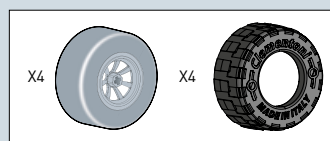
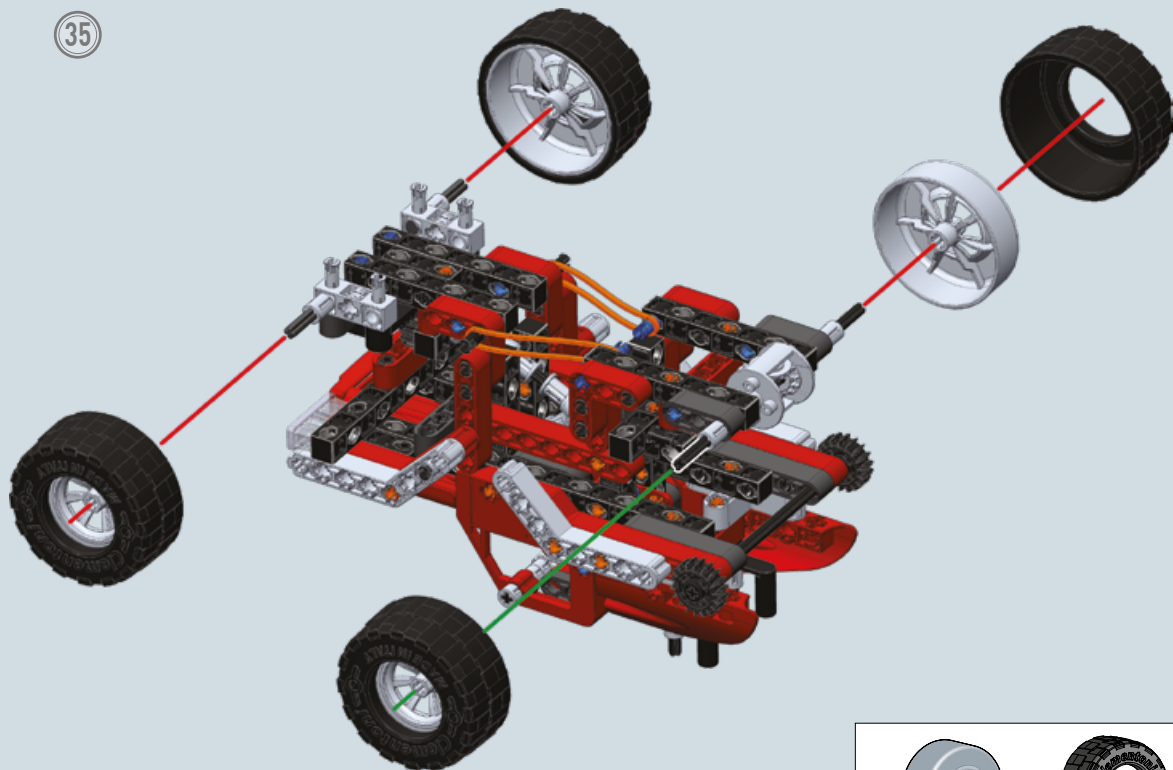
33



34



35

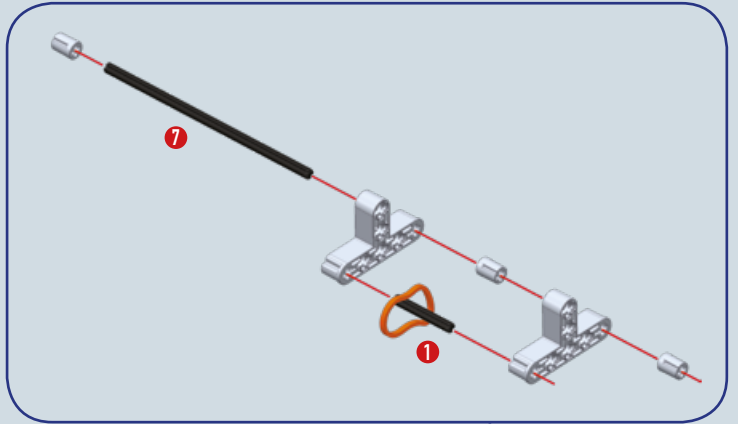
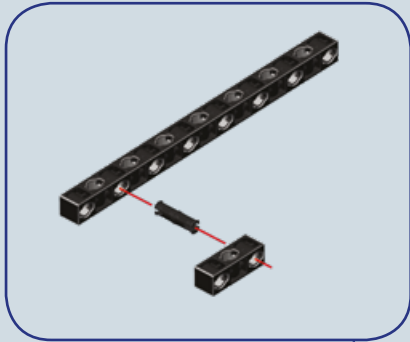


