

scienza
gioco &

TECNOLOGICA

Laboratorio di **MECCANICA** CAMION DA TRASPORTO

Costruzioni da **1** a **10**

- 1 - Come funziona il differenziale
- 2 - Il camion antico
- 3 - Il camion da miniera
- 4 - Il camion europeo
- 5 - Attrezzature da lavoro: pinza per tronchi
- 6 - Attrezzature da lavoro: cassone ribaltabile
- 7 - Attrezzature da lavoro: carro attrezzi
- 8 - Attrezzature da lavoro: braccio gru
- 9 - Attrezzature da lavoro: spazzaneve
- 10 - Il camion americano



ATTENZIONE

Solo per bambini di 8 anni e oltre.
Le istruzioni per gli adulti sono incluse e devono essere rispettate.



Assistenza clienti
Tel. 02.82.52.52
Email - assistenza@clementoni.it

Manuale da leggere e conservare per future referenze

Clementoni S.p.A.
Zona Industriale Fontenoce s.n.c.
62019 Recanati (MC) - Italy
Tel.: +39 07175811
www.clementoni.com

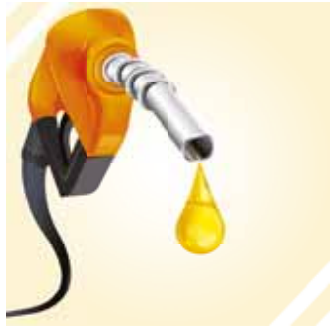
 **Clementoni**

ELENCO DEI PEZZI

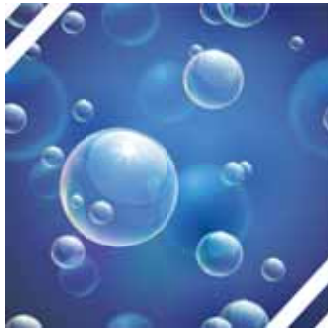
	Barra doppia 15 fori	pz. 2		Anello corto	pz. 12		Ruota 10 denti	pz. 2
	Barra doppia 11 fori	pz. 2		Anello lungo	pz. 12		Ruota 18 denti	pz. 5
	Barra doppia 9 fori	pz. 2		Vite senza fine	pz. 1		Ruota 26 denti	pz. 1
	Barra doppia 7 fori	pz. 6		Gabbia portasatelliti	pz. 1		Ruota 41 denti	pz. 1
	Barra doppia 5 fori	pz. 6		Ruota 32 denti	pz. 1		Modulo di trasmissione	pz. 2
	Barra doppia 3 fori	pz. 6		Ruota 24 denti	pz. 1		Pneumatico	pz. 4
	Barra singola 15 fori	pz. 2		Ruota 12 denti	pz. 9		Cerchione 8 fori	pz. 2
	Barra singola 13 fori	pz. 2		Chiodino corto doppio	pz. 16		Cerchione 4 fori	pz. 2
	Barra singola 9 fori	pz. 2		Chiodino corto singolo	pz. 8		Barra singola 7 fori	pz. 4
	Barra singola 7 fori	pz. 2		Chiodino lungo doppio	pz. 8		Barra singola 5 fori	pz. 4
	Barra singola 5 fori	pz. 2		Chiodino lungo libero	pz. 16		Barra singola 3 fori	pz. 4
	Barra singola 3 fori	pz. 2		Chiodino lungo libero	pz. 16		Modulo ad angolo alto	pz. 4
	Modulo ad angolo alto	pz. 2		Chiodino lungo doppio	pz. 8		Modulo ad angolo basso	pz. 4
	Modulo ad angolo basso	pz. 2		Chiodino lungo libero	pz. 16		Cabina	pz. 1
	Barra a 4 fori	pz. 2		Barra con chiodini	pz. 4		Pannello cabina DX	pz. 1
	Barra T	pz. 2		Barra con perni	pz. 6		Pannello cabina SX	pz. 1
	Barra ad angolo	pz. 4		Gancio	pz. 1			
	Astina 7 lunga cm. 9,9	pz. 1		Manovella	pz. 2			
	Astina 6 lunga cm. 11,7	pz. 1		Asta dentata	pz. 1			
	Astina 5 lunga cm. 8,1	pz. 1		Asta chiodo	pz. 2			
	Astina 4 lunga cm. 7,2	pz. 1						
	Astina 3 lunga cm. 5,4	pz. 5						
	Astina 2 lunga cm. 3,6	pz. 2						
	Astina 1 lunga cm. 2,7	pz. 1						

Il motore a combustione interna è una macchina capace di trasformare l'energia chimica in potenza meccanica. Per generare la potenza meccanica abbiamo bisogno di:

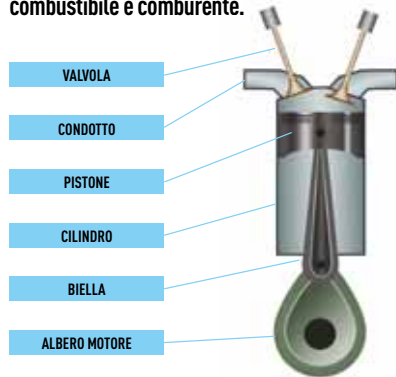
Combustibile: Gas, benzina o gasolio



Comburente: ossigeno



Camera di combustione: Il contenitore in cui avviene la reazione di combustione tra combustibile e comburente.



Come funziona? Le fasi che consentono la combustione sono in tutto 4:



FASE 1

Aspirazione:
il pistone scende.
L'aria o la miscela aria/
combustibile viene risucchiata
nel cilindro.



FASE 2

Compressione:
il pistone sale.
La miscela aria/combustibile viene
compressa.
Inizia la combustione.



FASE 3

Accensione ed Espansione:
il pistone scende.
Avviene la combustione che porta
all'espansione istantanea dei
gas. Il pistone viene spinto verso
il basso.



FASE 4

Scarico:
il pistone sale.
I residui della combustione vengono
espulsi dal cilindro.

Ad ogni ciclo appena descritto corrispondono due rotazioni dell'albero motore, che di conseguenza trasmette il moto agli altri organi meccanici del veicolo.

Motore a benzina vs motore diesel. Un motore a benzina e un motore diesel differiscono nella fase di Accensione:



MOTORE A BENZINA

E' un motore ad accensione comandata.
L'accensione avviene grazie a una scarica elettrica che incendia la miscela aria/combustibile.



MOTORE DIESEL

E' un motore ad accensione spontanea.
Il combustibile viene iniettato nel cilindro solo dopo la fase di compressione. L'aria compressa raggiunge temperature così elevate da incendiare il combustibile.

I camion da trasporto possono essere muniti di attrezzature da lavoro movimentate da specifici attuatori, che sfruttano la pressione dell'olio idraulico per compiere uno spostamento.

Il pistone idraulico è un attuttore costituito da due parti meccaniche:

- il cilindro, costituito da un corpo cilindrico vuoto
- il pistone o stelo, costituito da un tondo pieno

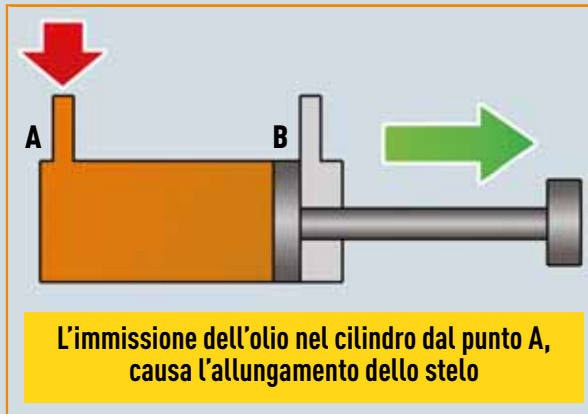


CILINDRO

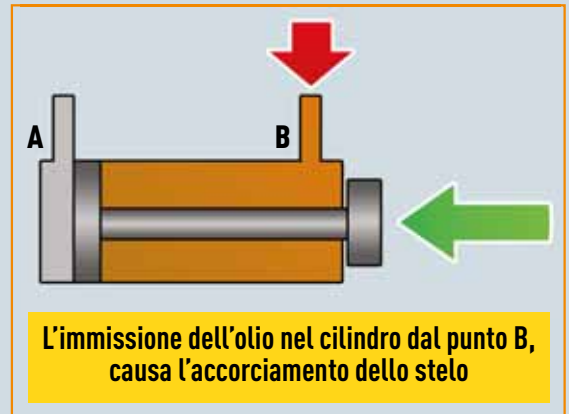
CAVITÀ PER L'OLIO IDRAULICO

PISTONE O STELO

Come funziona? Il pistone idraulico è costituito da un cilindro a doppio effetto, nel quale l'olio idraulico può essere immesso da due estremità, sotto il controllo dell'operatore.



L'immissione dell'olio nel cilindro dal punto A, causa l'allungamento dello stelo



L'immissione dell'olio nel cilindro dal punto B, causa l'accorciamento dello stelo

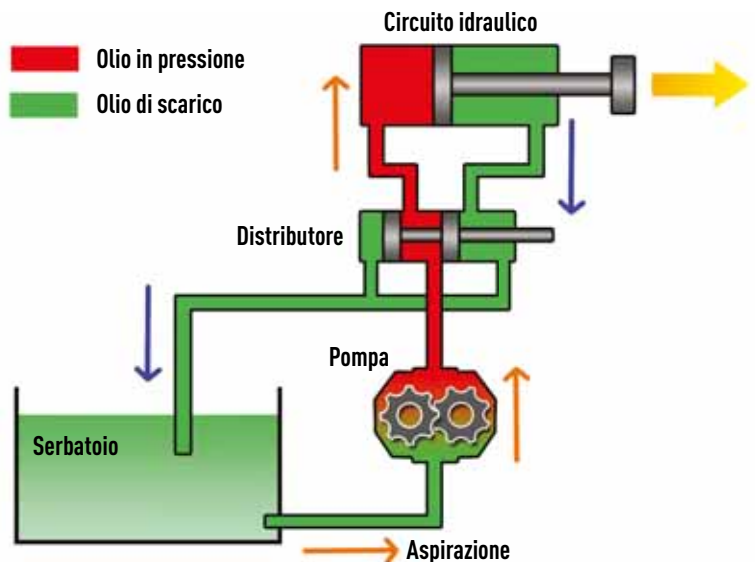
Circuito idraulico

L'olio idraulico viaggia all'interno di un circuito chiuso.

Da un serbatoio di stoccaggio l'olio viene risucchiato da una prima pompa e inviato al distributore.

Il distributore apre e chiude le due vie di accesso al pistone, provocando, sotto il controllo dell'operatore, l'allungamento o il rientro dello stelo.

Poiché si tratta di un circuito chiuso, l'olio spinto via da un lato del cilindro, viene di nuovo scaricato nel serbatoio grazie al distributore.



1 Come funziona il differenziale



Approfondimento tecnico-scientifico

Il differenziale è un organo meccanico in grado di trasferire la potenza sviluppata dal motore alla coppia di ruote motrici.

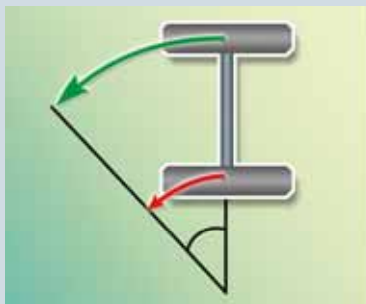


- 1 **Pignone:** trasferisce potenza dal motore alla corona e in ultimo alle ruote motrici.
- 2 **Corona:** vincolata alla gabbia porta satelliti, è accoppiata stabilmente al pignone.
- 3 **Gabbia porta satelliti:** è la scatola che racchiude gli ingranaggi.
- 4 **Satelliti:** ingranaggi vincolati alla gabbia.
- 5 **Planetari:** ingranaggi vincolati ai semiassi
- 6 **Semiassi:** asse che collega le ruote motrici ai planetari.

E' progettato per consentire alle due ruote di girare a velocità differenti in curva: nei tratti non rettilinei infatti, la ruota esterna alla curva percorre più strada rispetto a quella interna, di conseguenza quella esterna dovrà girare più velocemente.



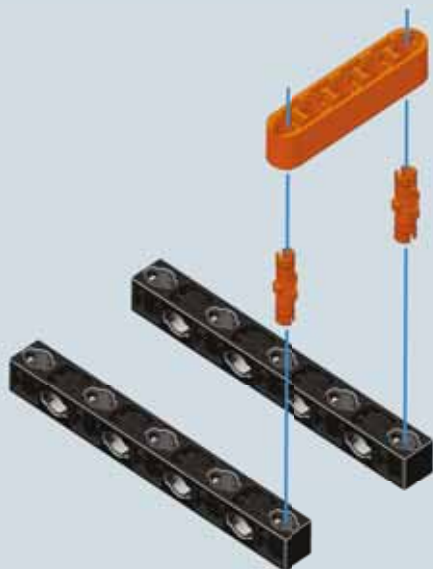
Il pignone trasferisce la potenza del motore al differenziale e di conseguenza ai semiassi.



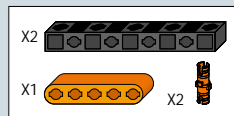
In curva la ruota interna percorre una distanza inferiore rispetto alla ruota esterna.



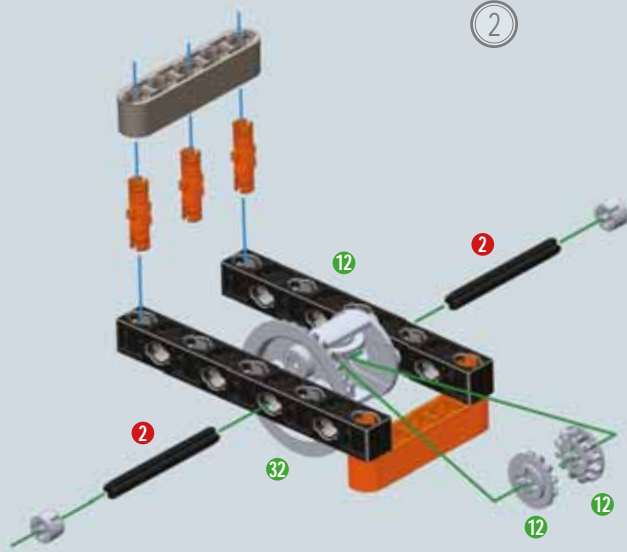
Grazie al differenziale, in curva, le ruote di una vettura girano a velocità differenti.



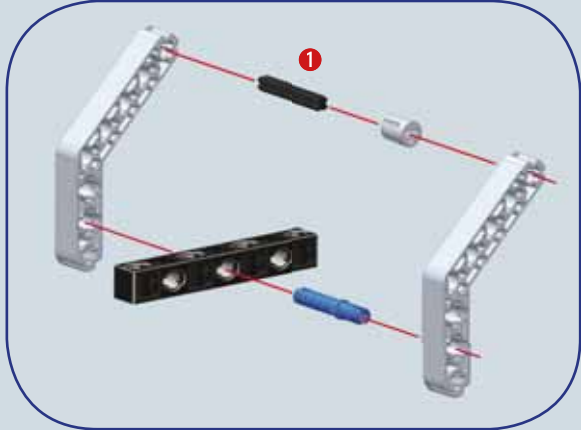
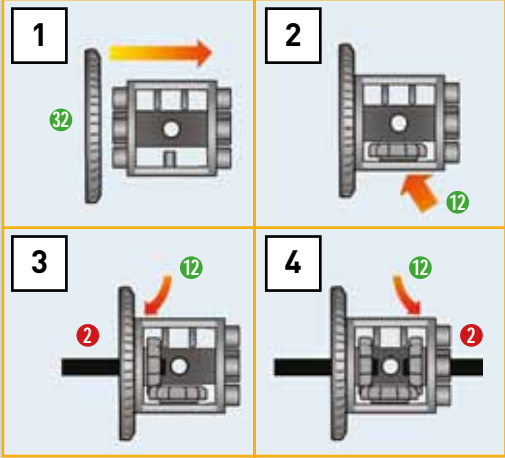
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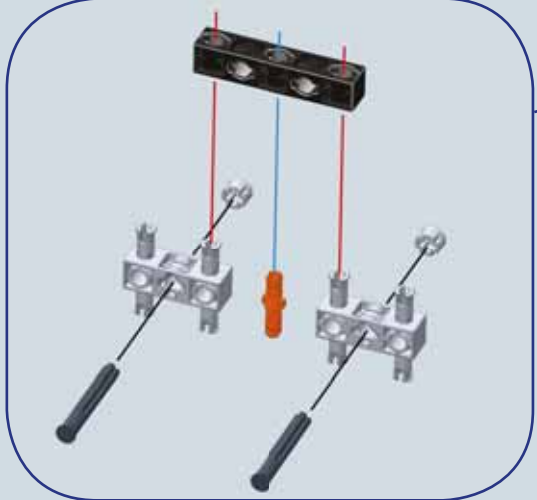
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- X1
- X3
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- X3



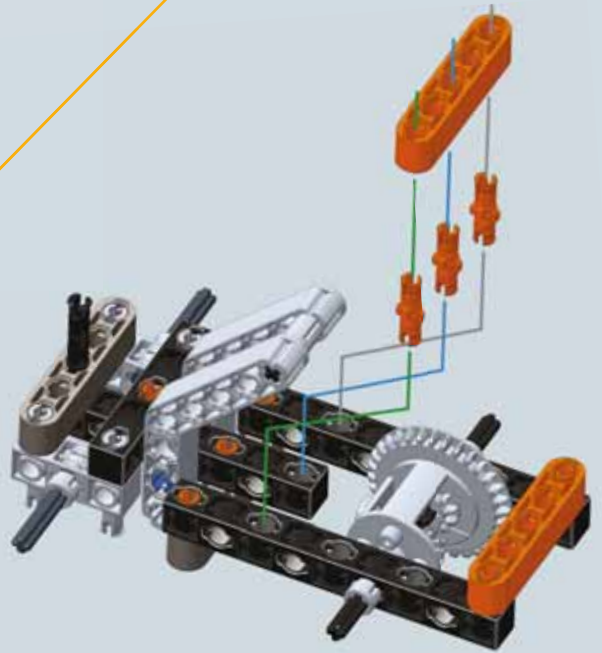
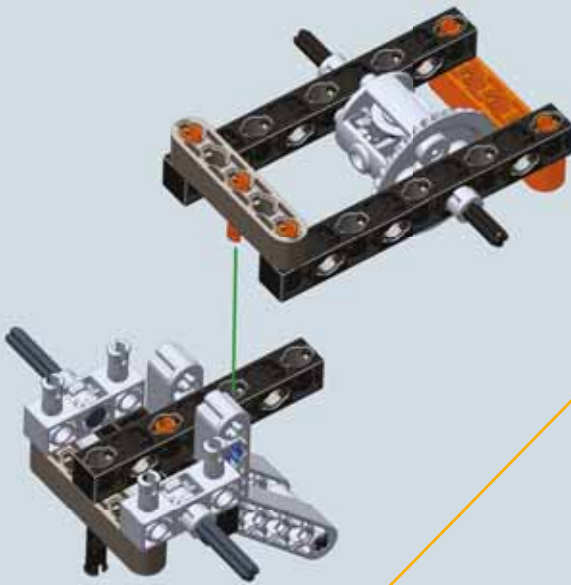
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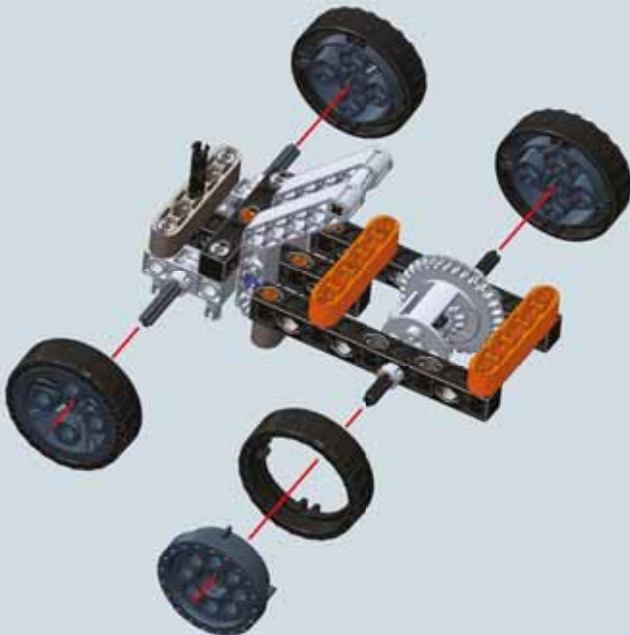
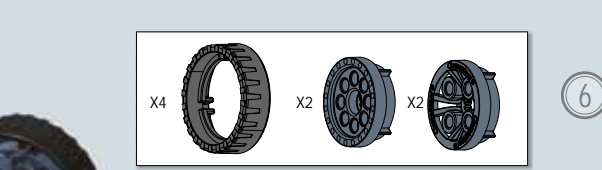
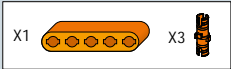
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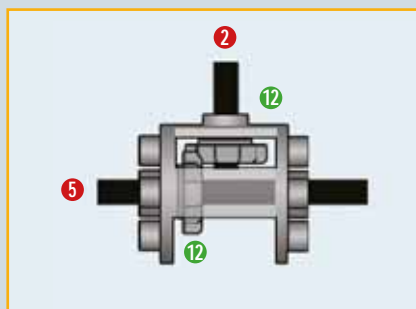
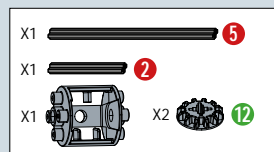
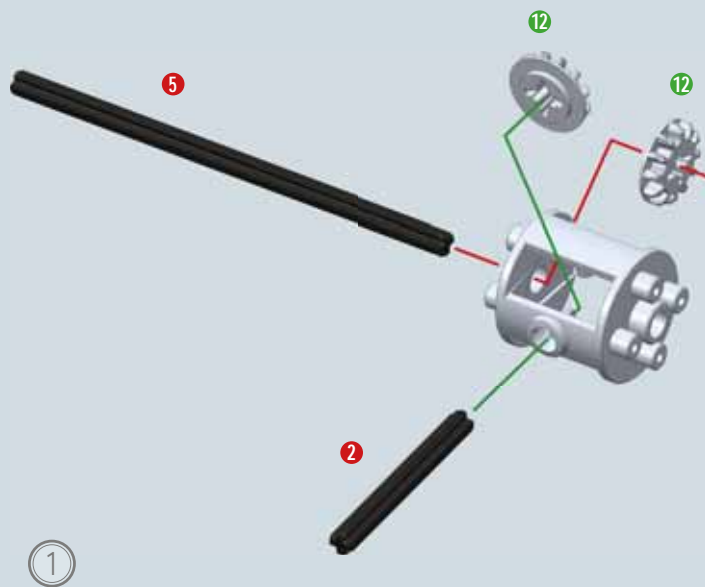


Modello finale

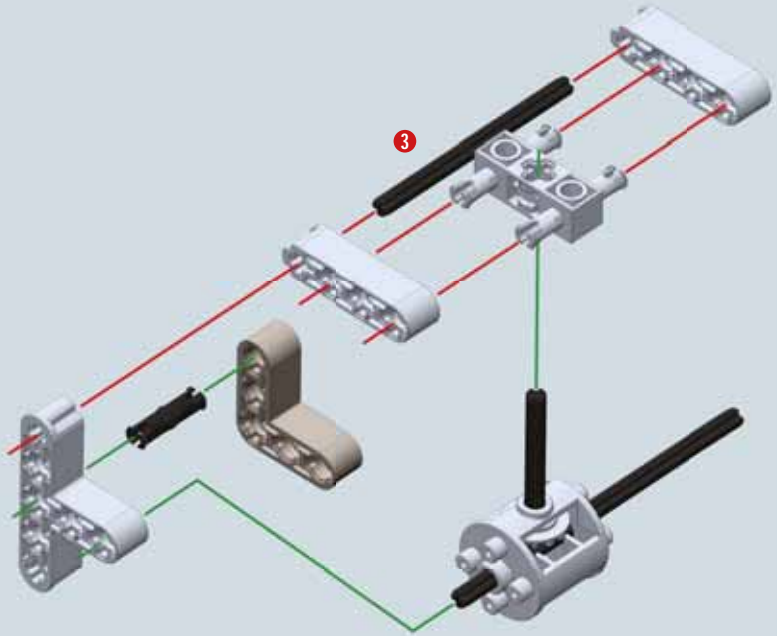


Notizie tecniche e curiosità

Il primo autocarro della storia fu realizzato nel 1896. Il progetto iniziale era molto semplice e derivava dai carri del tempo: la parte anteriore, destinata all'aggancio degli animali da tiro, era stata eliminata e il carro era stato dotato di un motore in grado di spingere il veicolo alla velocità di 16 km/h. Le ruote rimanevano in legno con il cerchione esterno in metallo. Anche l'impianto frenante era lo stesso utilizzato per le carrozze.



2

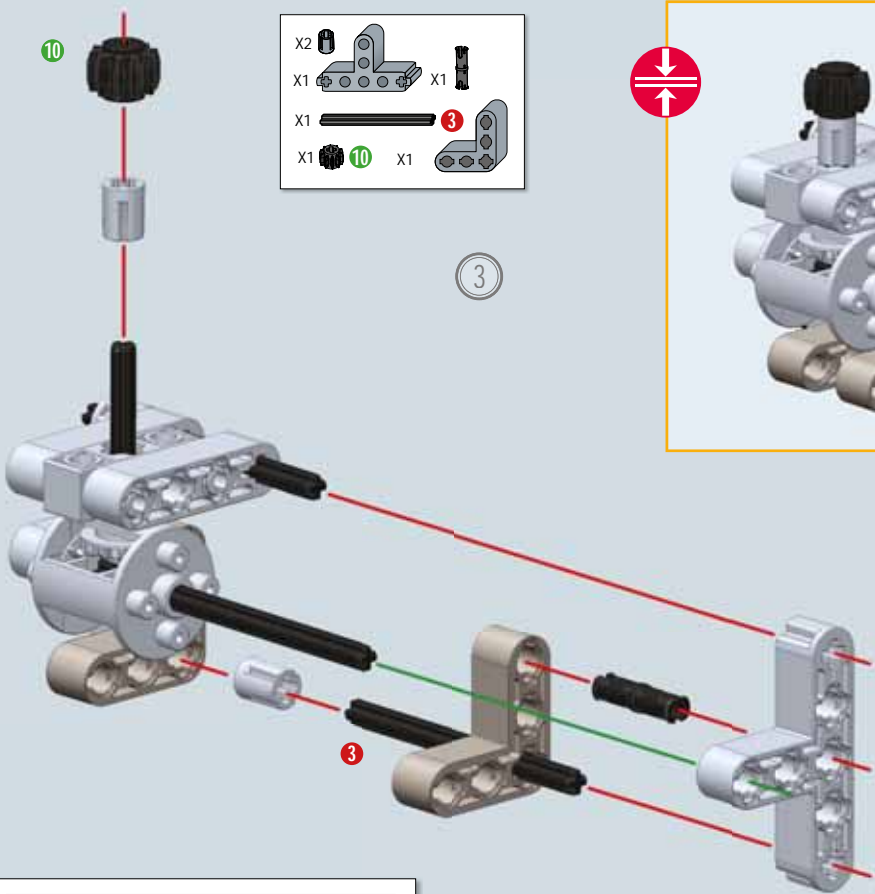
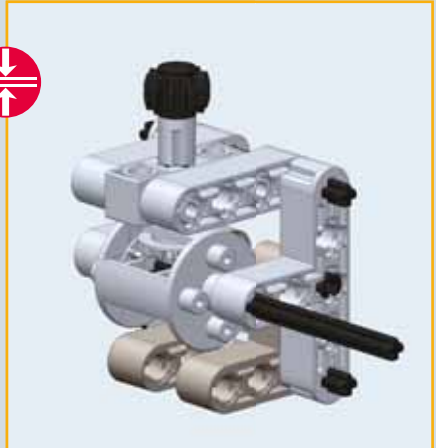


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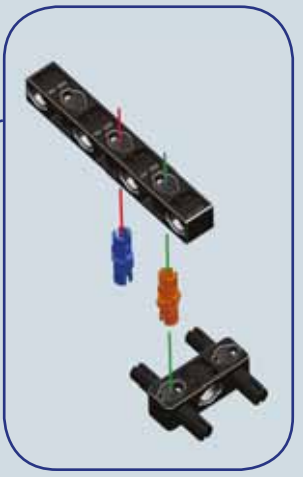
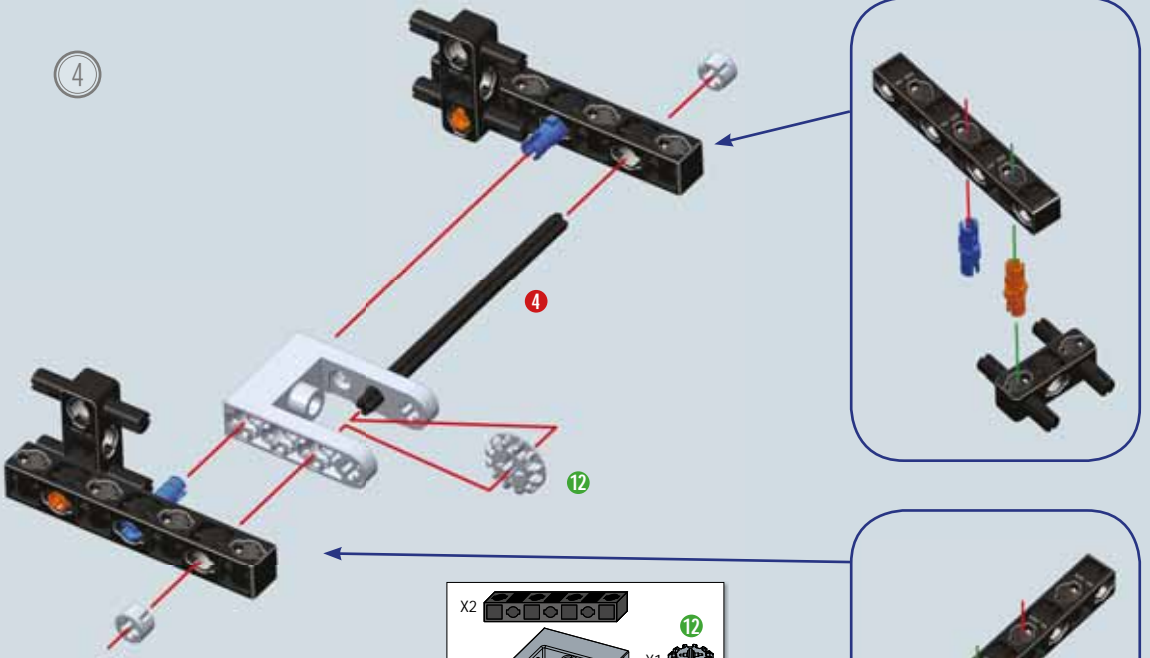
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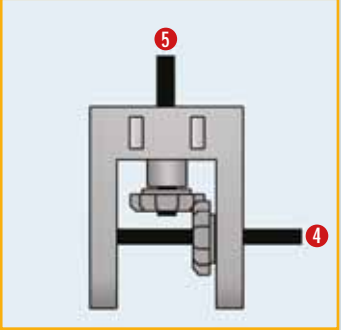
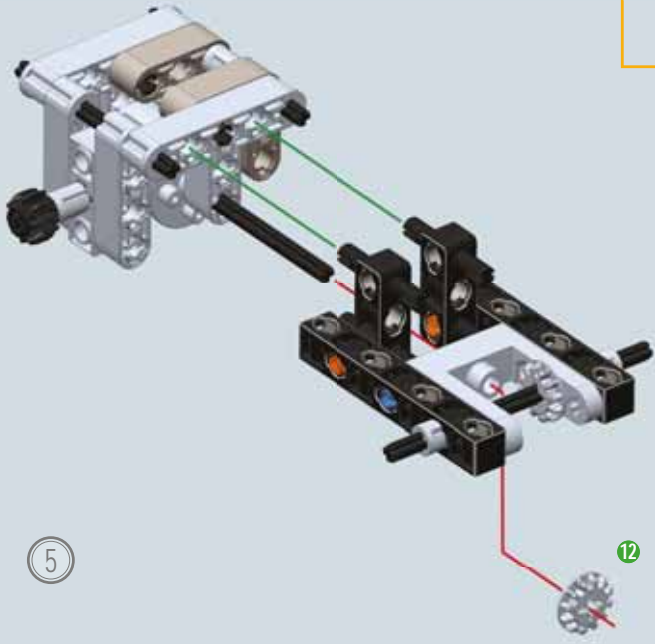


