

15

building the T-R3X

The T-R3X is an ominous surveillance robot in the shape of a *Tyrannosaurus rex* (see Figure 15-1)! It walks on two strong legs, wags its sharp tail, and bites its prey with powerful jaws.

As you build this robot, you'll learn another approach to building a weight-shifting biped walker. But be warned: Keep your fingers far away from its teeth!

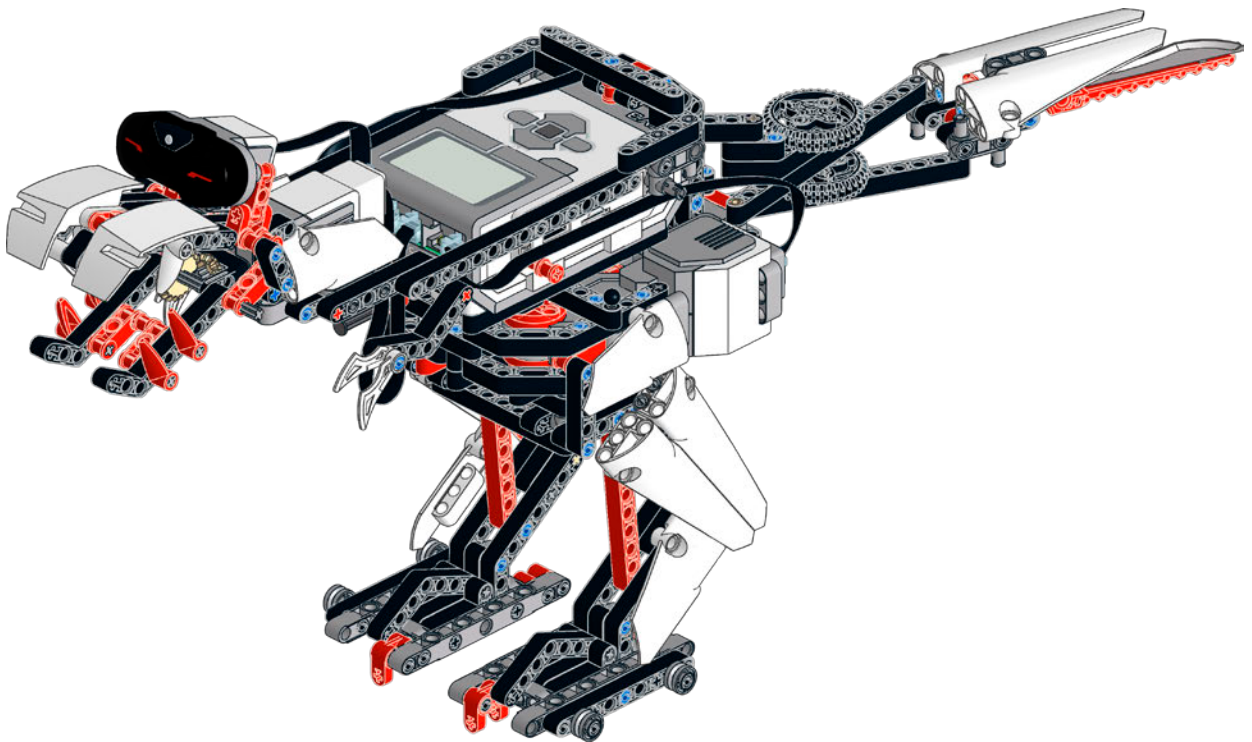


Figure 15-1: T-R3X!

main assembly

1



2x



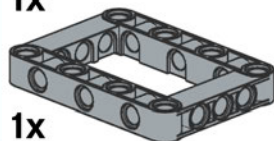
1x



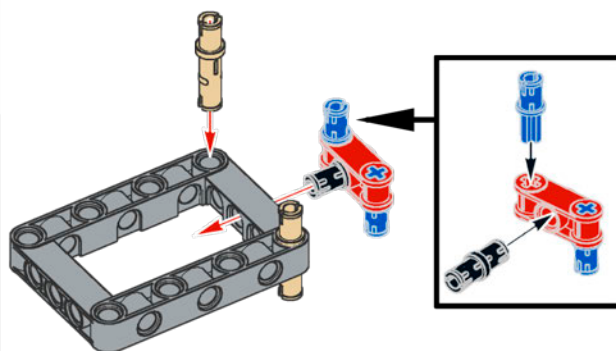
2x



1x



1x



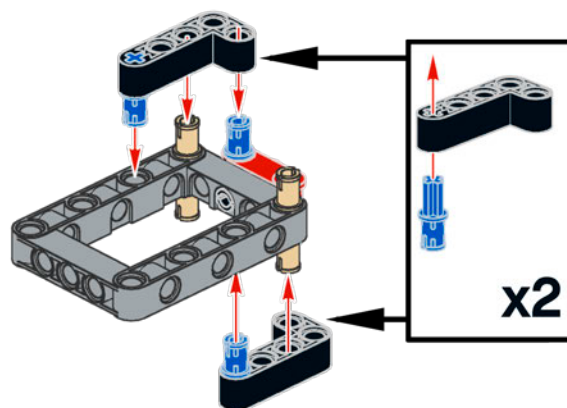
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2x



2x



3

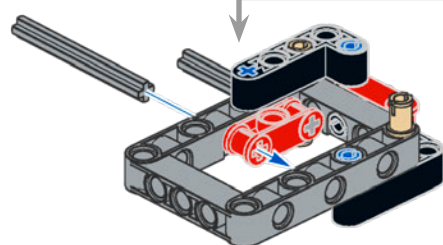


1x

5

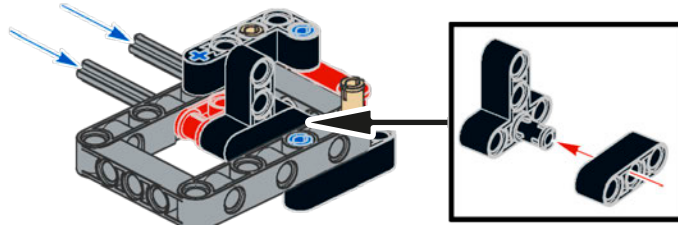
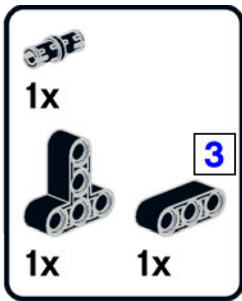


2x

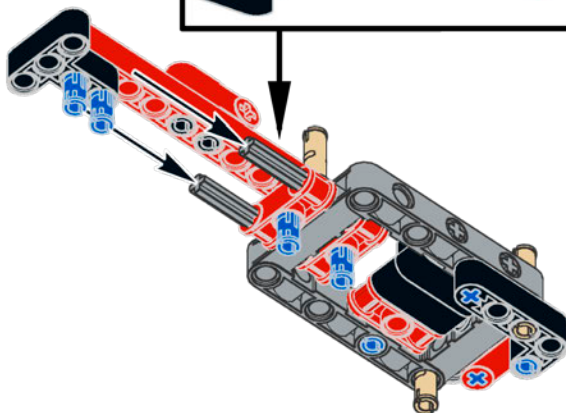
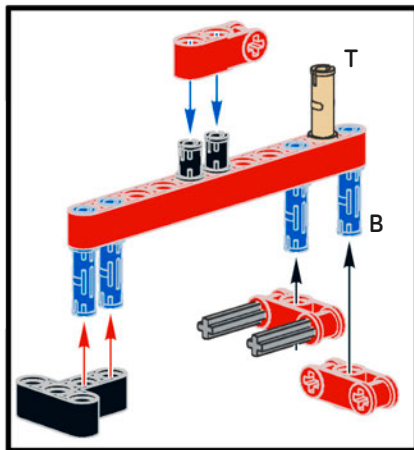
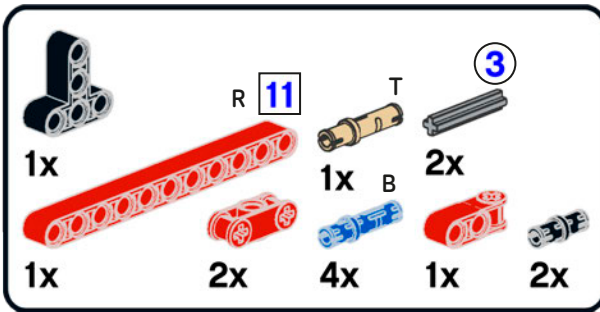


Don't insert the 5M axles completely.

4



5



1:1



3



5

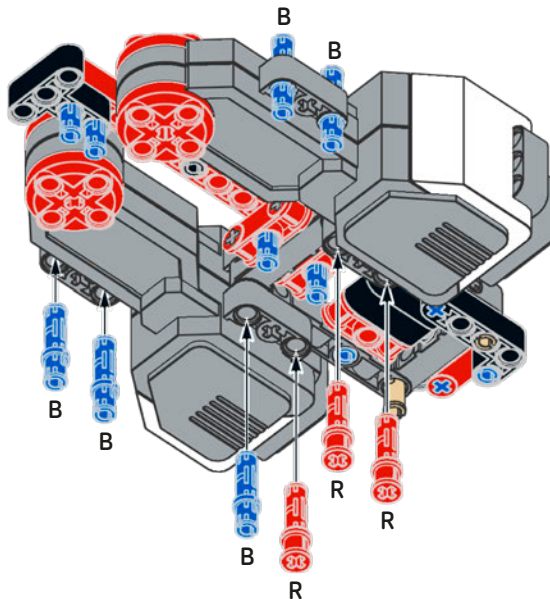
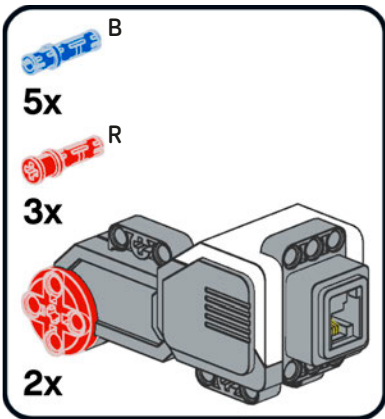


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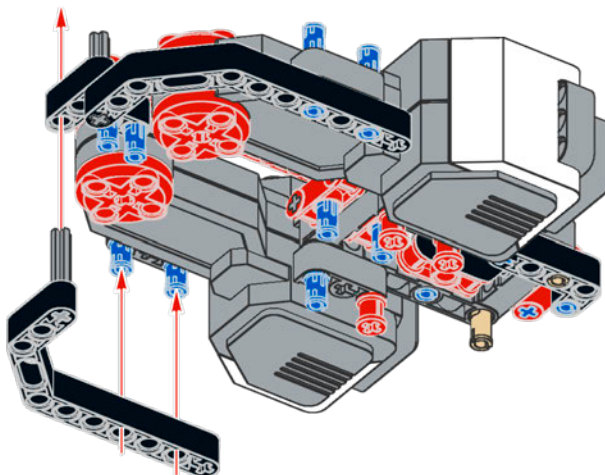
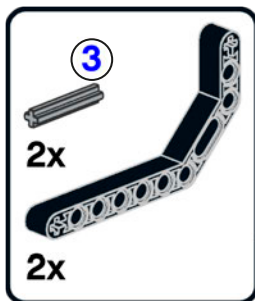


11

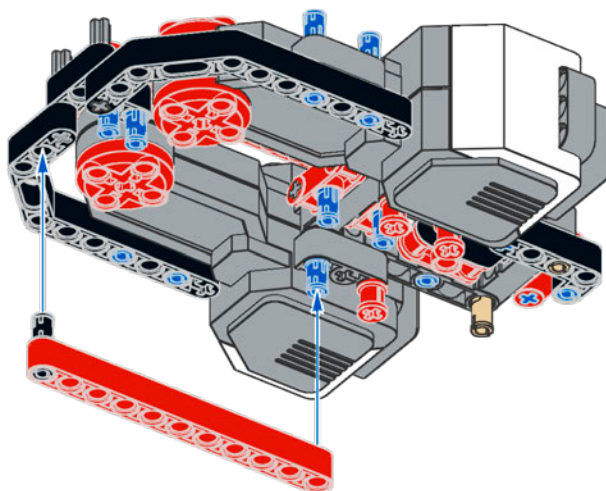
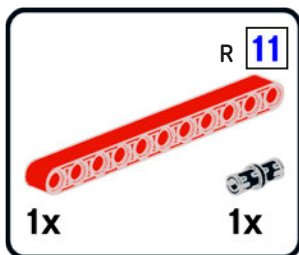
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7



8



1:1



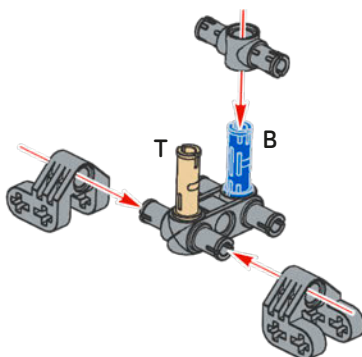
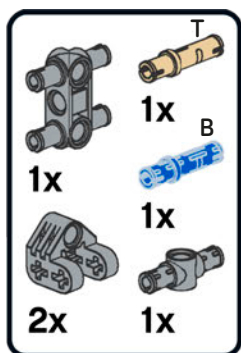
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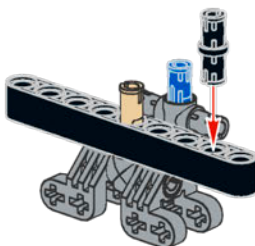
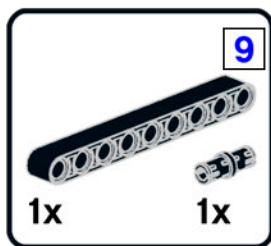
11

legs frame assembly

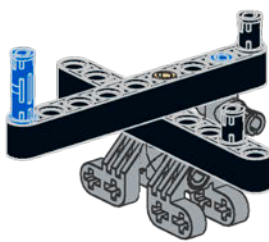
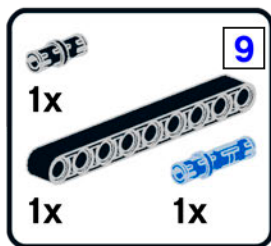
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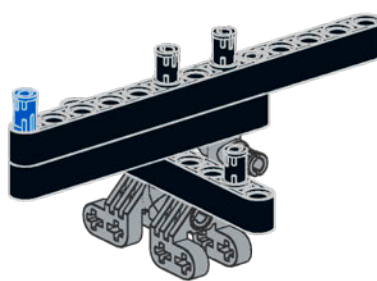
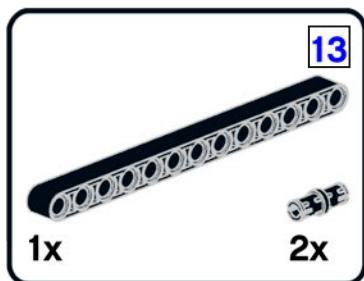
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3



4



1:1

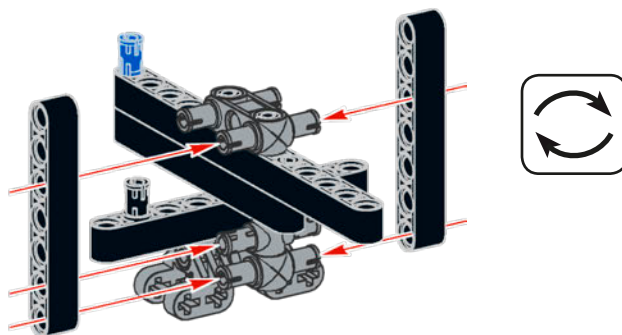
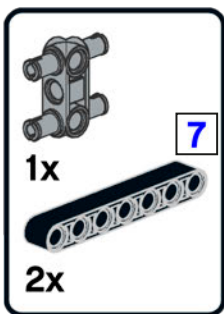


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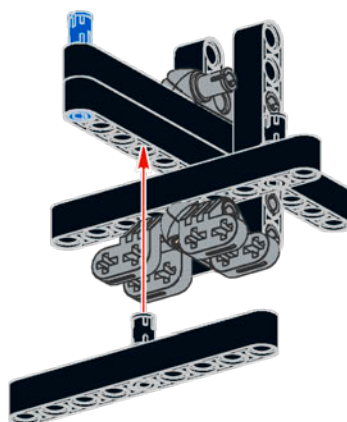
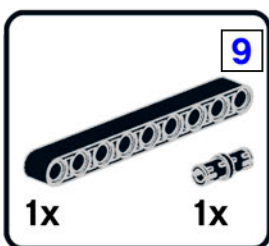


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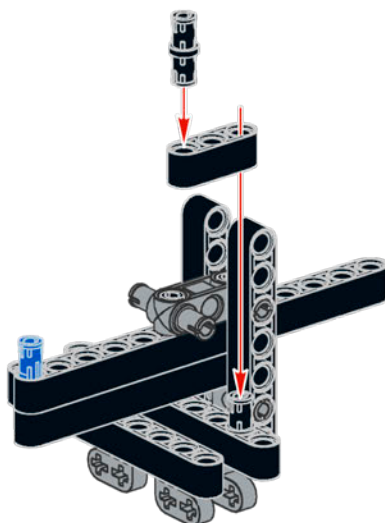
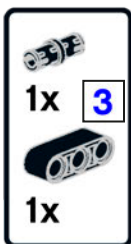
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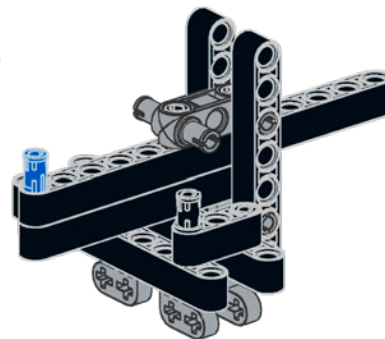
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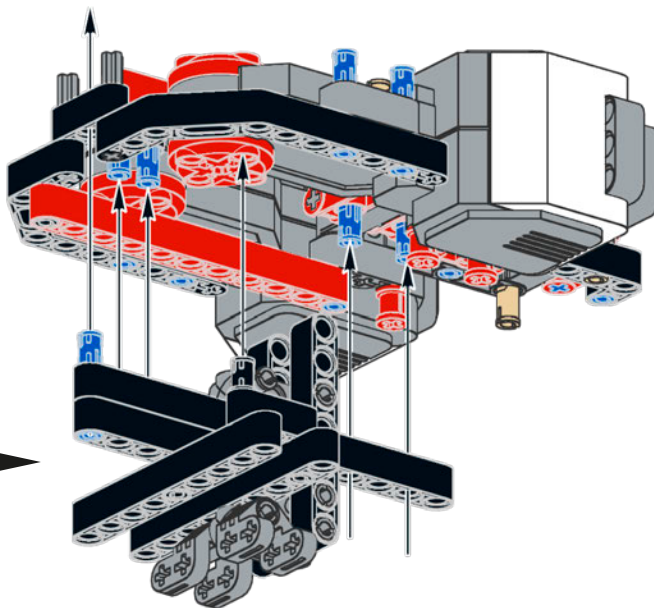
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1:1