Modelo final

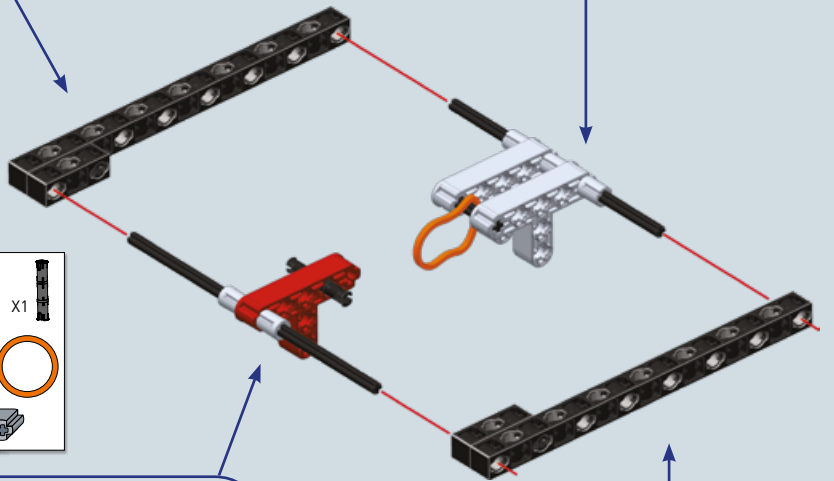
### 3 Spider truck



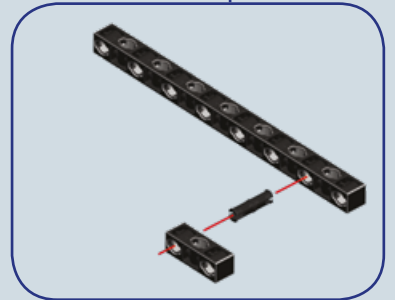
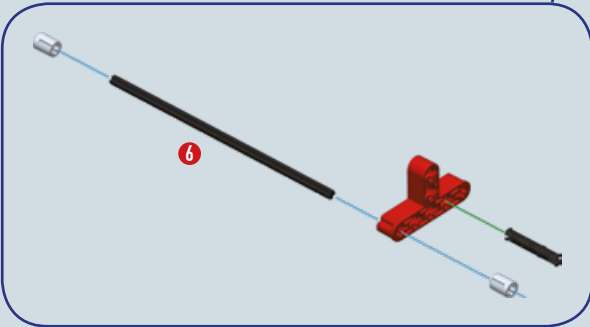
INSTRUÇÕES 3D INTERATIVAS NA APLICAÇÃO  
LABORATÓRIO DE MECÂNICA



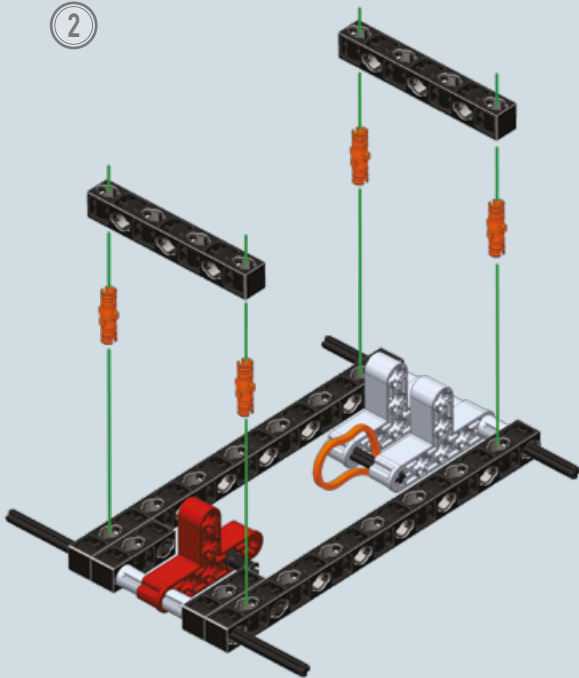
1



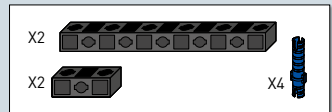
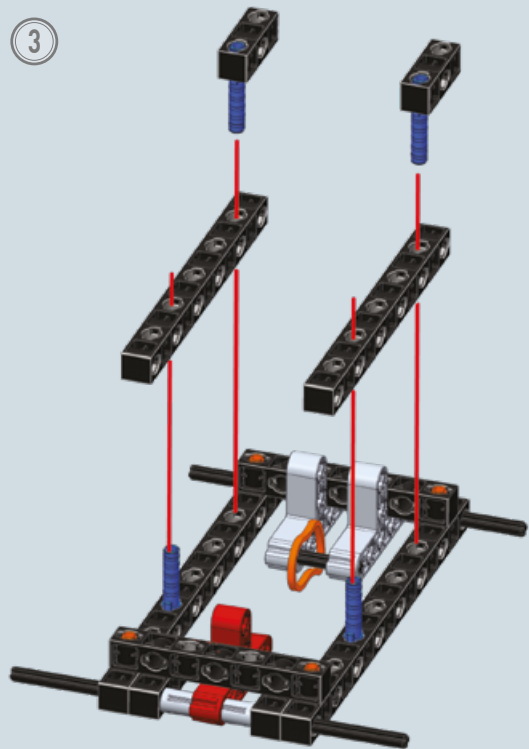
- |    |  |    |  |
|----|--|----|--|
| X2 |  | X1 |  |
| X2 |  | X5 |  |
| X1 |  | X1 |  |
| X1 |  | X2 |  |
| X1 |  |    |  |



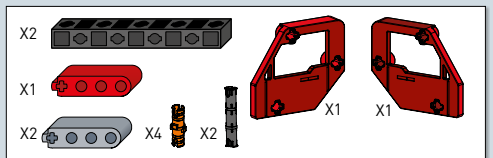
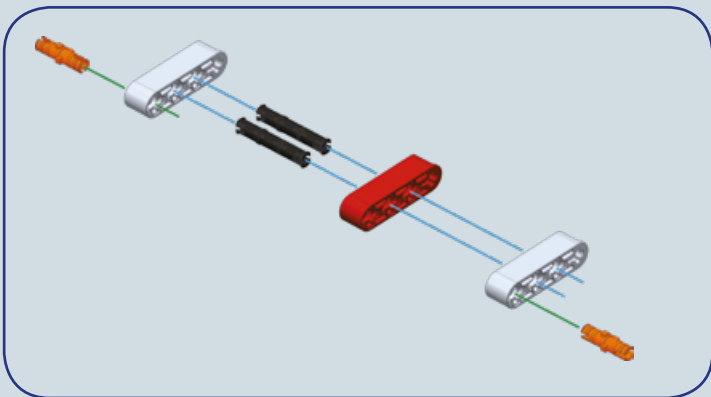
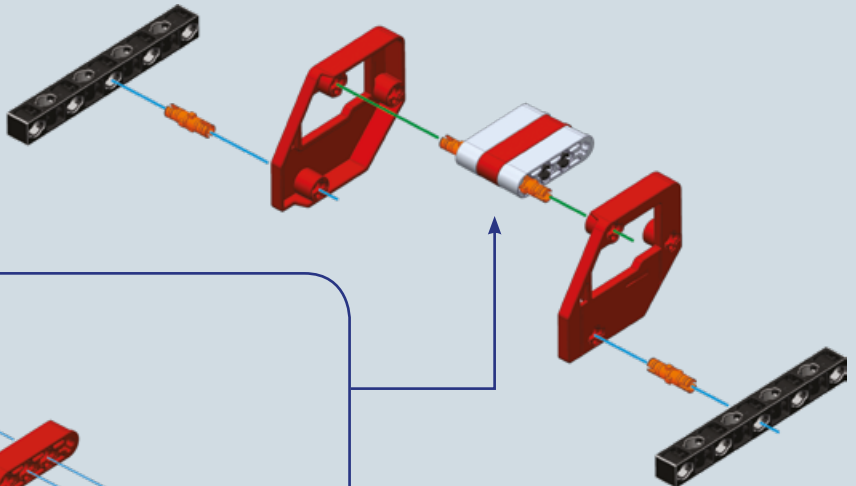
2