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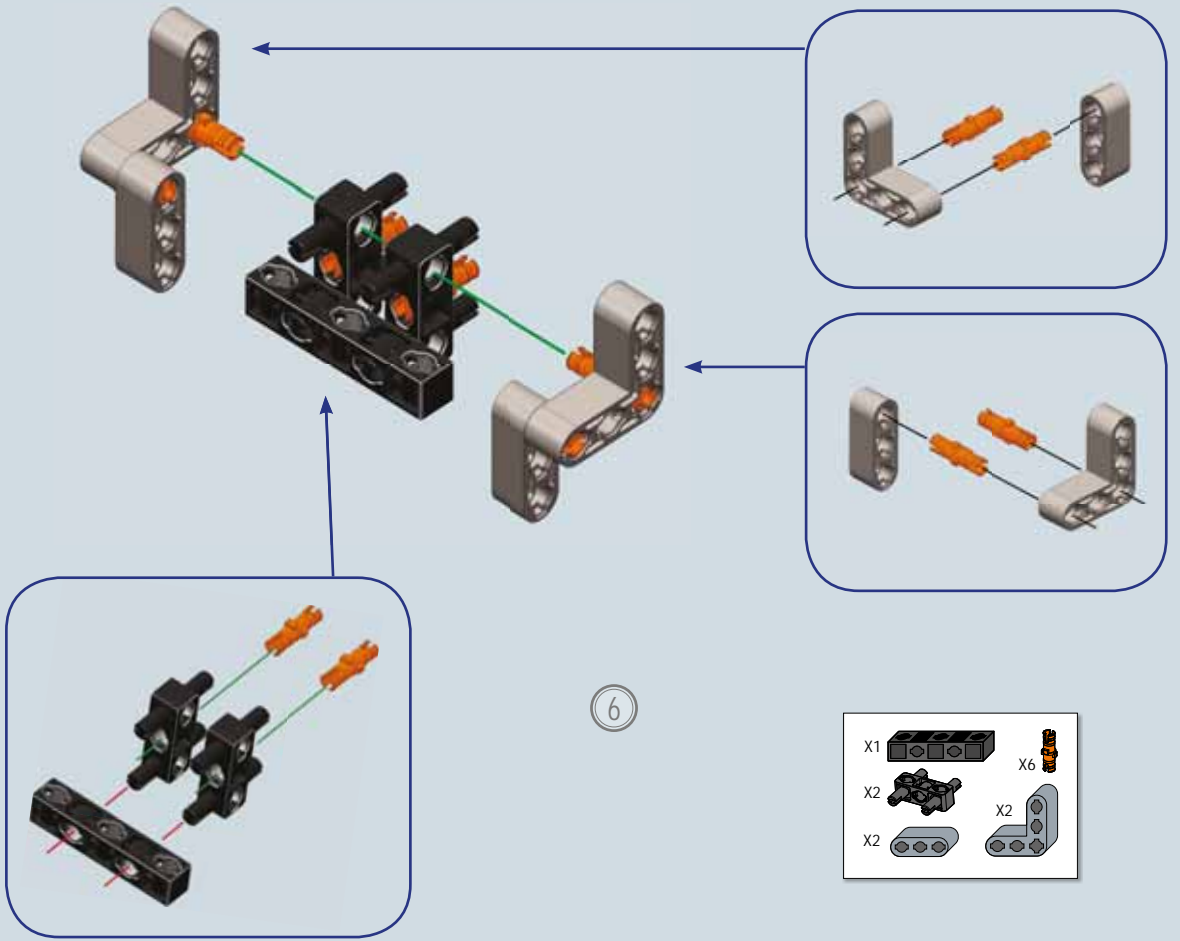


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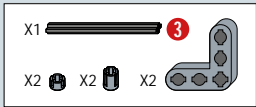
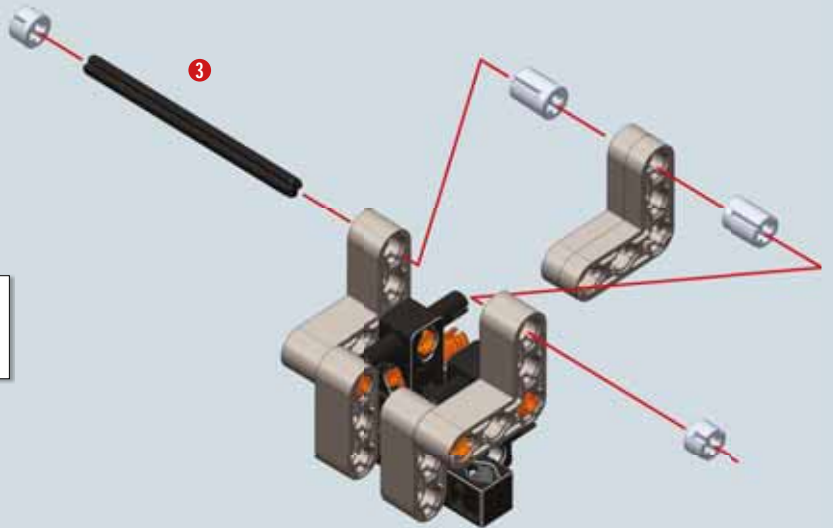


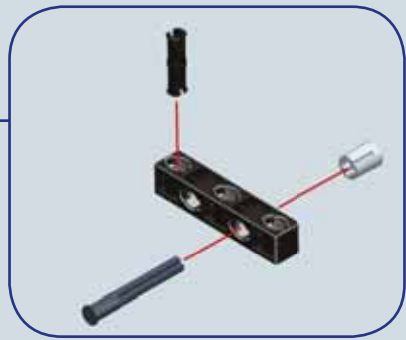
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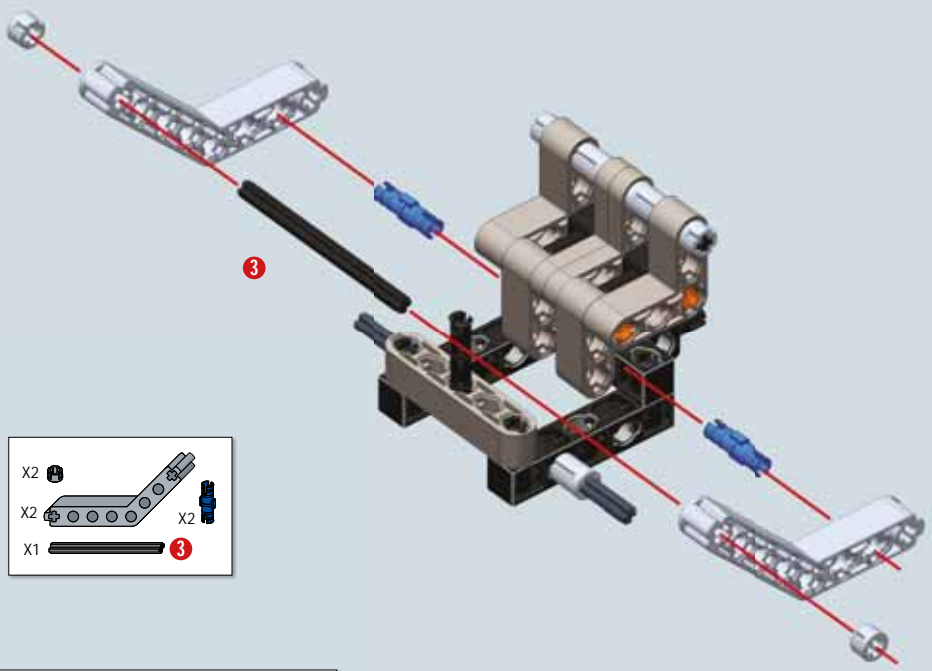
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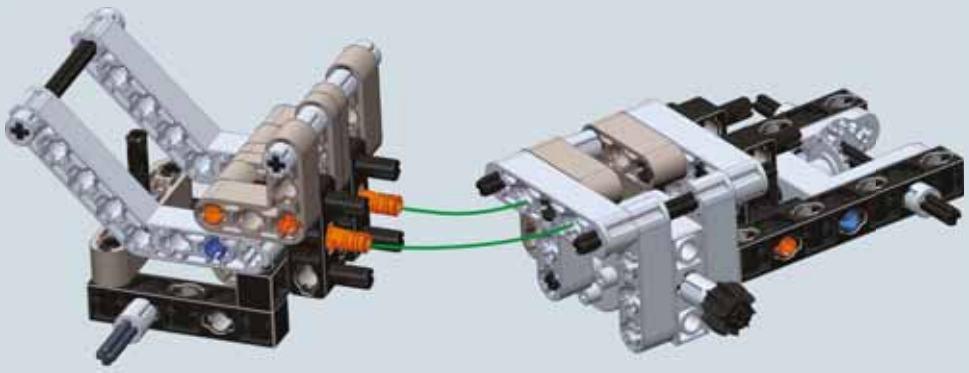
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| X2 | | X2 | |
| X2 | | X1 | |



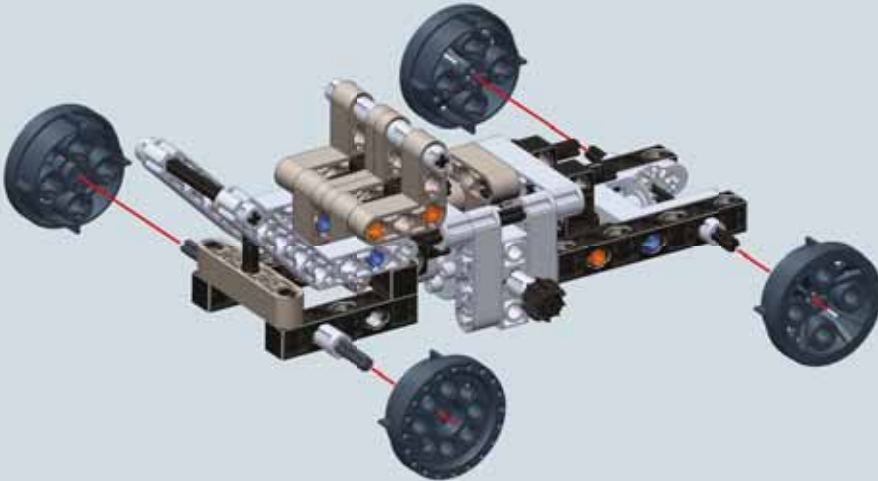
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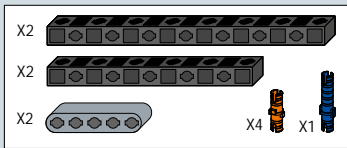
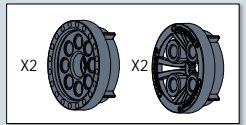
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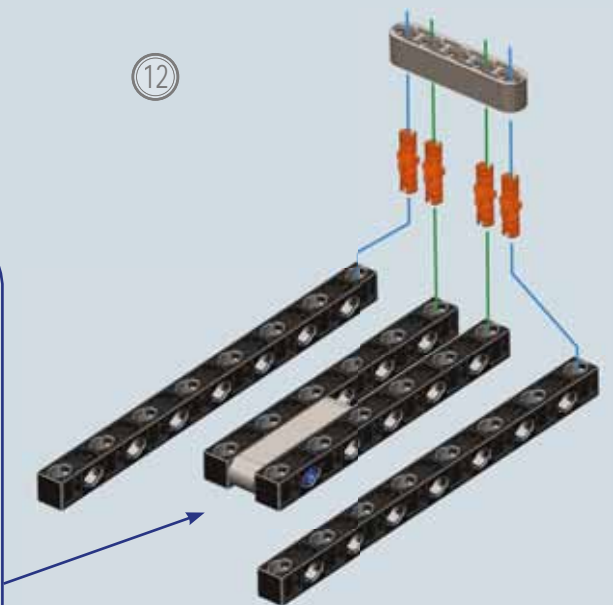
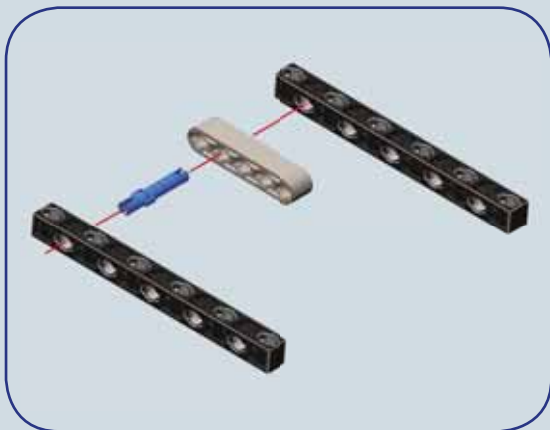
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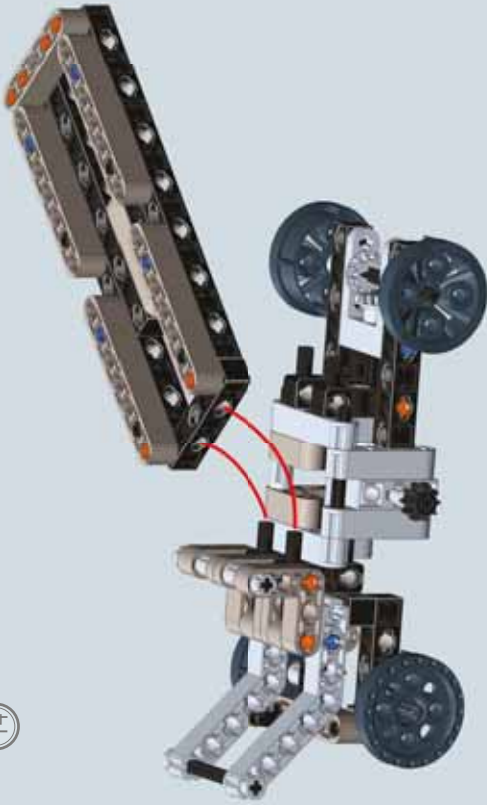
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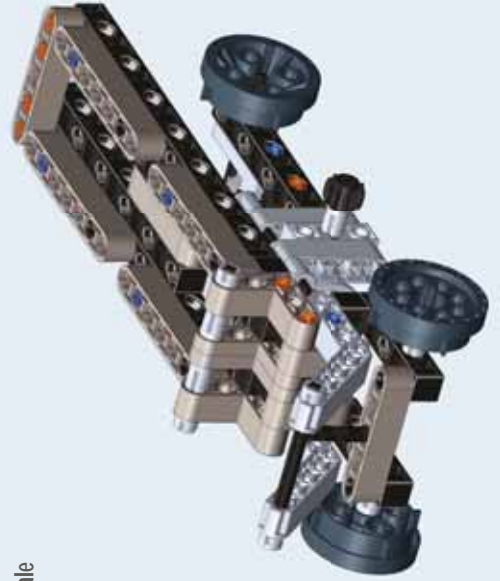
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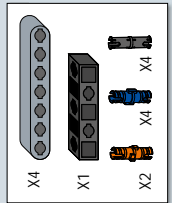
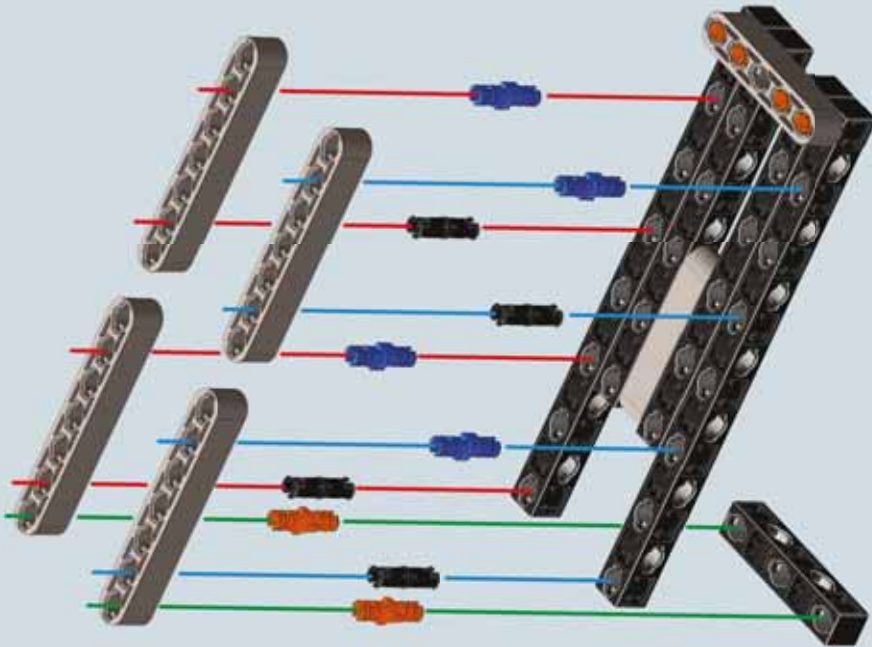
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Modello finale



13

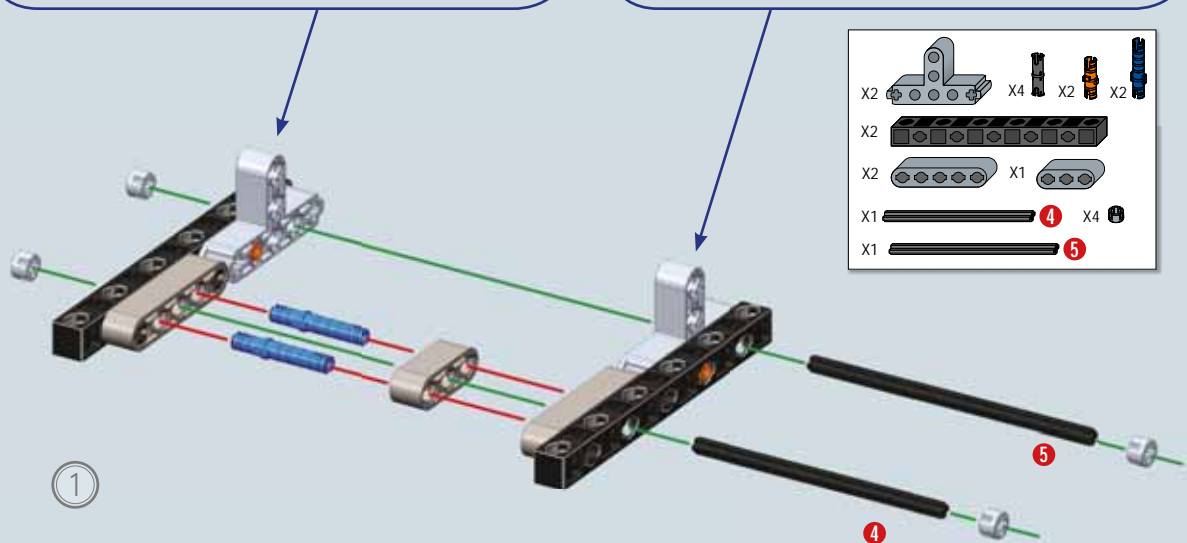
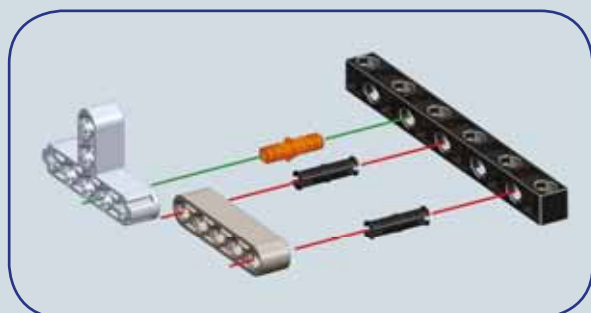
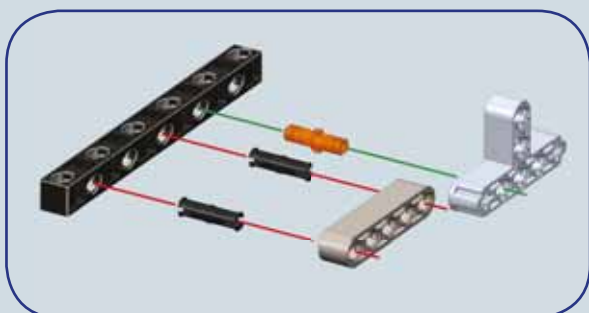


3 Il camion da miniera



Notizie tecniche e curiosità

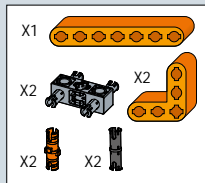
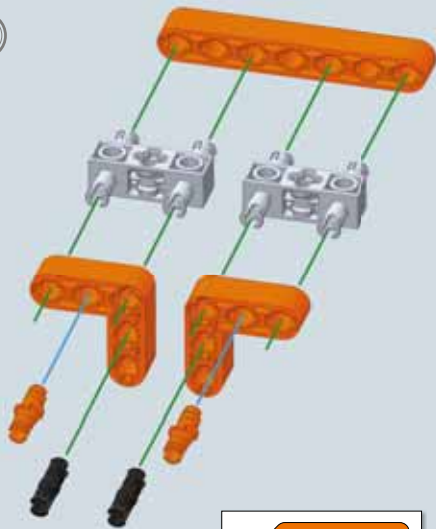
I camion utilizzati nell'industria mineraria sono dei veri e propri colossi su ruote. I modelli più grandi possono arrivare ad un'altezza di 7 metri (come una palazzina di due piani) e montano un motore diesel grande come un furgone. Il cassone è lungo quasi 10 metri e può trasportare una quantità enorme di materiale terroso. A pieno carico, l'intero mezzo può pesare fino a 600 tonnellate. Monta solitamente 6 ruote, anch'esse di notevoli dimensioni (circa 4 metri di diametro).



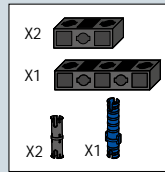
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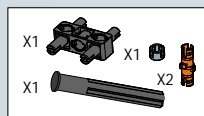
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3



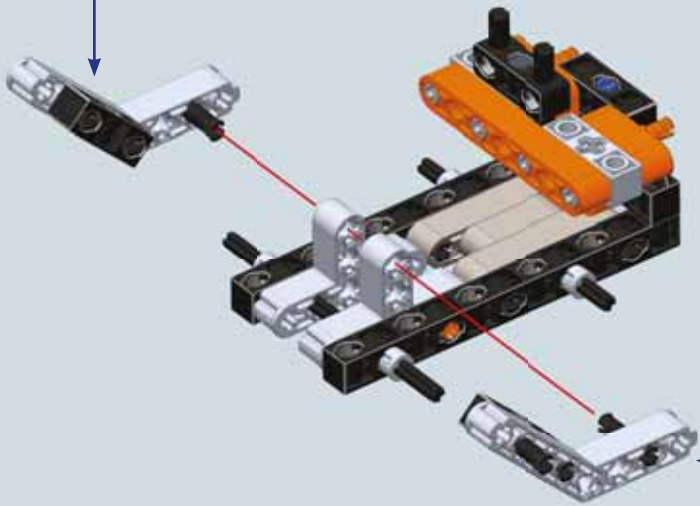
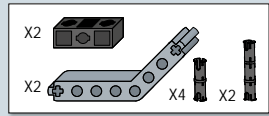
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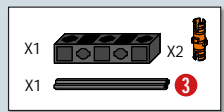
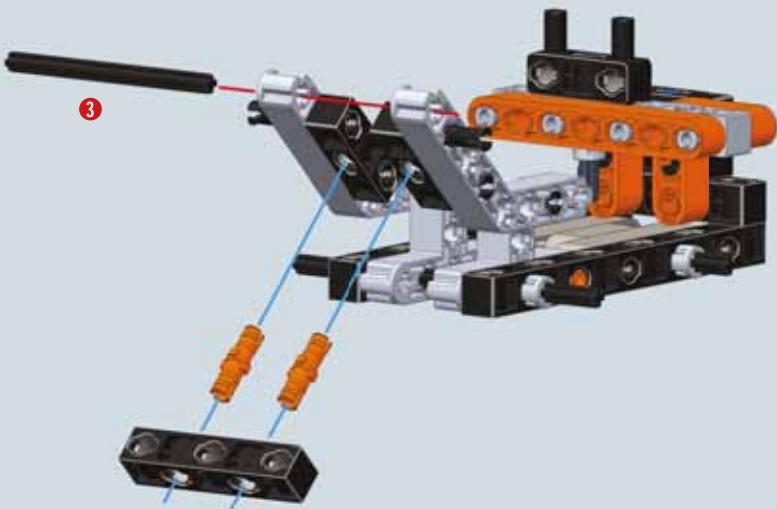
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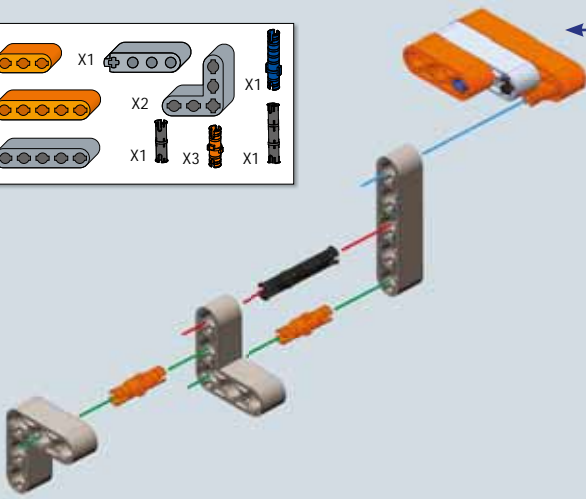
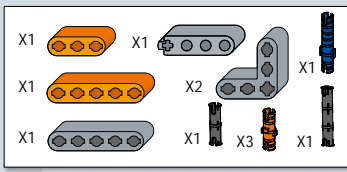


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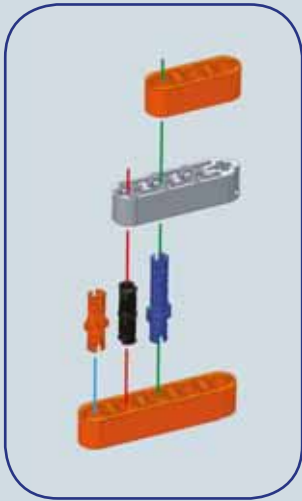
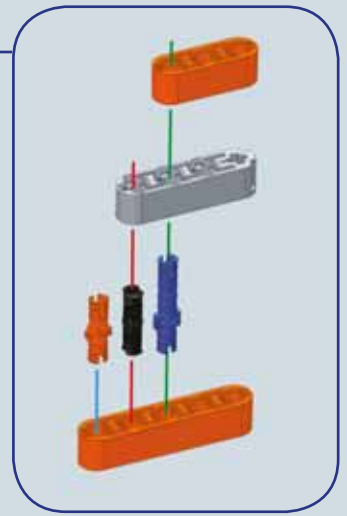


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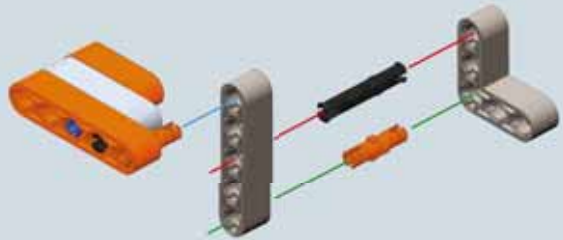
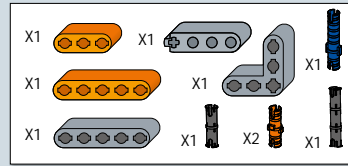




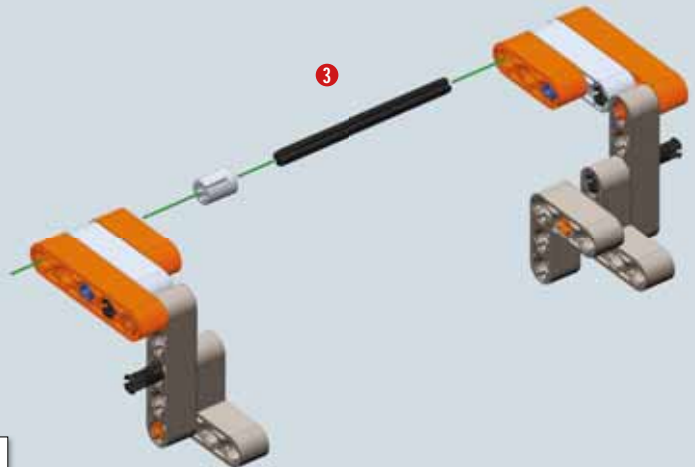
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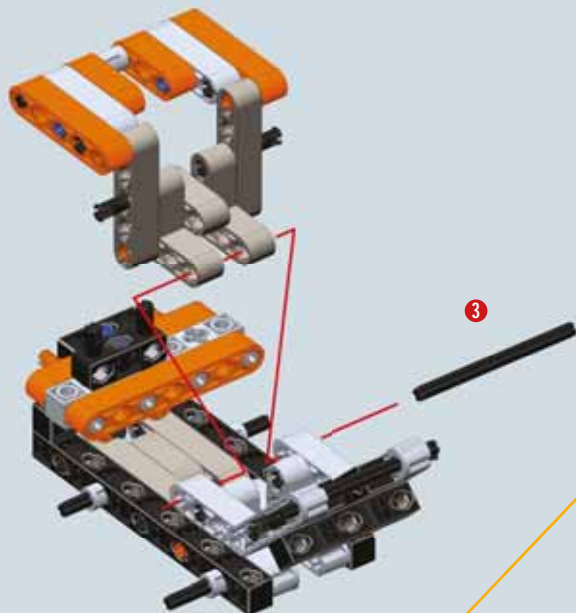