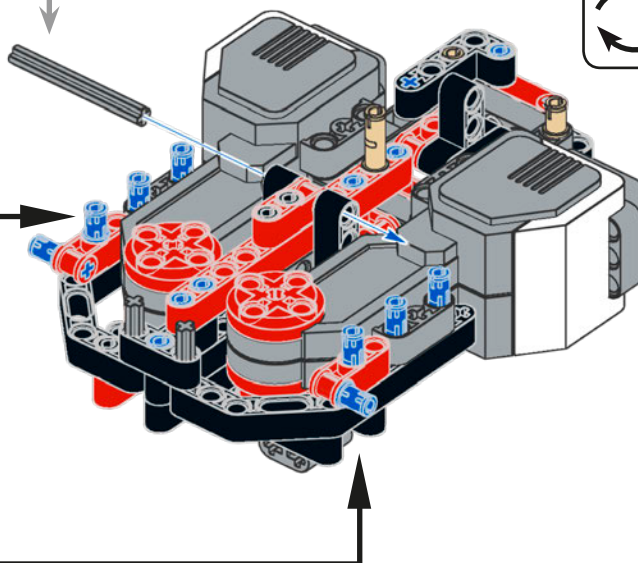
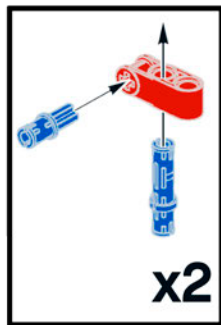
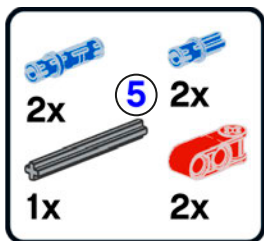
main assembly

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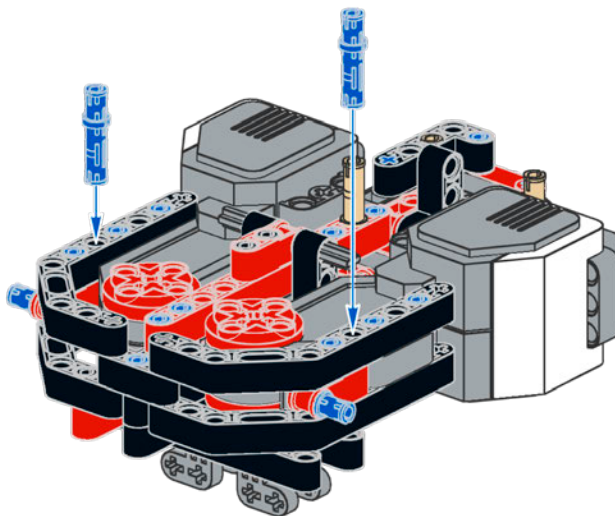
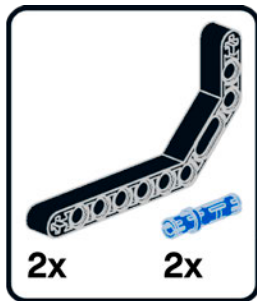
This frame allows the legs to step forward alternately. Once locked with the 5M axle in the next step, the frame can't be pulled away.

10

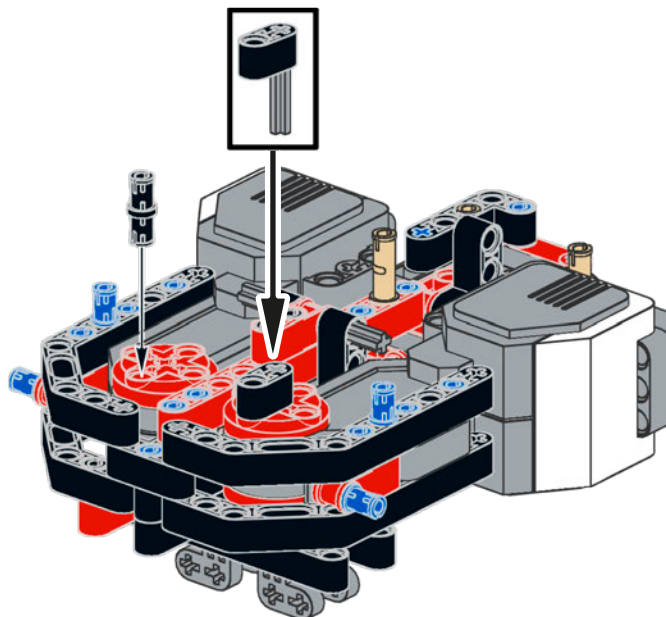
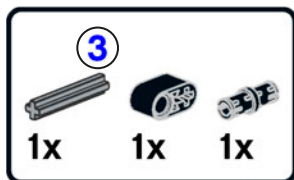


⑤ 1:1

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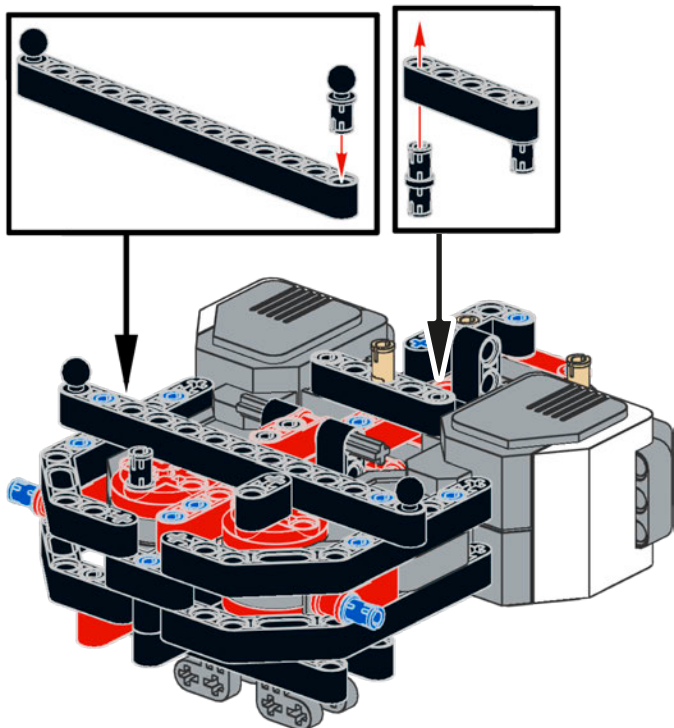
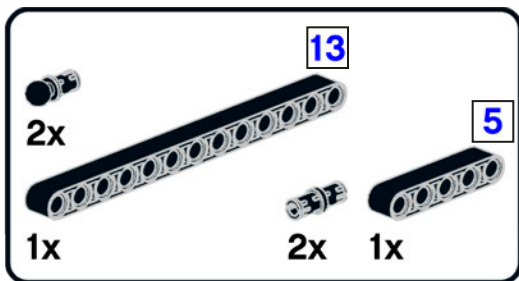


12



③ 1:1

13



1:1



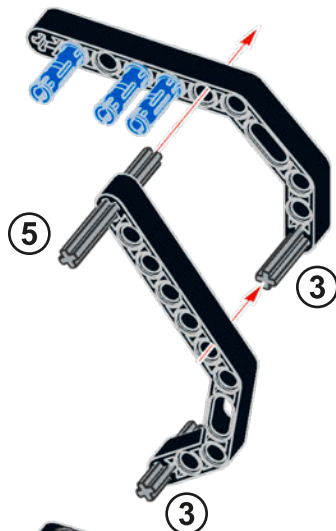
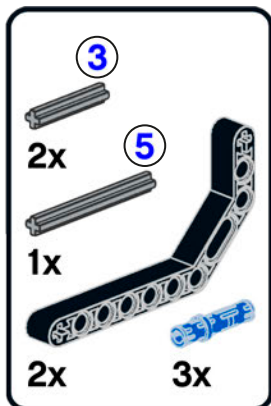
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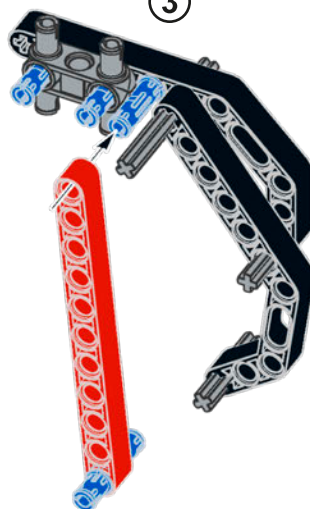
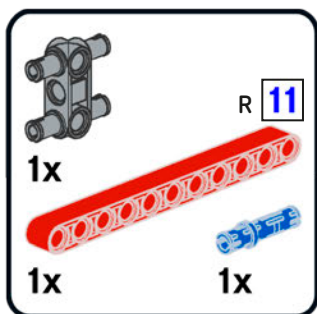
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left leg

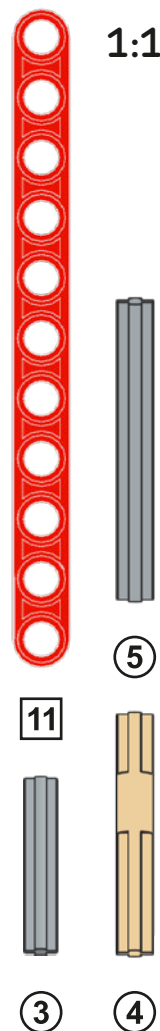
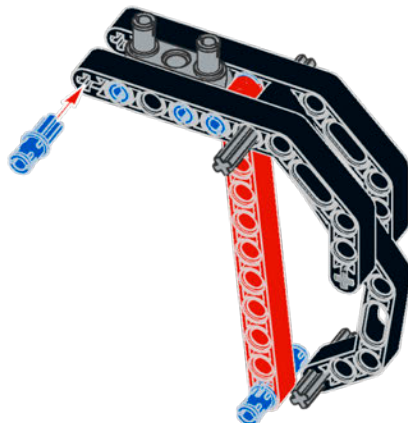
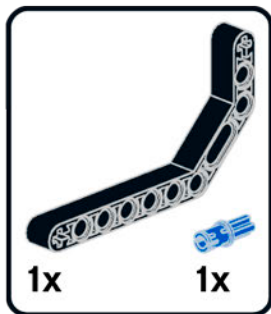
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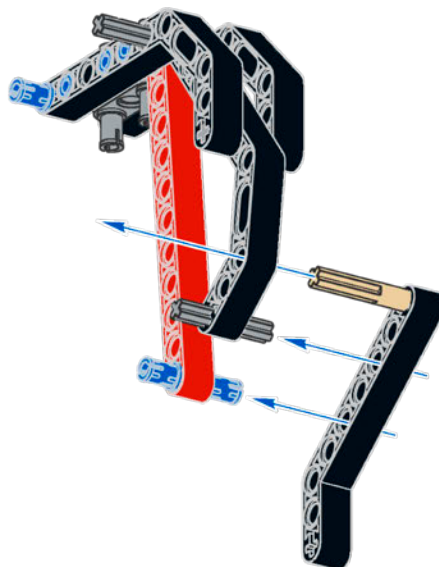
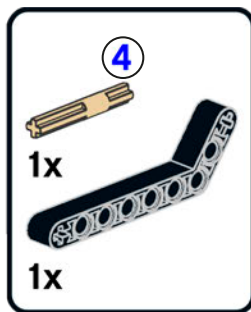
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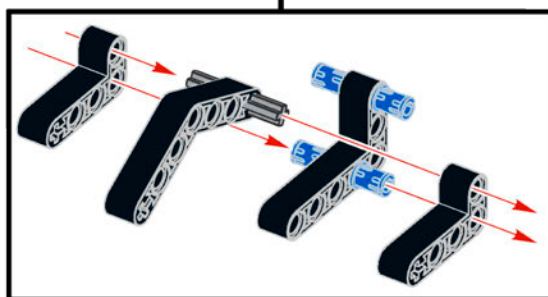
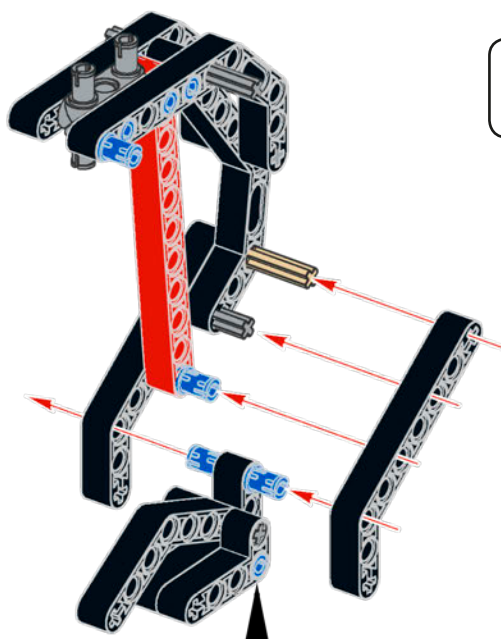
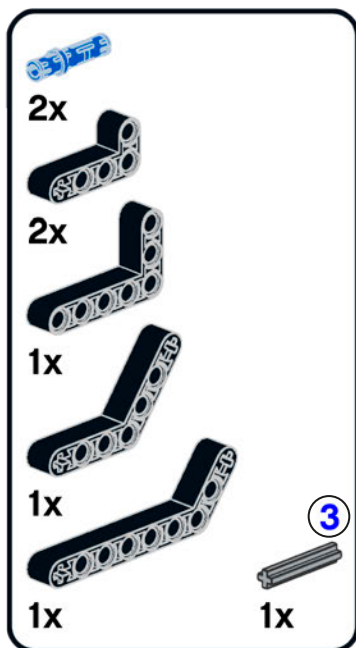
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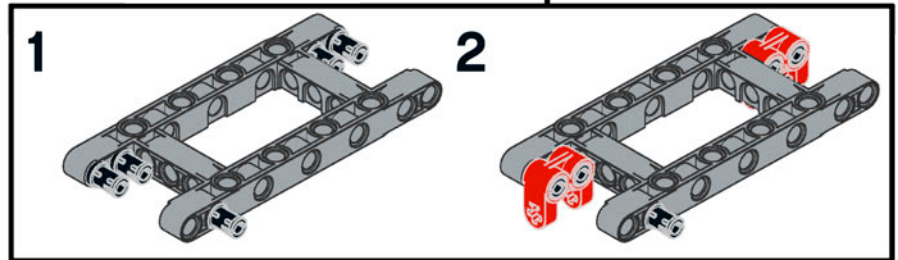
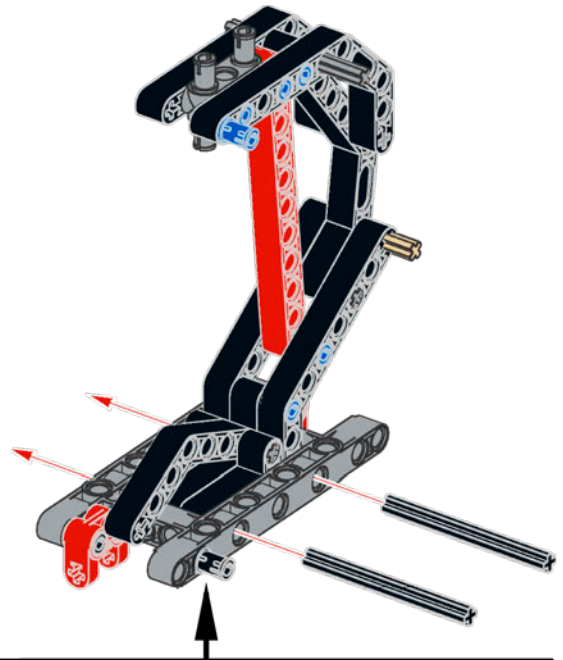
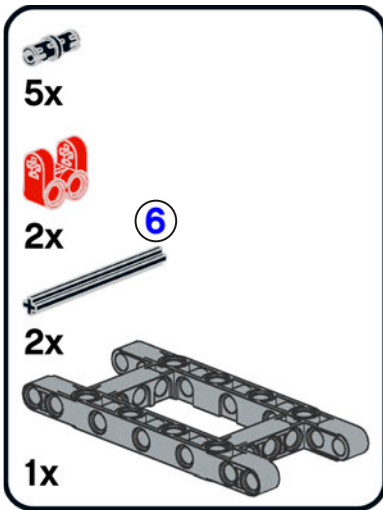
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6



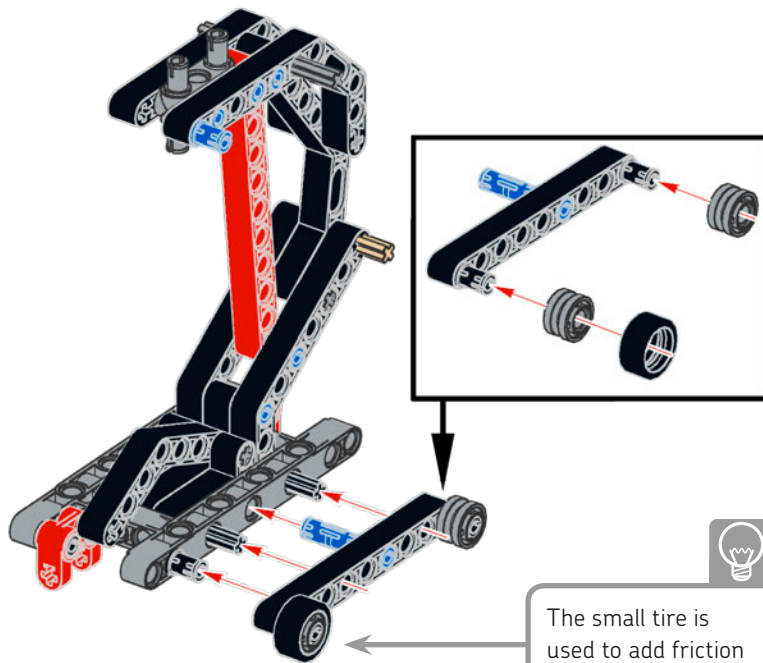
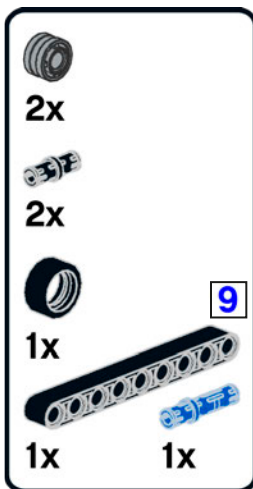
The two red cross blocks are used as wedges to make the robot tilt to the side when its weight shifts slightly.