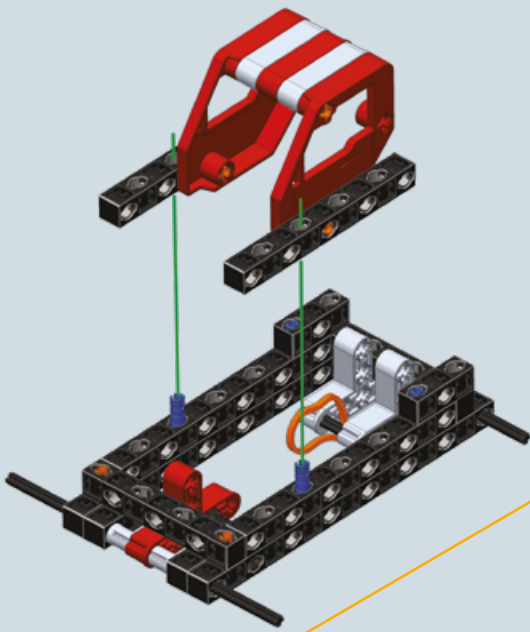


3

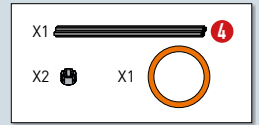


4

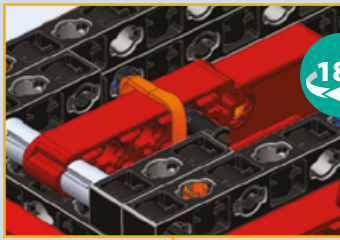




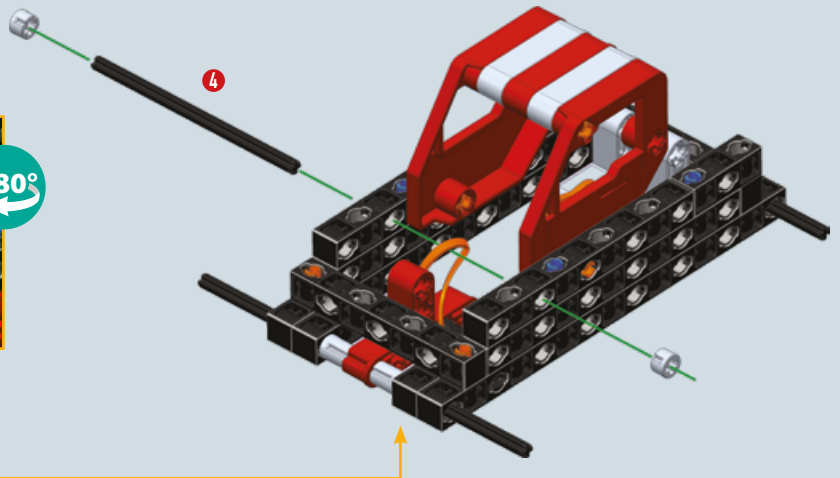
5



6

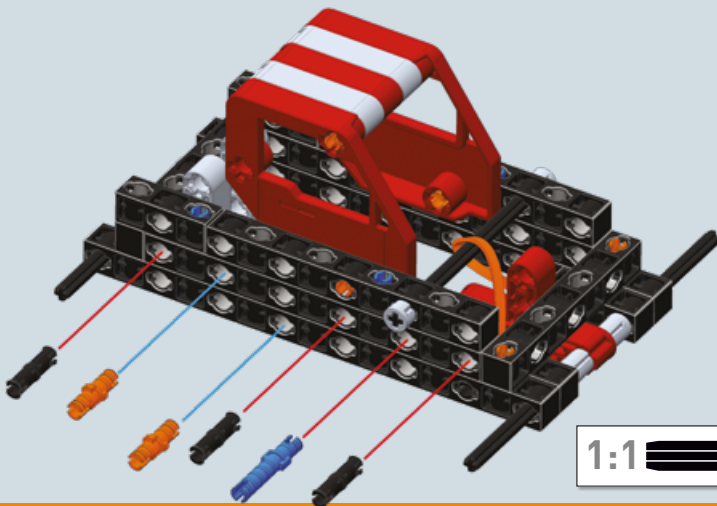


180°



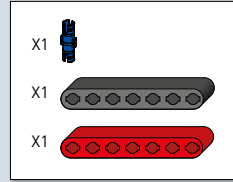
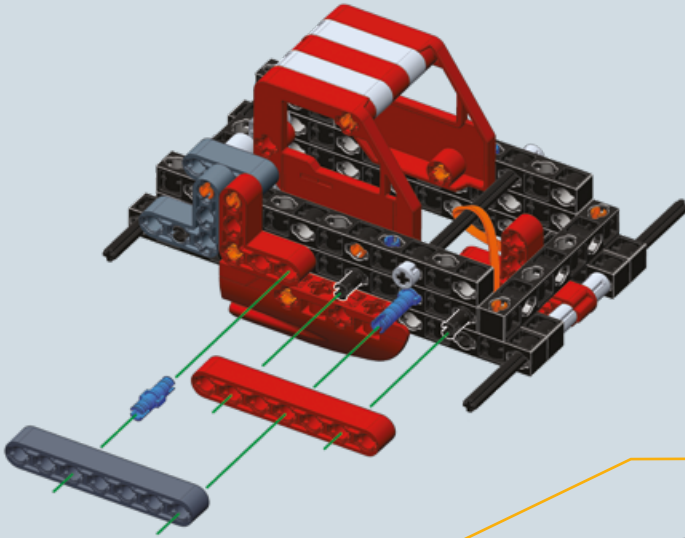