9



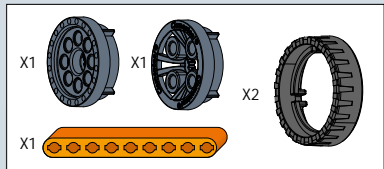
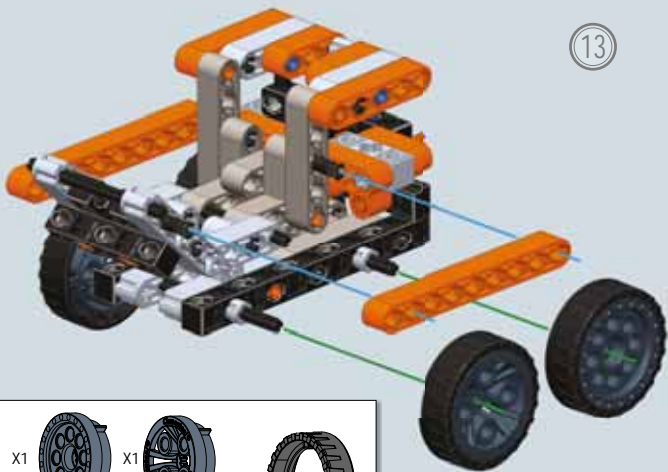
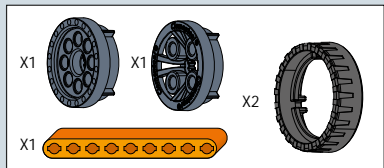
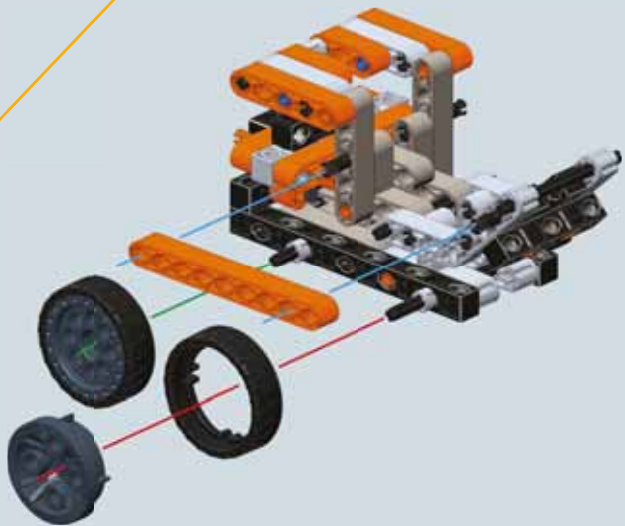
10





X1  3

1:1  3



Modello finale

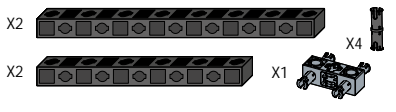
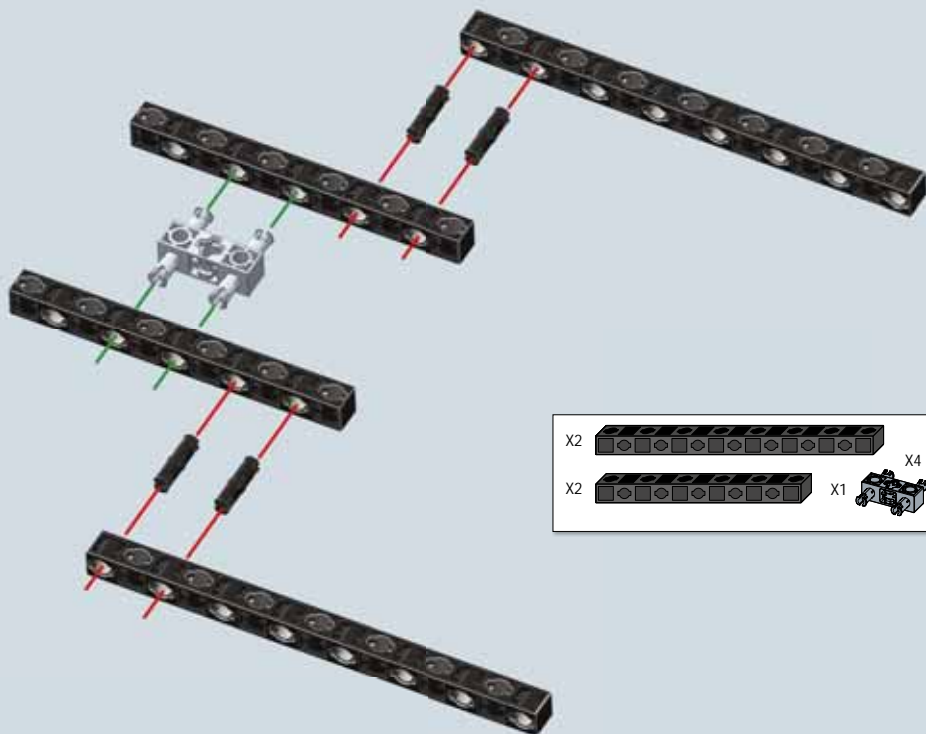
4 Il camion europeo



Notizie tecniche e curiosità

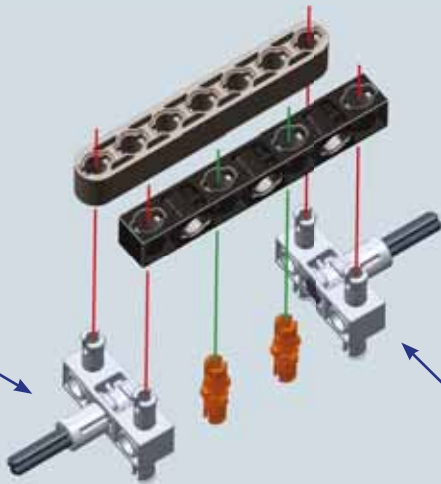
L'autocarro, o camion, è un veicolo progettato per il trasporto delle merci. Spinto da potenti motori diesel può avere dalle 4 alle 6 ruote. Il modello che andremo a costruire in questa attività, per la precisione, è un trattore stradale, ovvero un veicolo adibito esclusivamente al traino di semirimorchi con cui, una volta agganciato, forma particolari complessi veicolari denominati autoarticolati. L'autocarro e il trattore stradale si differenziano per il fatto che il trattore stradale non può caricare autonomamente merci. Il muso piatto, tipico dei camion europei, è dovuto alle rigide norme sulle dimensioni dei veicoli introdotte per questioni di sicurezza e gestione del traffico.

Un tempo venivano usati come trattori stradali dei veri e propri trattori agricoli equipaggiati con carrozzeria e gomme leggermente modificati rispetto ai modelli originali.



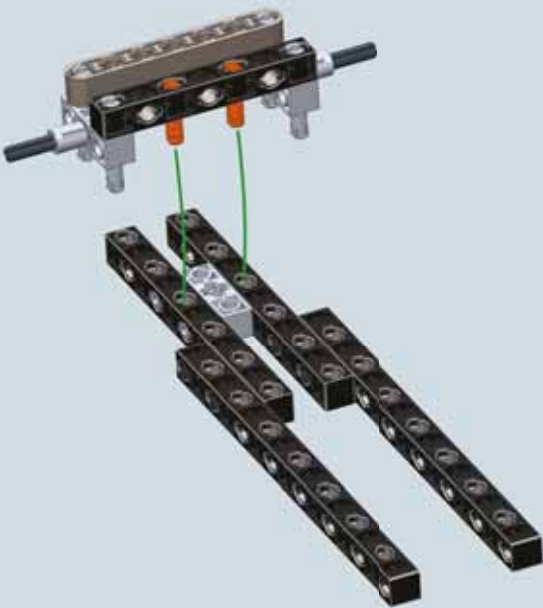
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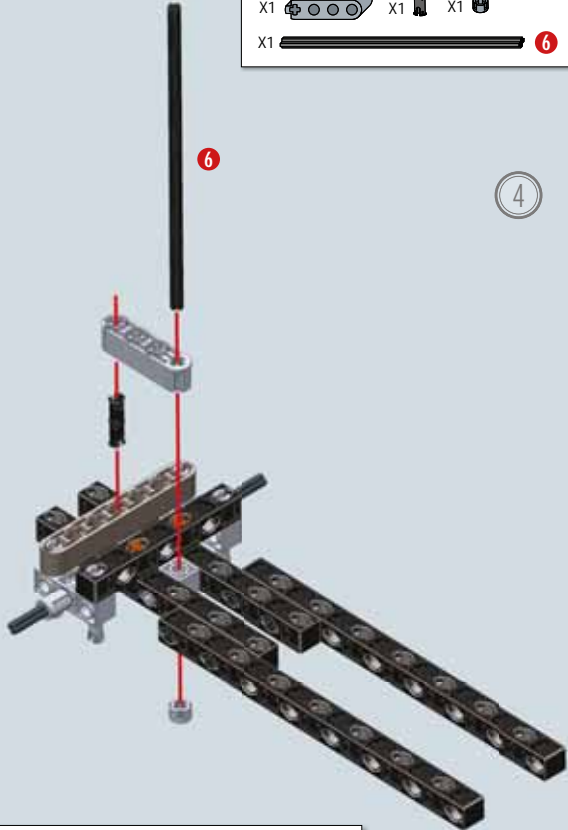
- X1
- X2
- X1
- X2
- X2
- X2

3



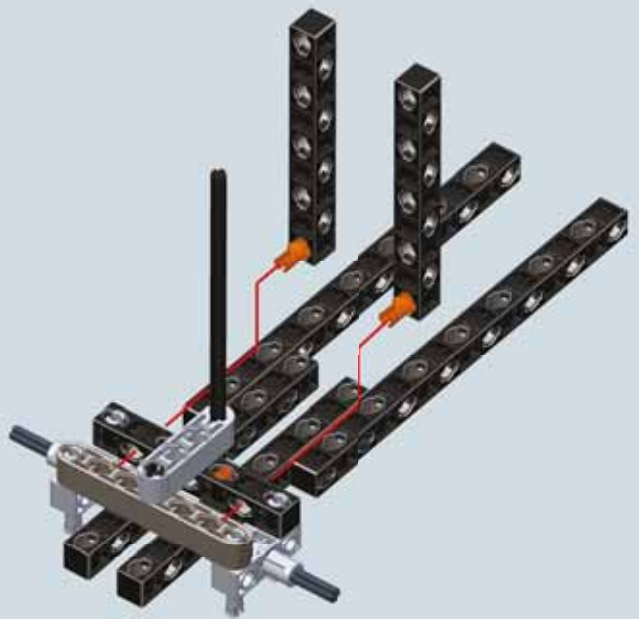
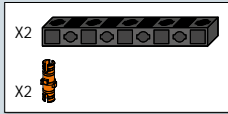
- X1
- X1
- X1
- X1

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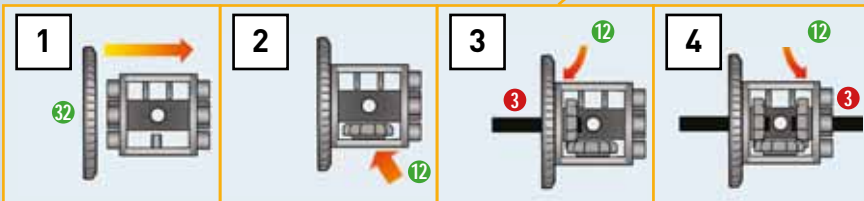
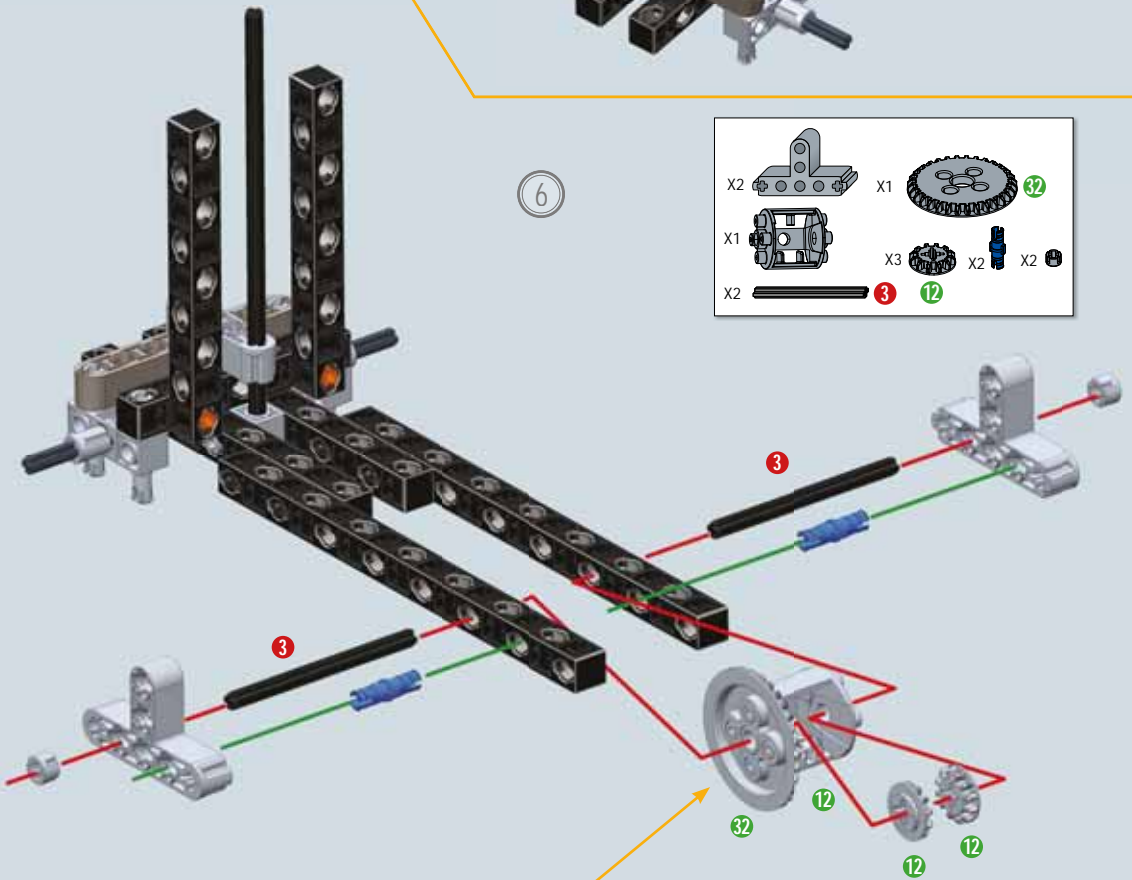
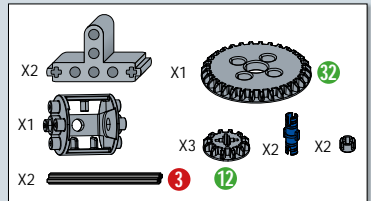


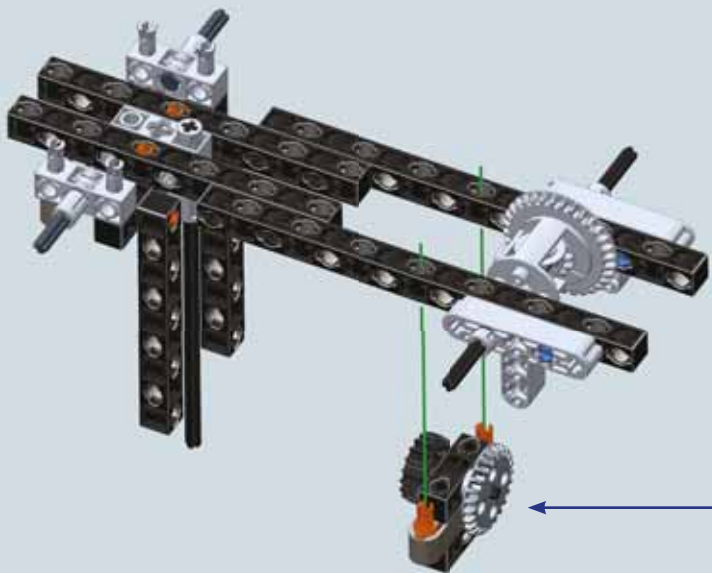
- 1:1

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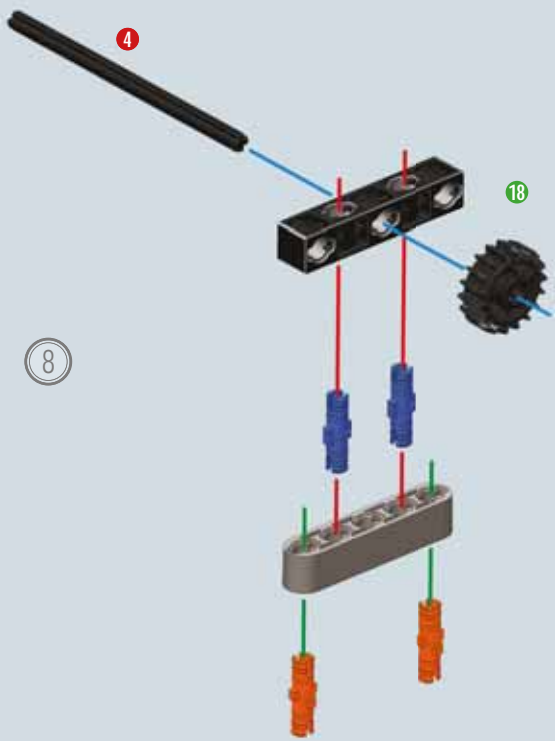
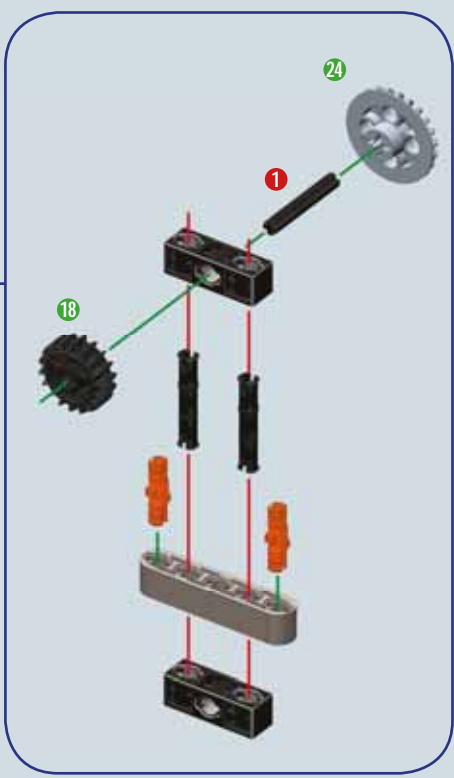


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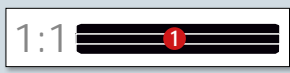


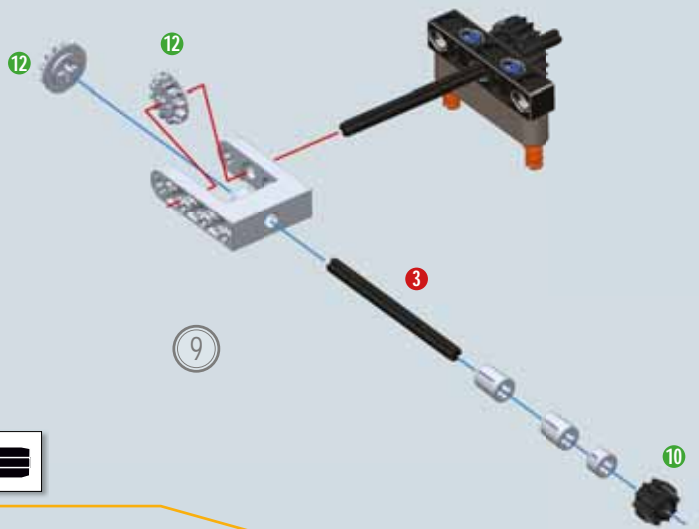
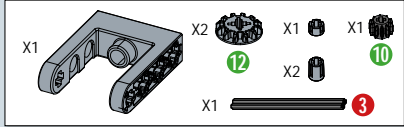
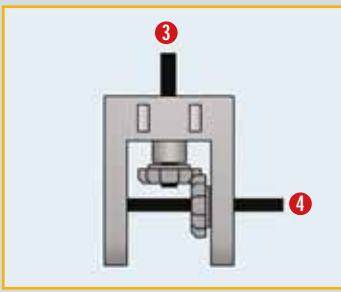


- X1 1
- X2 X2
- X1 X1 24
- X2 X2
- X1 X1 18
- X2 X2



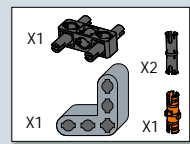
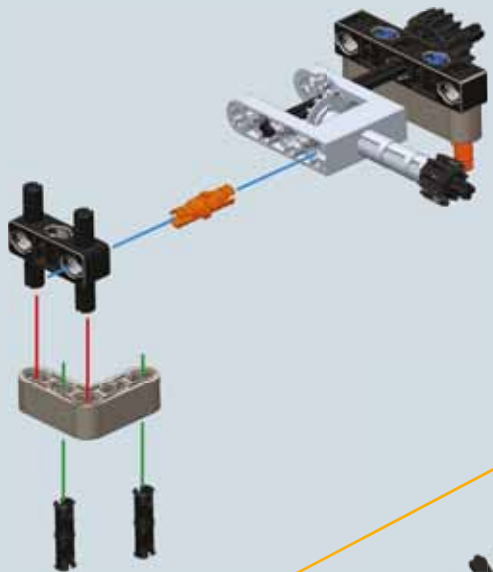
- X1 X1
- X1 X1
- X1 X1 4
- X1 X1 18
- X2 X2
- X2 X2





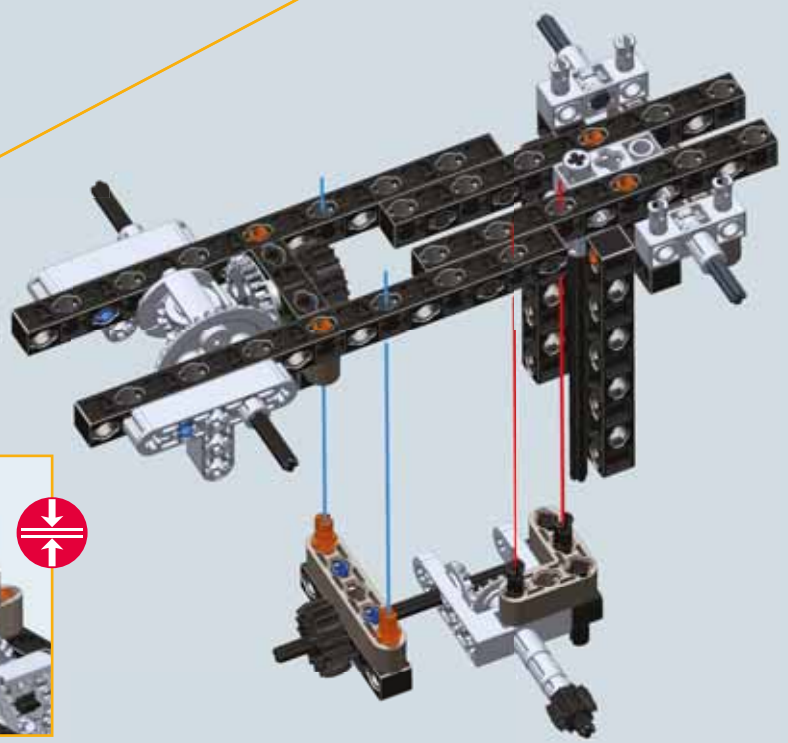
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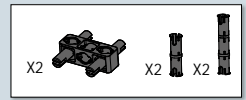
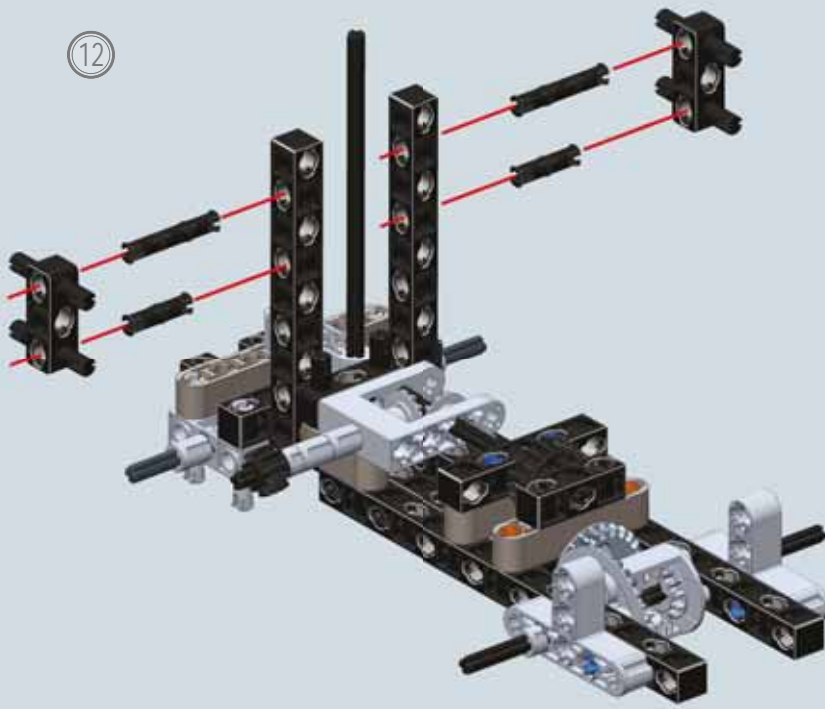