1:1

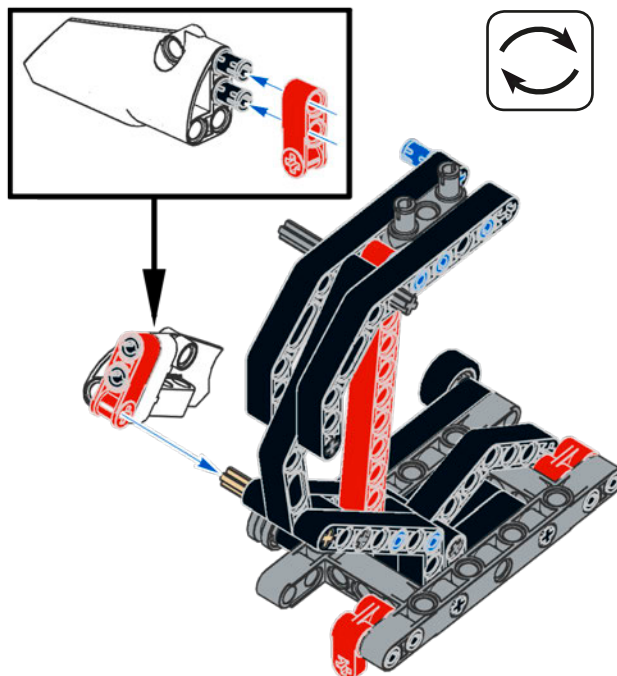
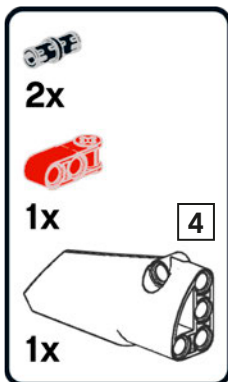


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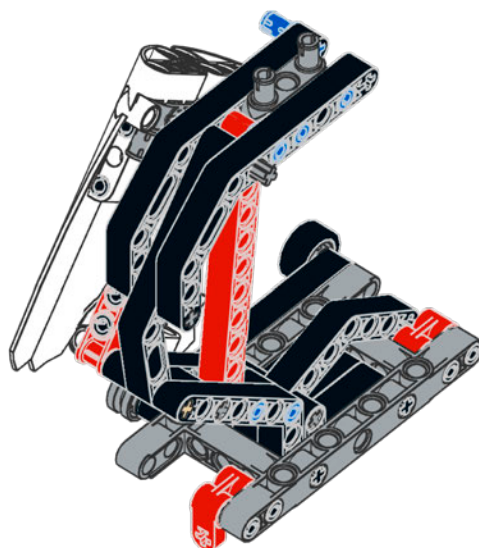
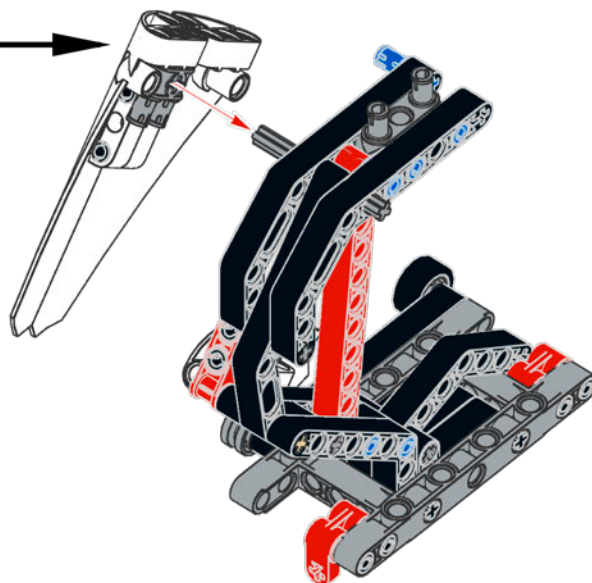
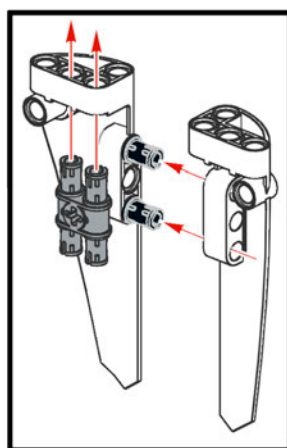
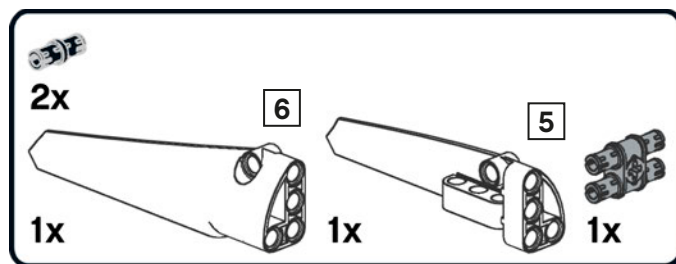


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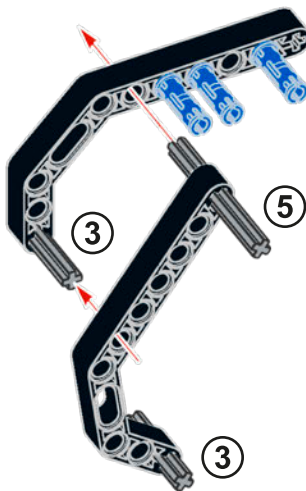
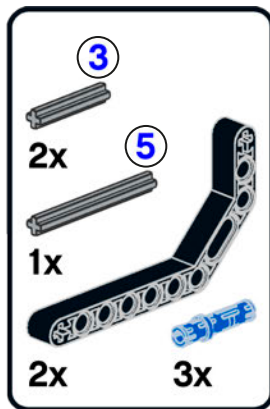
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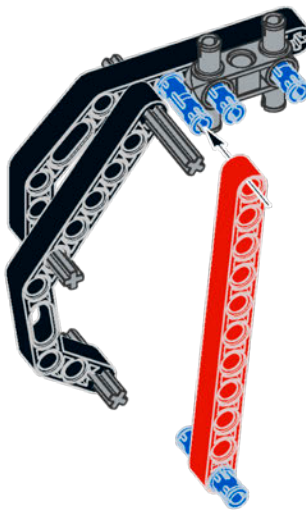
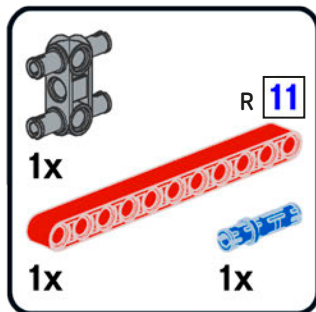


right leg assembly

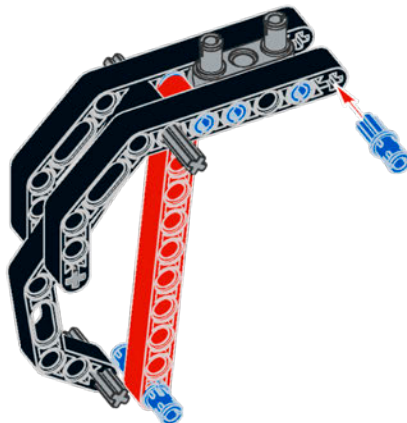
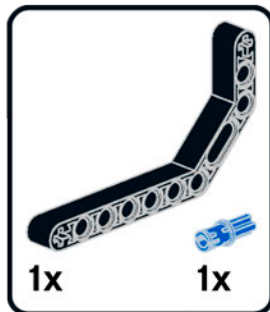
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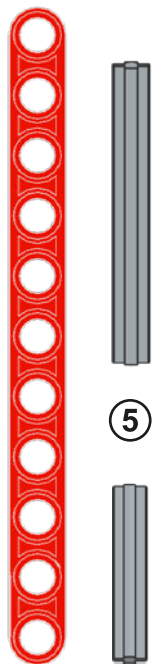
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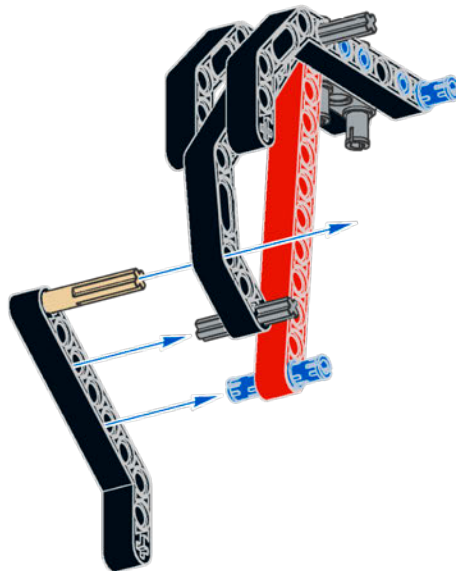
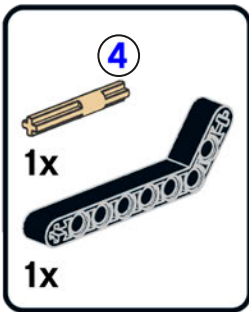
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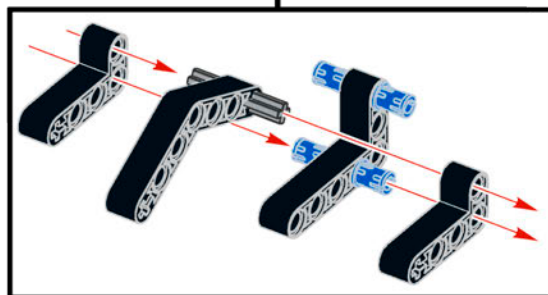
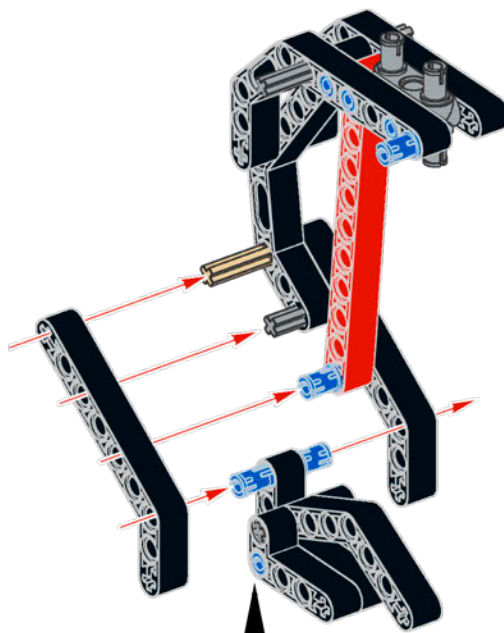
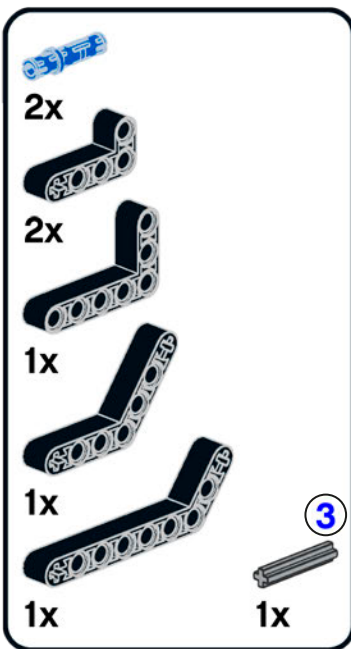
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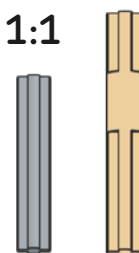
4



5



1:1



3

4

6



5x

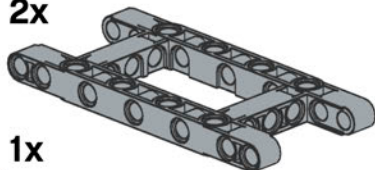


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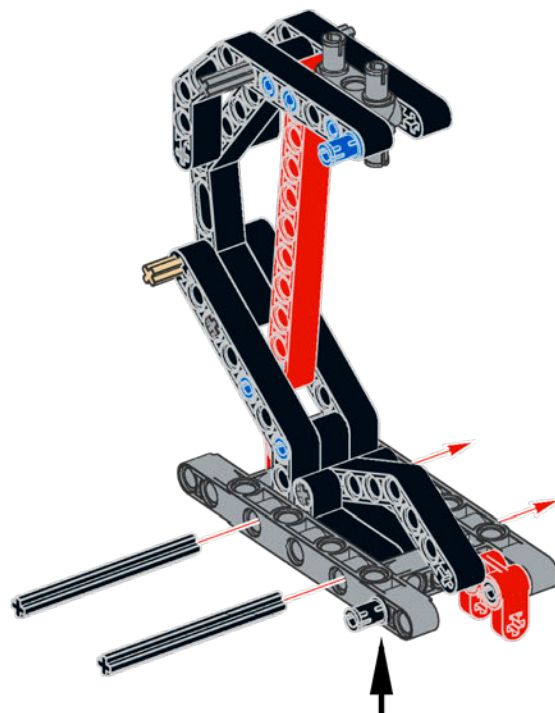
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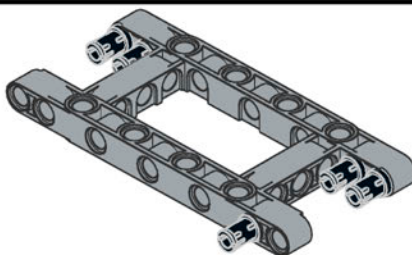
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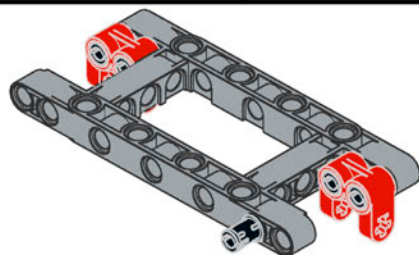
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1



2

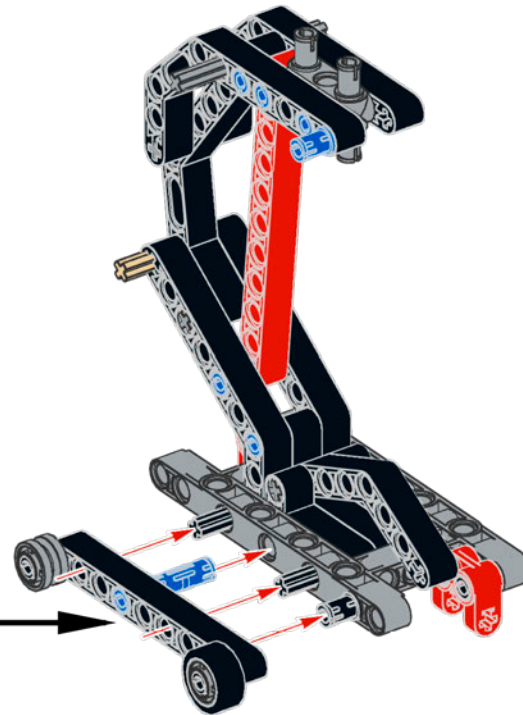
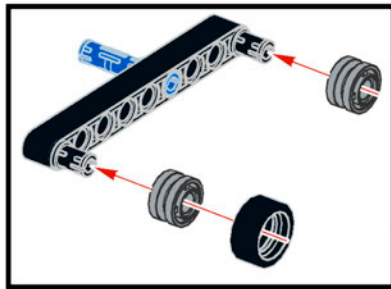
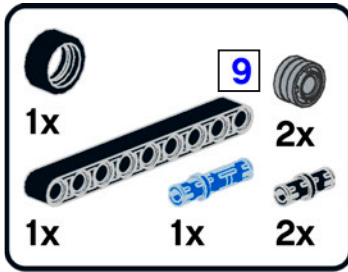


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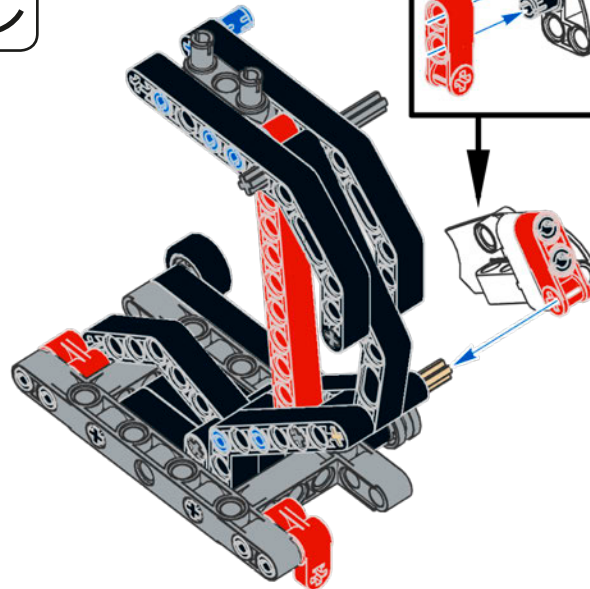
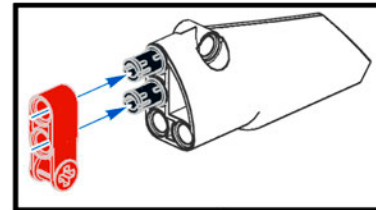
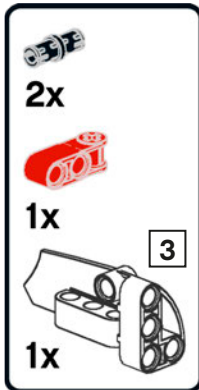