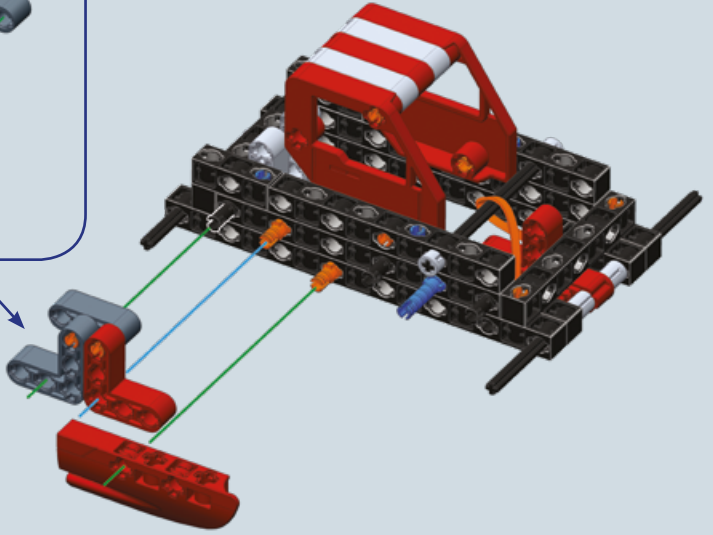
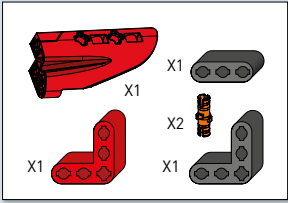
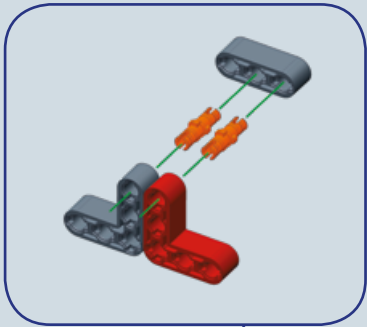
4

7



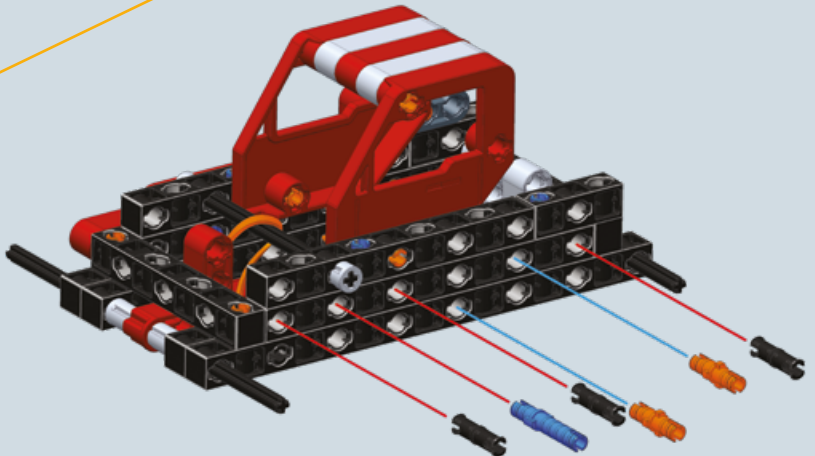


8

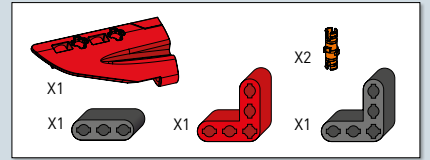
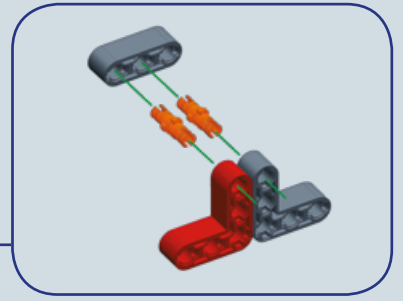
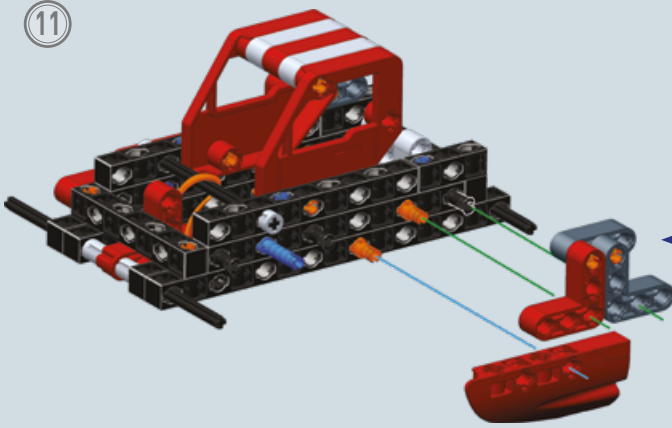