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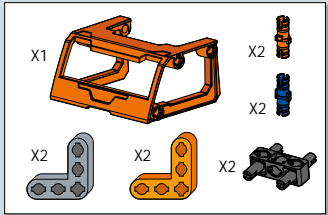
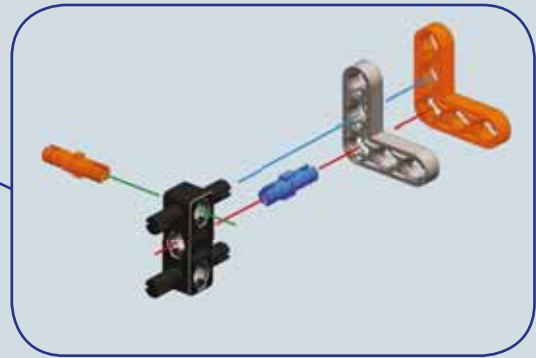
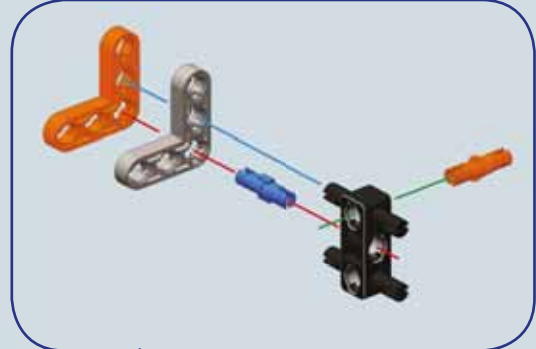
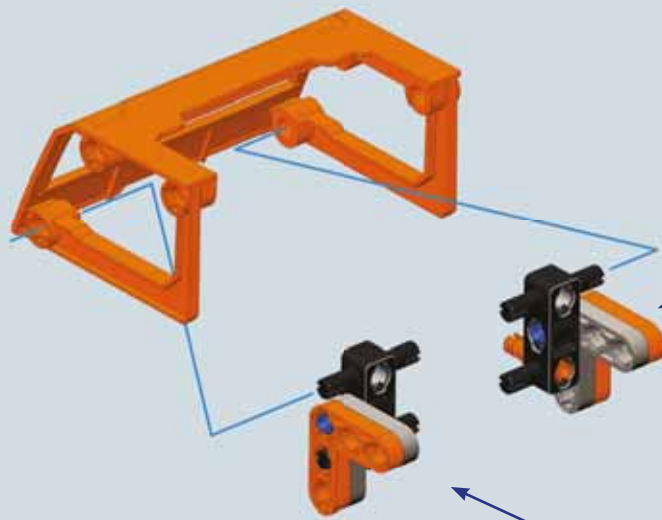
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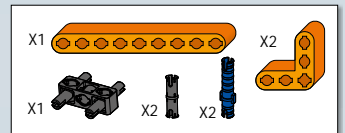
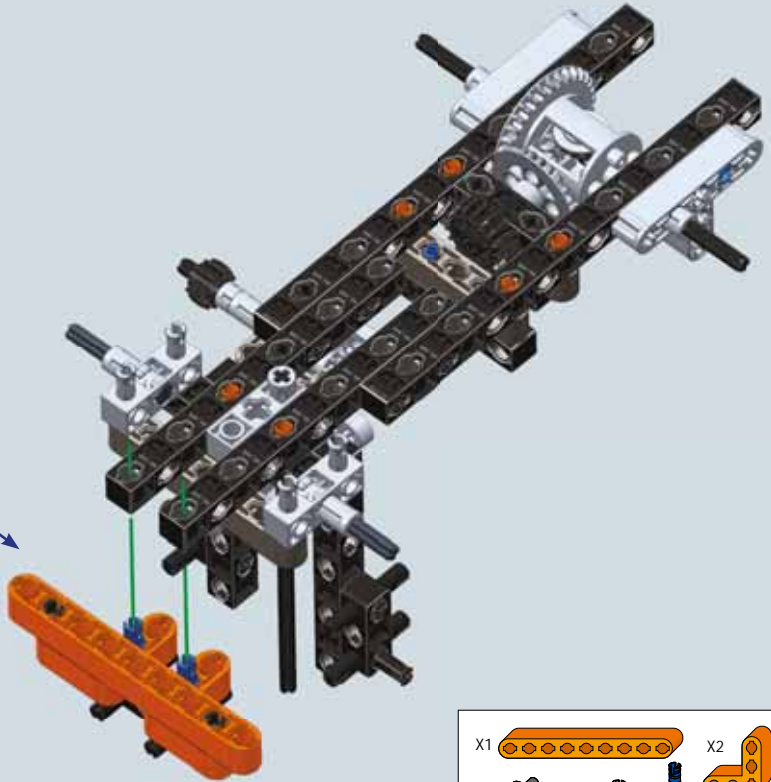
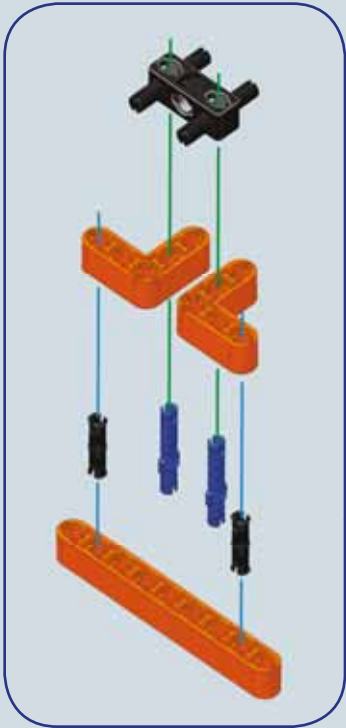
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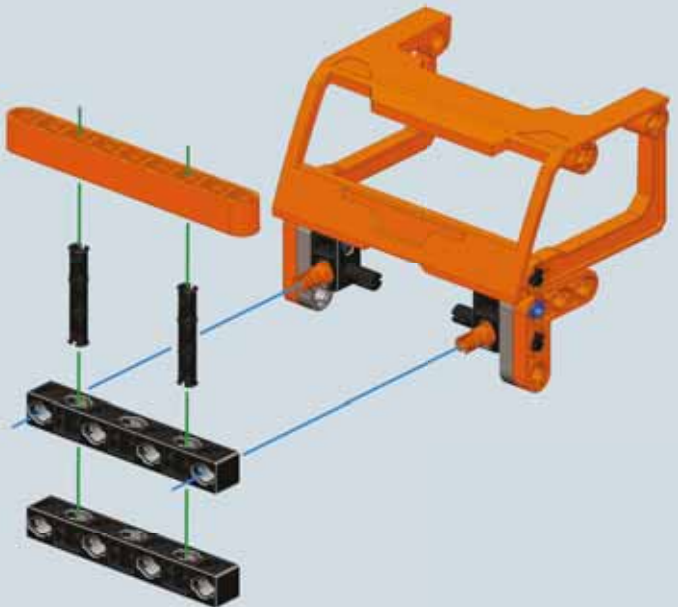
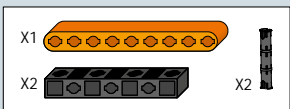
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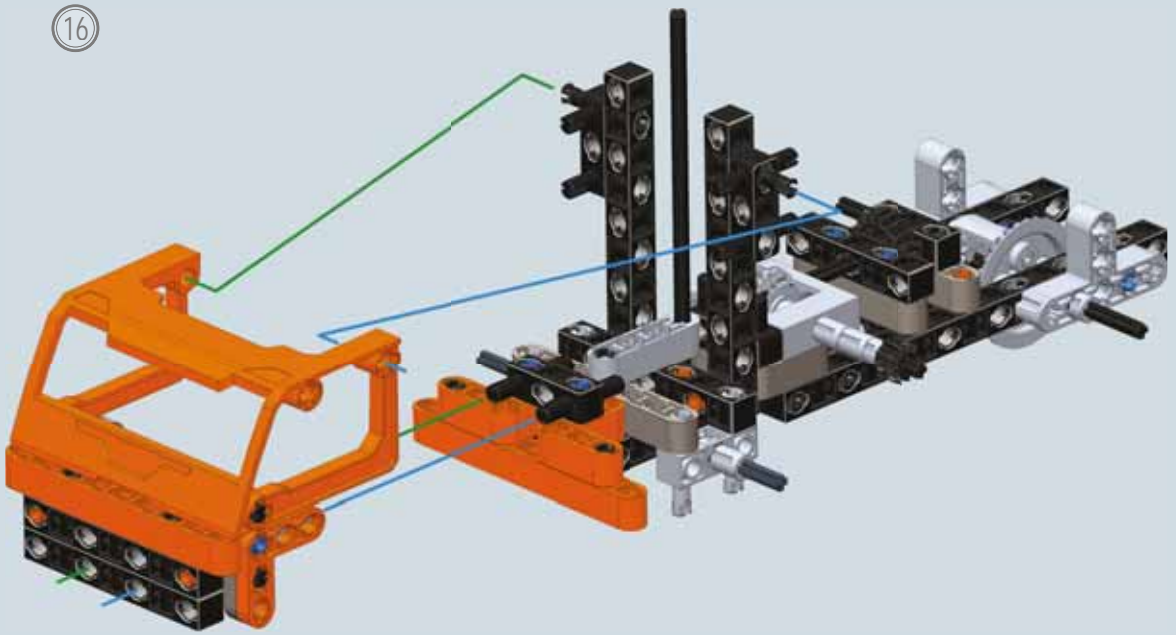
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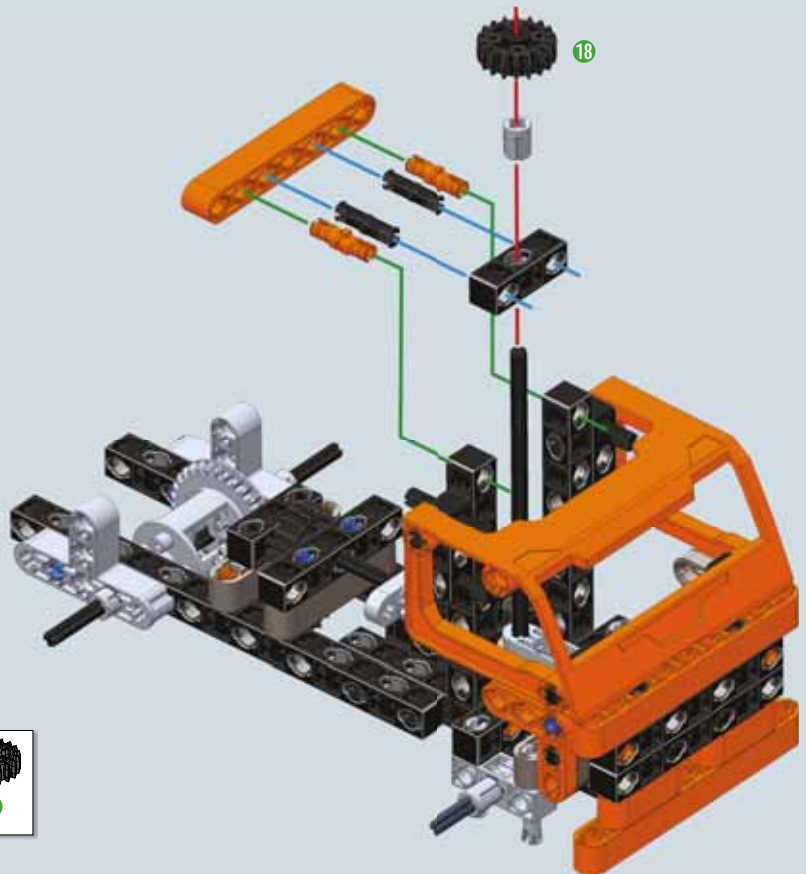
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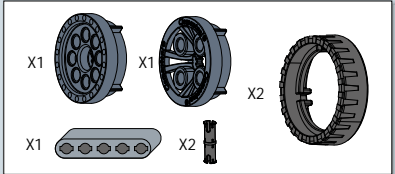
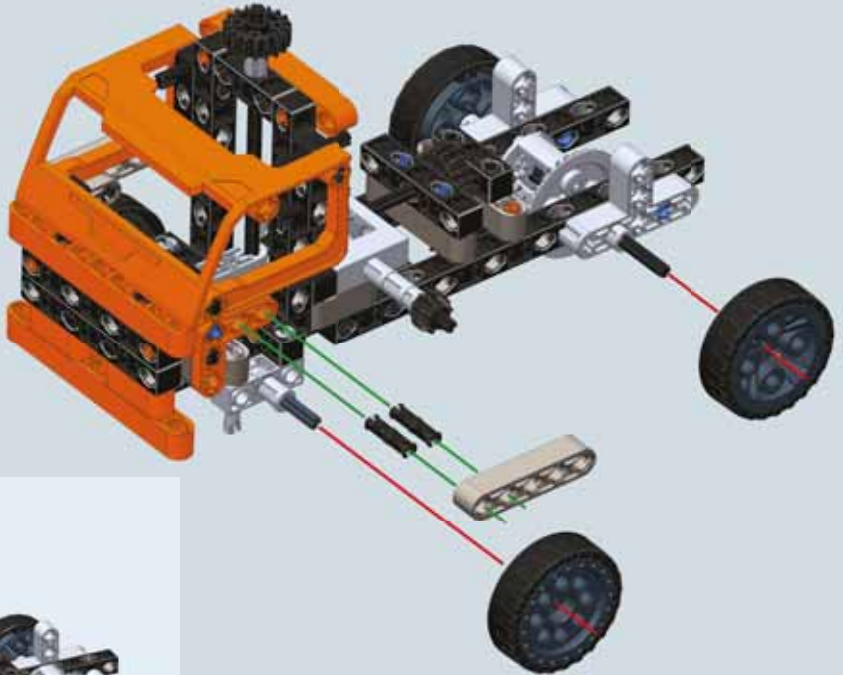
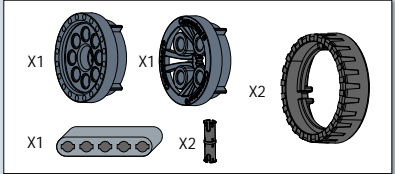
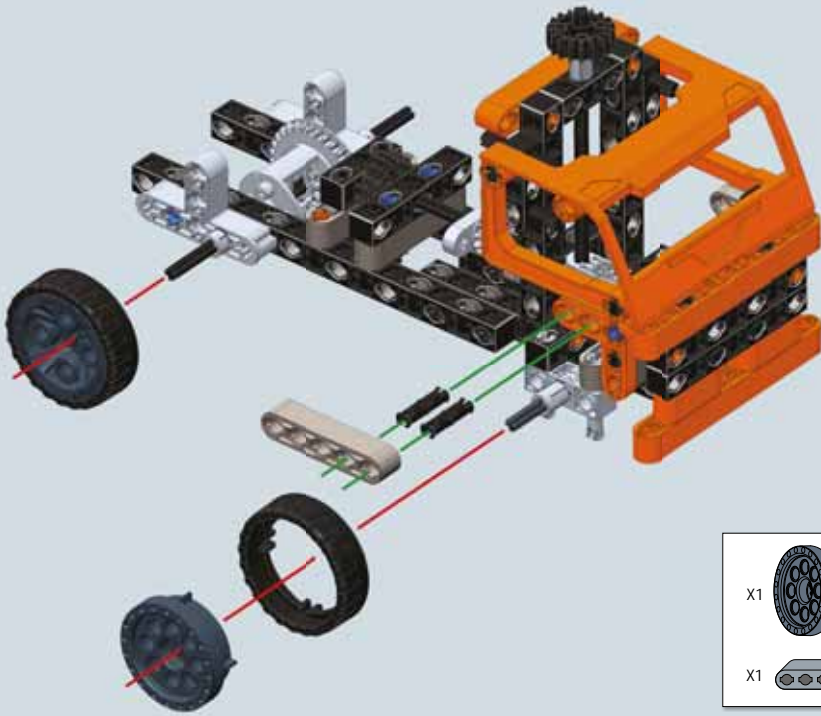
16



17



- | | | | |
|----|----|----|-----------|
| X1 | | X1 | |
| X1 | | X1 | |
| | X2 | X2 | |
| | X2 | | |
| | | | 18 |



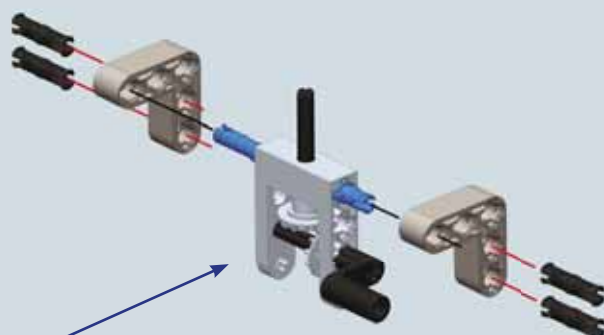
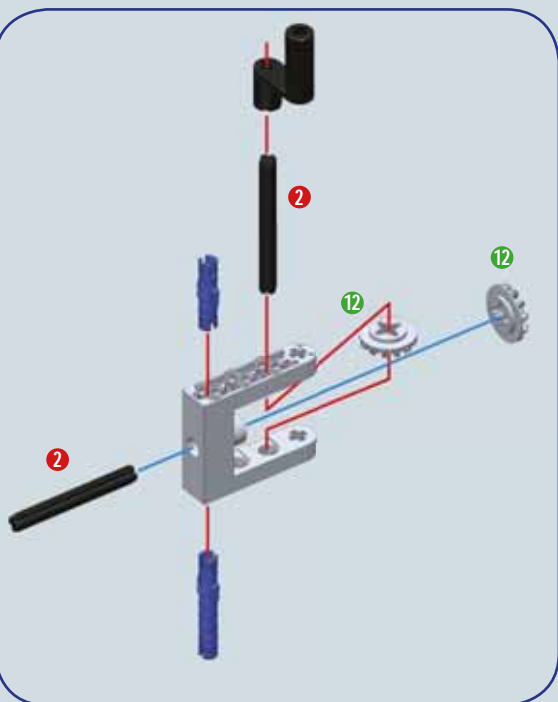
Modello finale

5 Attrezzature da lavoro: pinza per tronchi

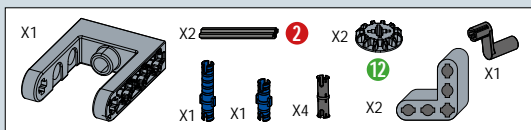
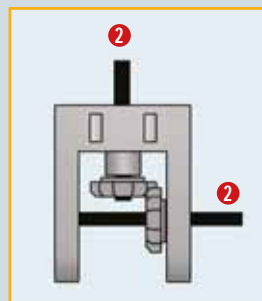


Notizie tecniche e curiosità

La pinza idraulica è un'attrezzatura di presa costituita da una tenaglia azionata da uno o più cilindri idraulici. Anche il braccio estensibile che la connette al camion sfrutta gli stessi attuatori idraulici per il movimento. Questo tipo di attrezzatura viene adottata in ambito forestale per il carico del legname destinato al commercio o anche per lo sgombero di zone bloccate da tronchi e ramaglie.



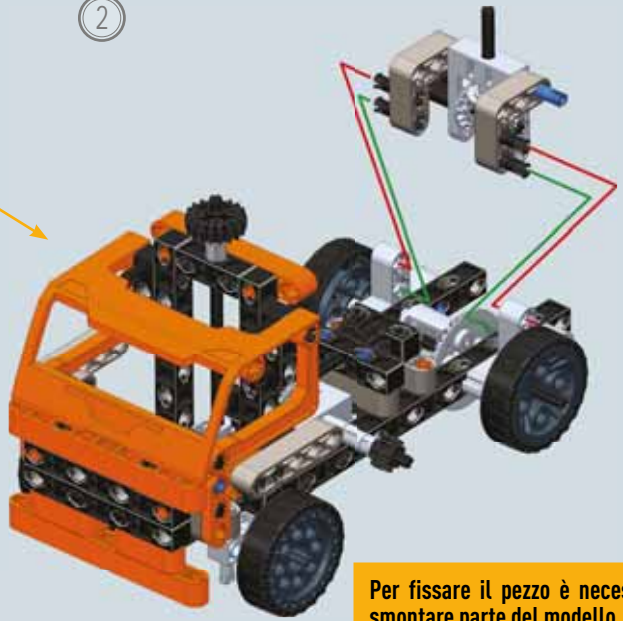
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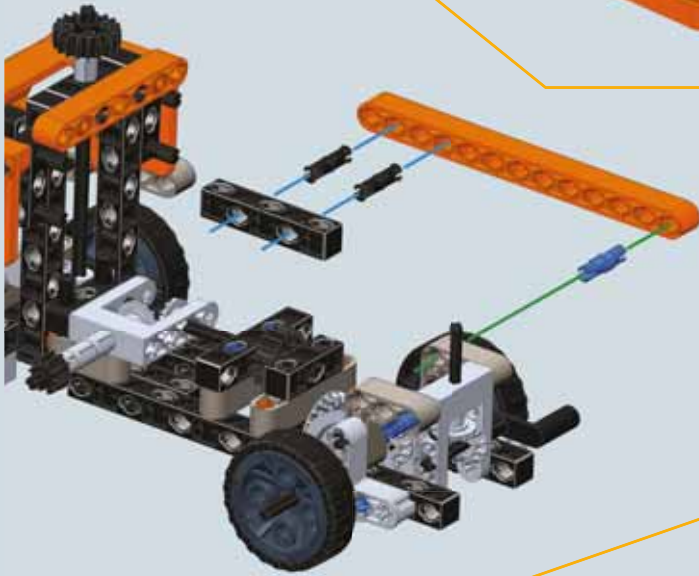


Modello assemblato nell'attività 4

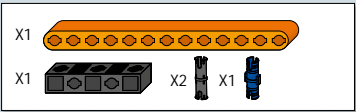
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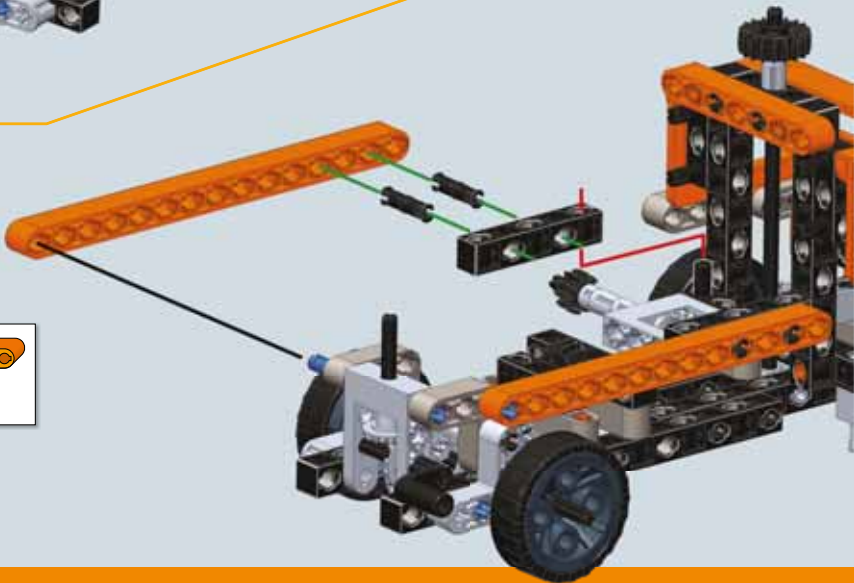
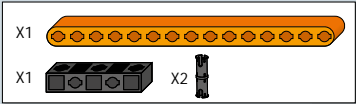
Per fissare il pezzo è necessario smontare parte del modello.



3



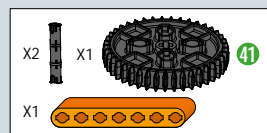
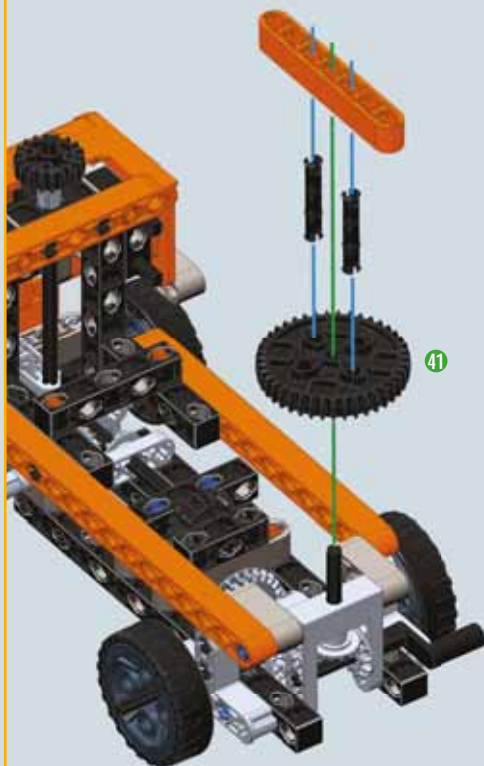
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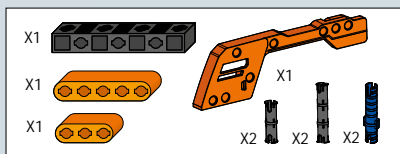
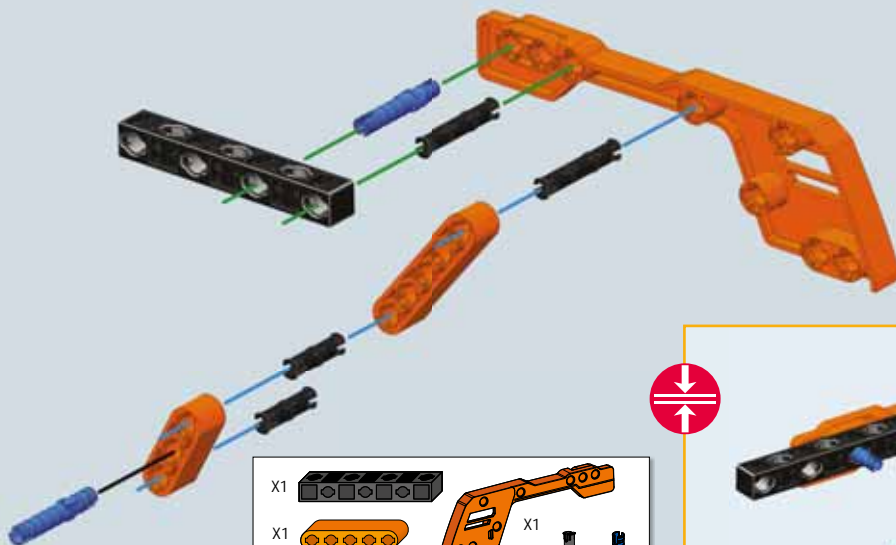
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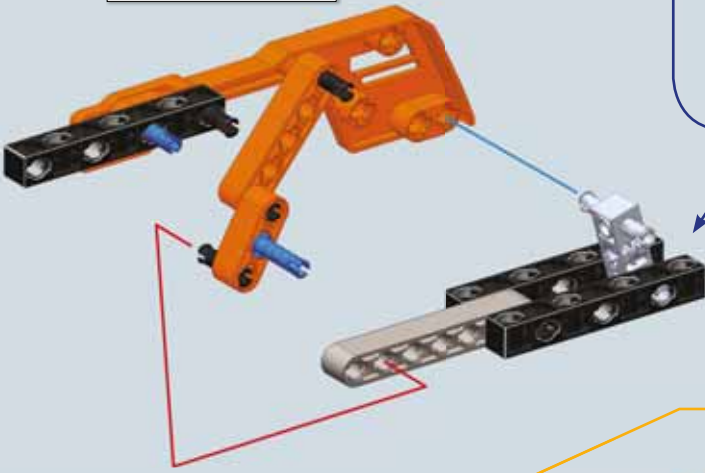
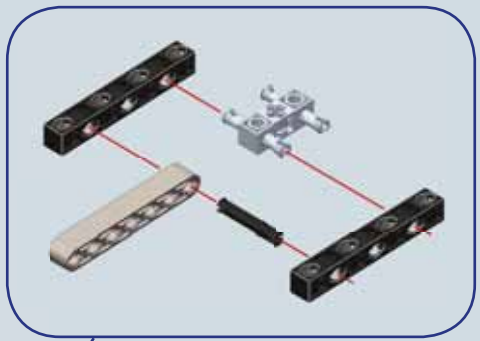
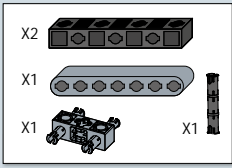
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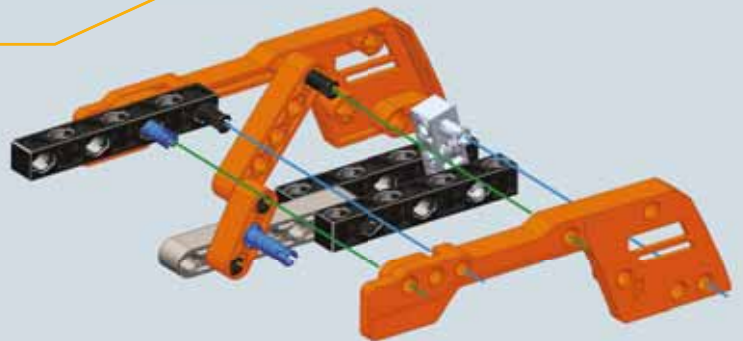
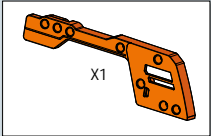
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8

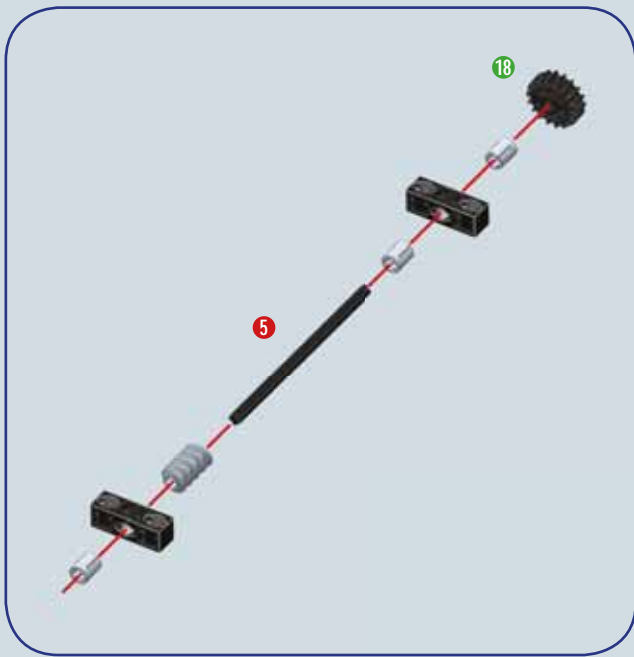


9



10

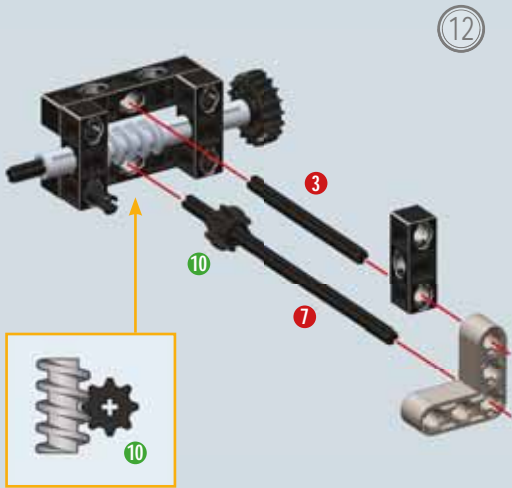




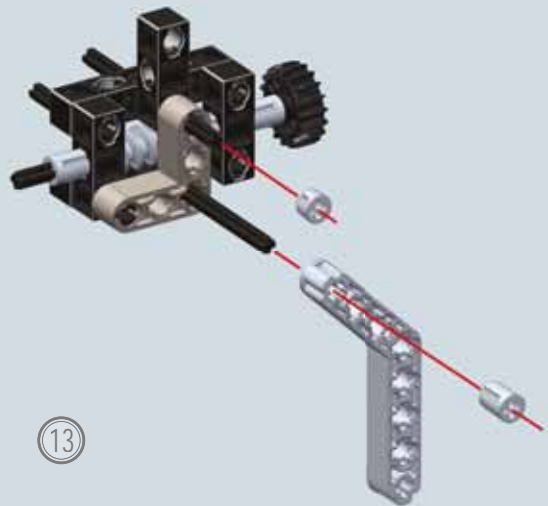
11



X2		X3		X1	
X2					
X1					
X1		X3		X1	



12



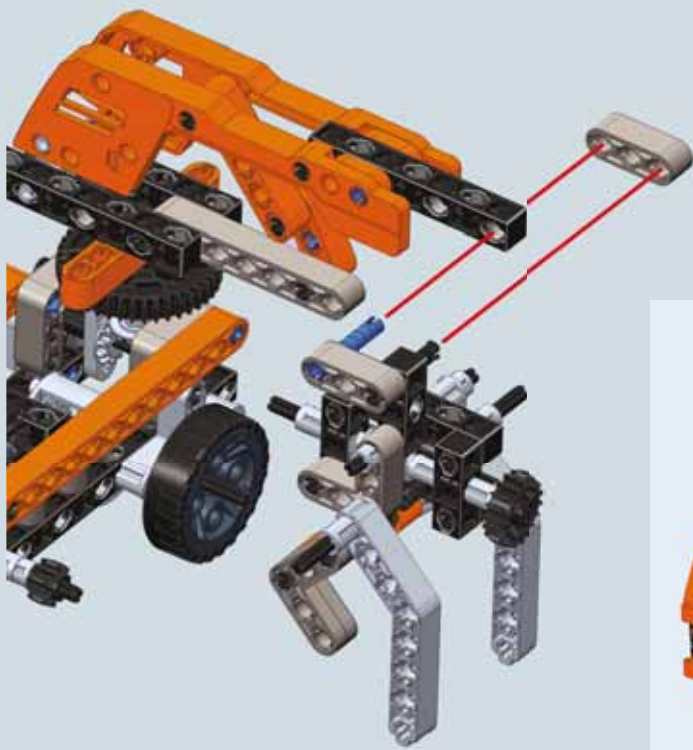
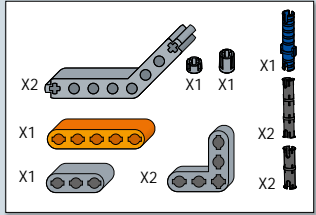
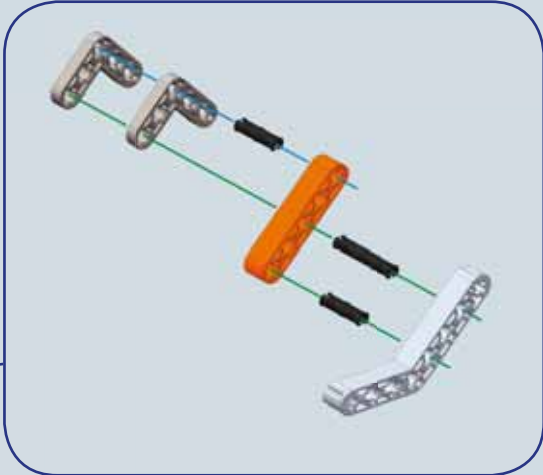
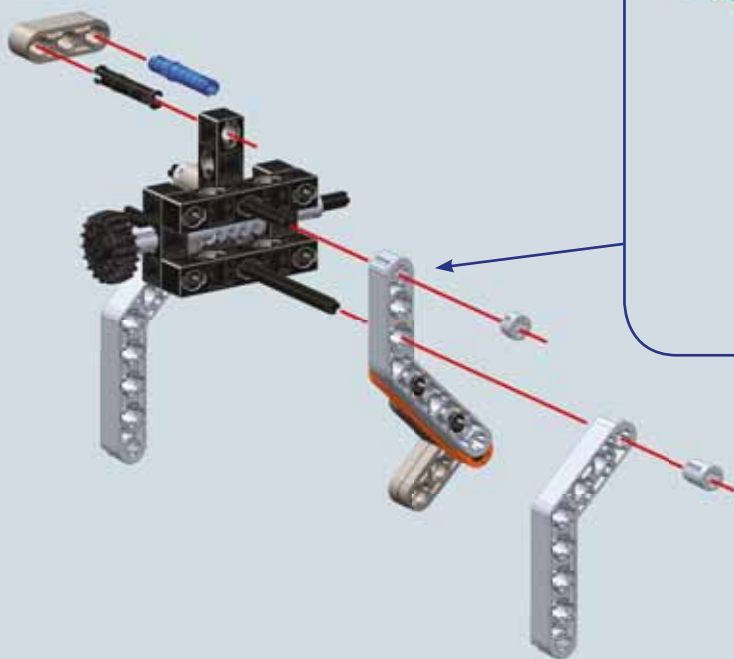
13