6

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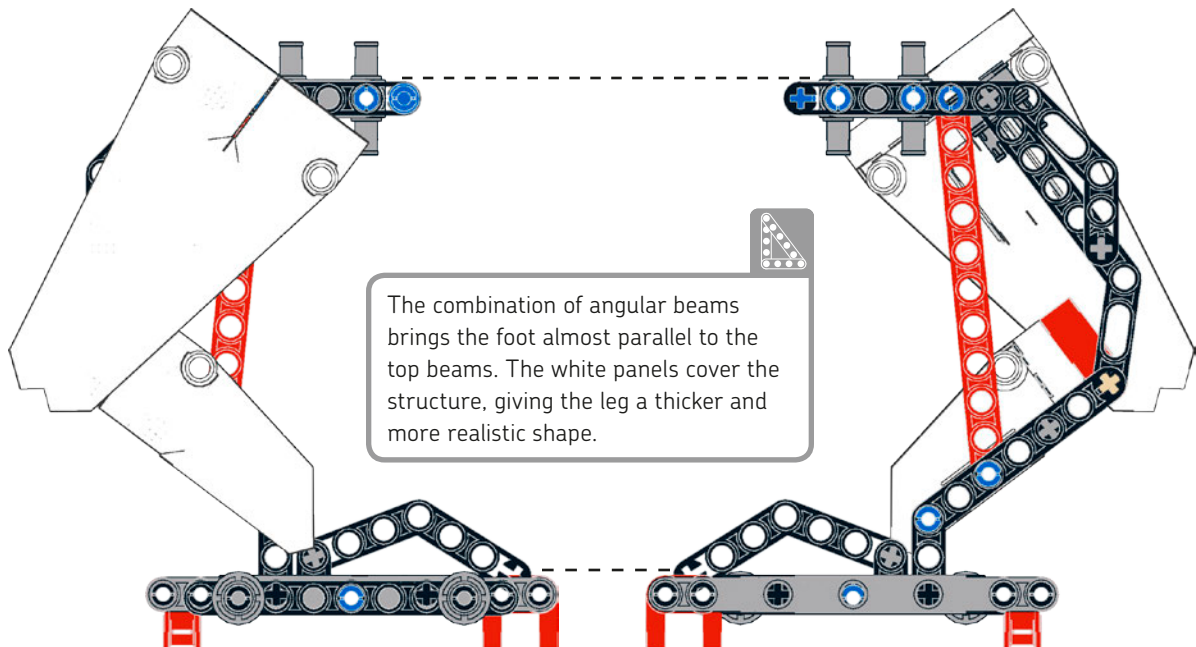
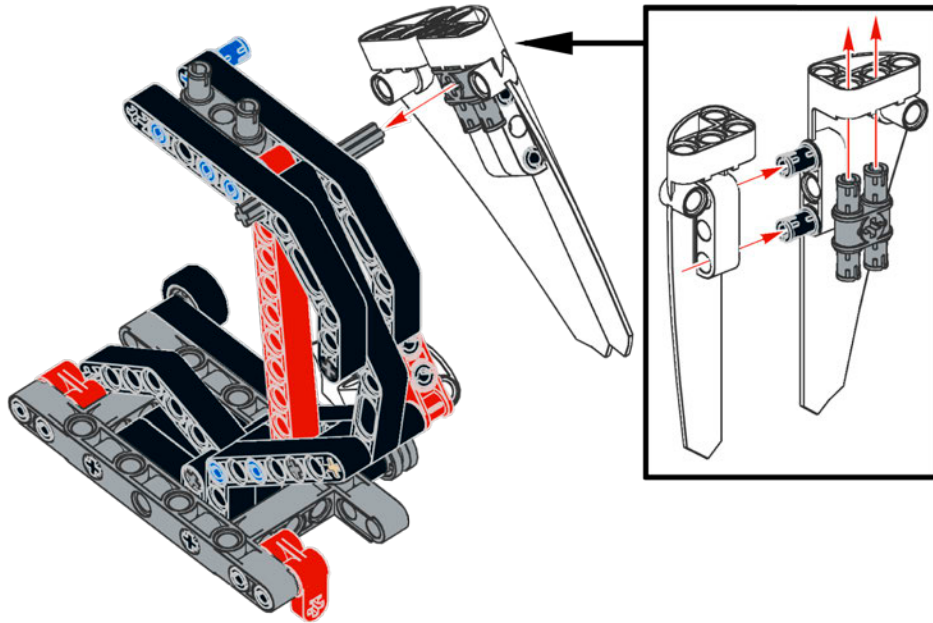
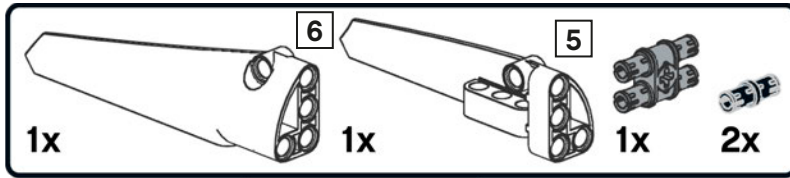


8



1:1  9

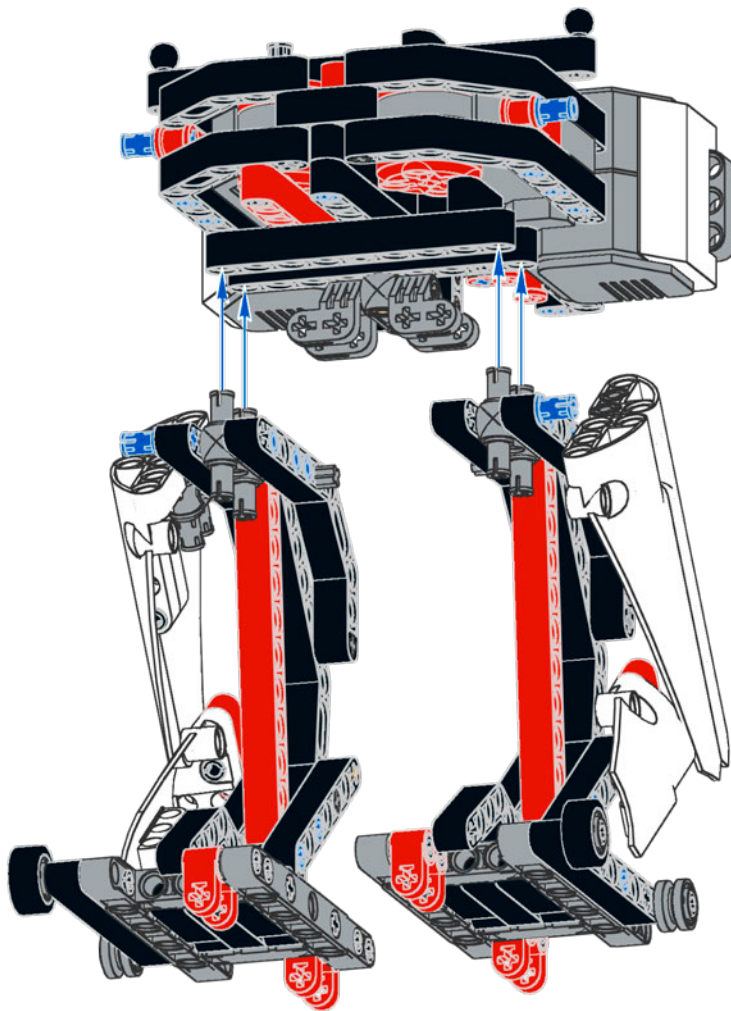
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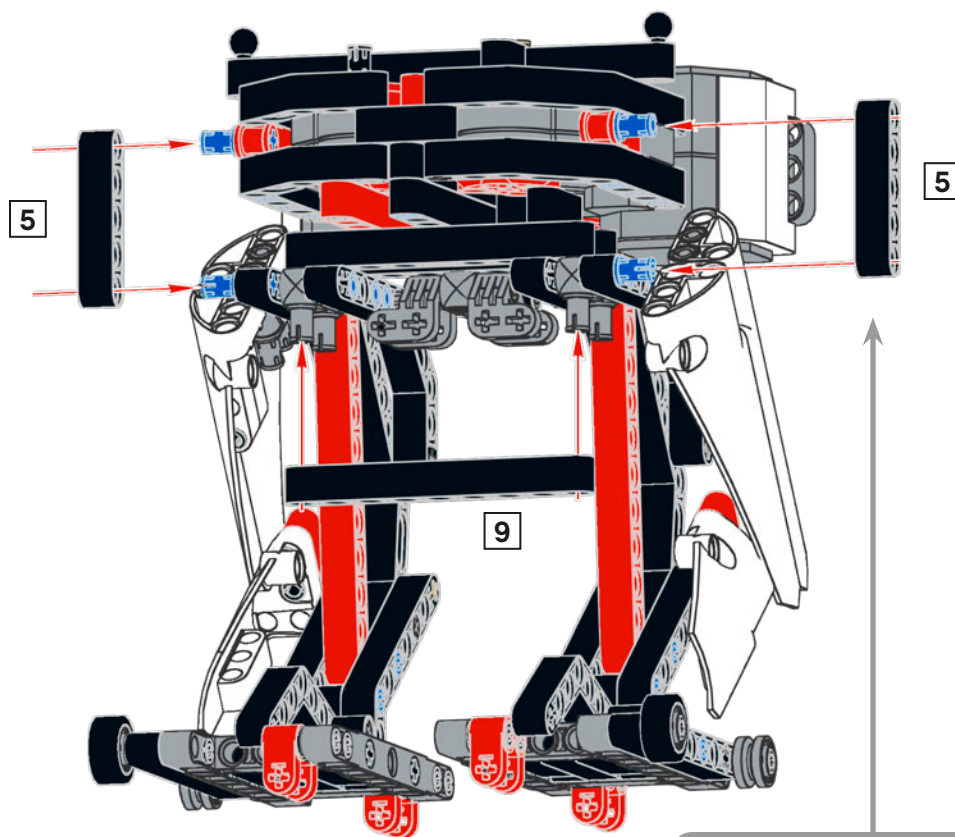
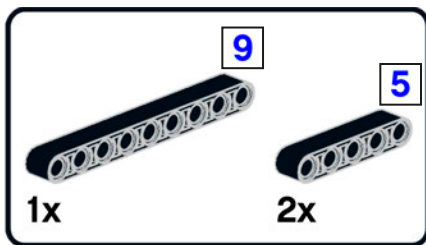
The combination of angular beams brings the foot almost parallel to the top beams. The white panels cover the structure, giving the leg a thicker and more realistic shape.

main assembly

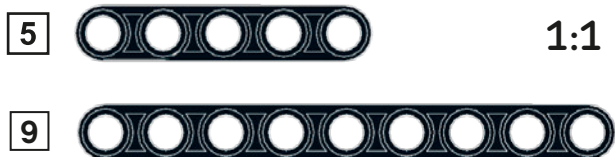
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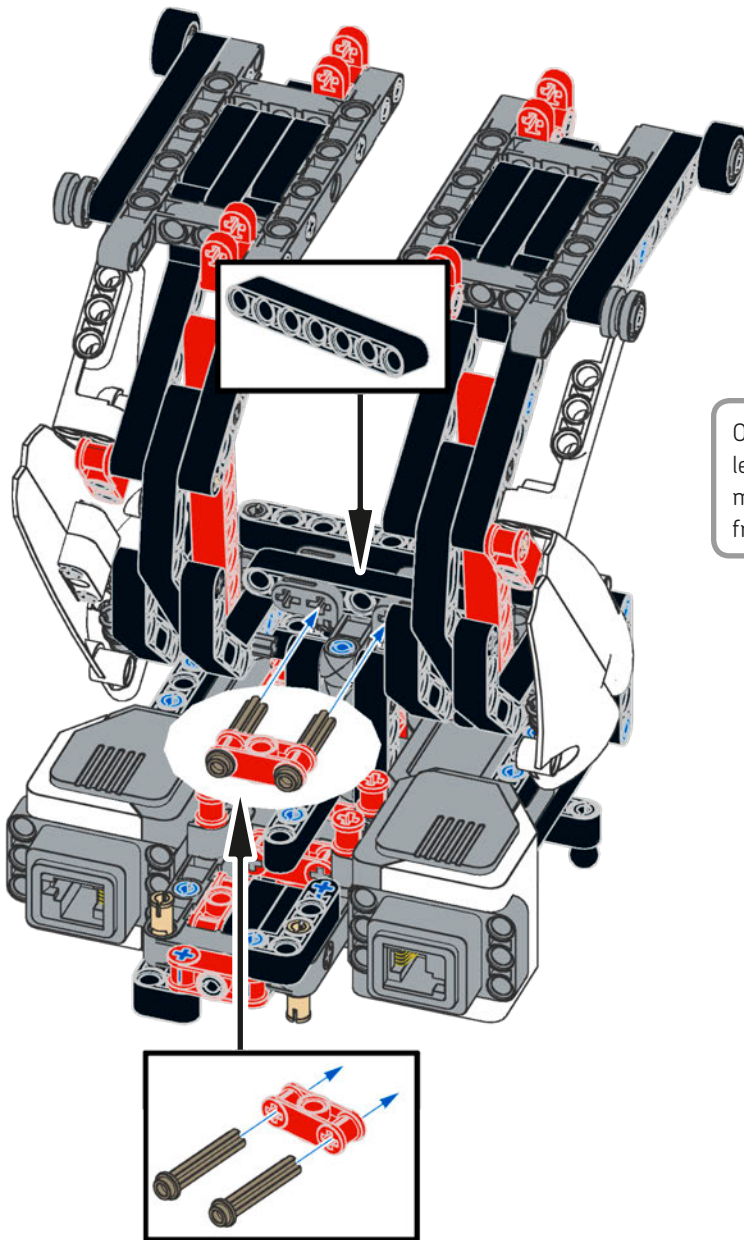
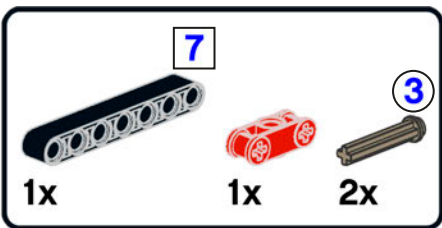
15



The 5M beams help hold the legs in place, and they swing when the legs take steps. The 9M beams and the legs form a parallelogram-like moving linkage.



16



Once the 7M beam is locked in place, the legs cannot be pulled out. This strong, multi-braced design prevents the robot from coming apart.

③

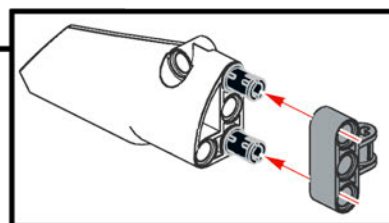
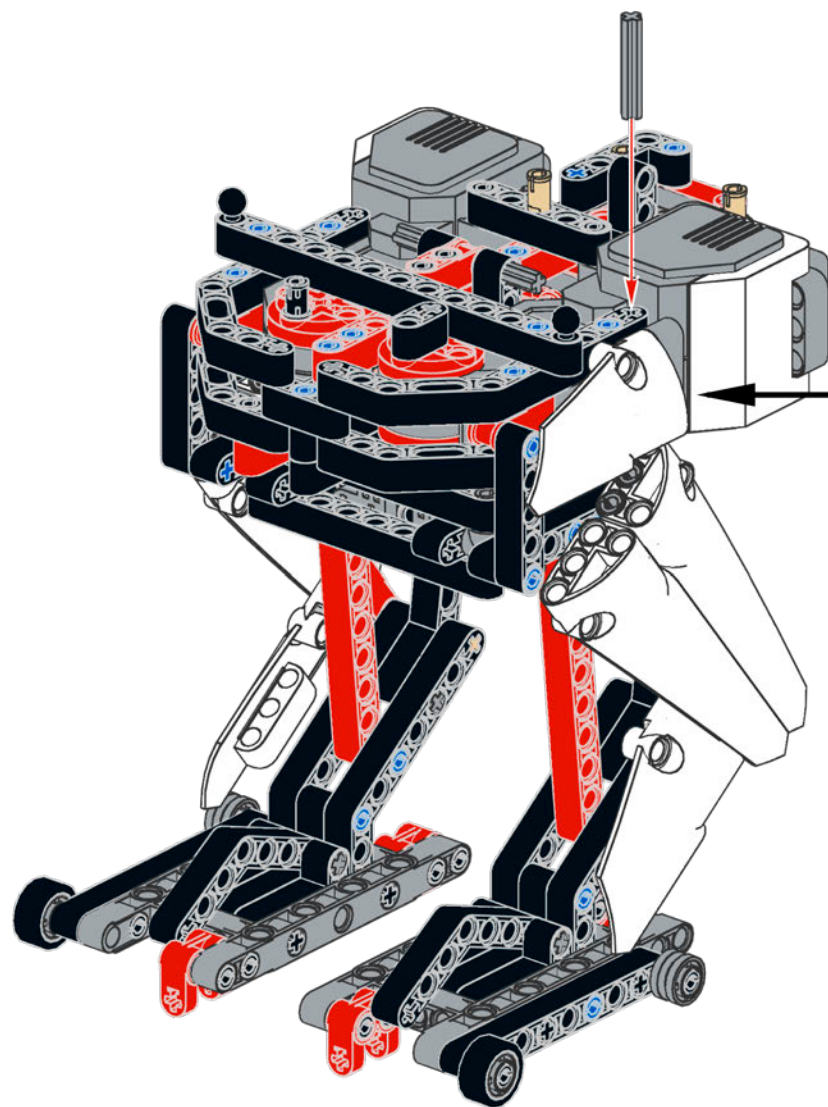
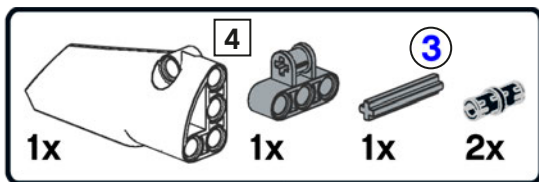