9

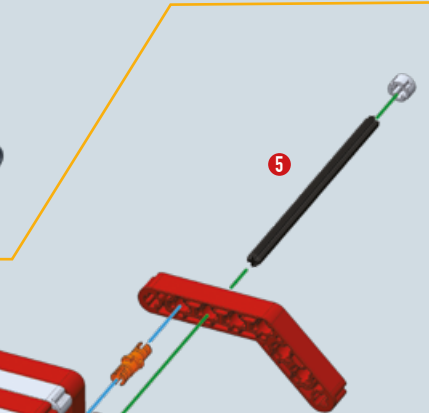
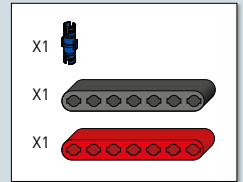
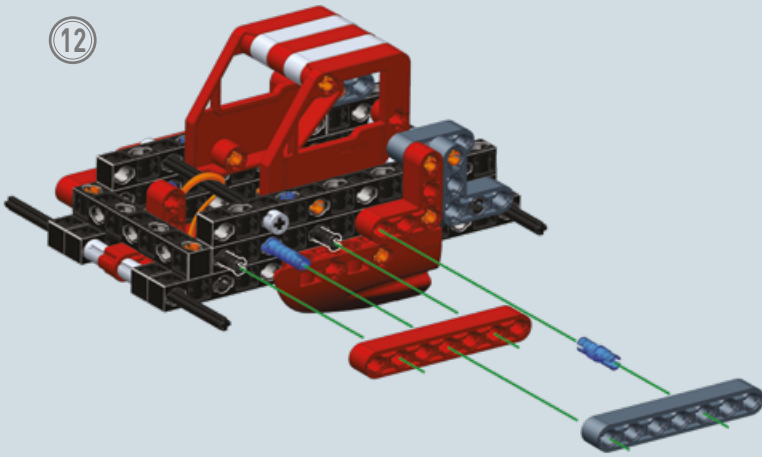
10



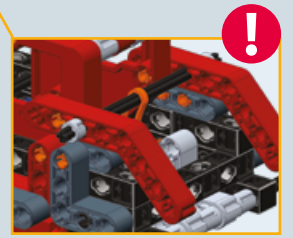
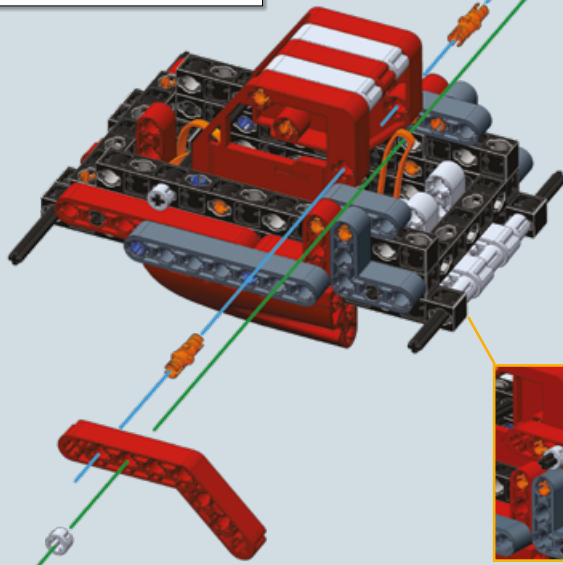
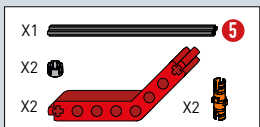
11



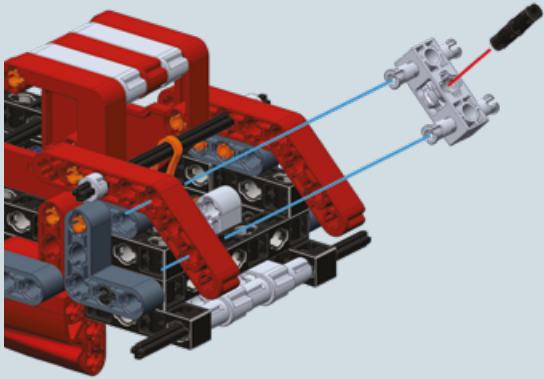
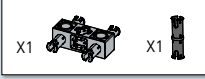
12



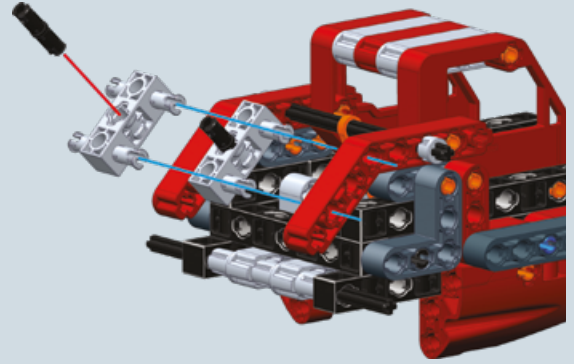
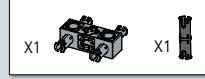
13