X1		X1		X1	
X1					
X1					



X1		X1	
X1			





15



Modello finale

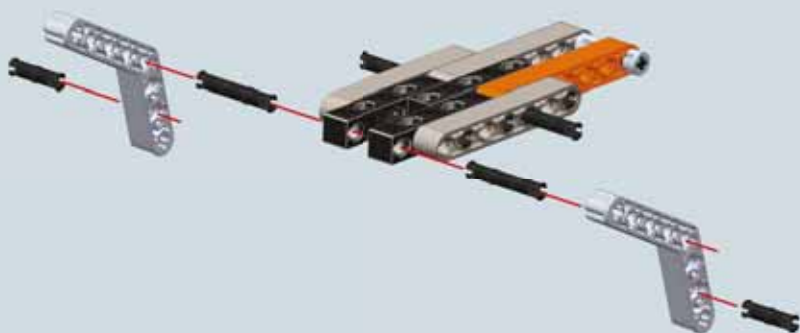
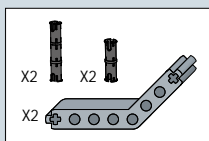
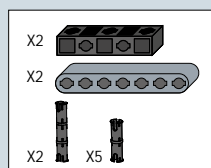
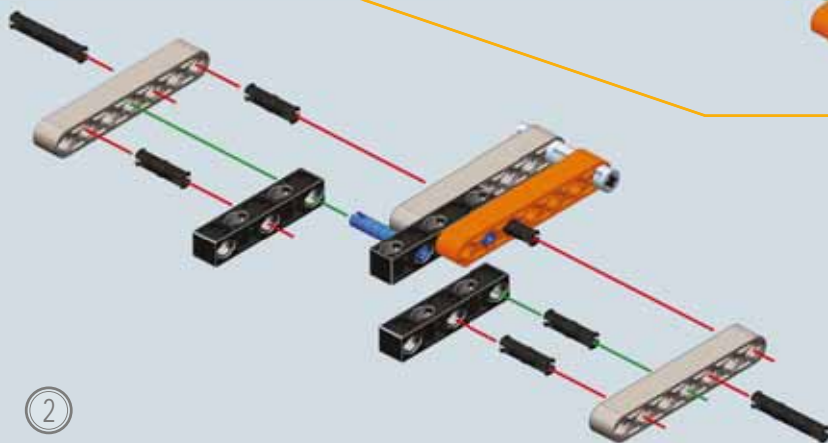
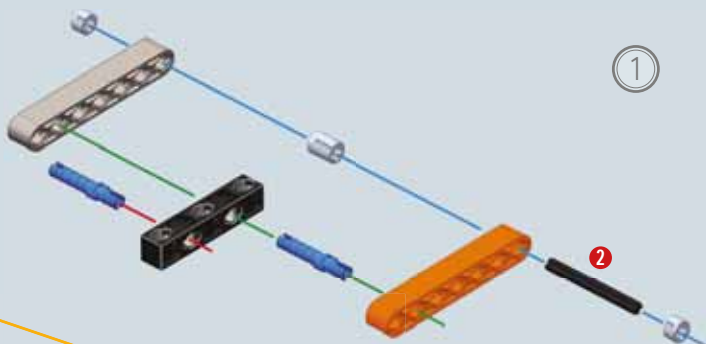
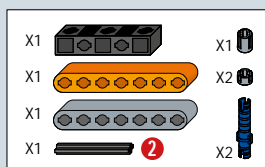
6 Attrezzature da lavoro: cassone ribaltabile



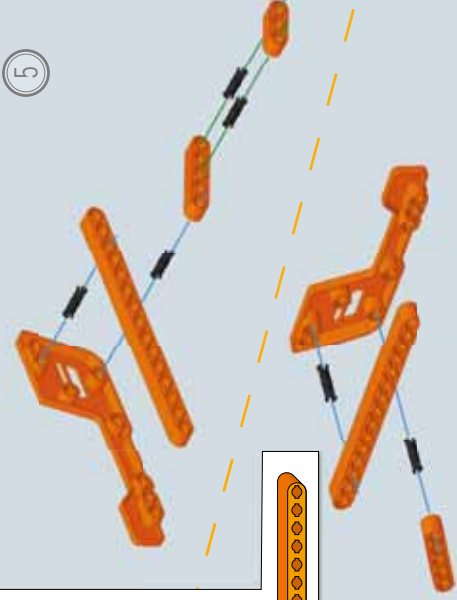
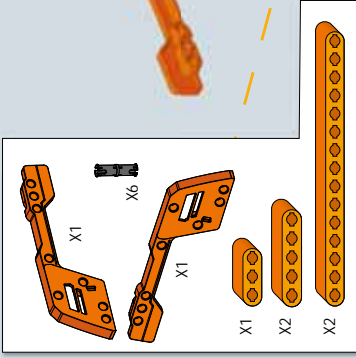
Notizie tecniche e curiosità

Il camion con cassone ribaltabile è un autocarro, in quanto è in grado di trasportare autonomamente la merce.

È solitamente adibito al trasporto di merce "alla rinfusa" come sabbia, ghiaia o spazzatura. Il movimento del cassone è affidato, anche in questo caso, a pistoni idraulici.



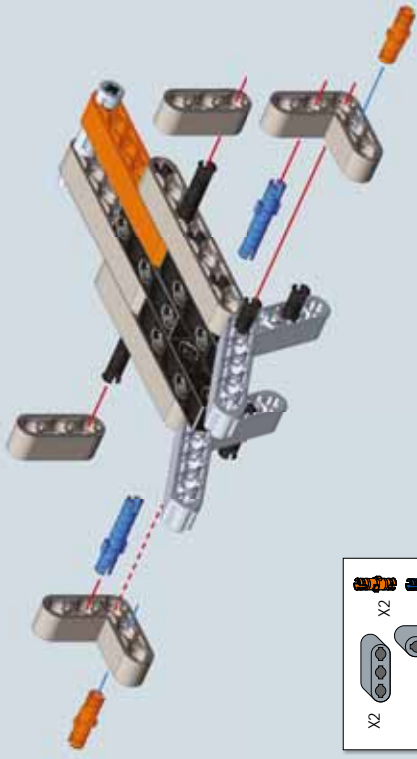
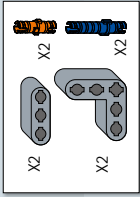
5



7

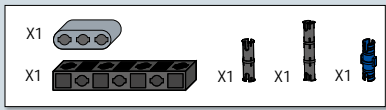


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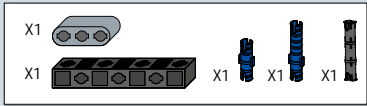
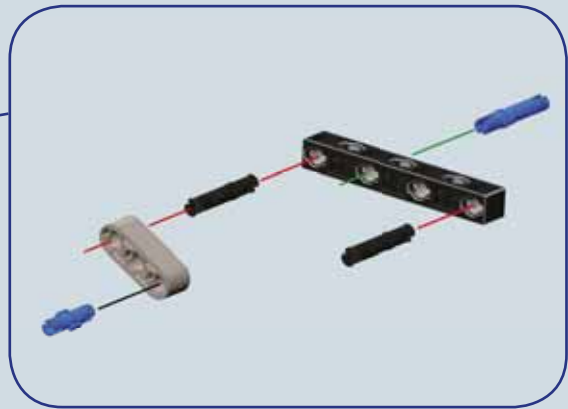
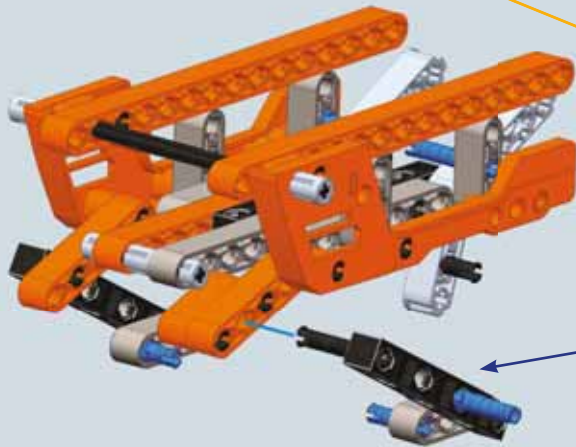
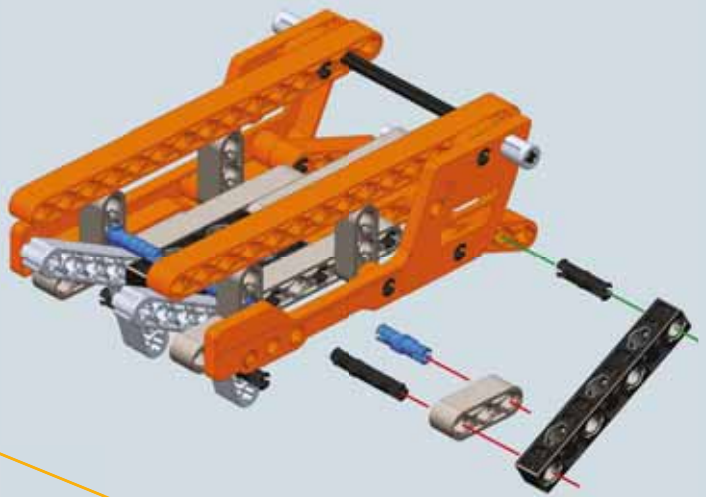


4

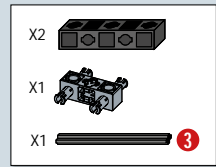
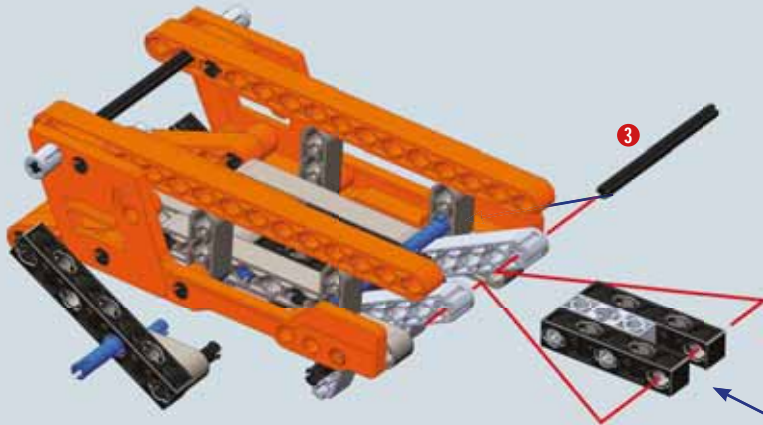




8

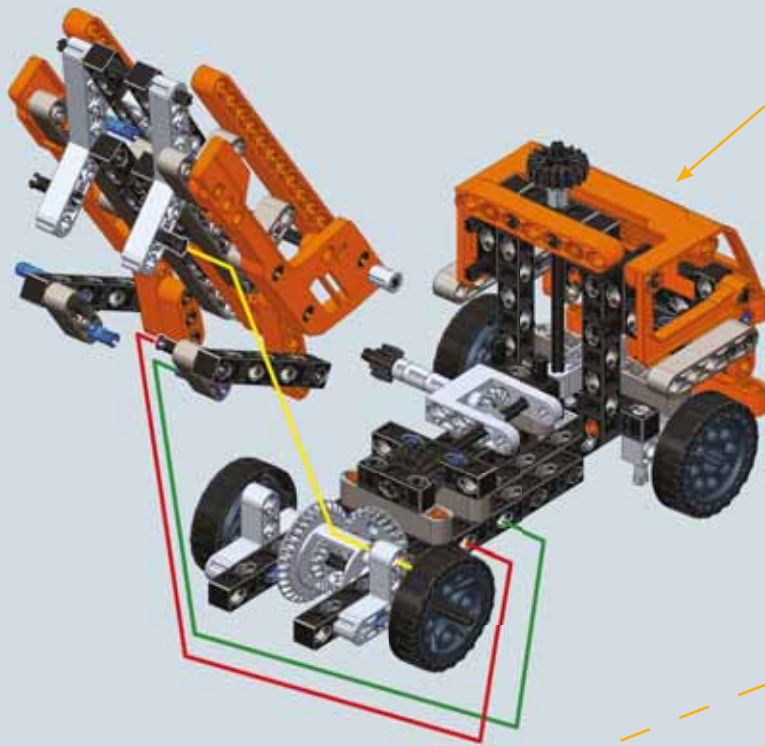


9



10

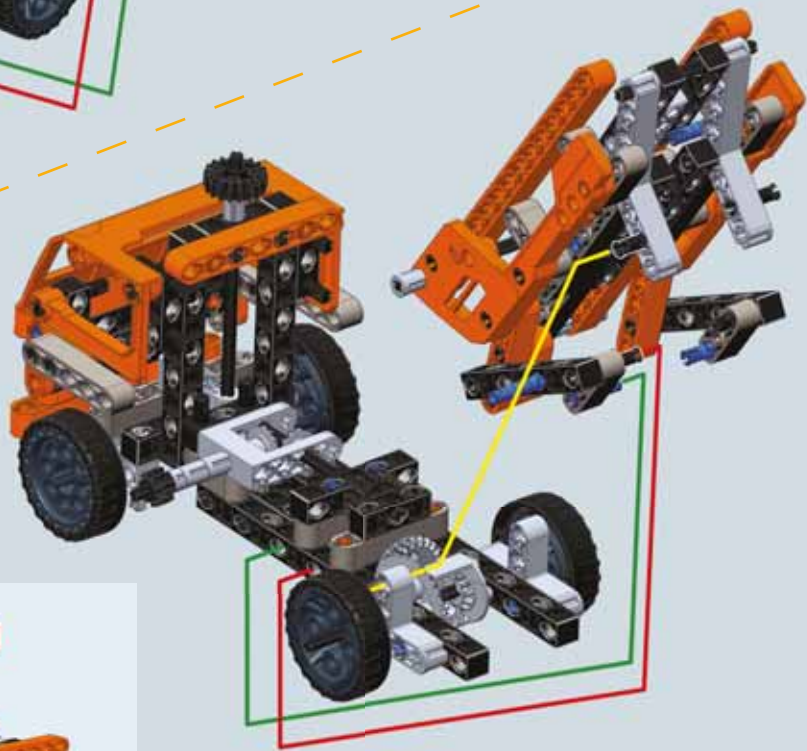




Modello assemblato nell'attività 4

11

Per fissare il pezzo è necessario smontare parte del modello.

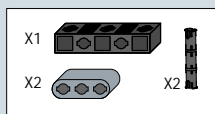
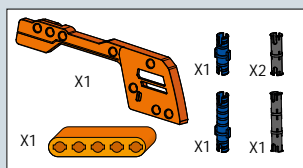
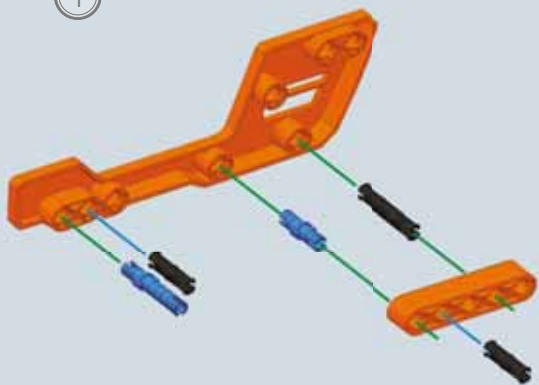


Modello finale

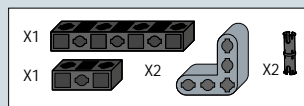
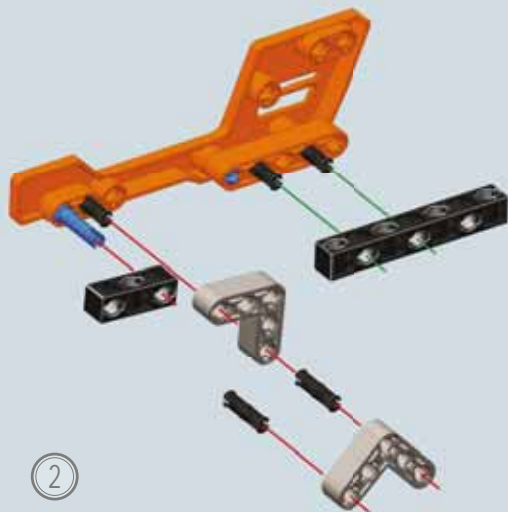
7 Attrezzature da lavoro: carro attrezzi



1

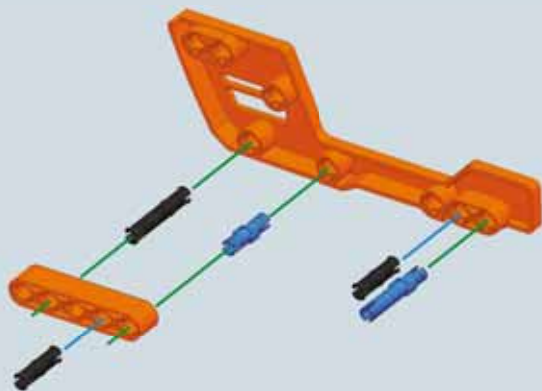


2

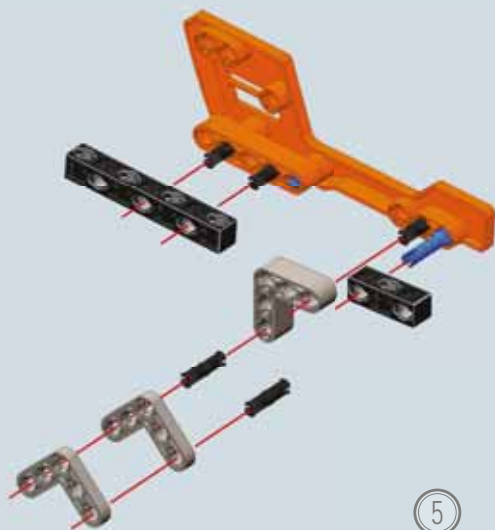
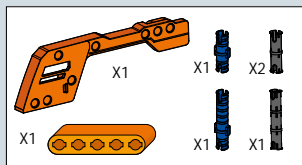


3

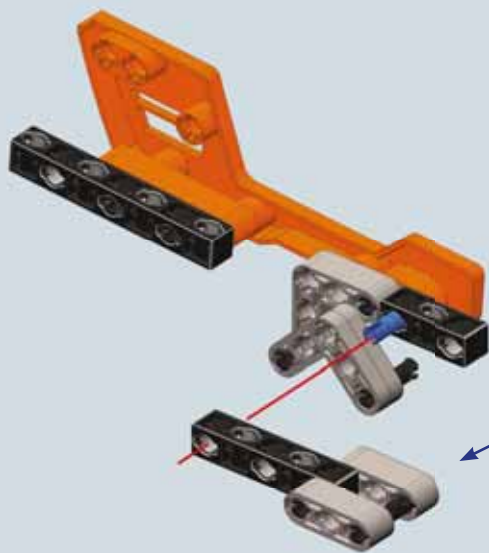
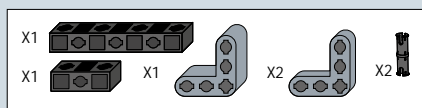




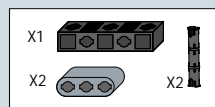
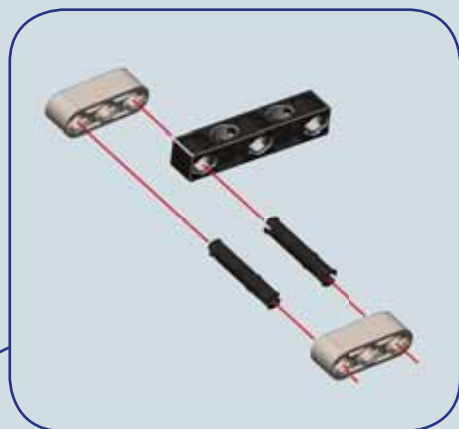
4



5



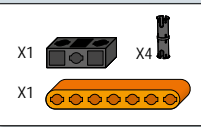
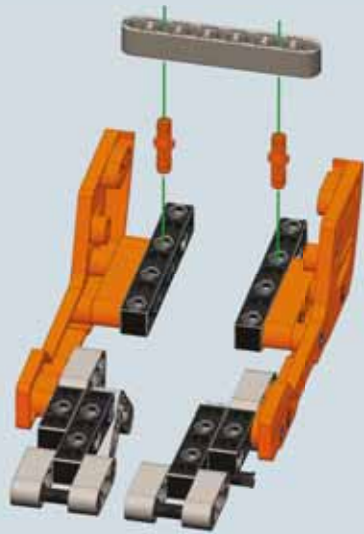
6



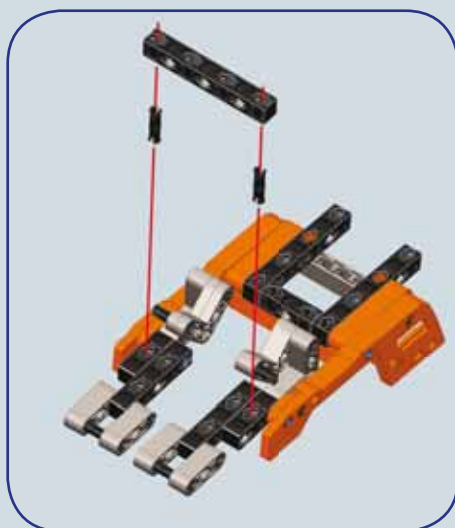
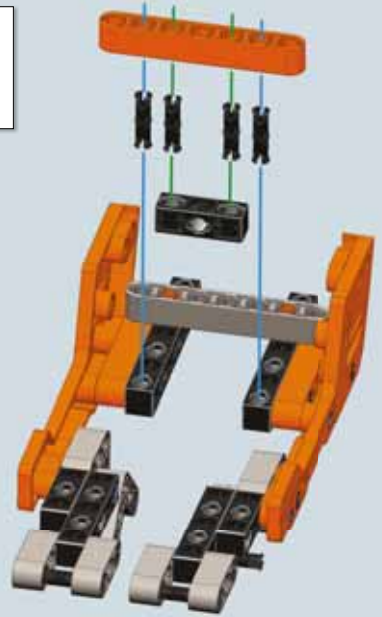
Notizie tecniche e curiosità

Il carro attrezzi è un veicolo da soccorso stradale realizzato per prestare aiuto ad altri mezzi a motore in difficoltà tecniche e all'eventuale loro trasferimento da un luogo ad un altro. Nella maggior parte dei casi si occupa del recupero di veicoli che sono usciti fuori strada in luoghi difficili da raggiungere, a seguito di un incidente.

7



8



9



Per fissare il pezzo è necessario smontare parte del modello.



Modello finale

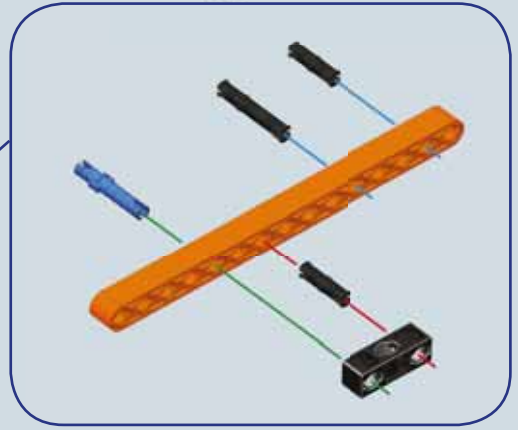
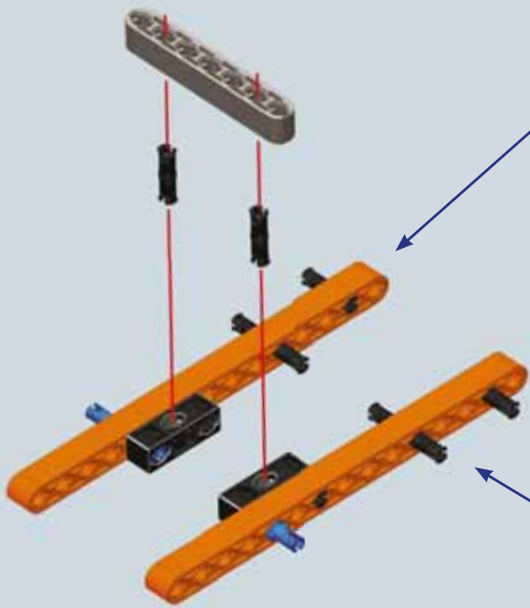