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17

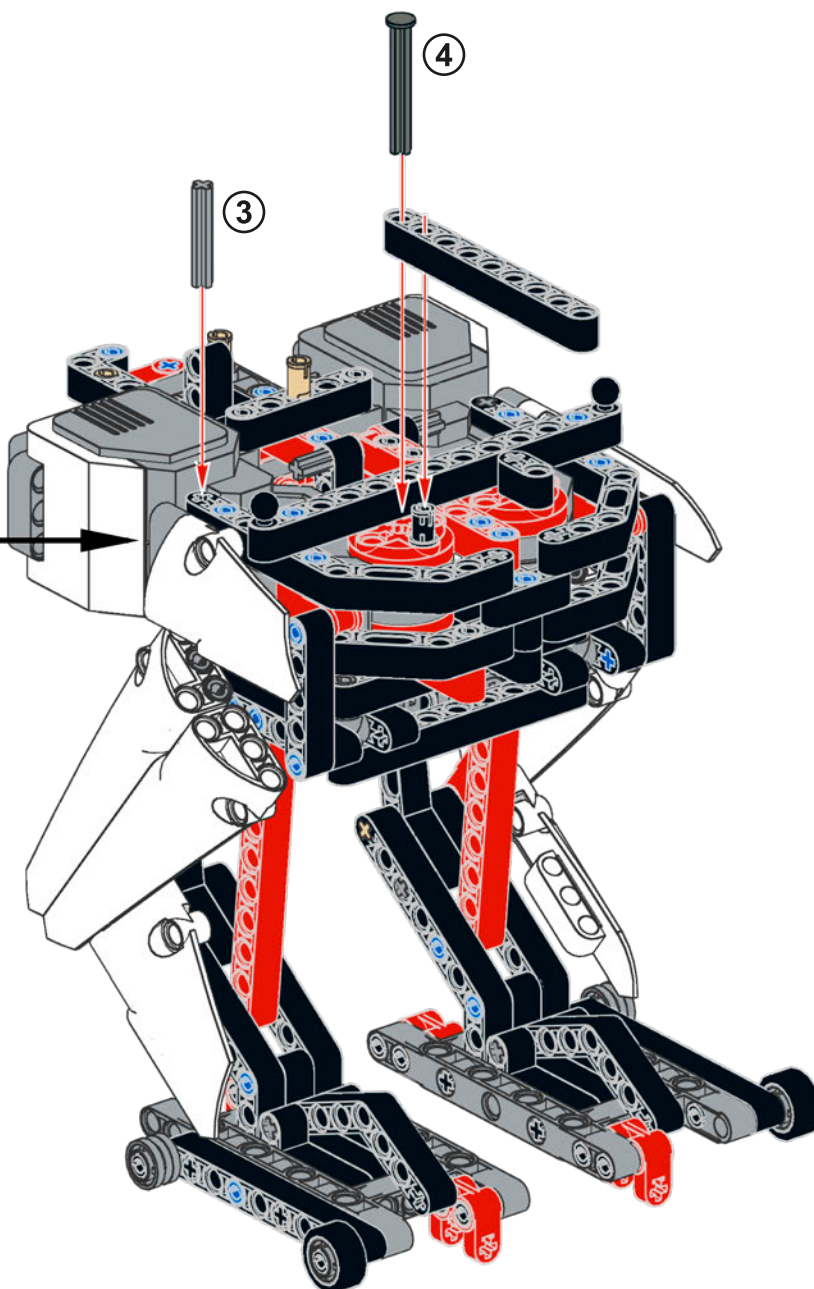
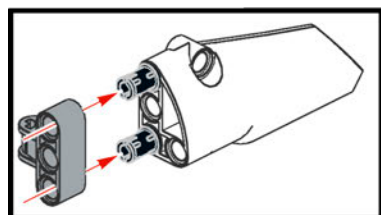
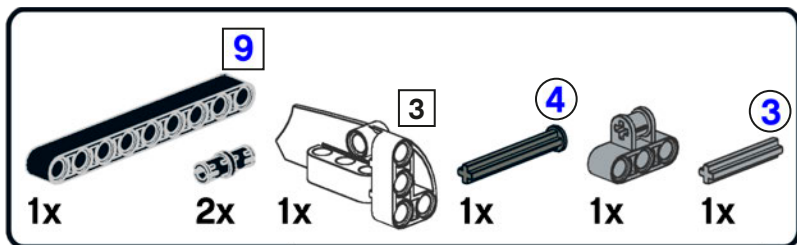


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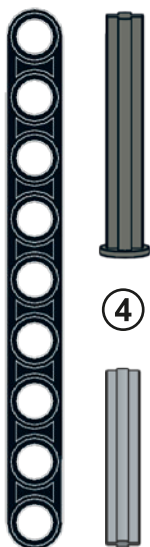


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18



1:1

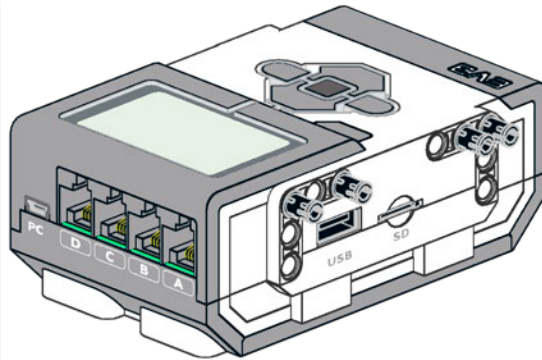
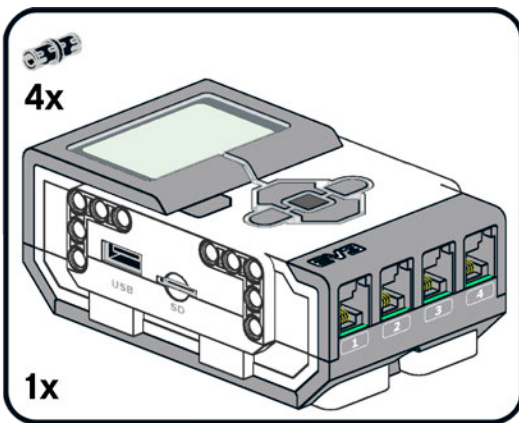


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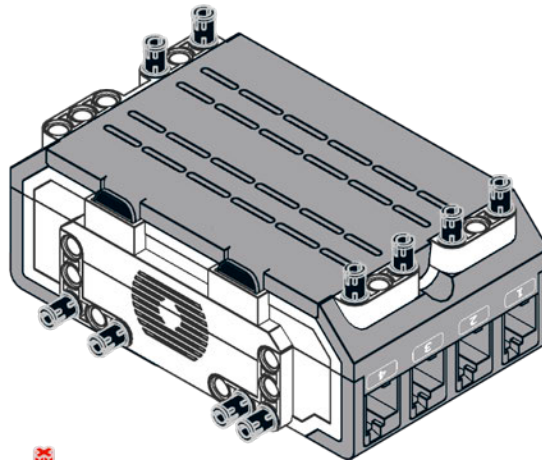
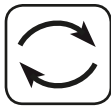
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EV3 brick assembly

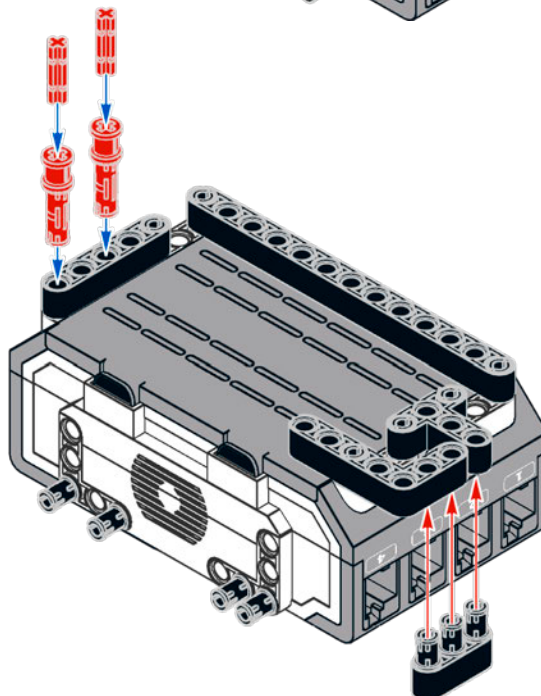
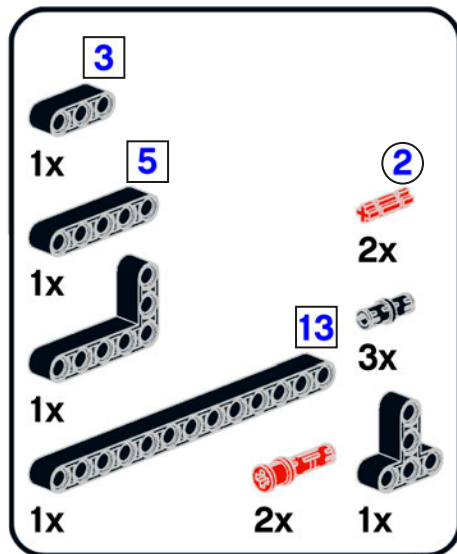
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13



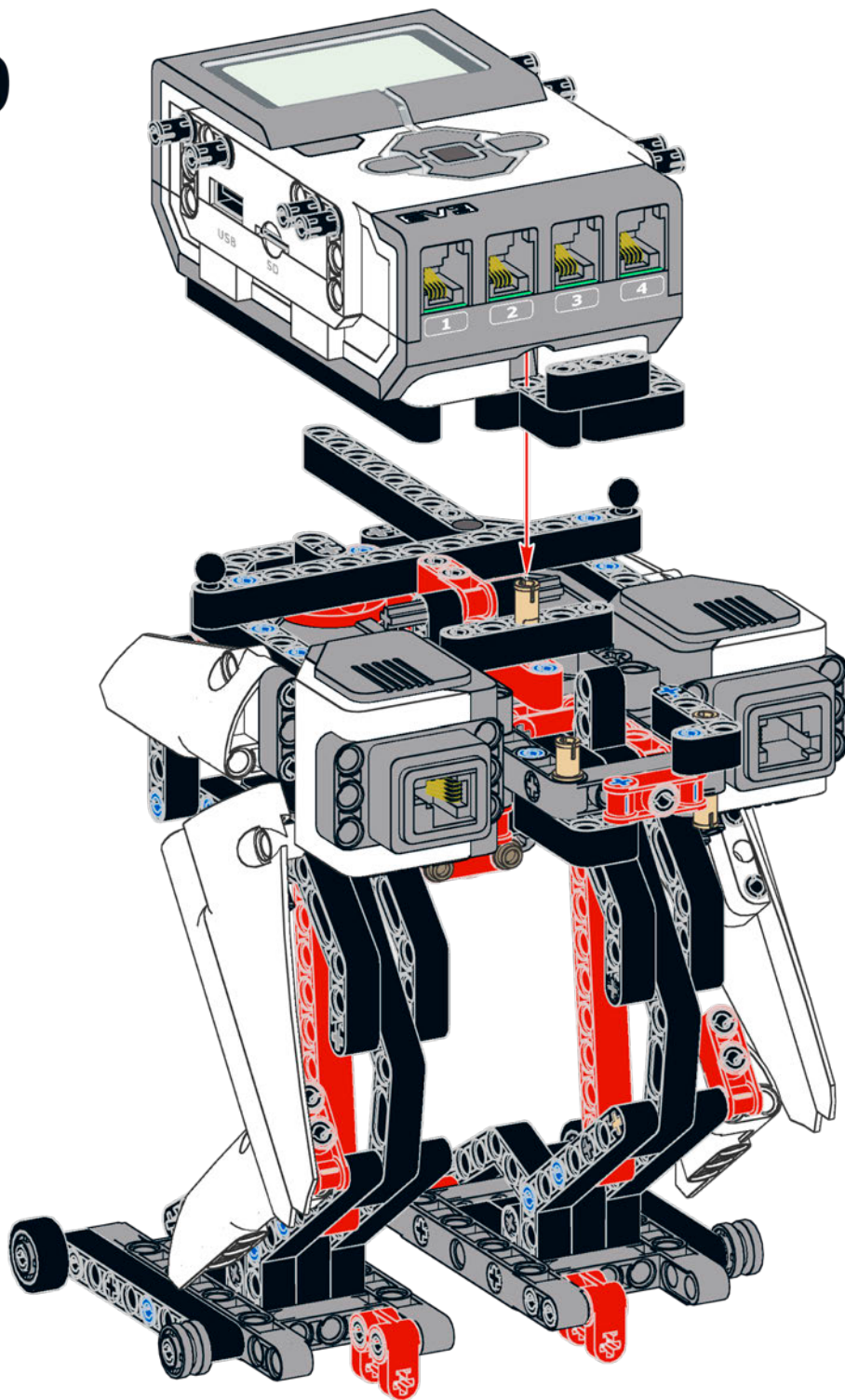
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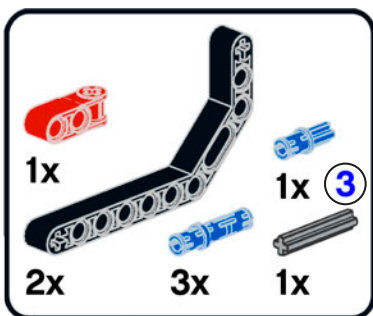
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main assembly

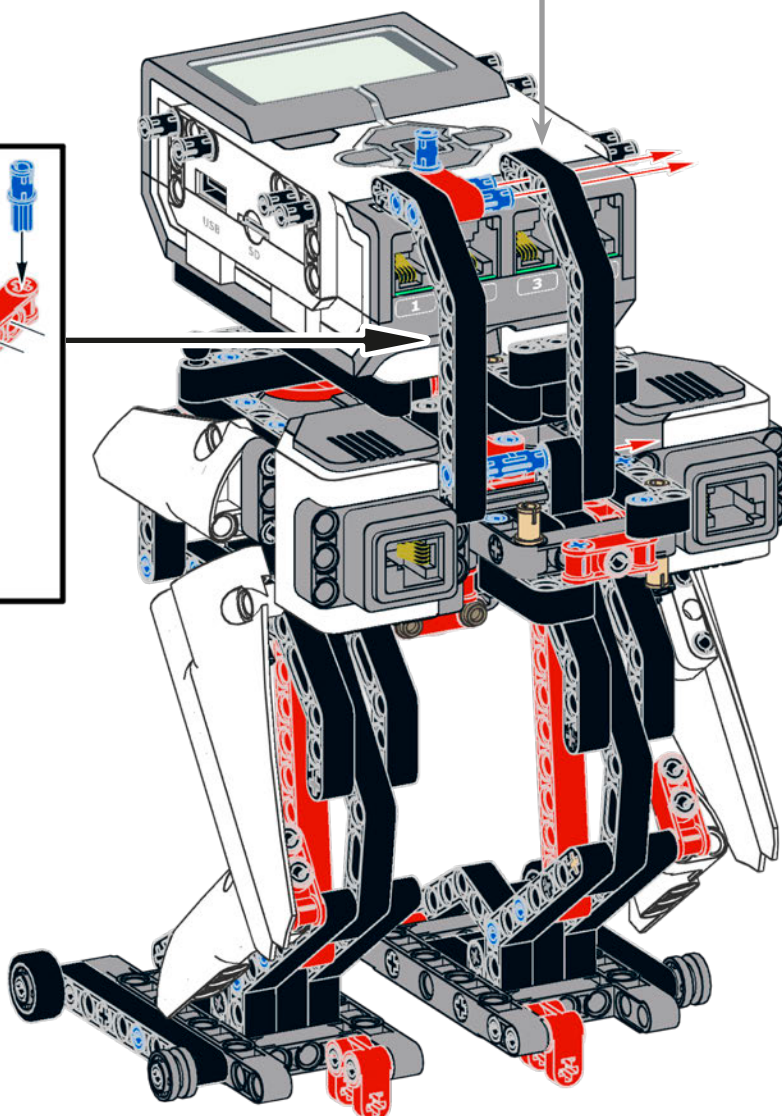
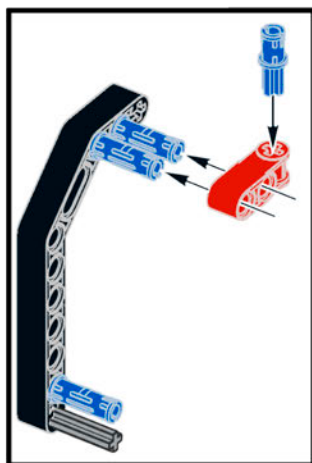
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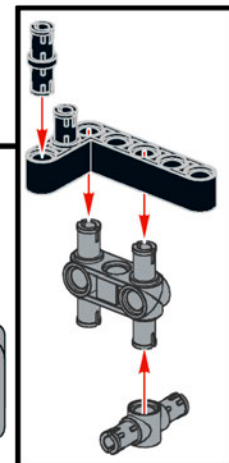
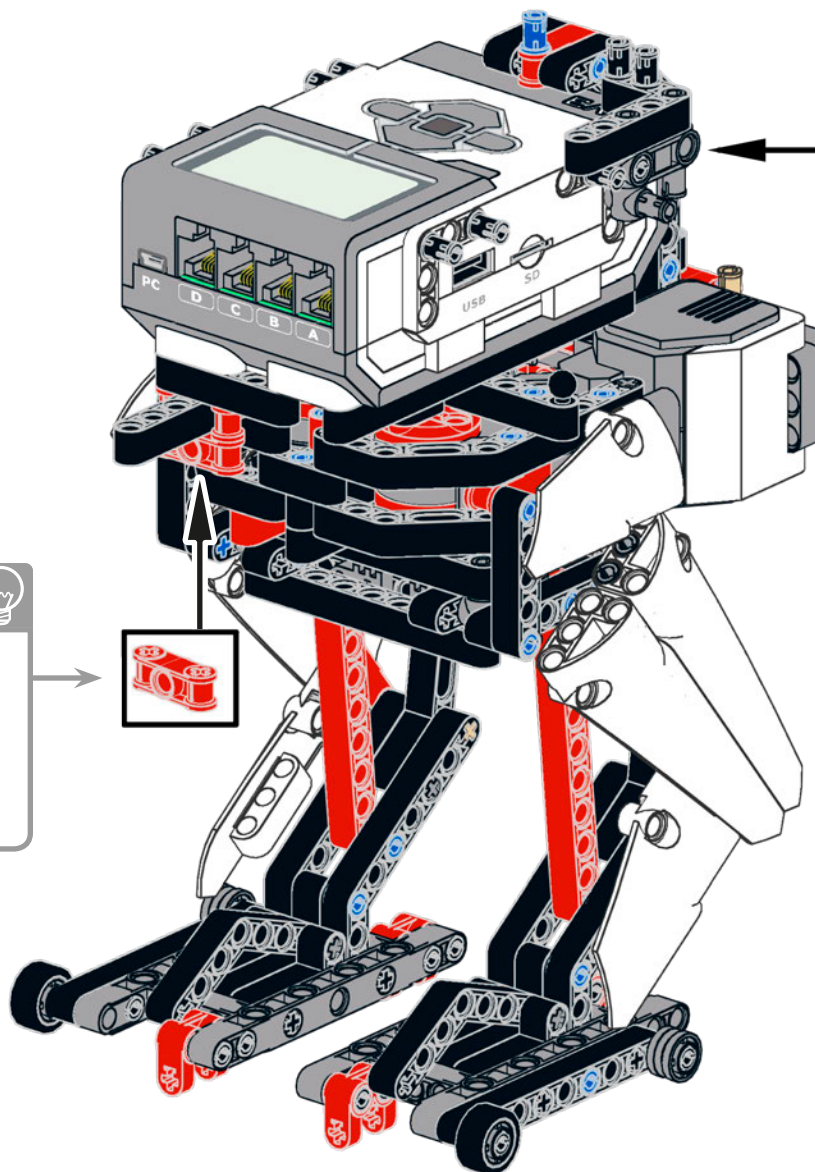
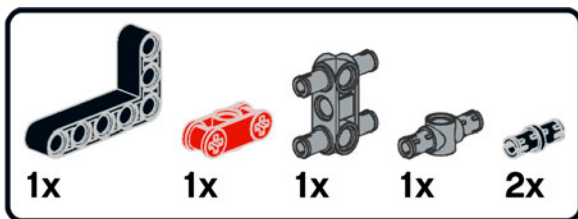