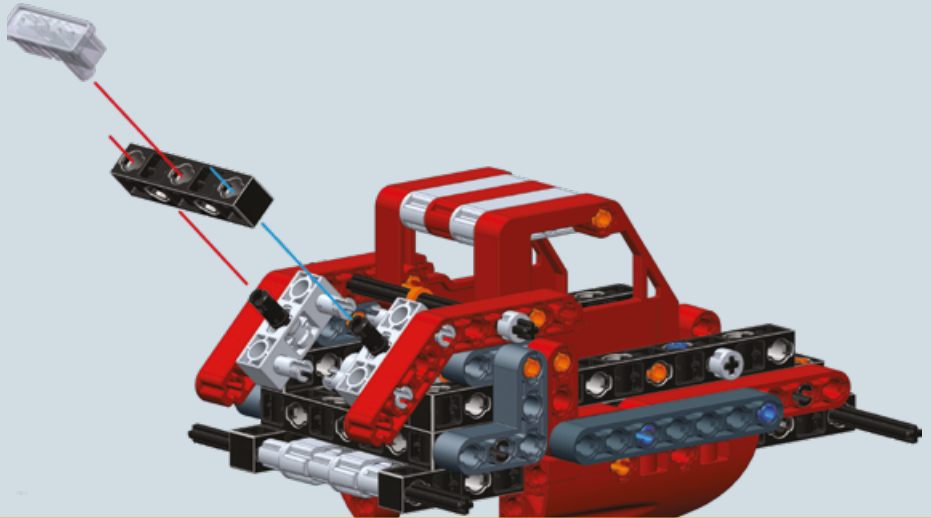
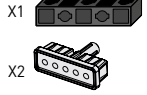
14



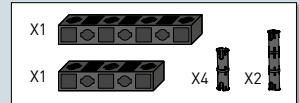
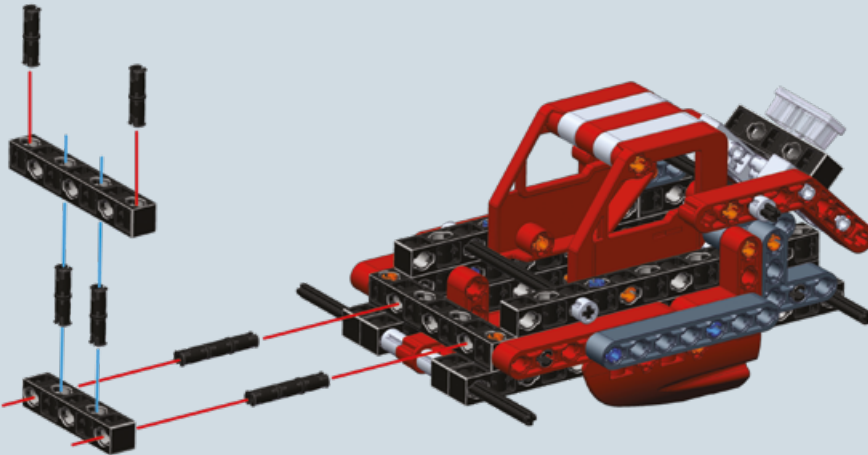
15



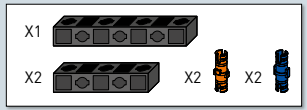
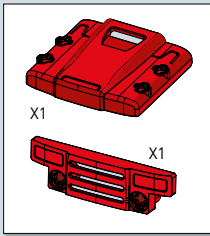
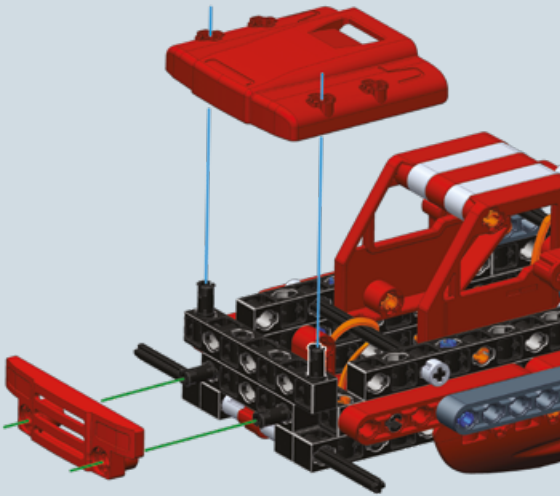
16



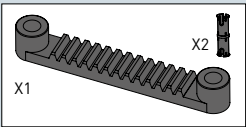
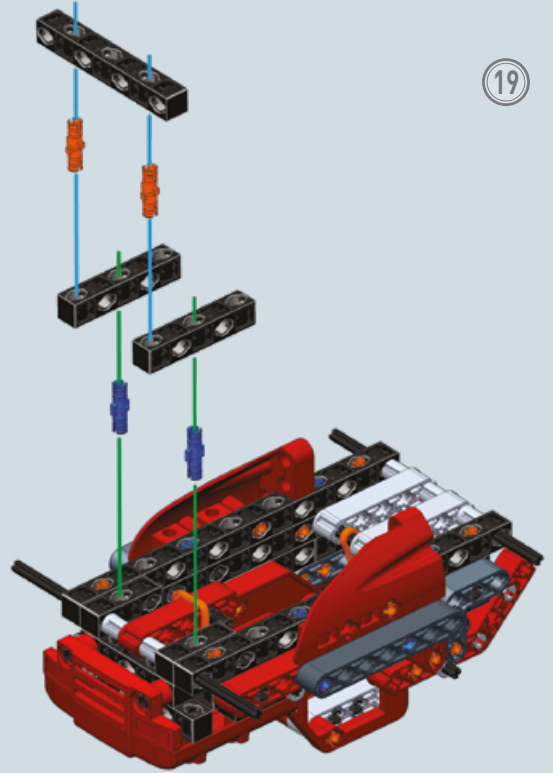
17