Modello assemblato nell'attività 4

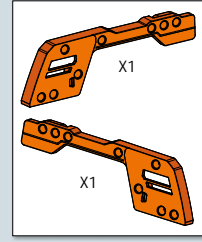
8 Attrezzature da lavoro: braccio gru



1



- X2
- X2
- X2
- X6
- X2
- X1

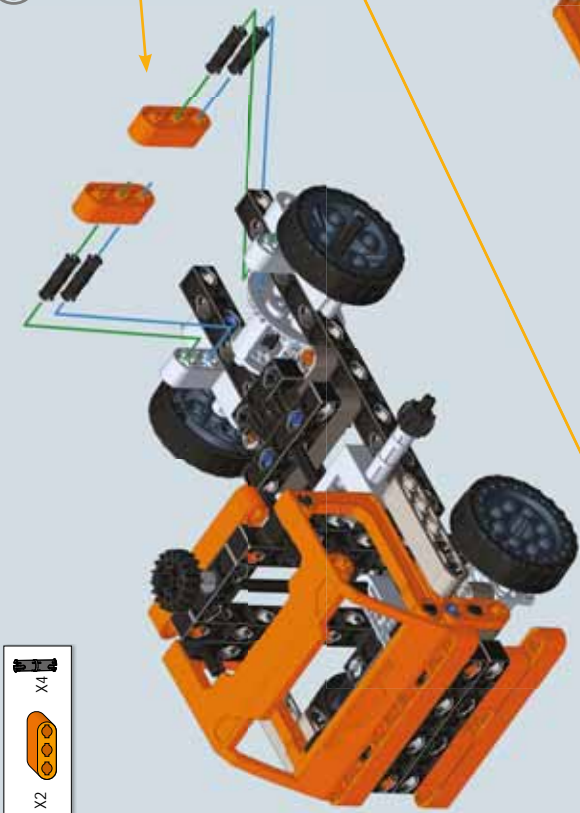


2



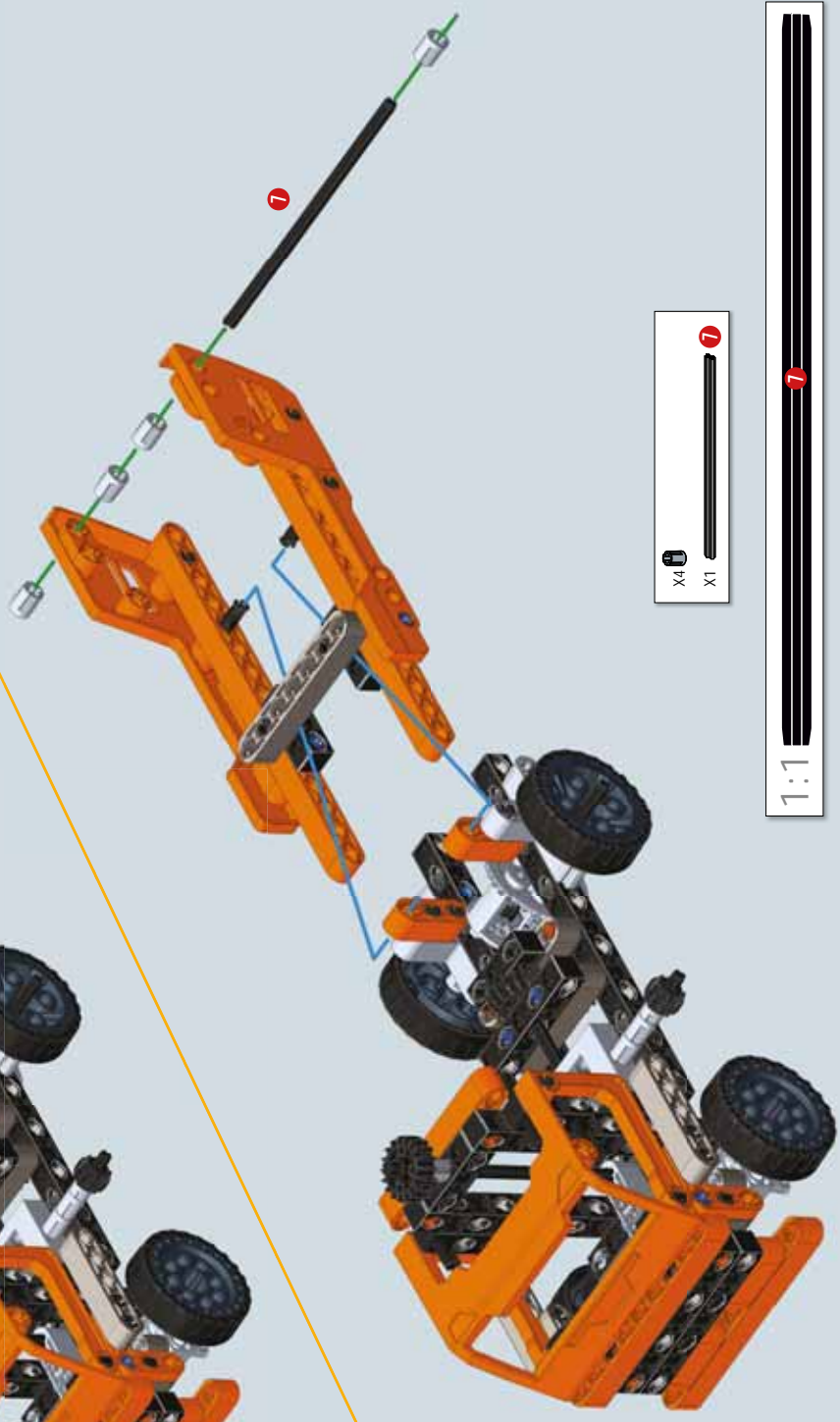
Modello assemblato nell'attività 4

3



X2

X4

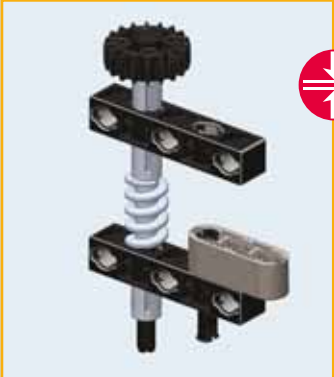


X4

X1

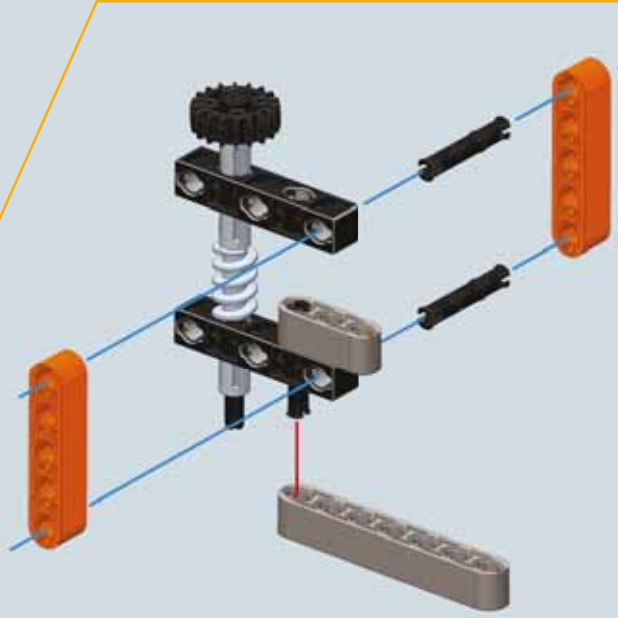
4

1:1



- X2
- X1
- X1
- X1
- X1
- X3
- 5**
- X1
- X1

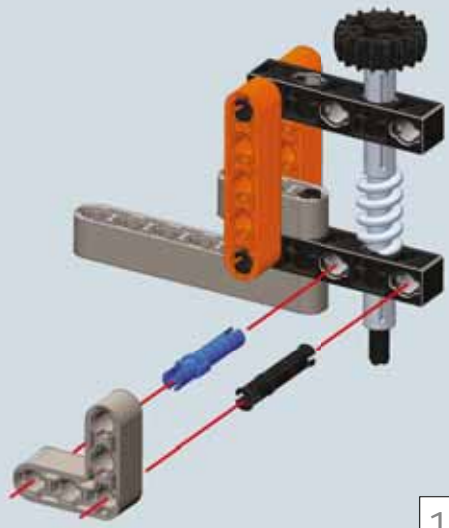
5



6

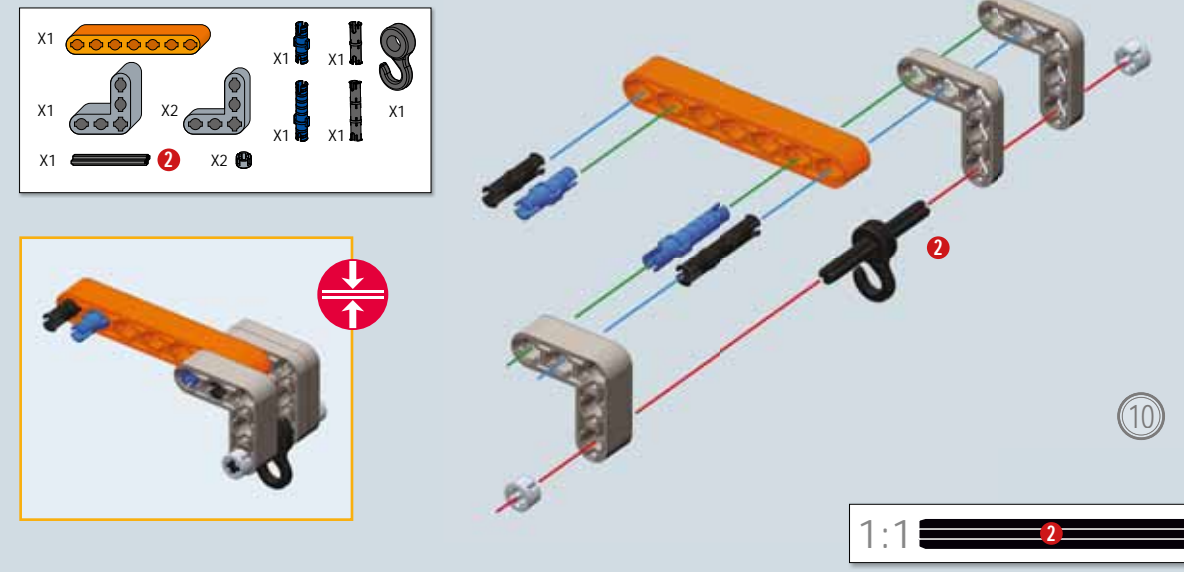
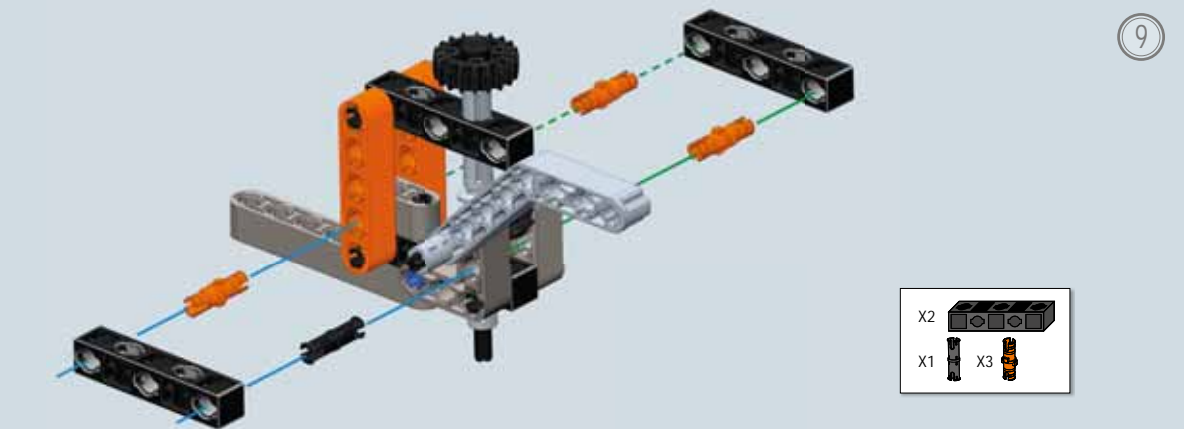
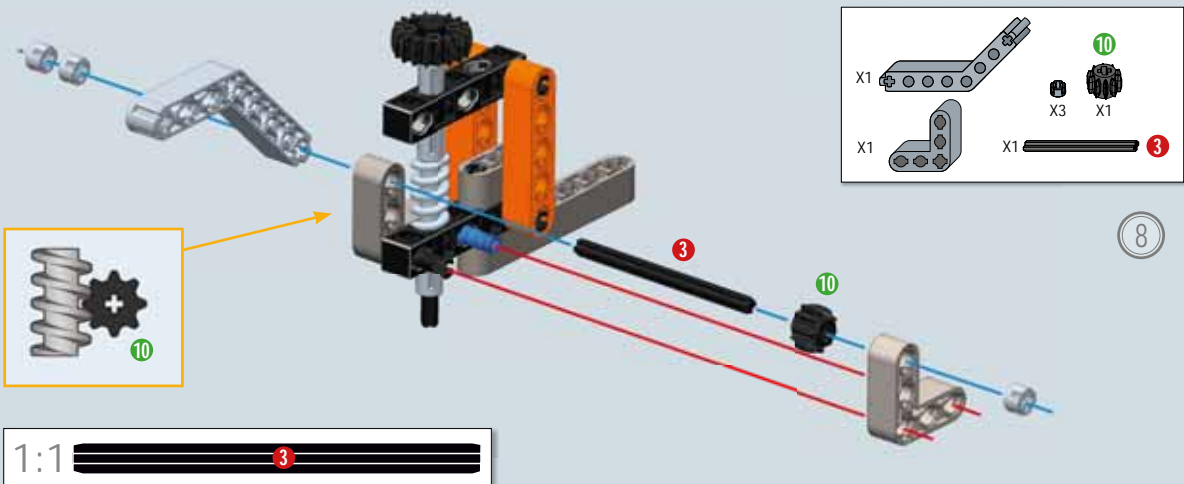
- X2
- X1
- X2

7

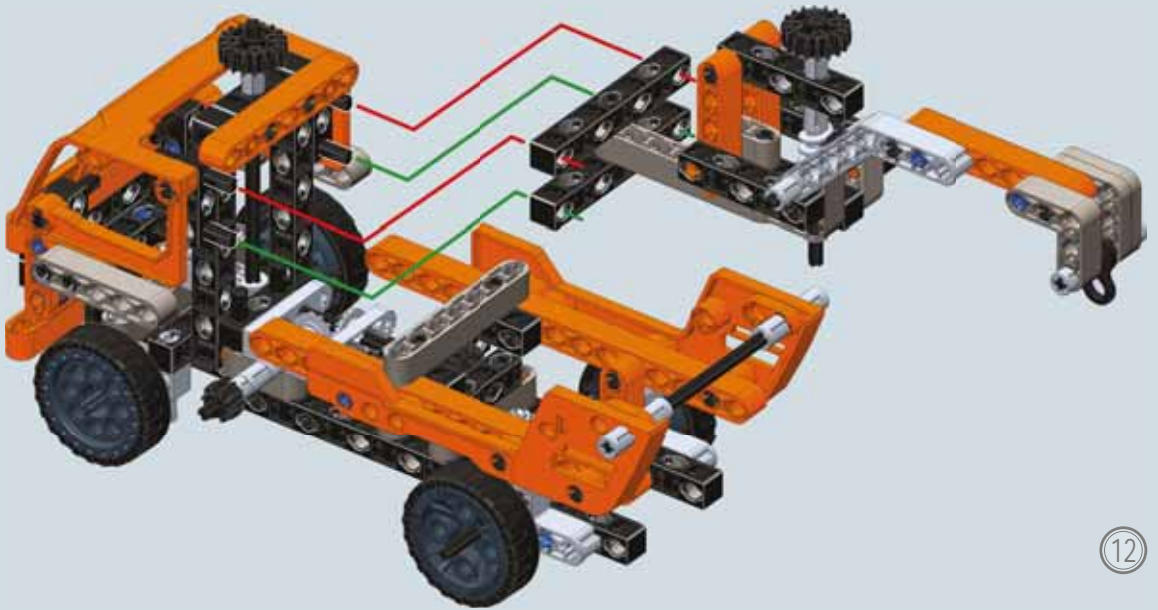
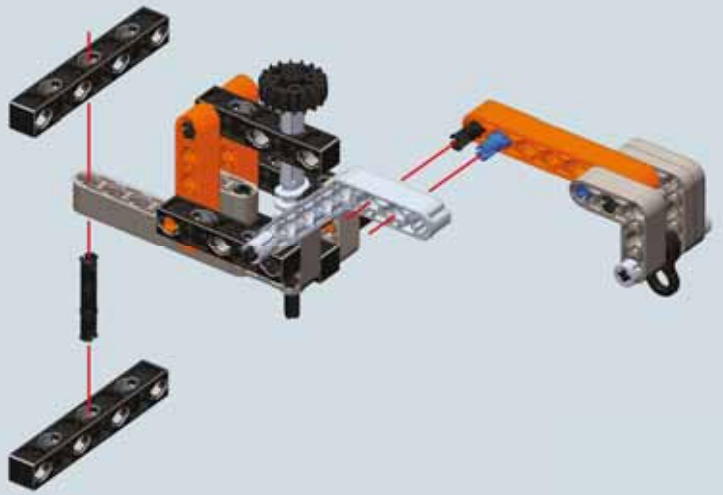


- X1
- X1
- X1

1:1 **5**



11



12



Modello finale

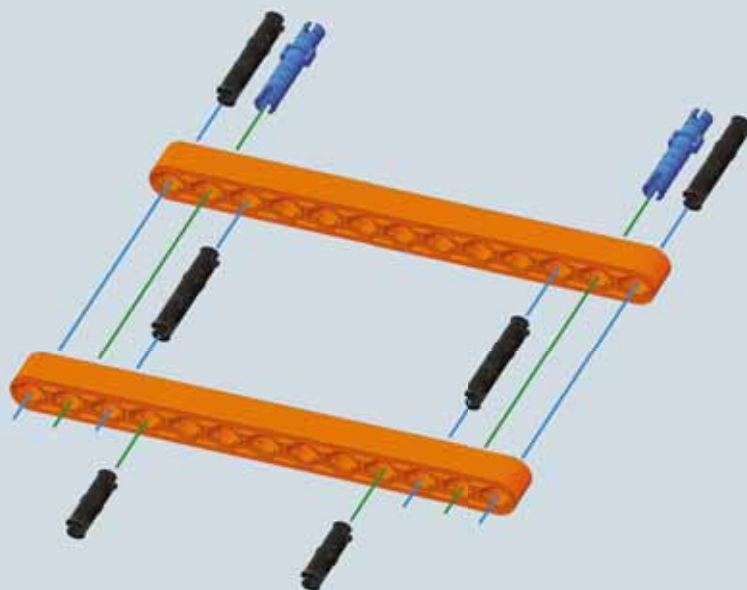




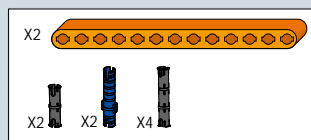
Notizie tecniche e curiosità

Con il termine spazzaneve, non si intende propriamente un veicolo, quanto un'apparecchiatura montata su di un veicolo e utilizzata per la rimozione della neve e del ghiaccio dalla superficie stradale.

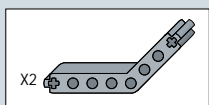
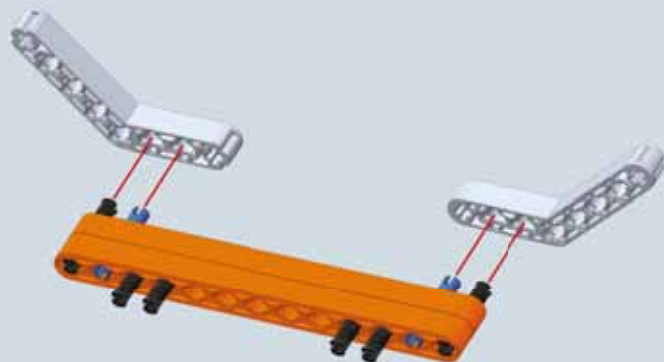
Lo strumento che rende tale uno spazzaneve è la lastra di acciaio sagomata, che può essere montata non solo su camion, ma anche su normali mezzi fuori strada e addirittura su treni, per lo sgombero dei binari.

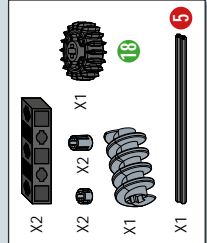


1

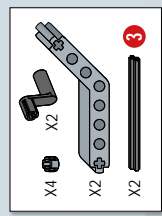
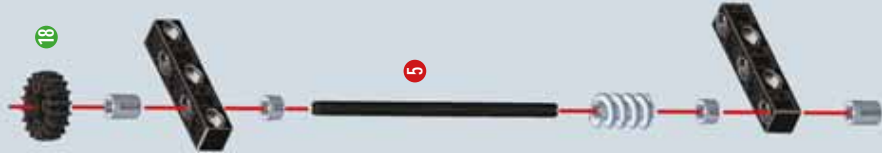


2

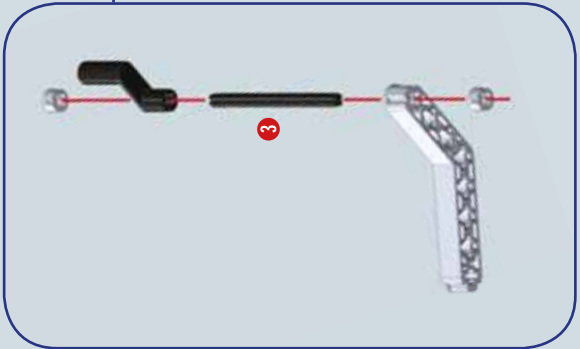
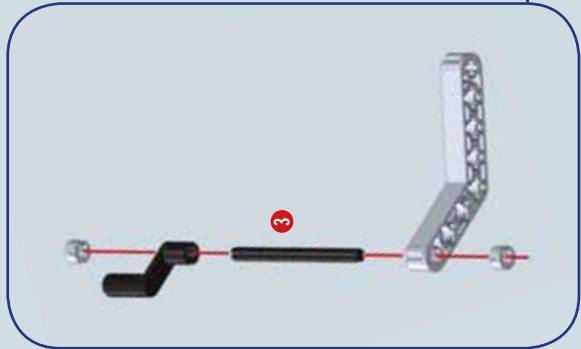
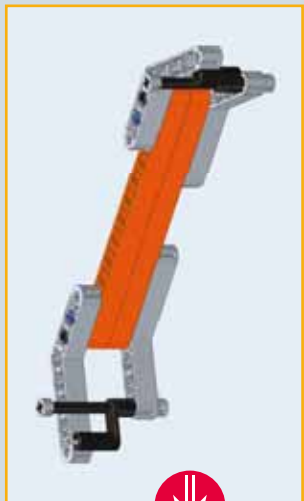
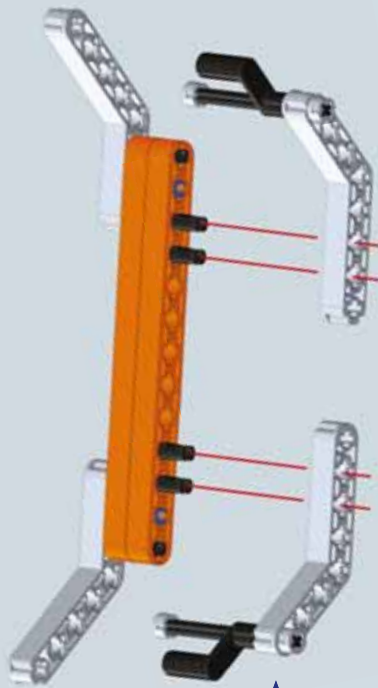






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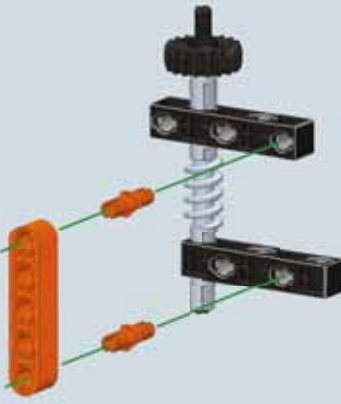



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
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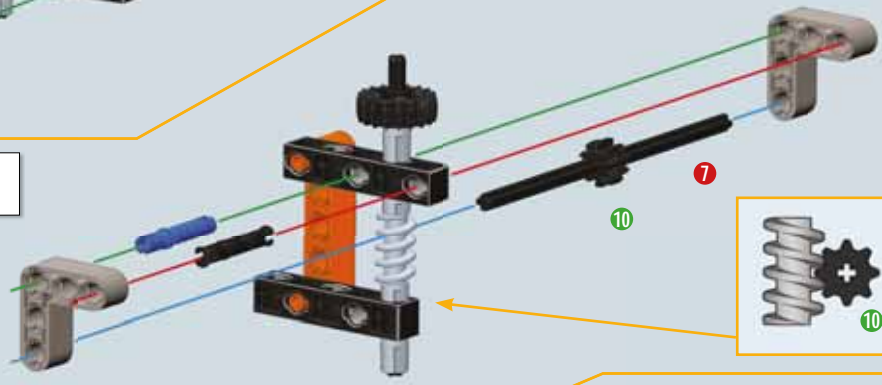
X1  X2 



X1  7

X1  X1  X1  10

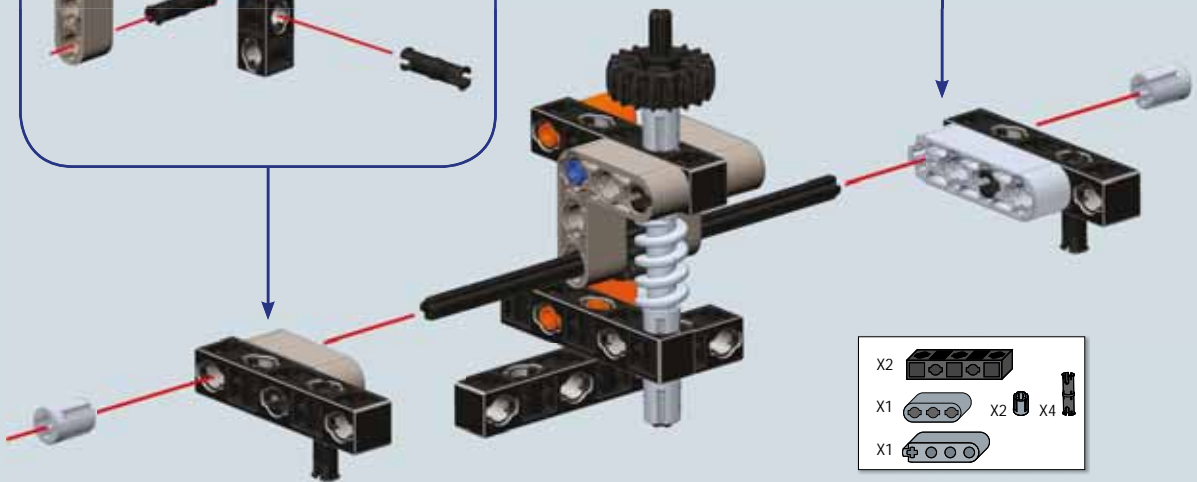
X2 







6




7



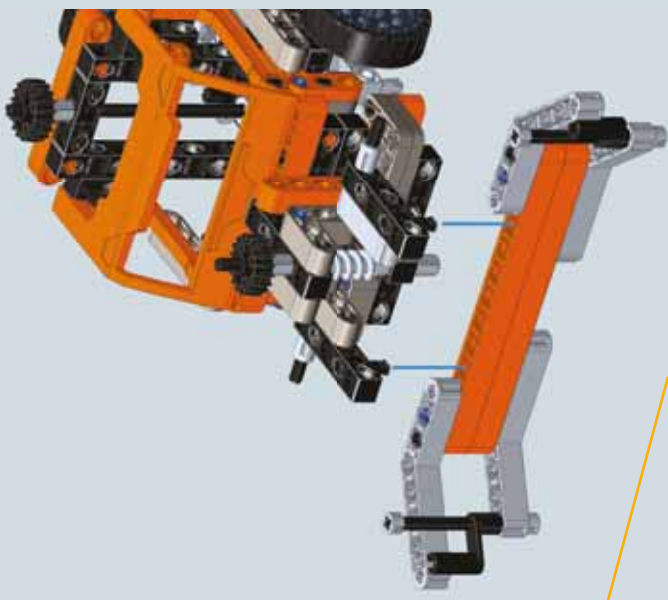
X2 

X1  X2  X4 

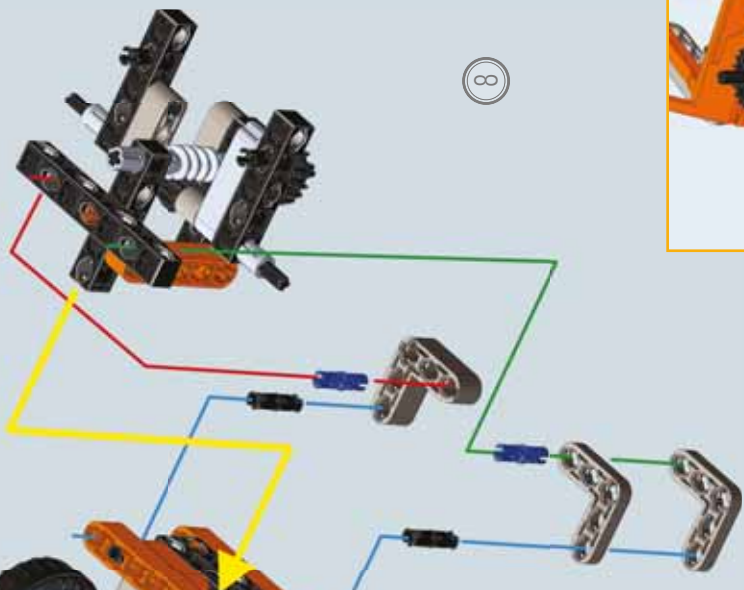
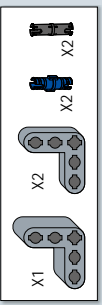
X1 

1:1  7

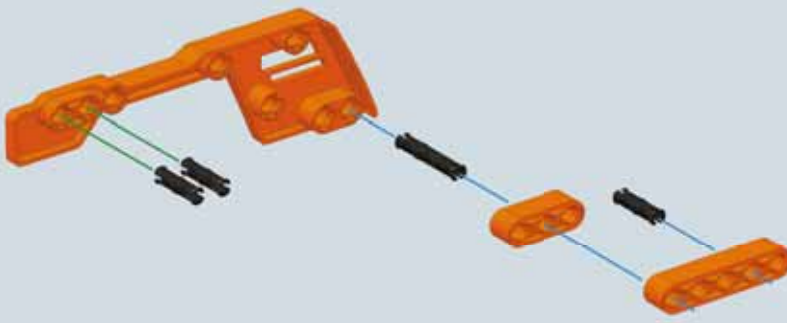
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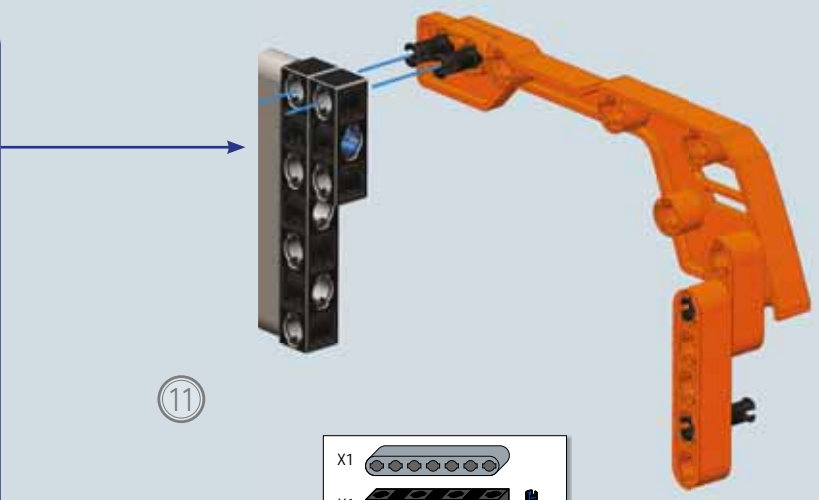
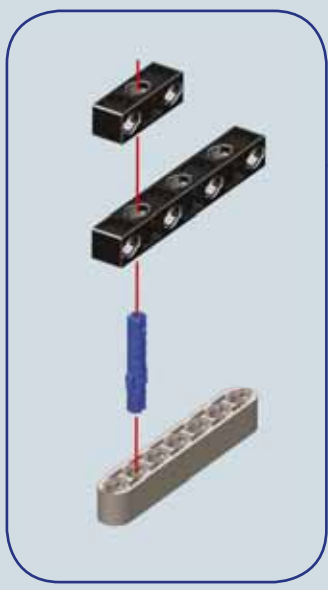
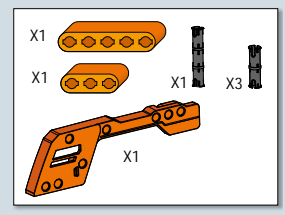
8



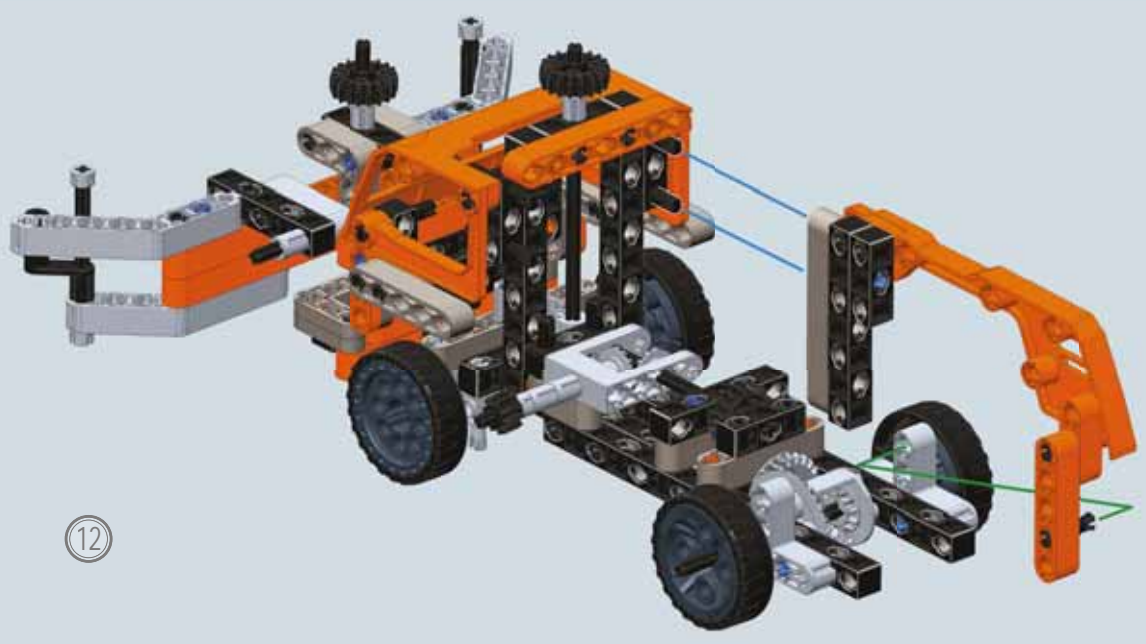
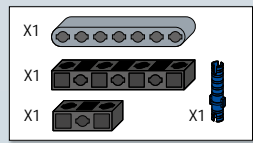
Modello assemblato nell'attività 4