This is another example of bracing. First, place the double angular beam on the right, then lock it by attaching the subassembly on the left. These beams will hold the EV3 Brick in place. (You'll finish locking it later.)



③ 1:1

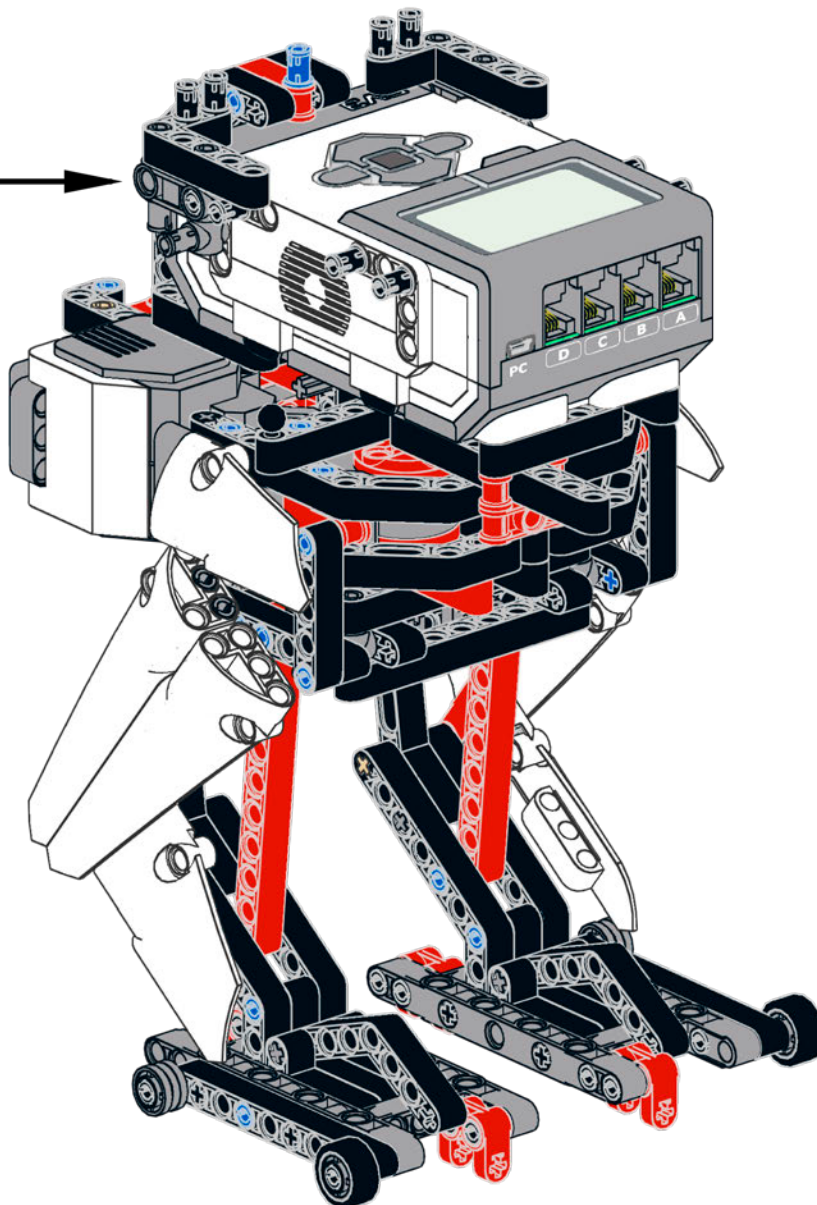
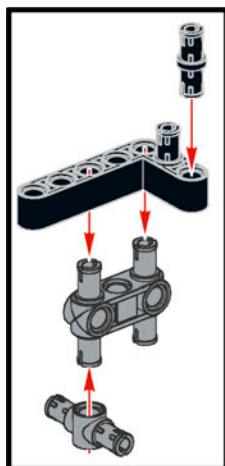
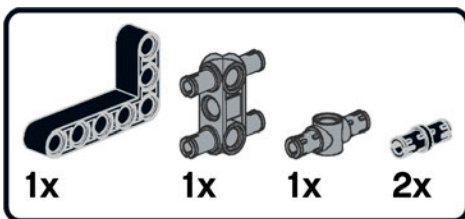
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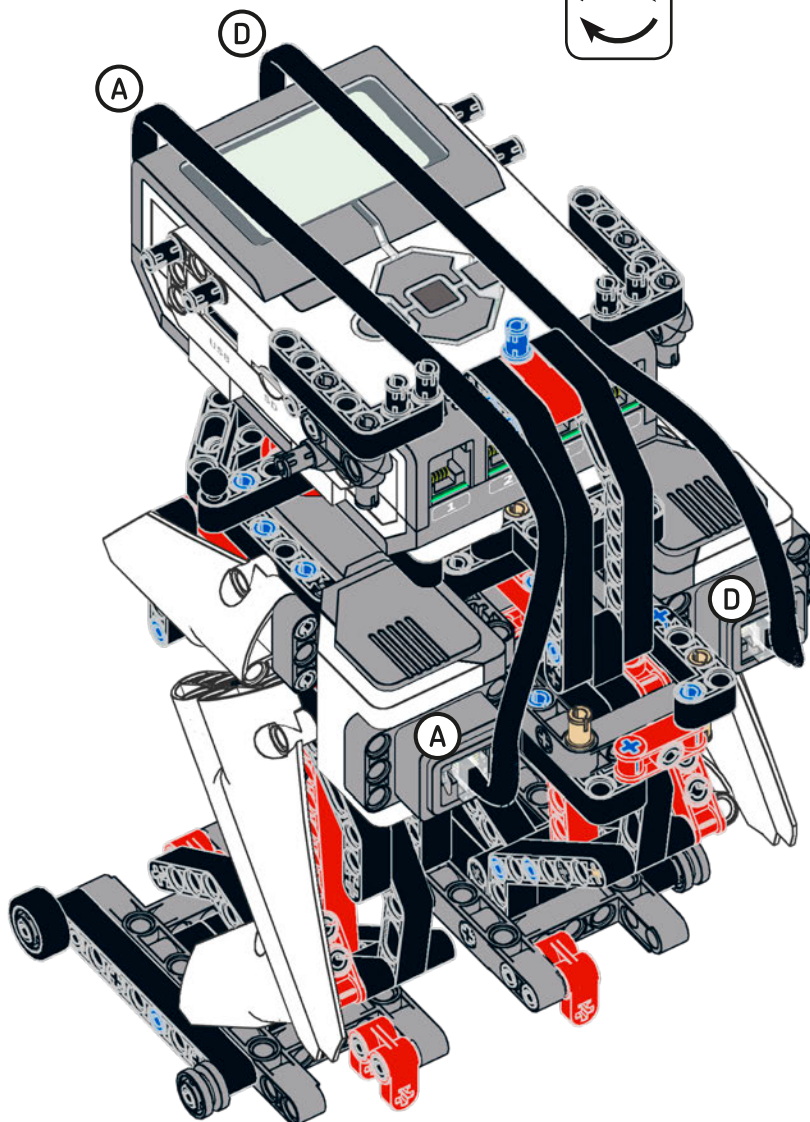
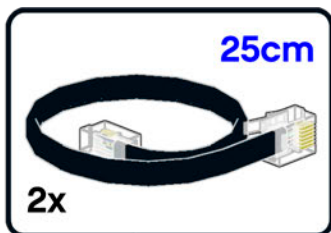
The red double cross block locks the beam in place. Test the assembly by manually moving the EV3 Brick—you should hear the motor rotating.



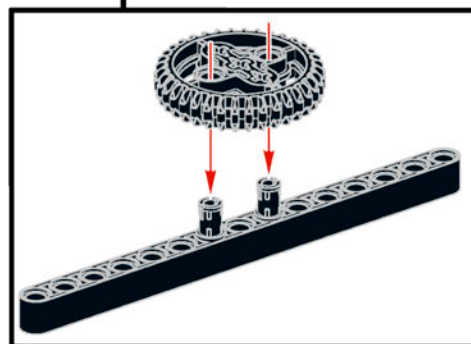
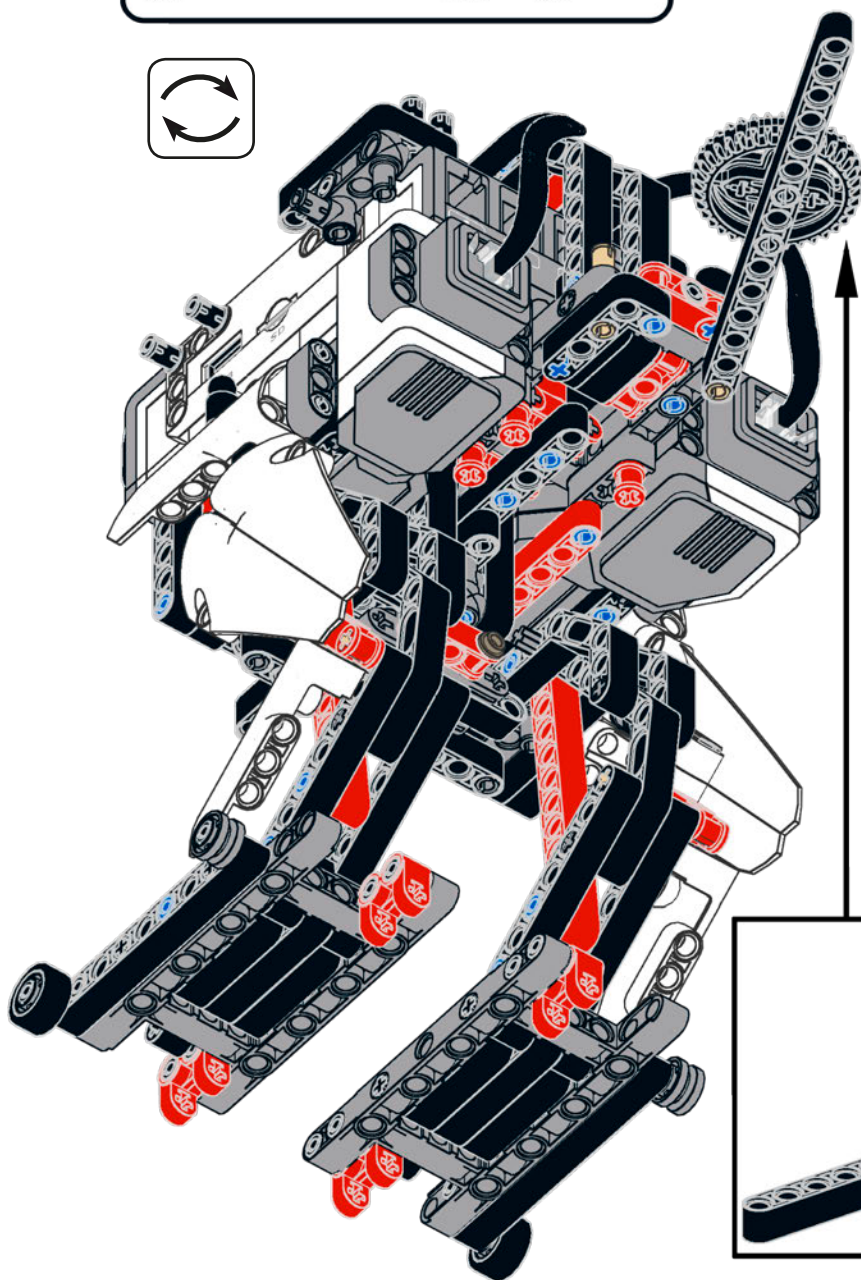
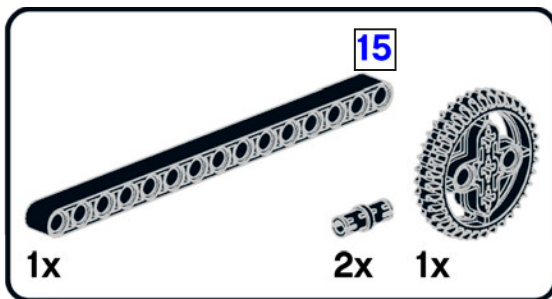
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23