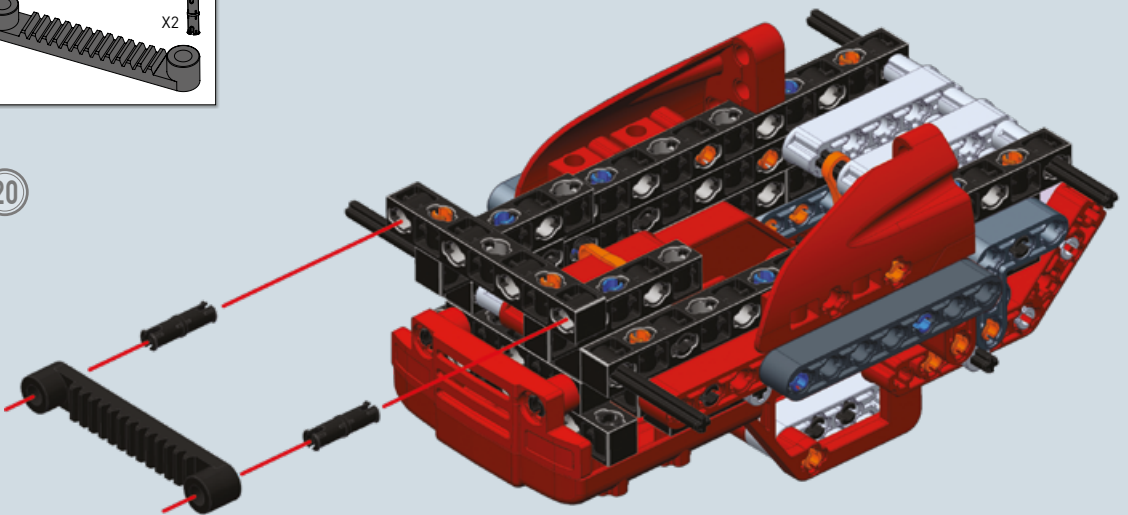
18

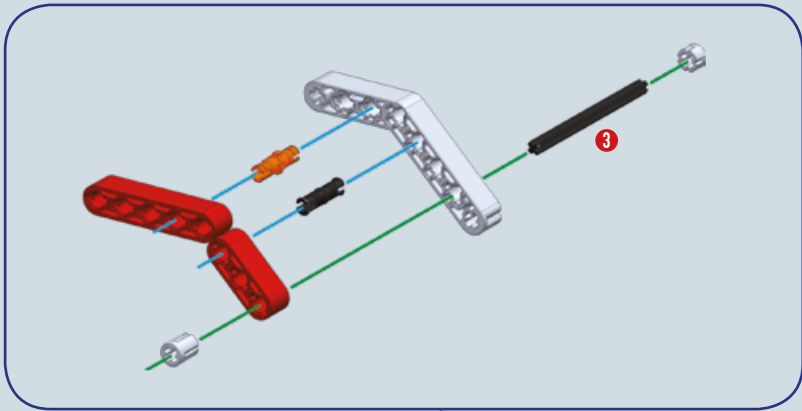


19

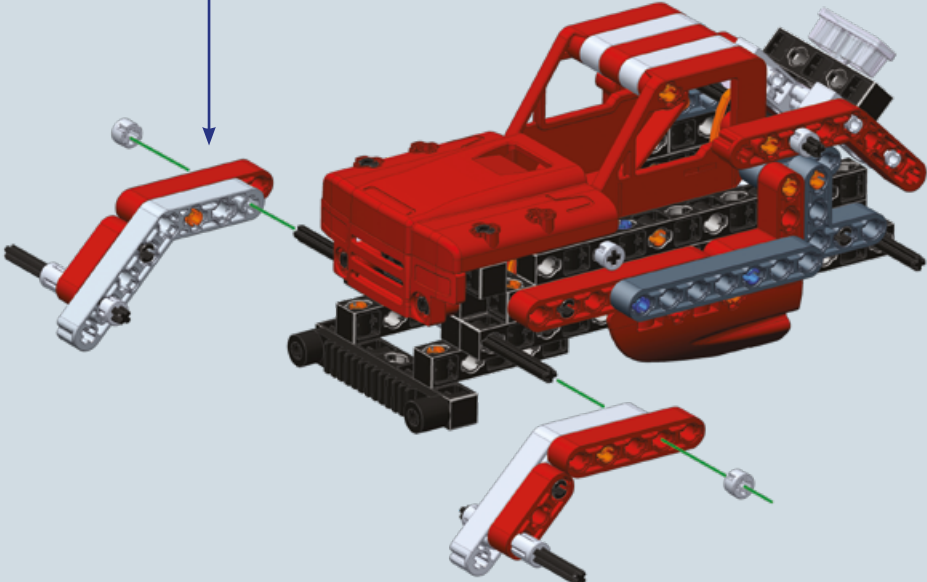


20

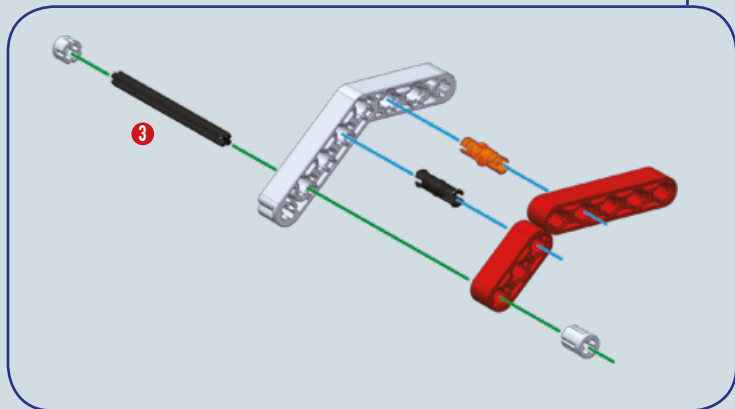




- X2
- X2
- X2
- X2
- X2
- X2
- X4
- X2
- X2
- 



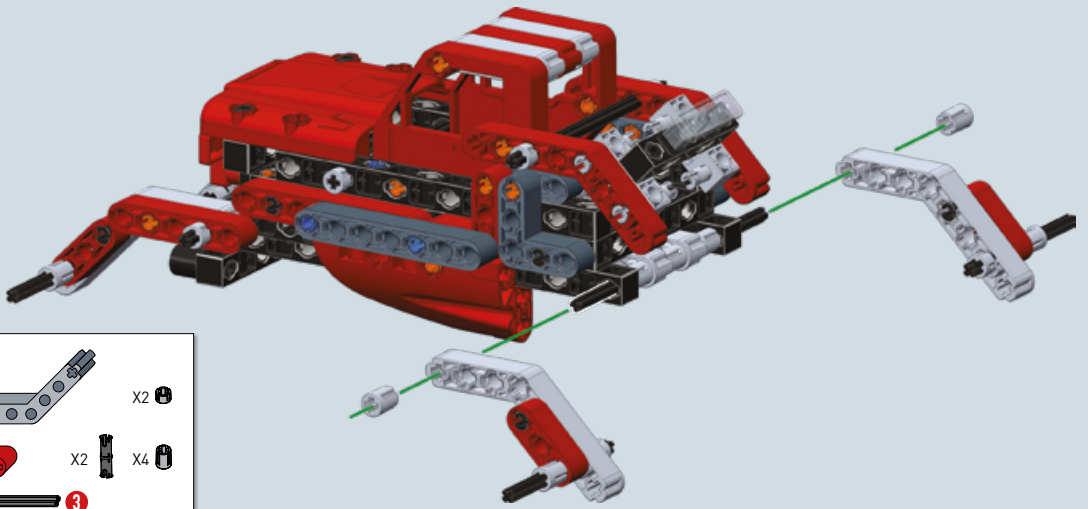
21



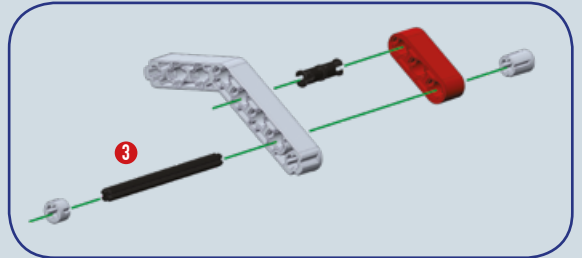
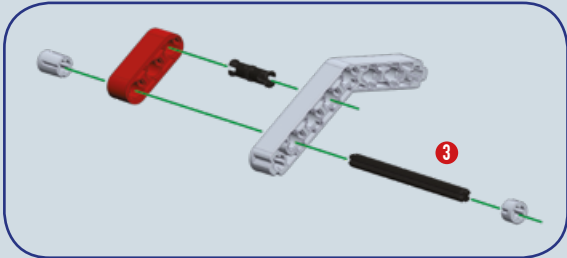
1:1



22

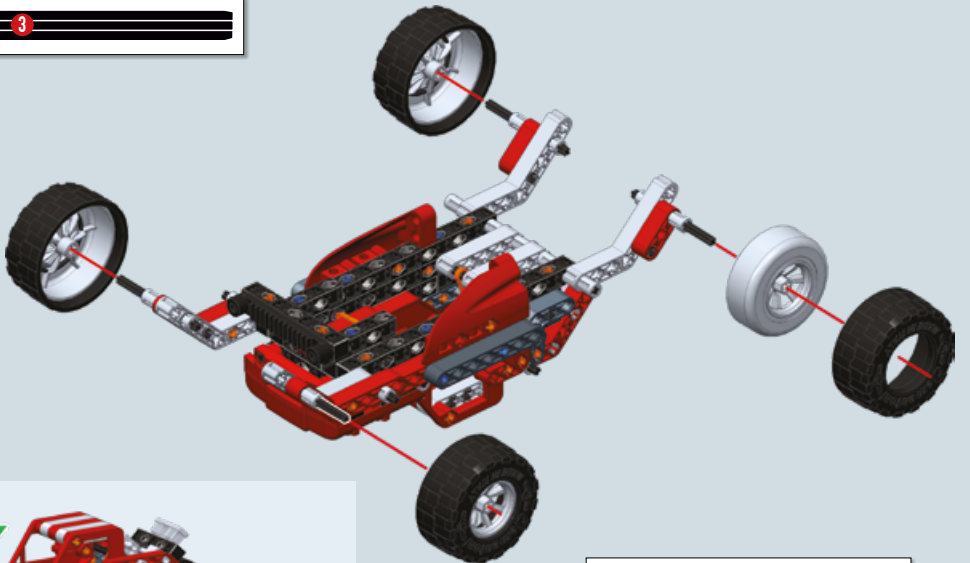


X2		X2	
X2		X2	
X2		X4	

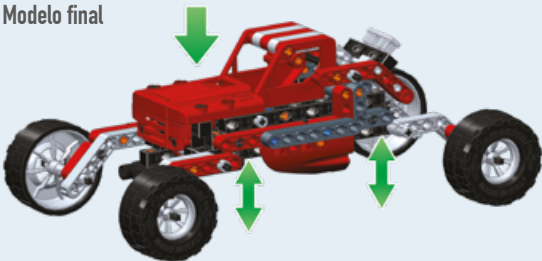


1:1

23



Modelo final



X4		X4	
----	--	----	--

DESCARREGA A APLICAÇÃO GRATUITA **LABORATÓRIO DE MECÂNICA**  
PARA REALIZARES OS 10 FANTÁSTICOS MODELOS



APLICAÇÃO compatível com dispositivos  
**ANDROID**, **APPLE** e **AMAZON**

Disponível na  
**App Store**

DISPONÍVEL NO  
**Google Play**

disponível na  
**amazon appstore**

Apple e o logótipo Apple são marcas da Apple Inc., registadas nos Estados Unidos e noutros países. App Store é uma marca de serviço da Apple Inc.

Google Play e o logótipo da Google Play são marcas da Google Inc.

Amazon e todos os logótipos associados são marcas da Amazon.com, Inc ou das respetivas filiais

**NÃO COMPATÍVEL** com sistemas operativos **WINDOWS**

AS ANIMAÇÕES INTERATIVAS ORIENTAM-TE DURANTE A MONTAGEM DE FORMA SIMPLES E RÁPIDA



 **Clementoni**