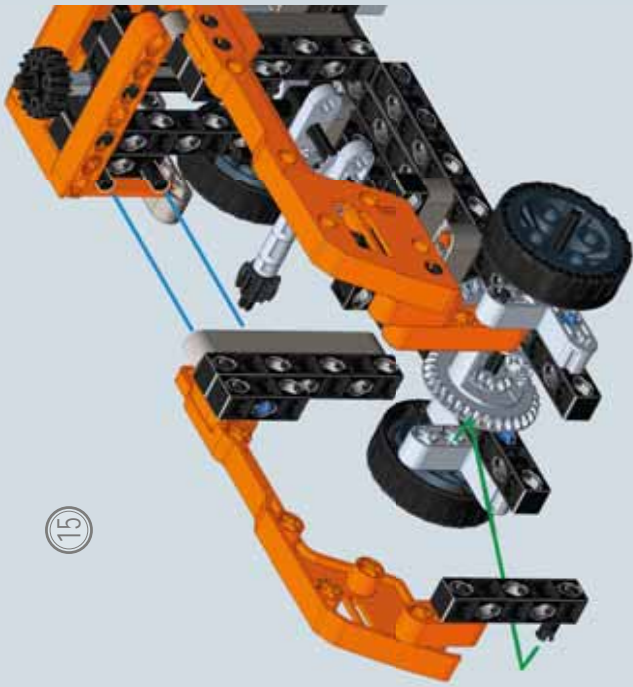
10



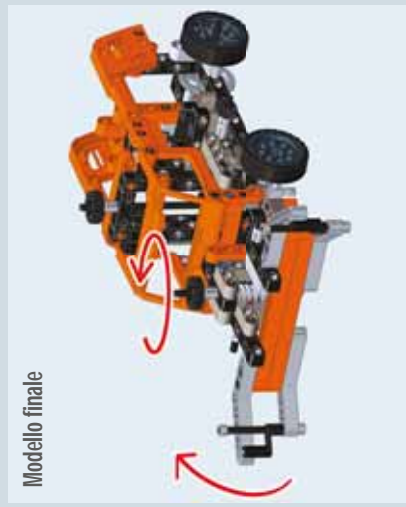
11



12

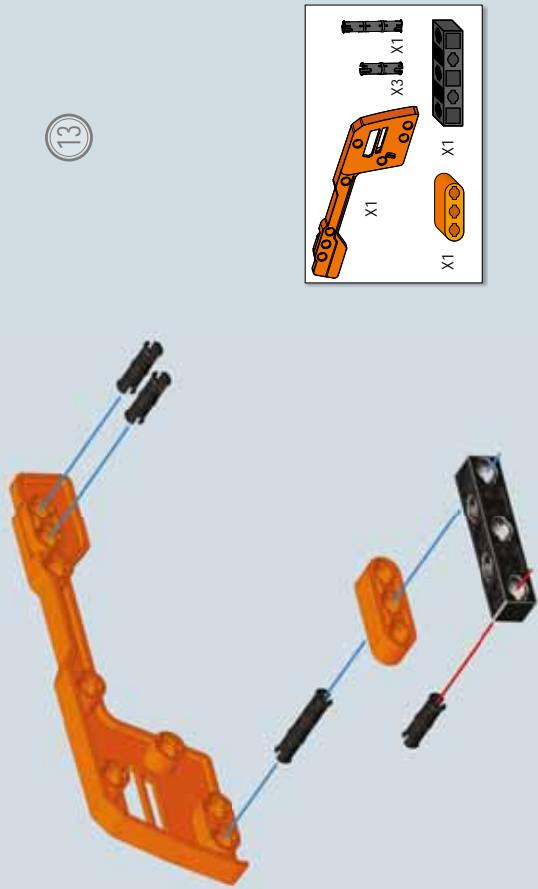


15

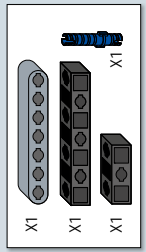
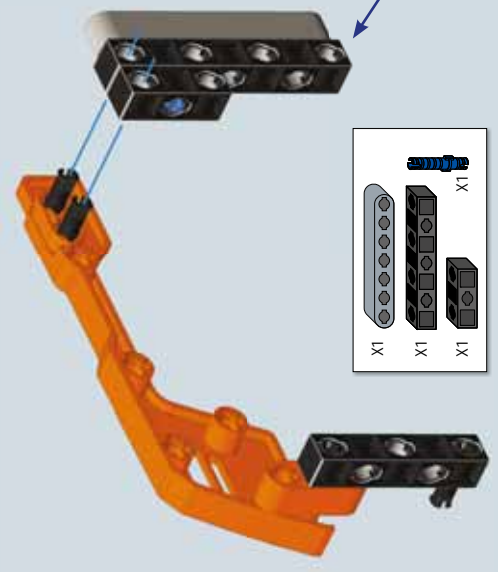
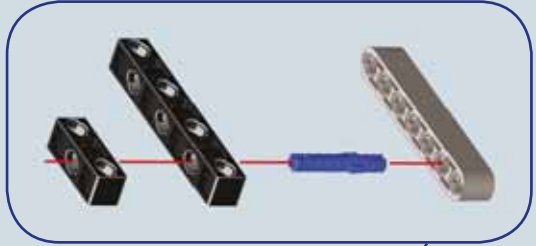
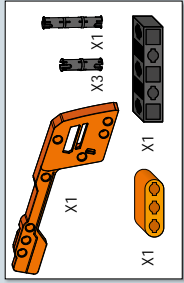


Modello finale

14



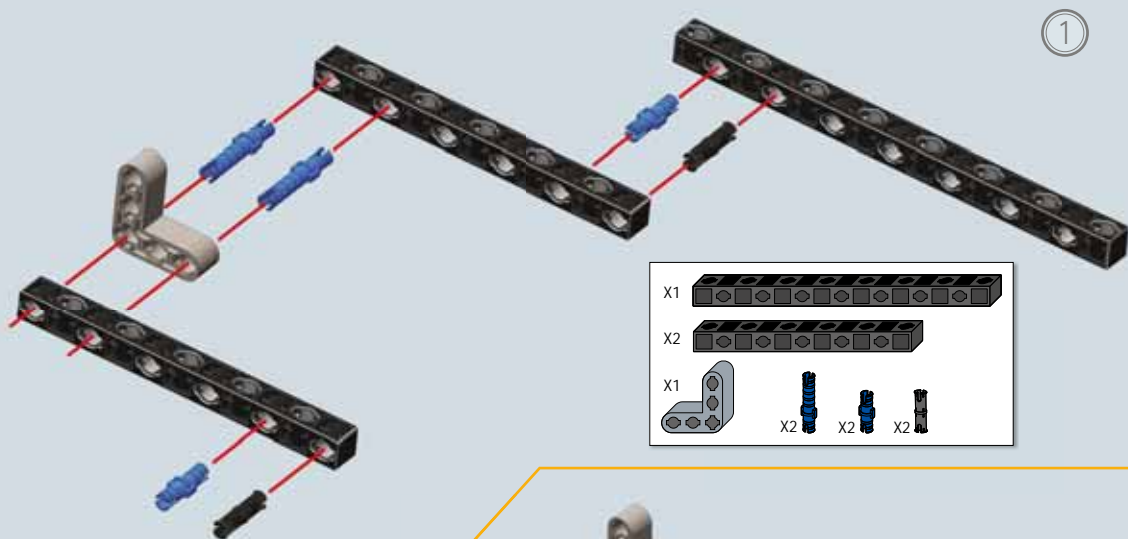
13



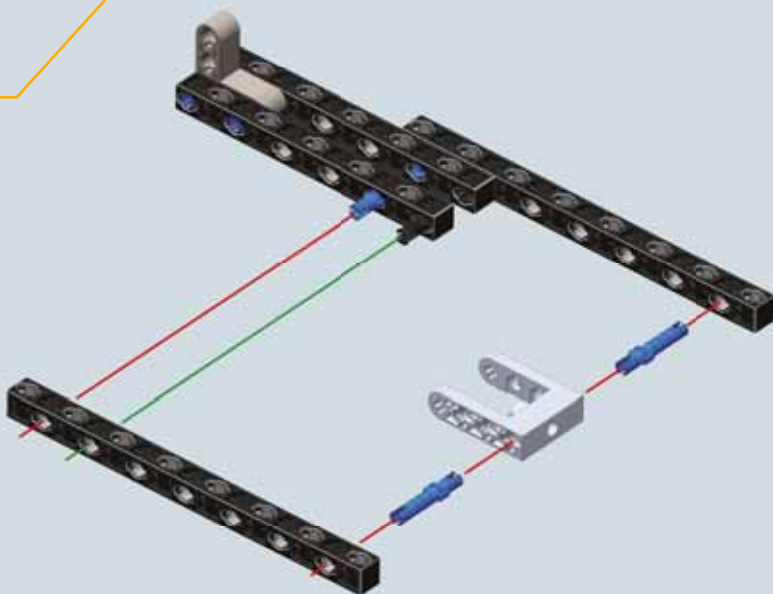
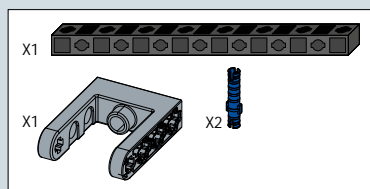
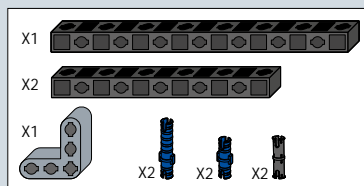


Notizie tecniche e curiosità

Una caratteristica che rende immediatamente riconoscibili i camion americani è il muso allungato. Non essendo soggetti alle restrizioni del codice della strada vigenti nei paesi Europei e a causa dei lunghi viaggi da affrontare, questi modelli di camion sono delle vere e proprie case viaggianti.

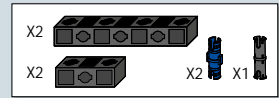
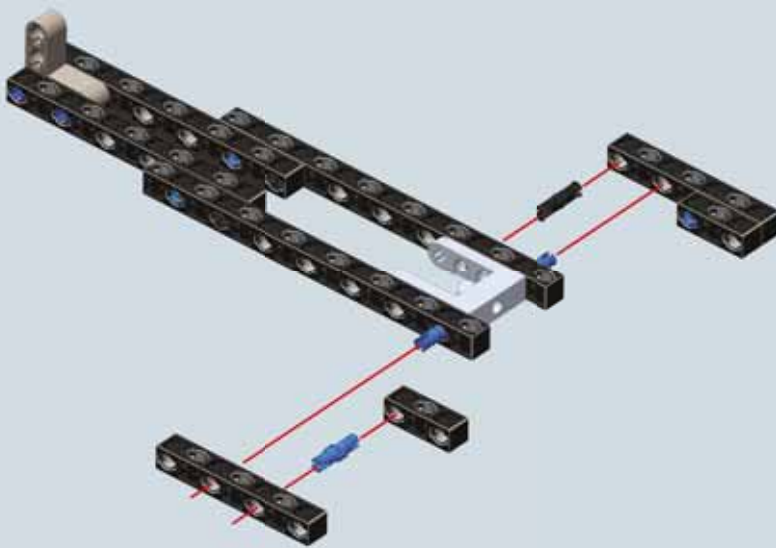


1

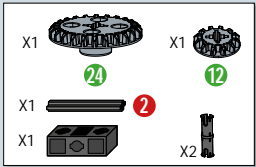
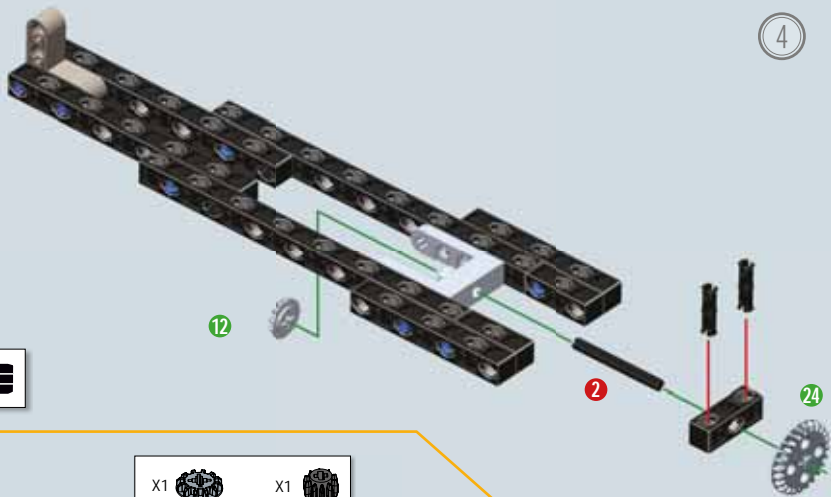


2

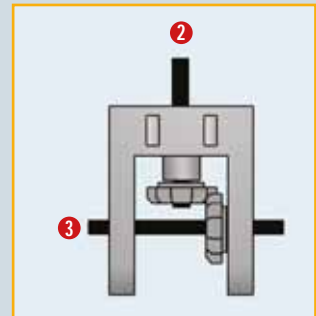
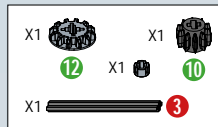
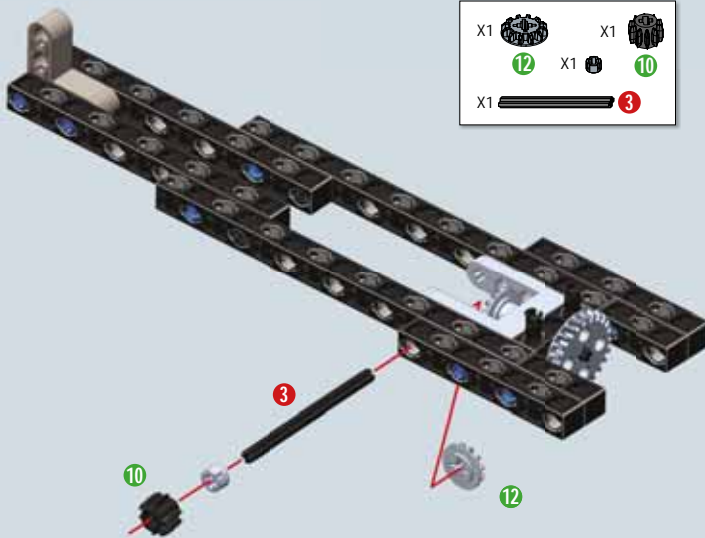
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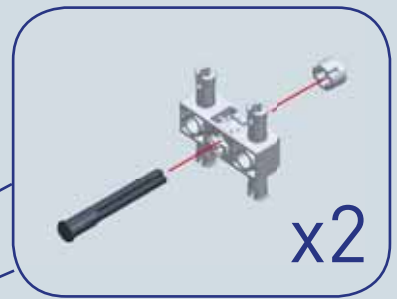
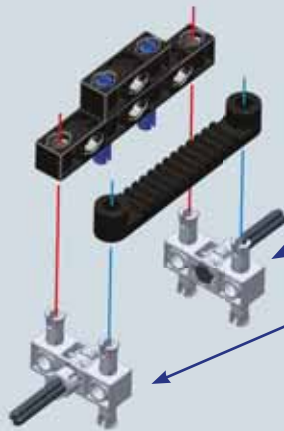
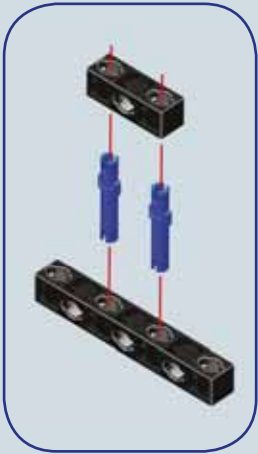
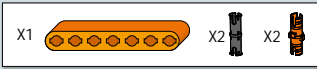
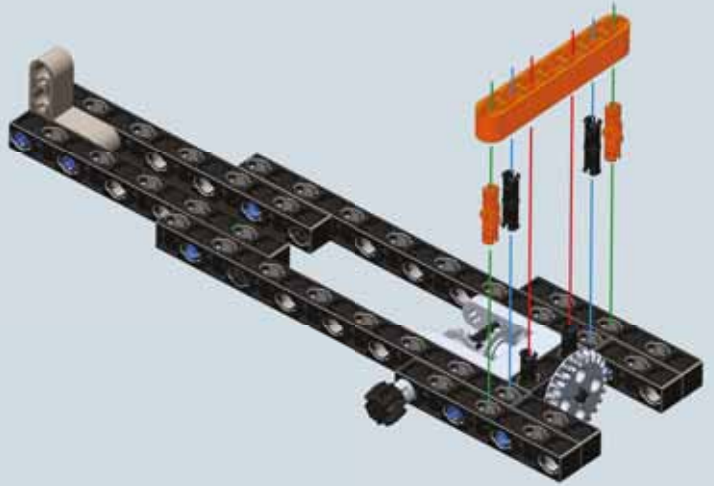
4



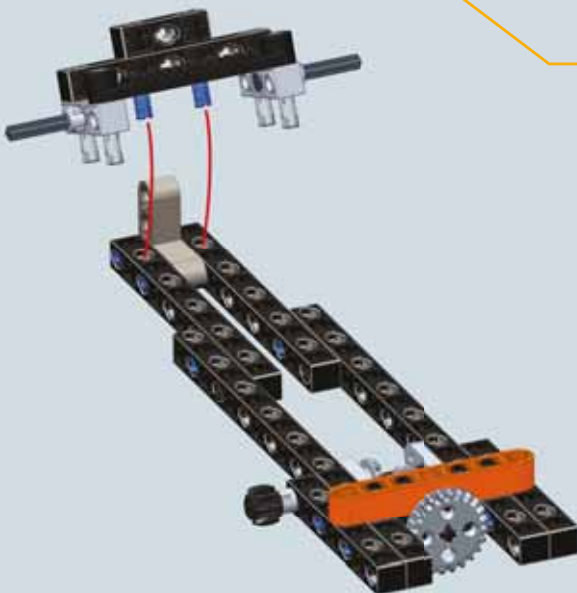
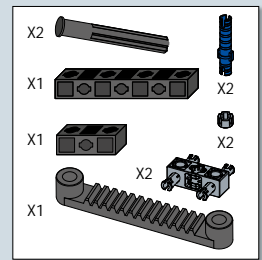
5



6

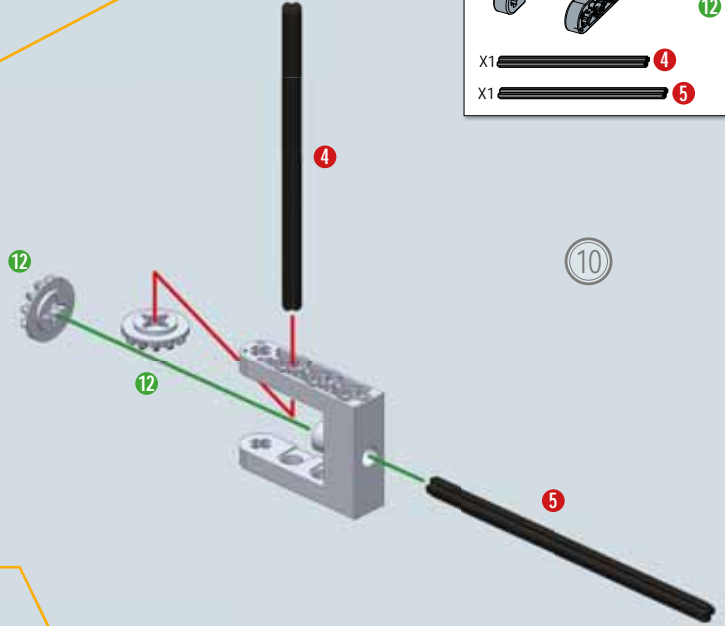
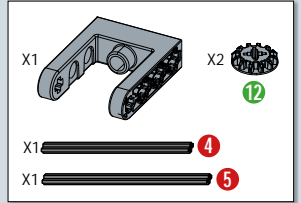
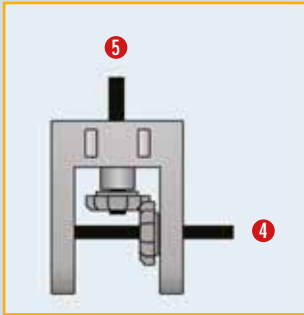
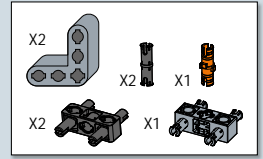
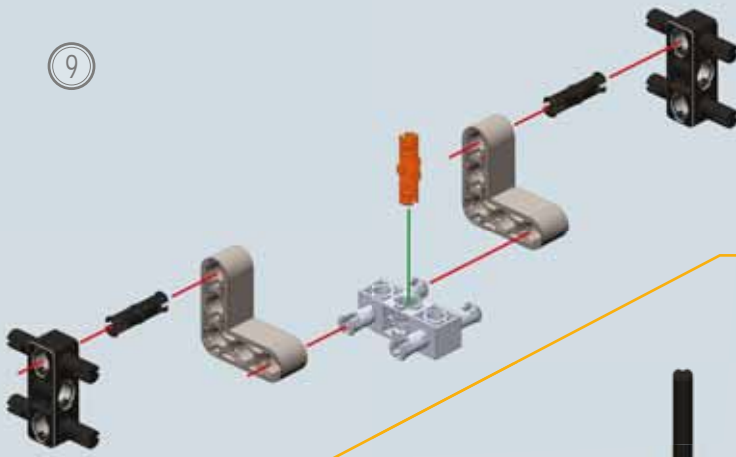


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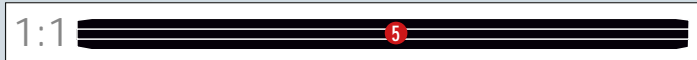
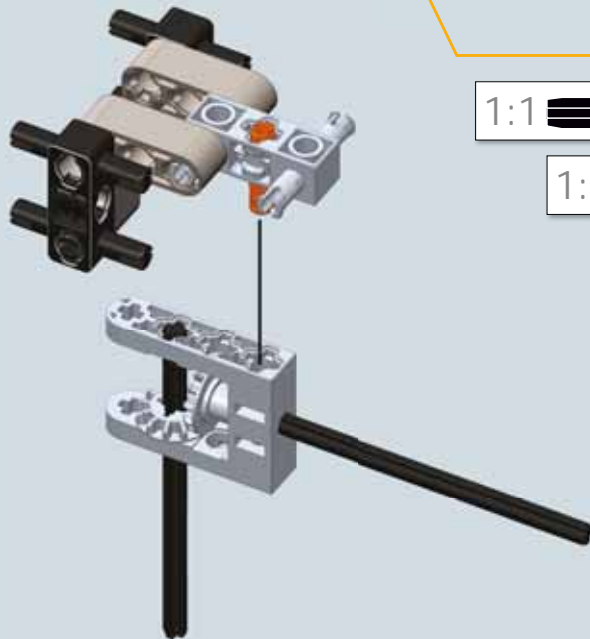


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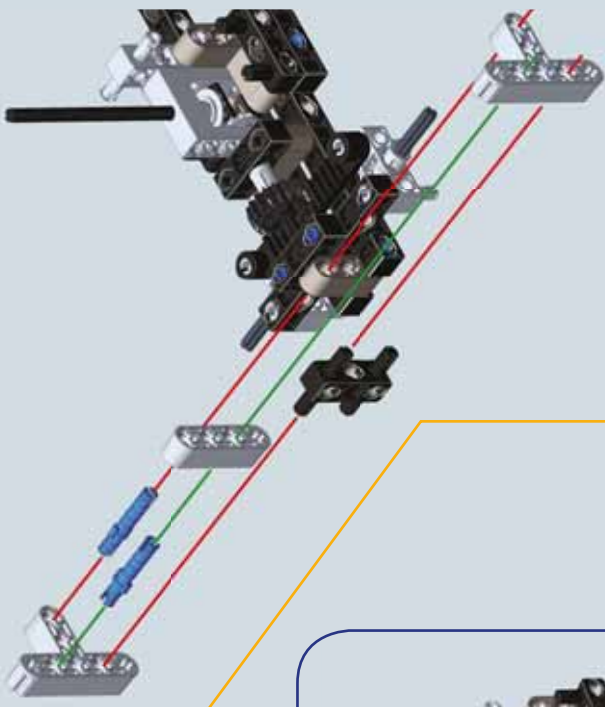
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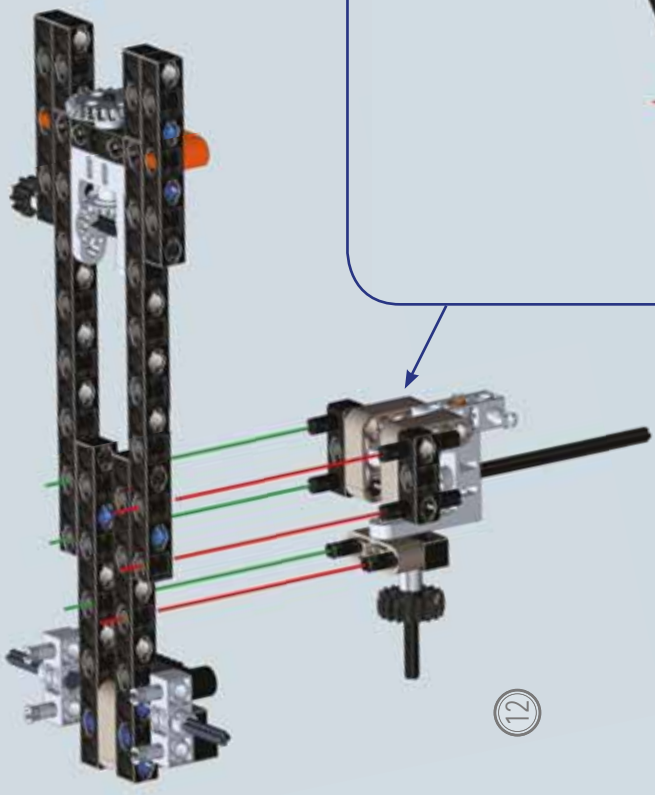
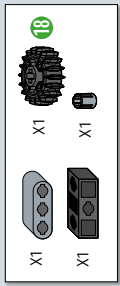
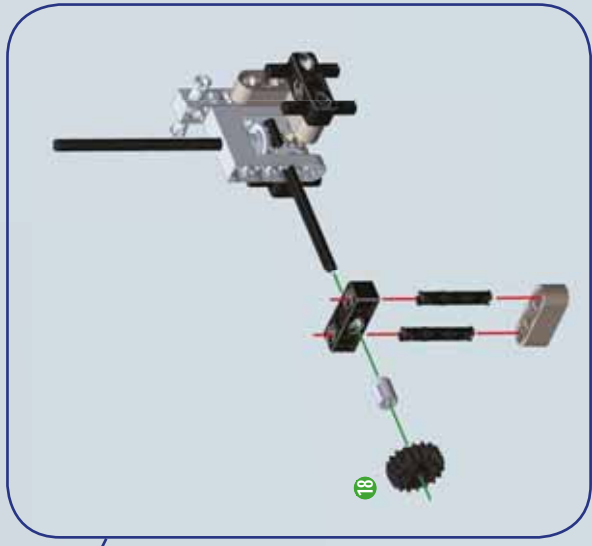
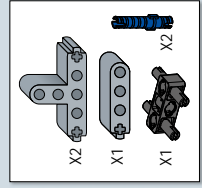
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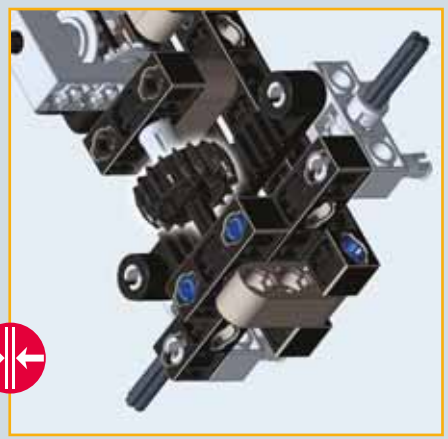
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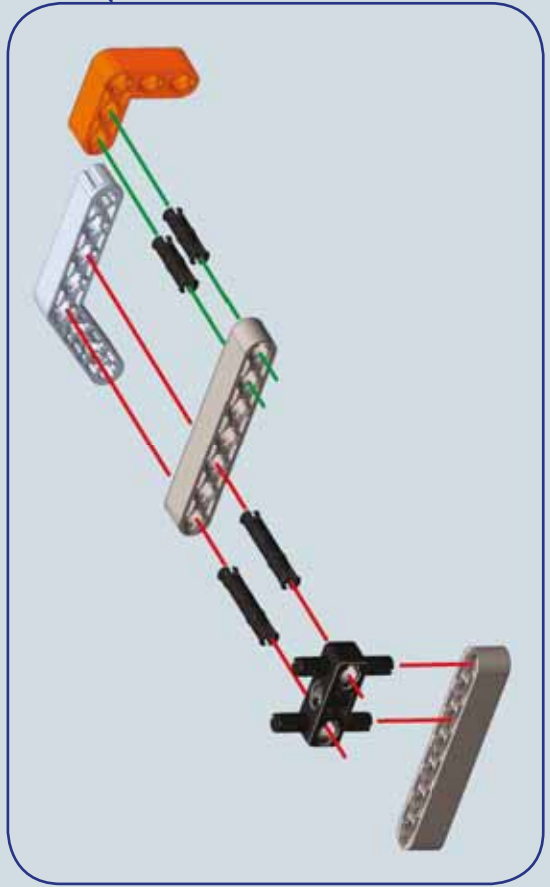
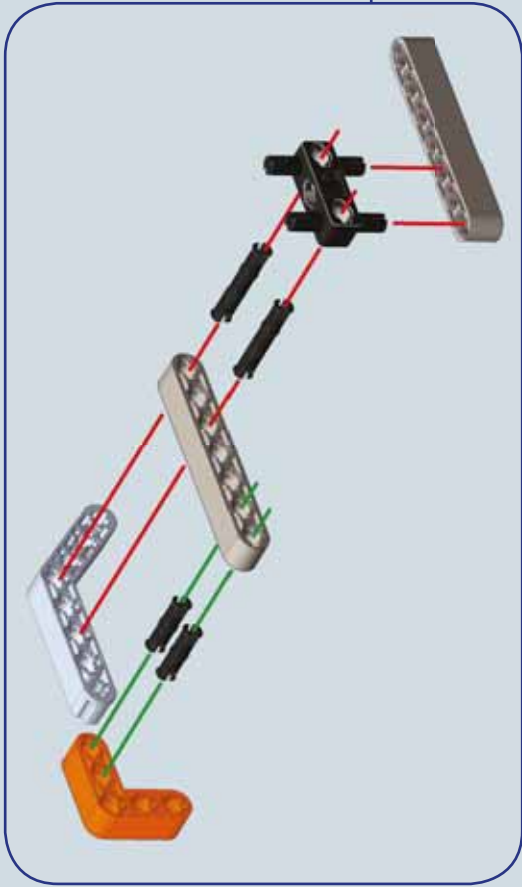
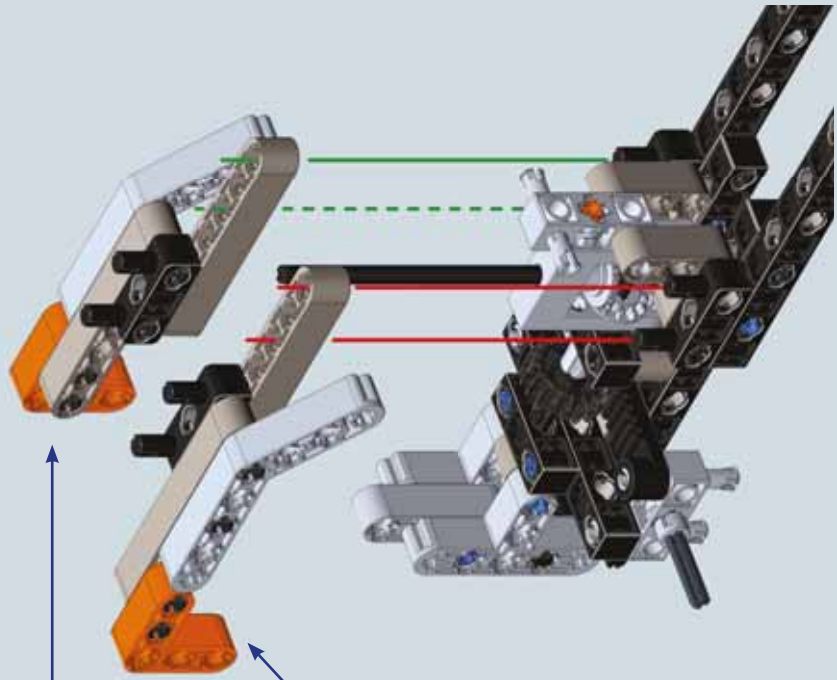
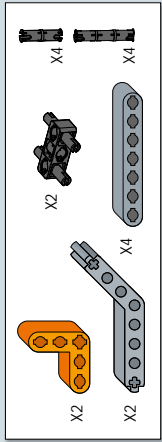
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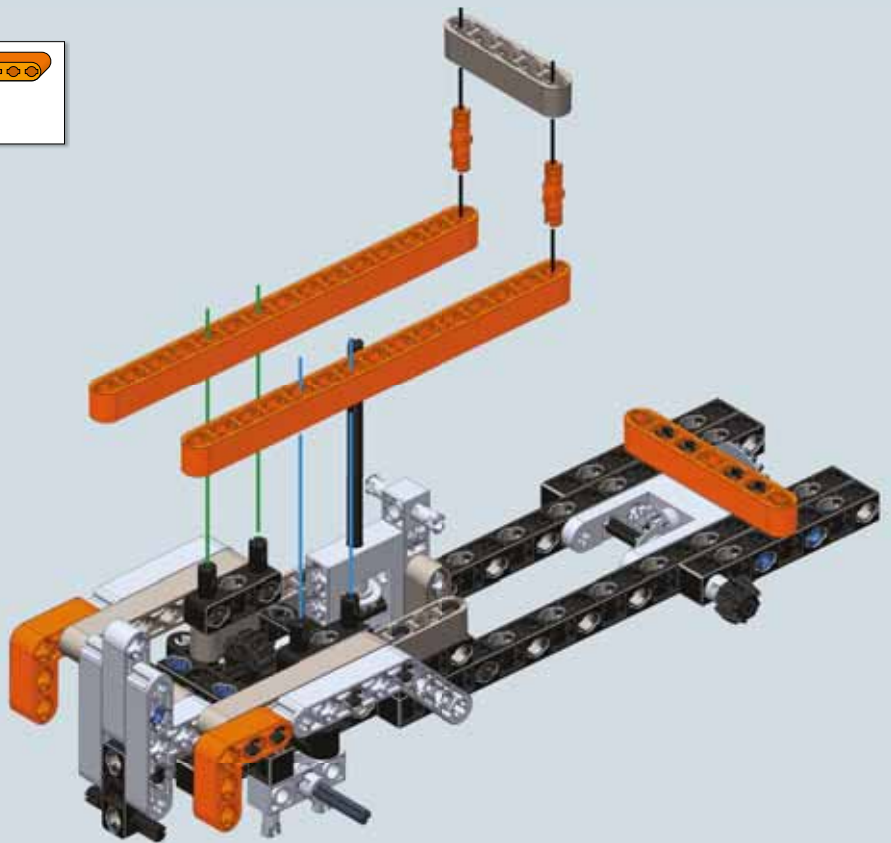