24

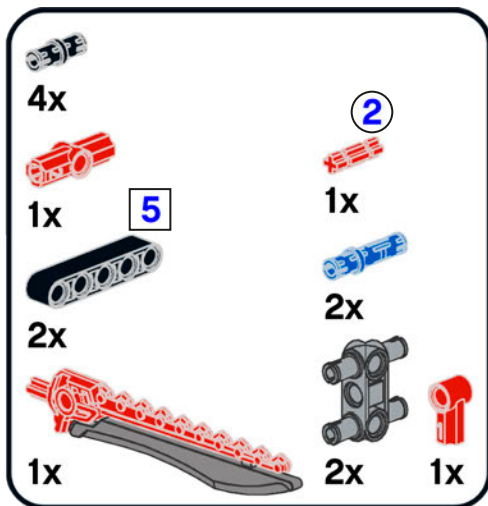


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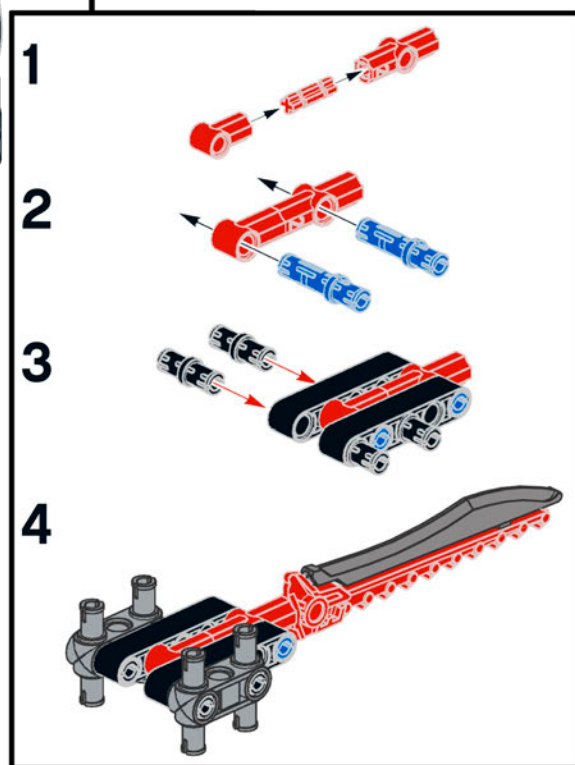
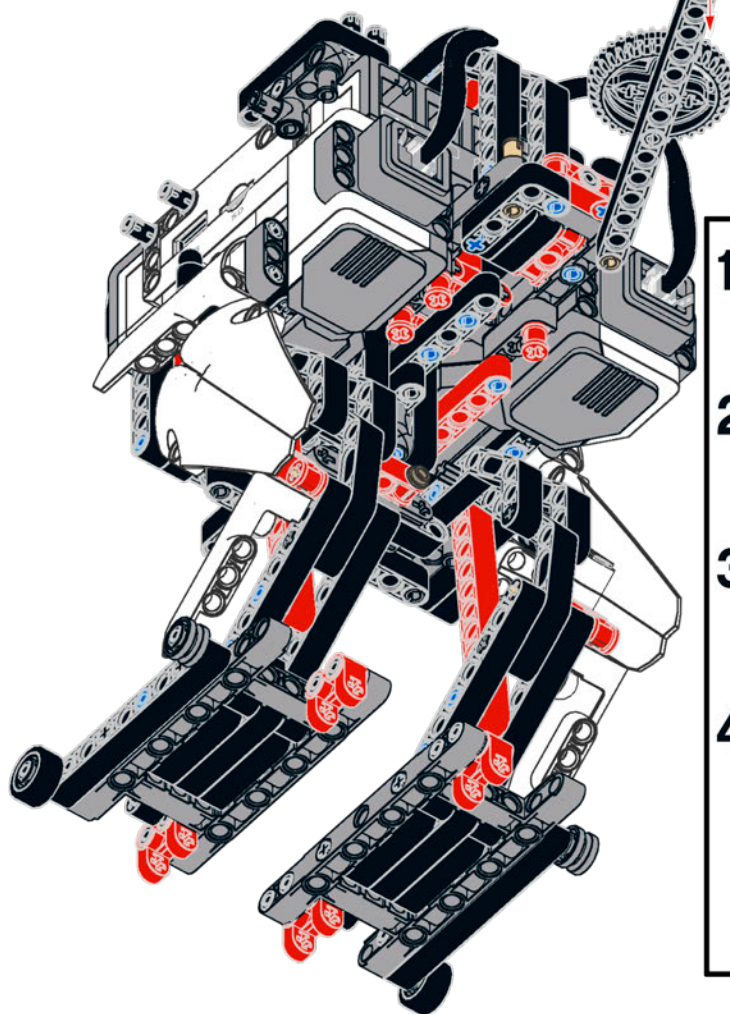
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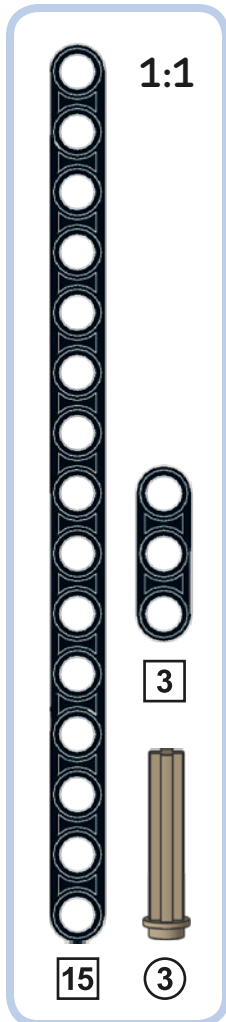
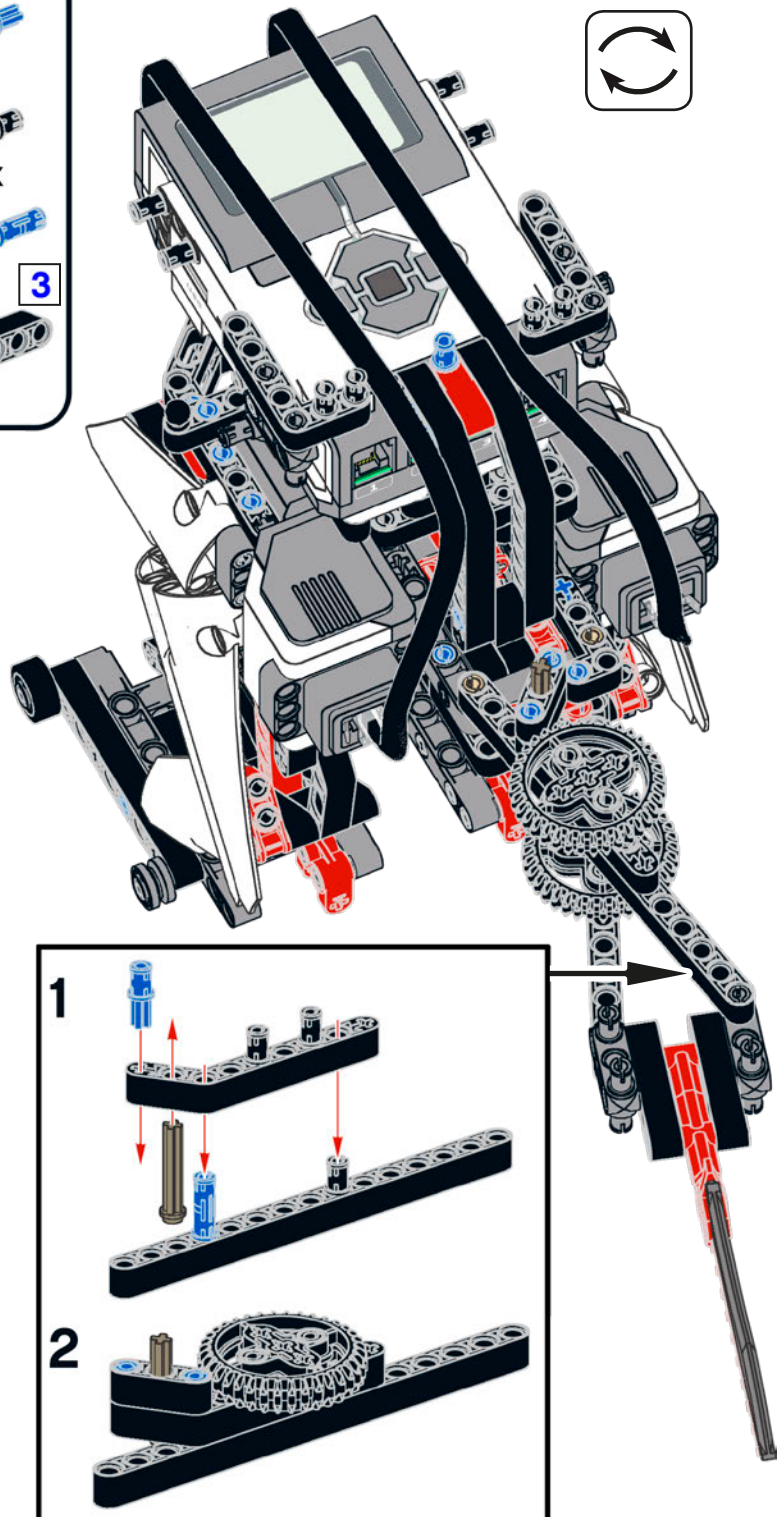
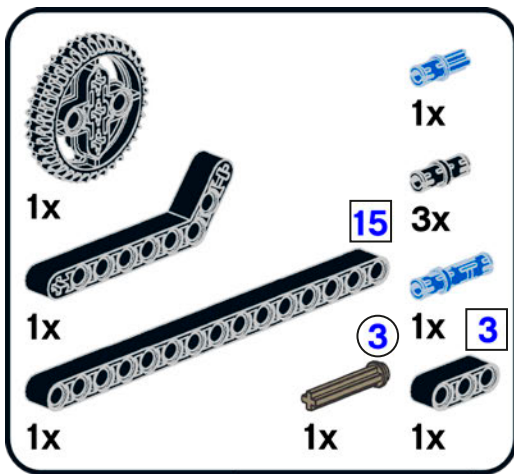
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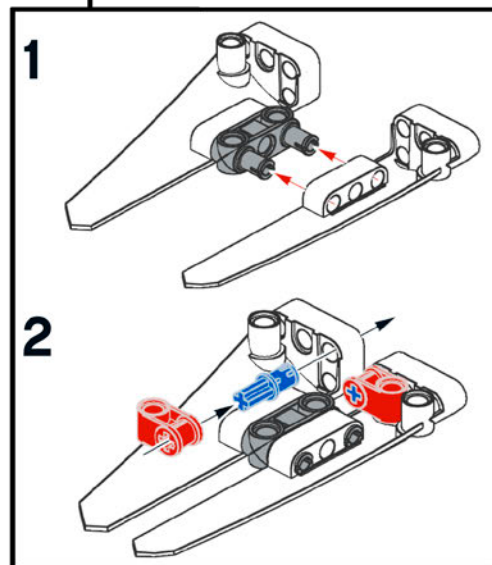
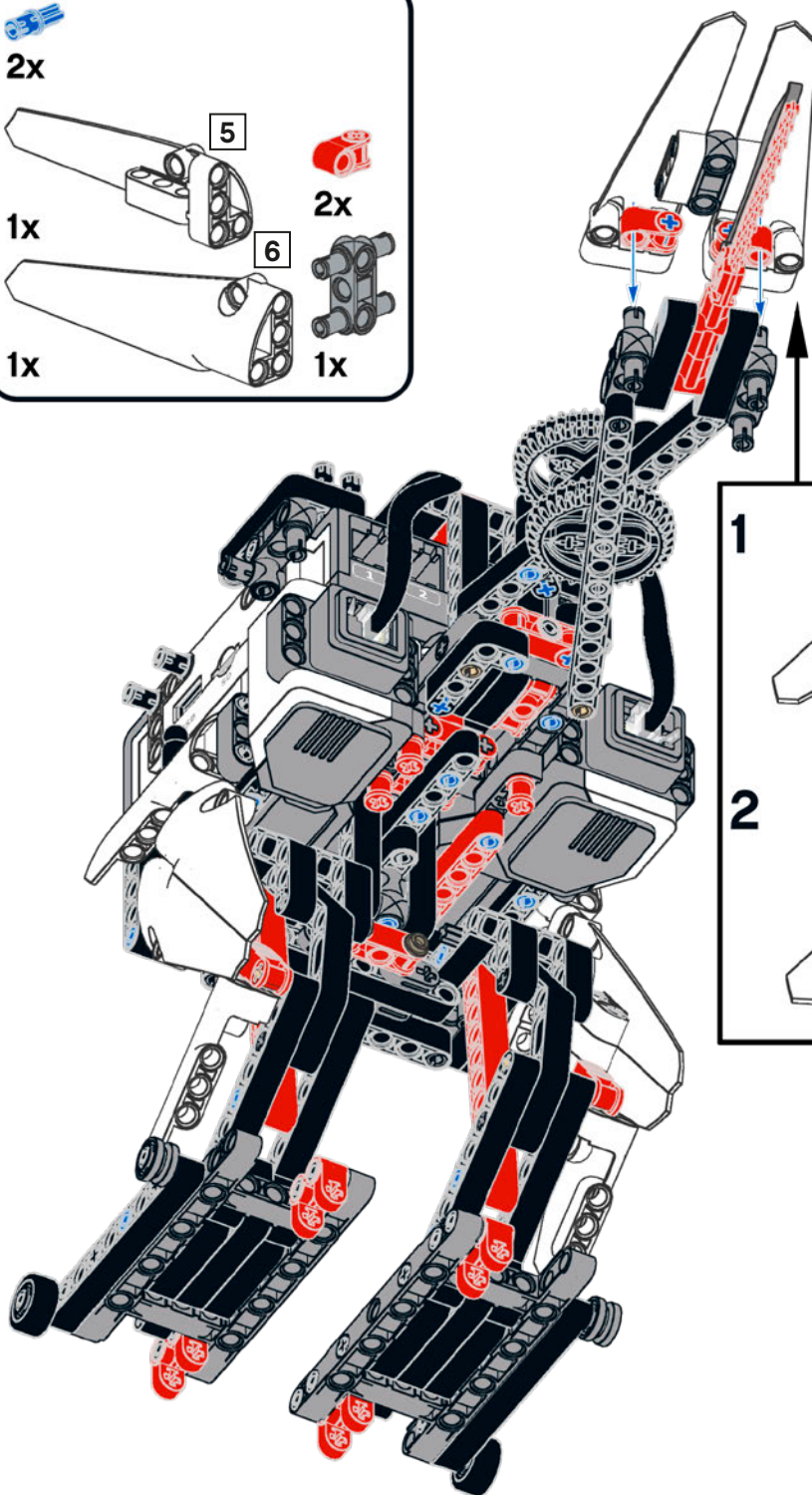
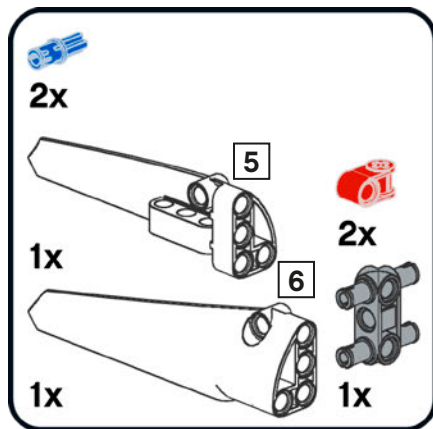
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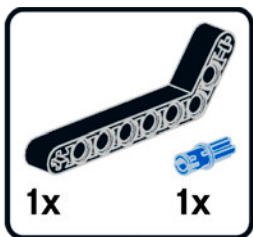
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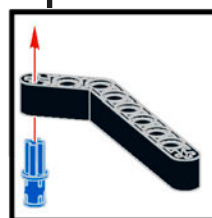
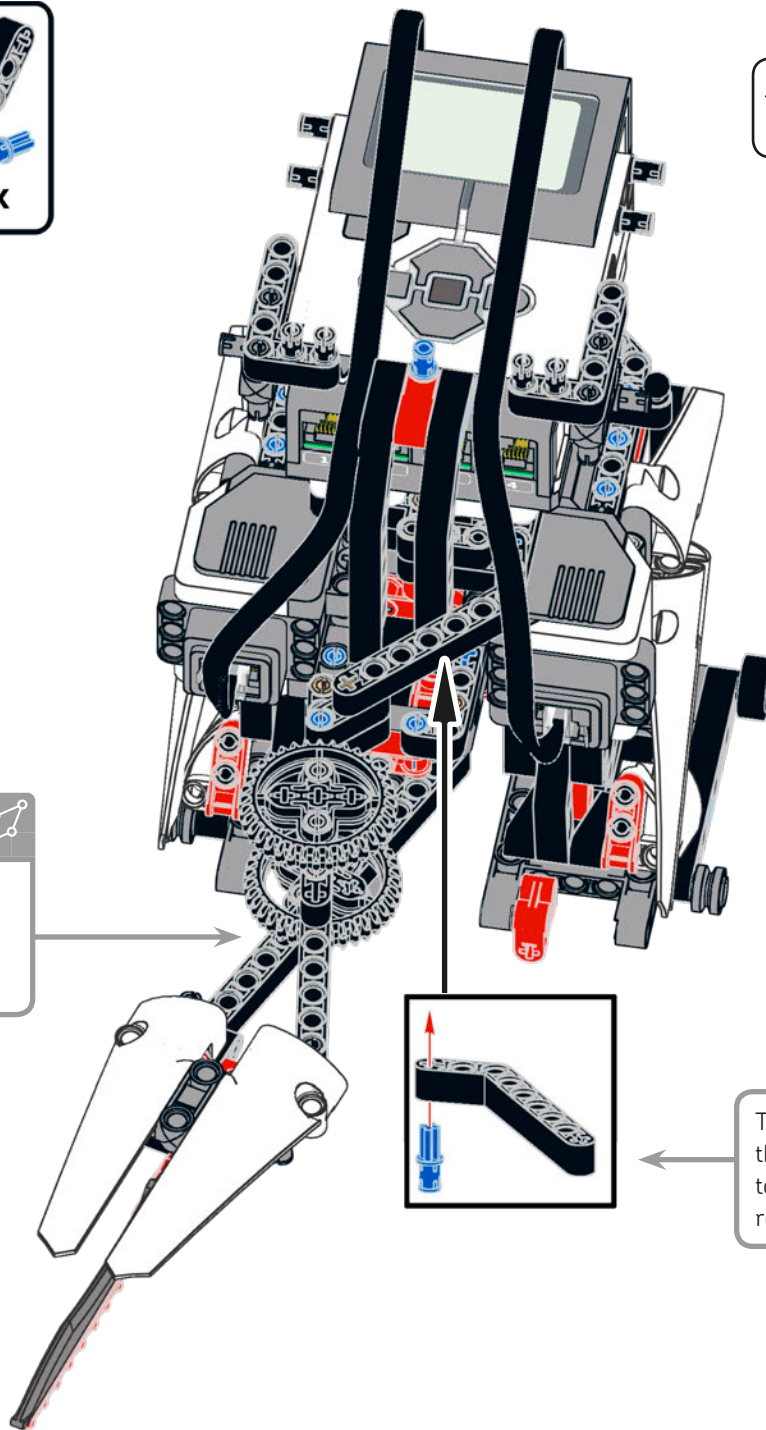
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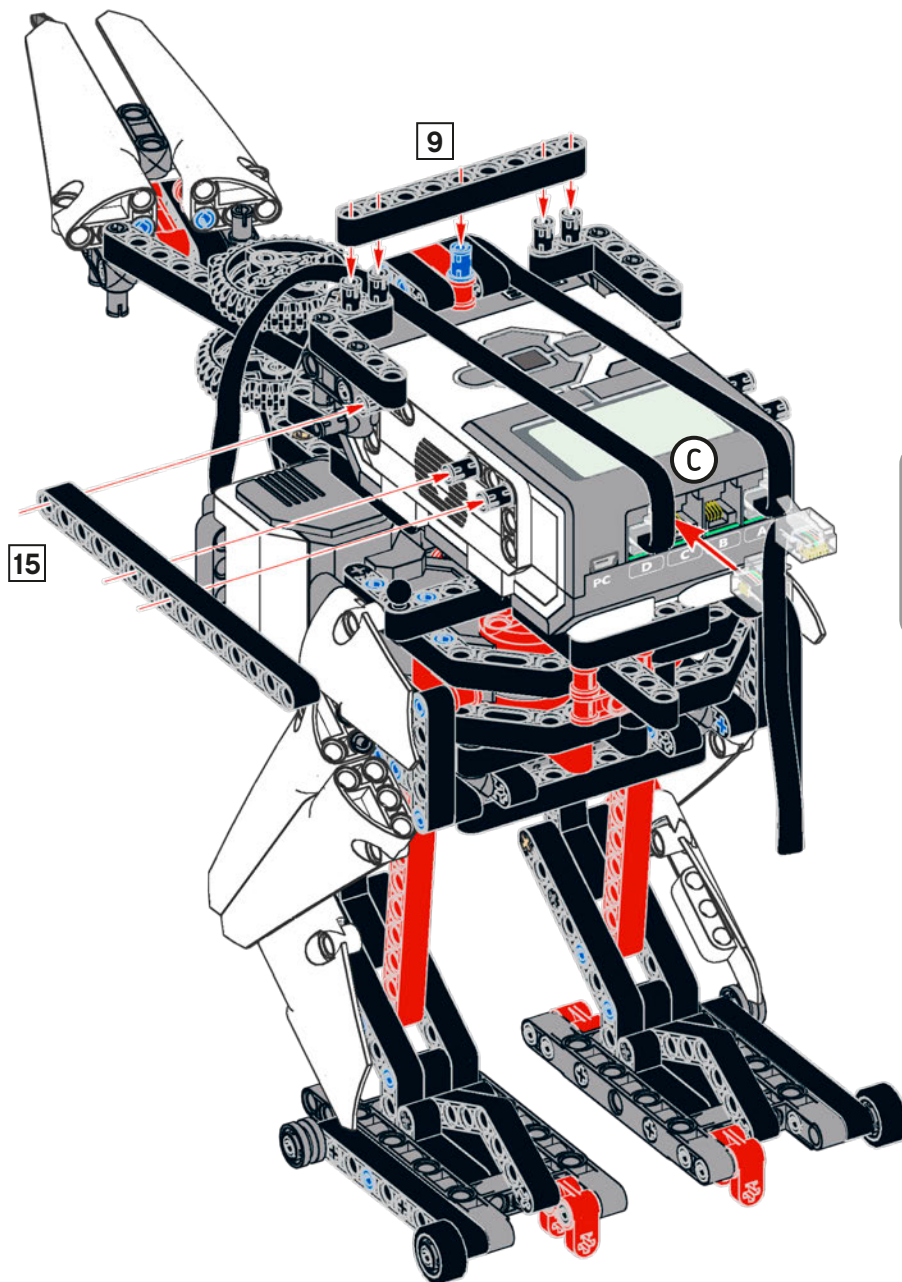
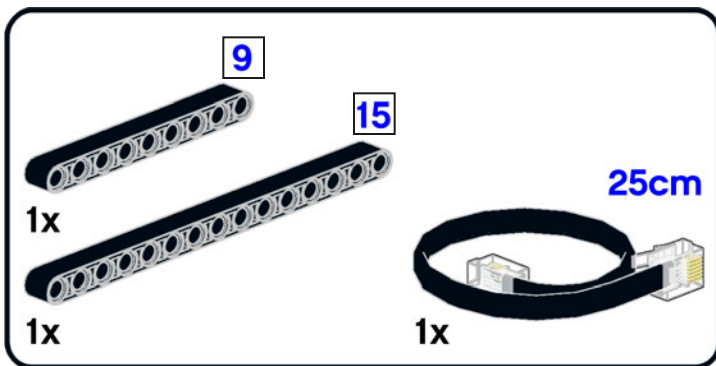