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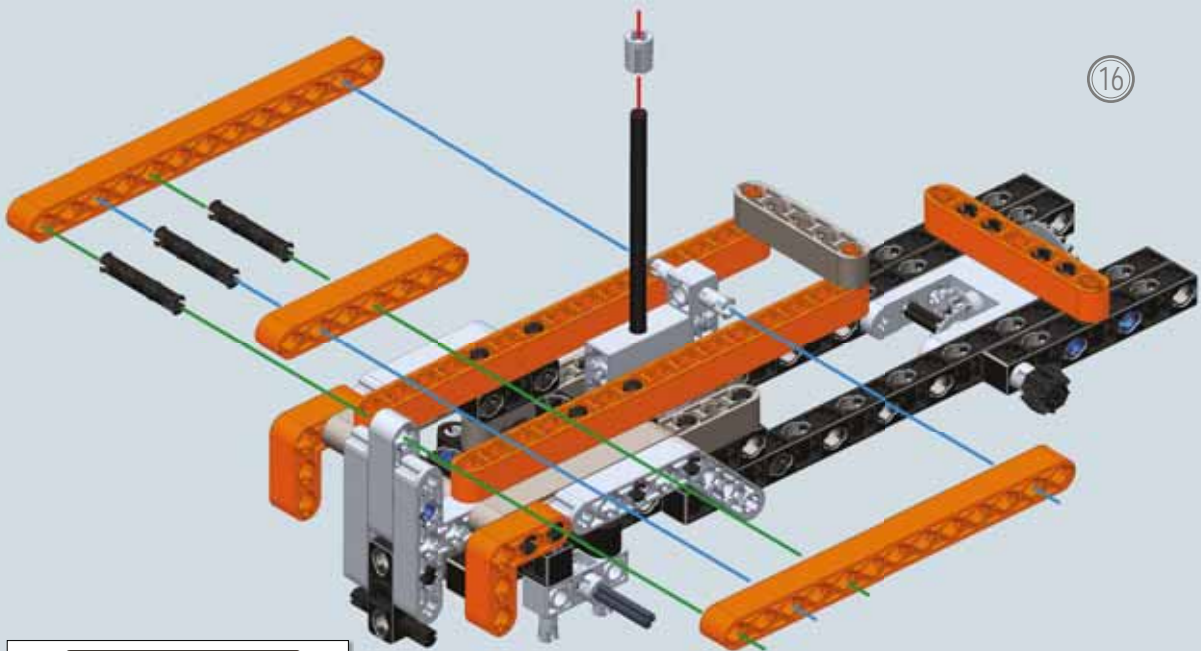


- X2
- X1
- X2

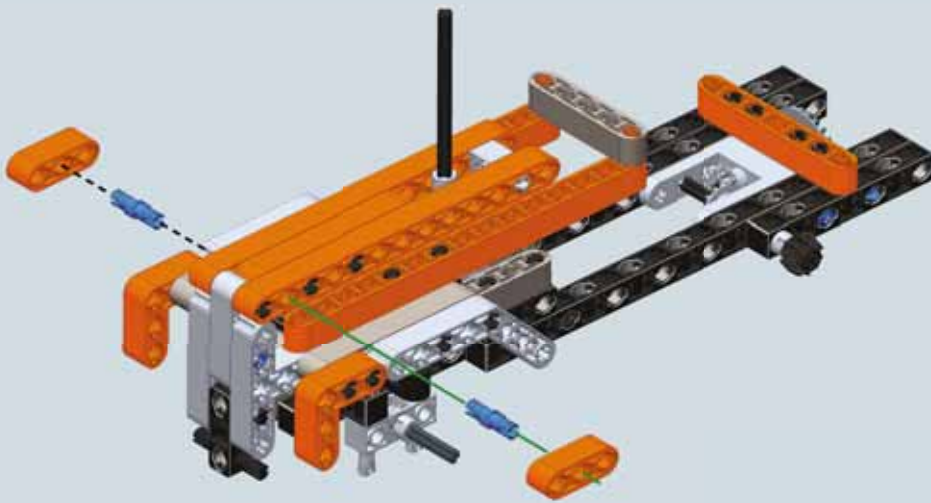
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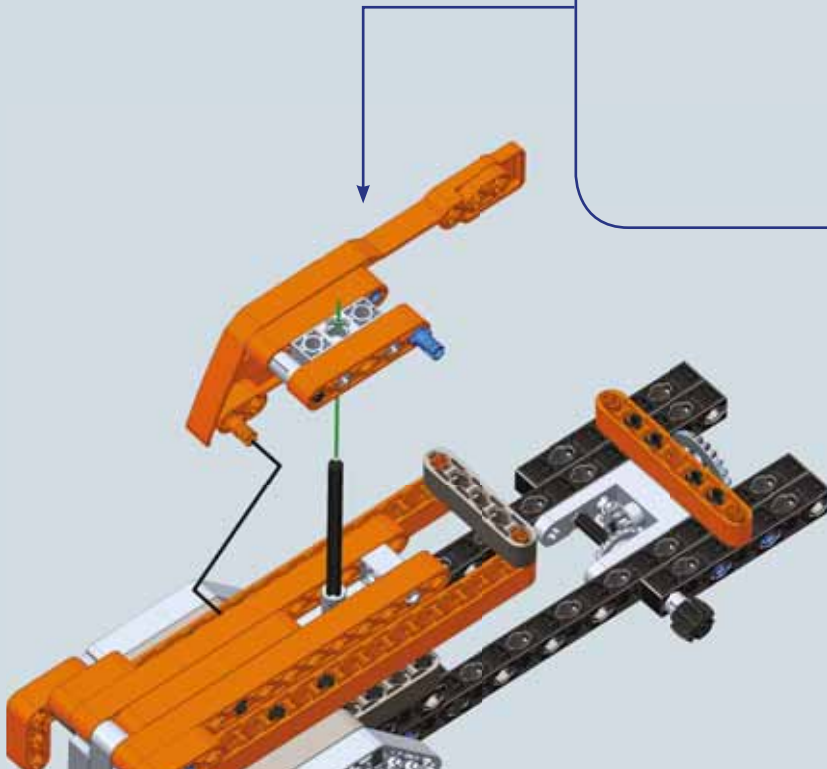
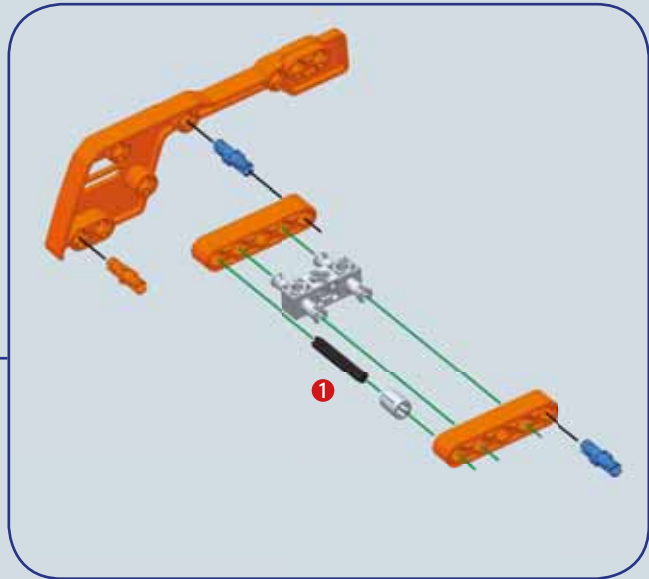
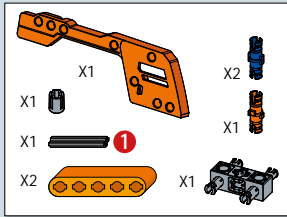
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- X2
- X1
- X1
- X3



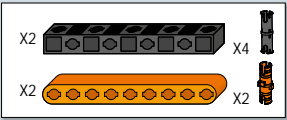
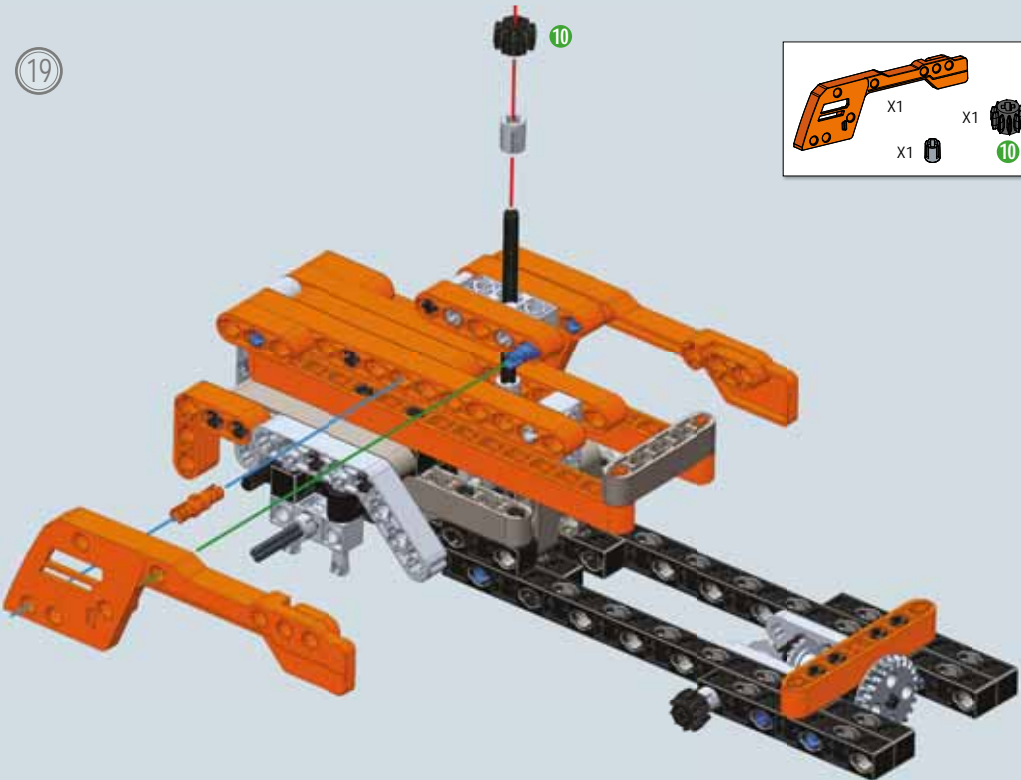
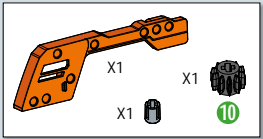
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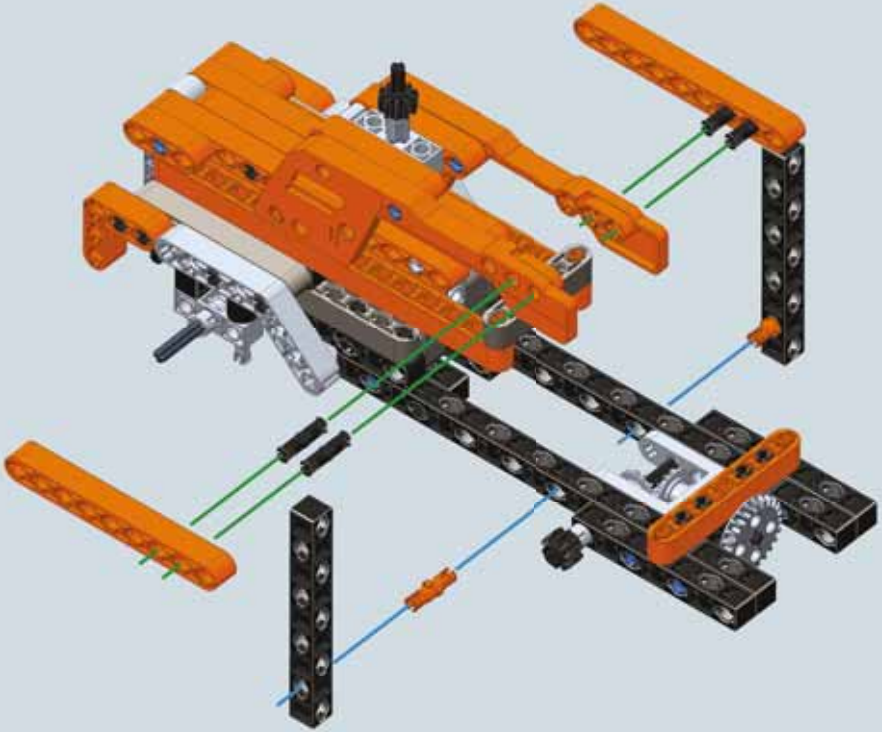
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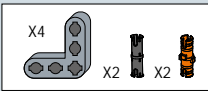
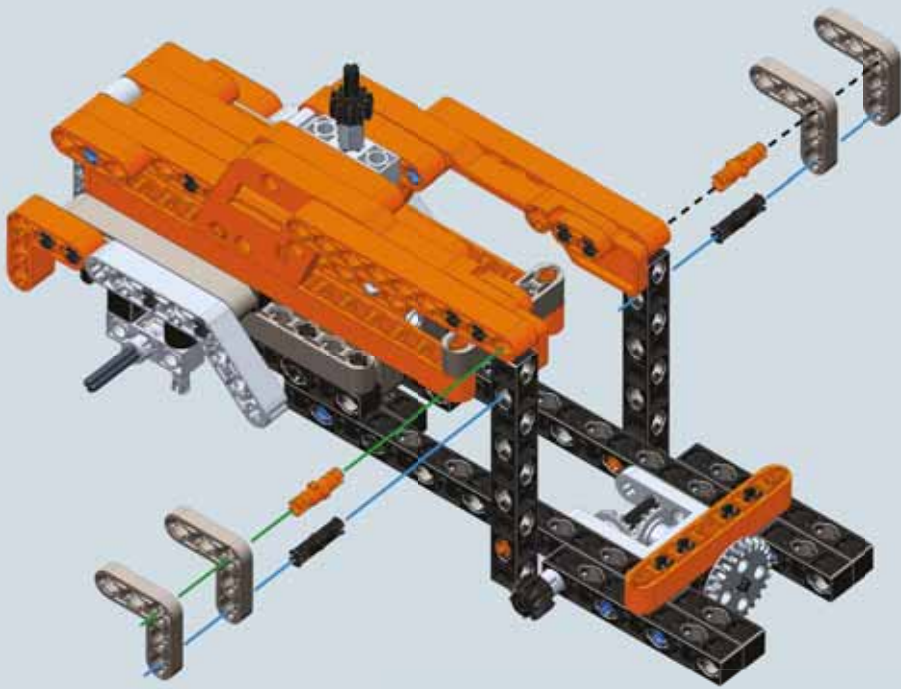
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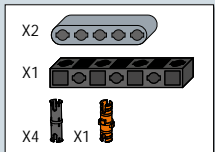
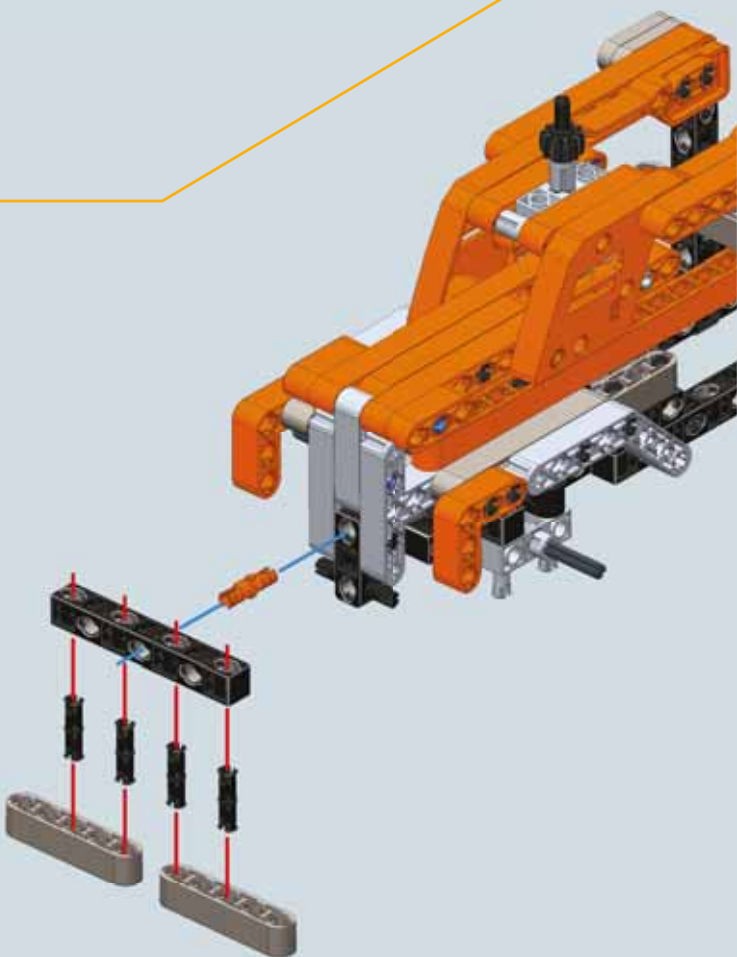
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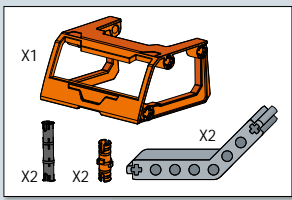


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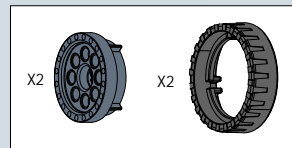
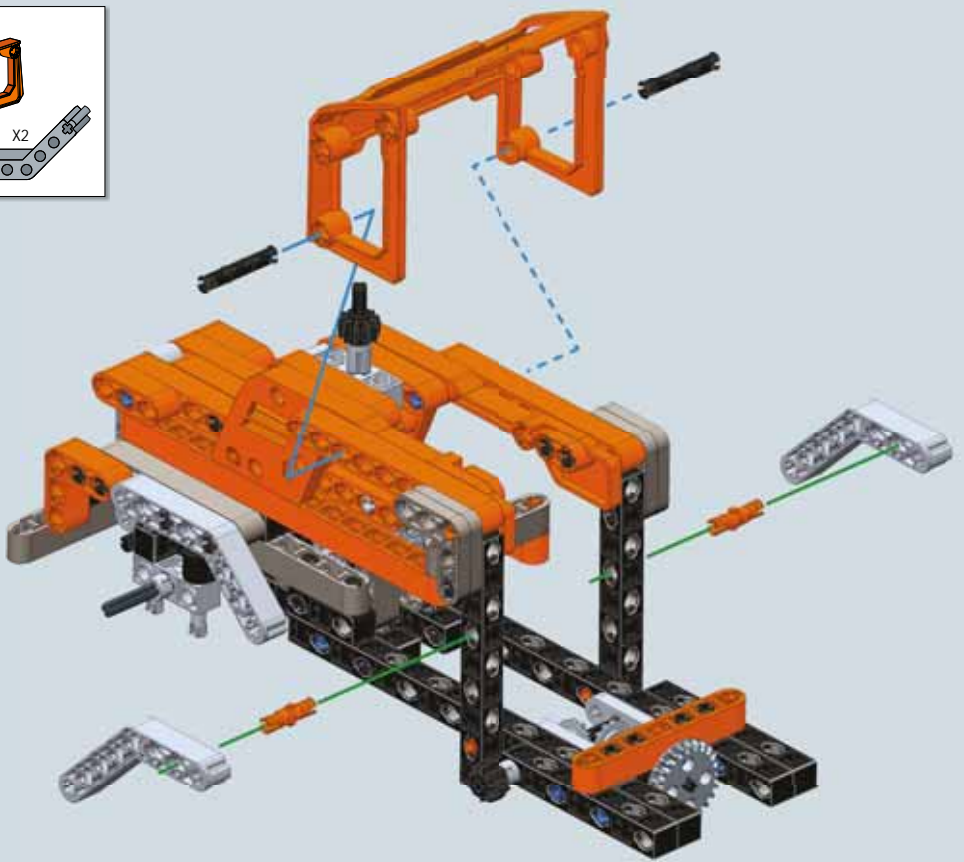


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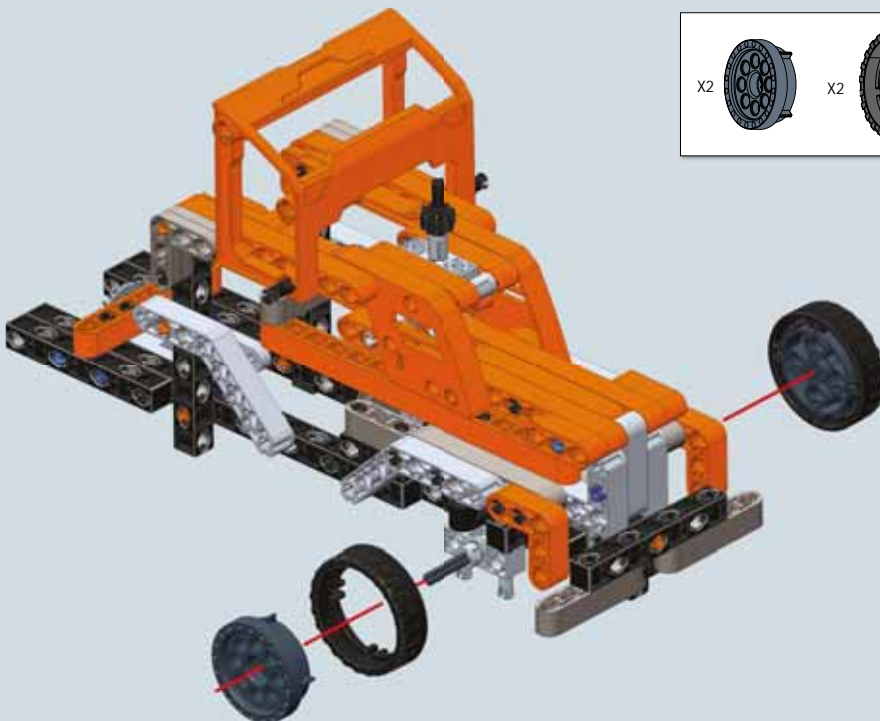


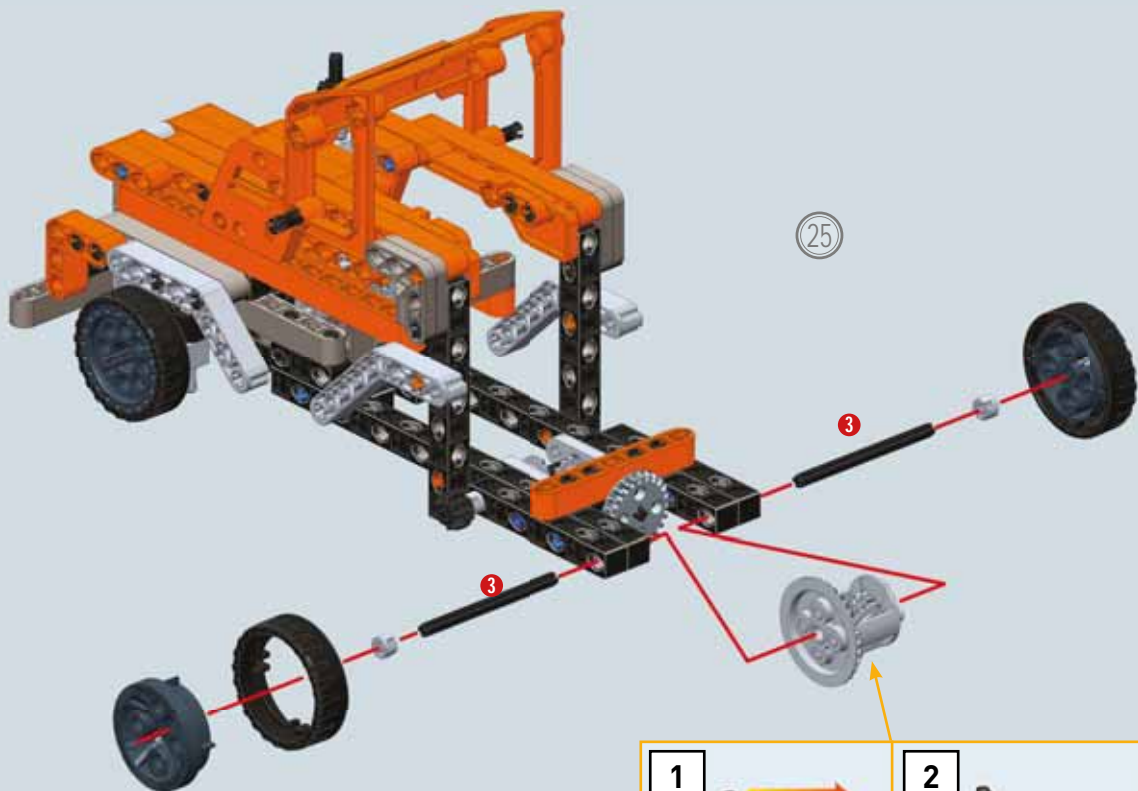


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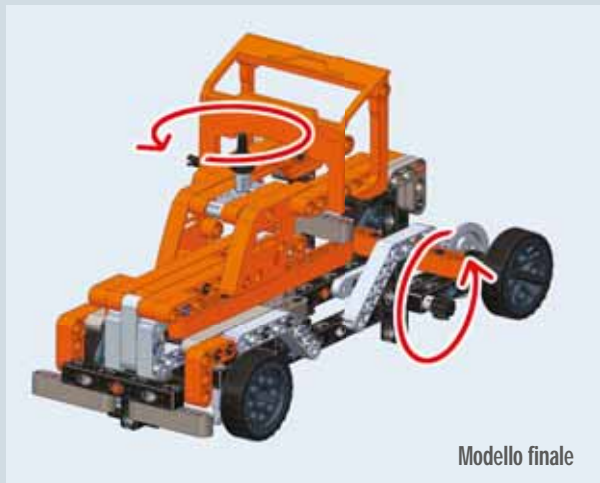
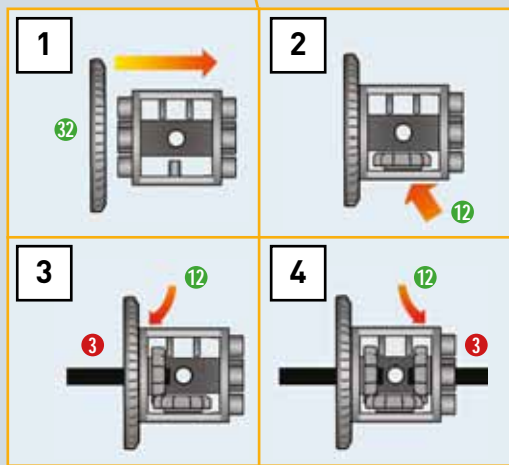
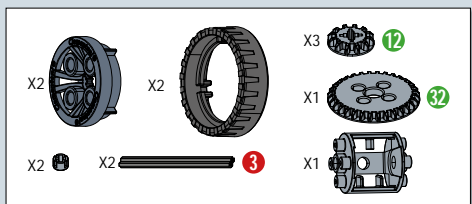


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Modello finale