The crossing 15M beams that form the tail allow the tip of the tail to curl.



The angular beam links the wagging of the tail to the shifting of the robot's weight.

29



You will attach the other end of the cable to the Medium Motor later.

1:1



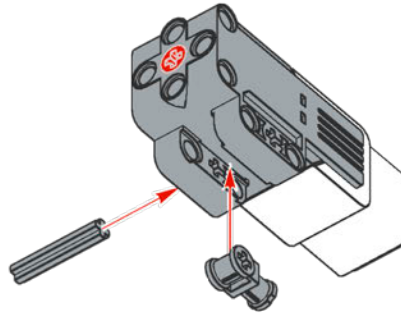
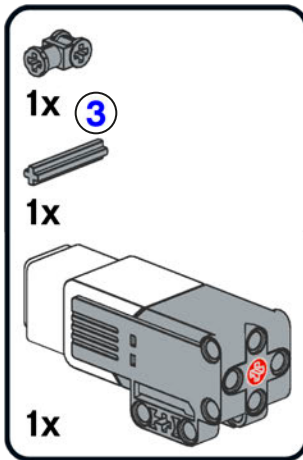
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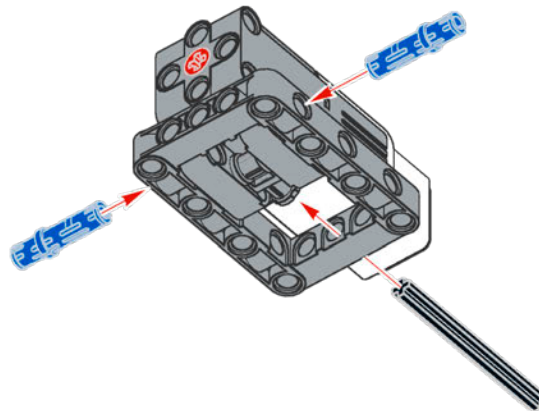
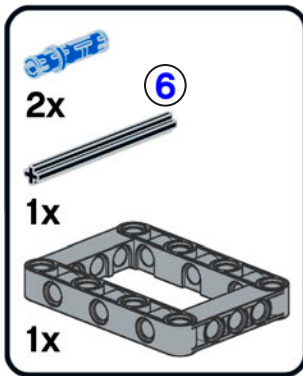
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head and torso assembly

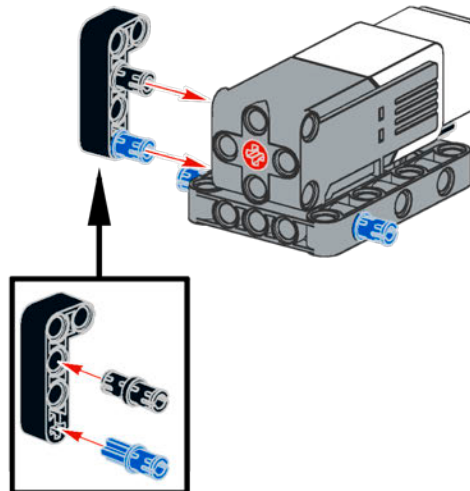
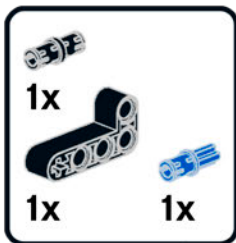
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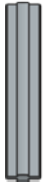
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3



1:1

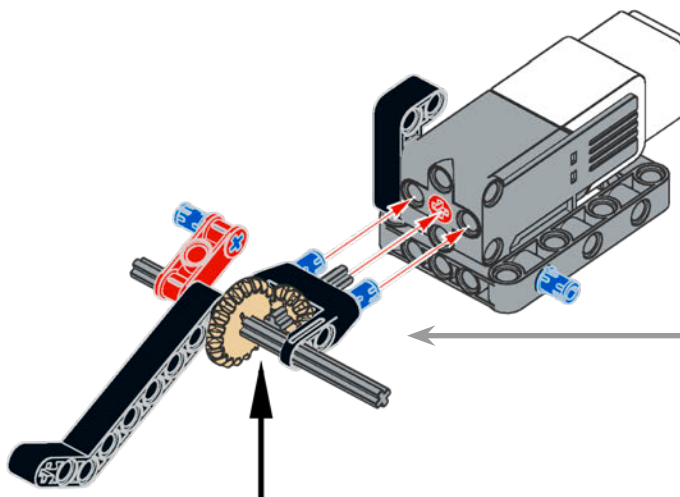


③

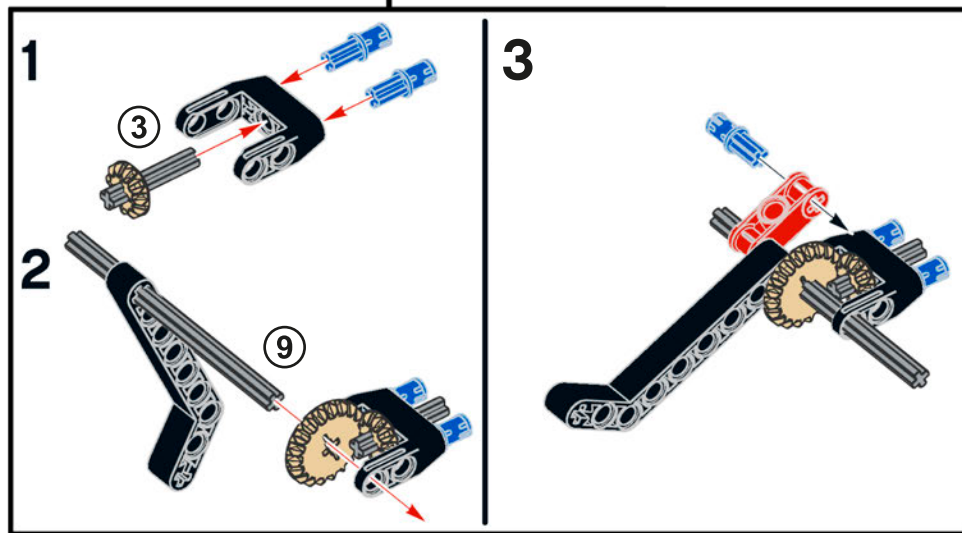


⑥

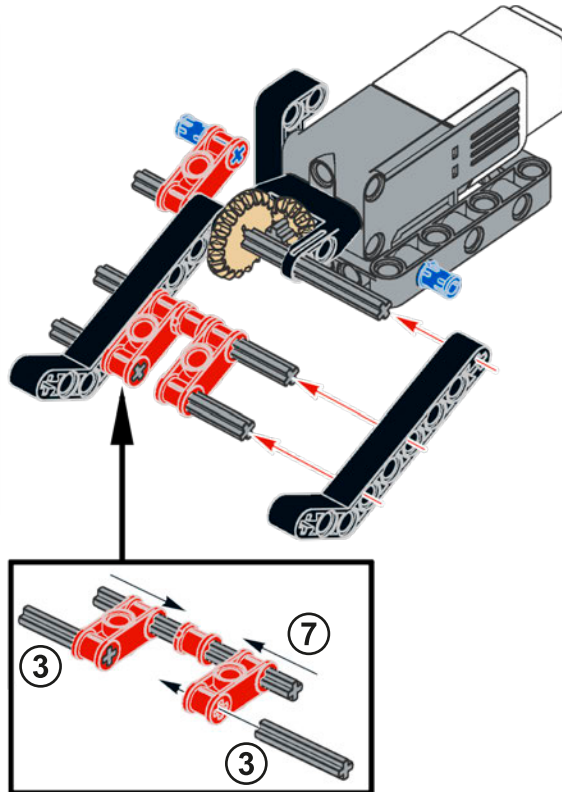
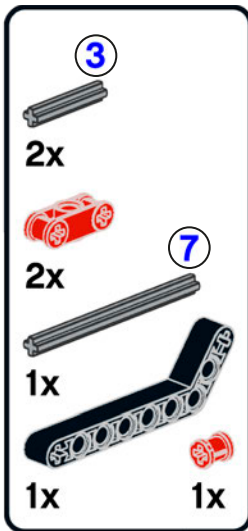
 1x
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 1x



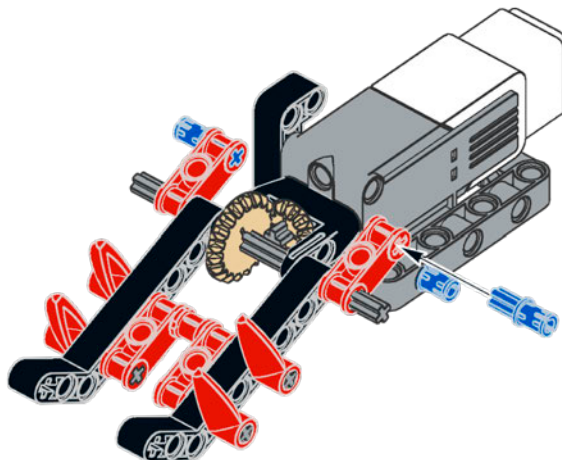
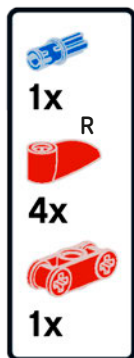
The black gearbox holds the 12z and 20z bevel gears that power the jaws. Since the smaller gear is driving the larger one, the torque of the Medium Motor is increased.



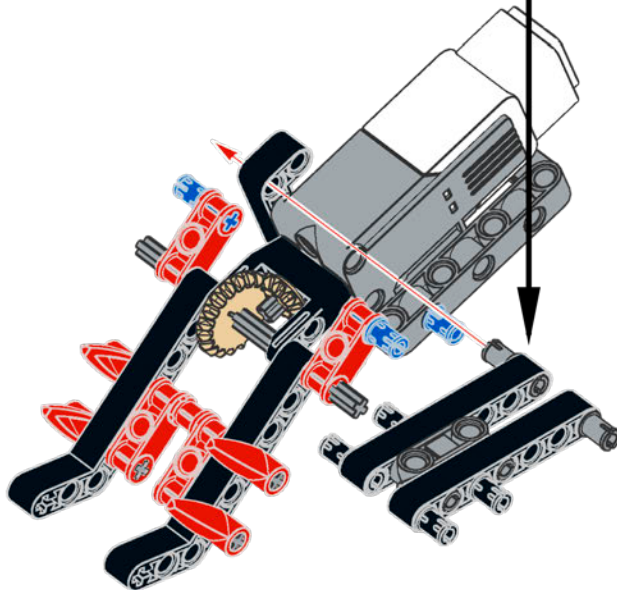
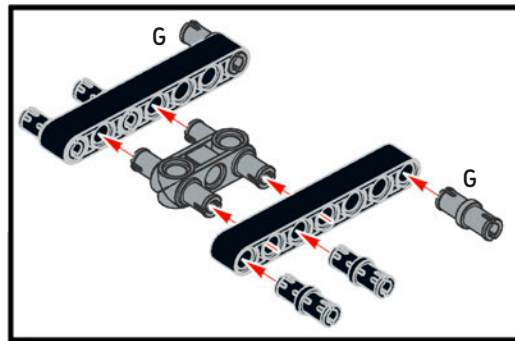
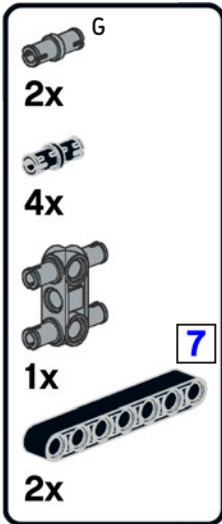
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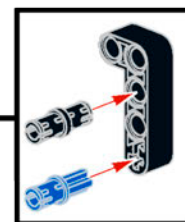
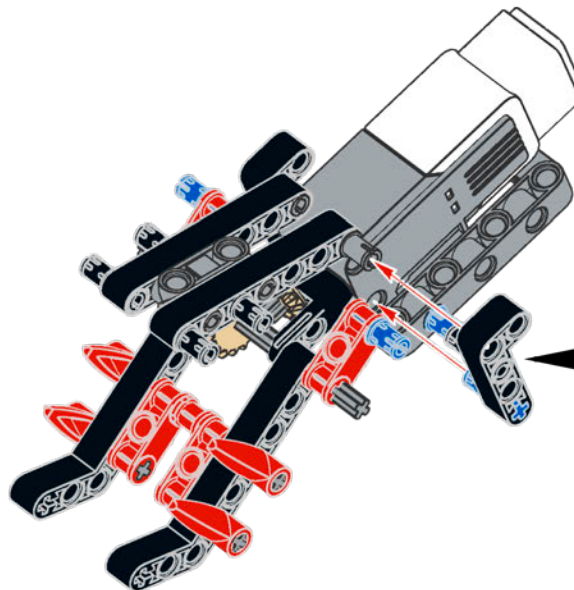
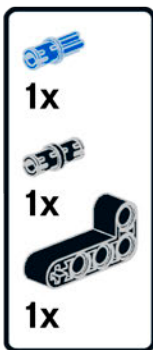


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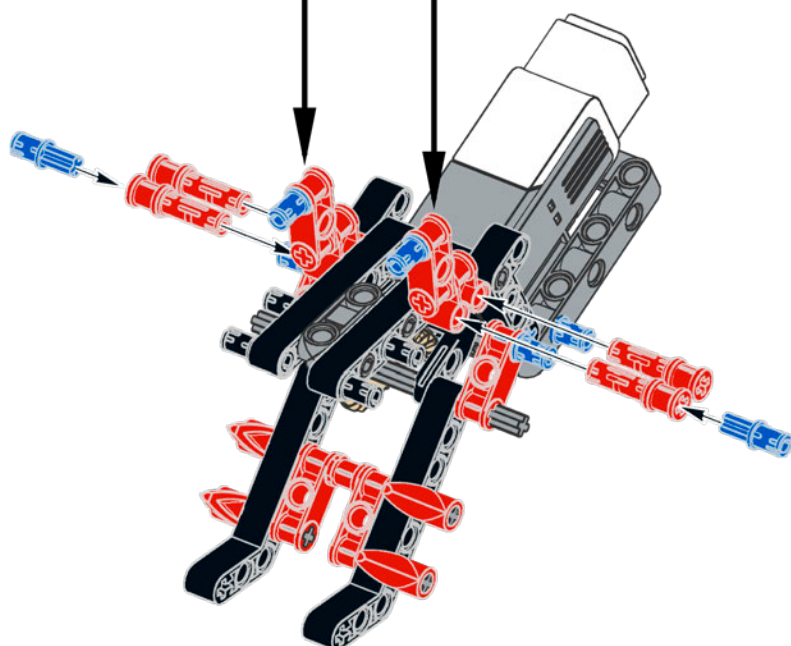
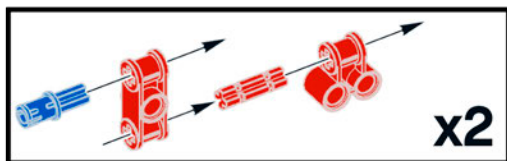
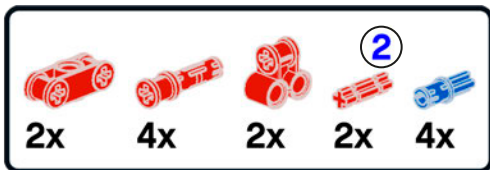


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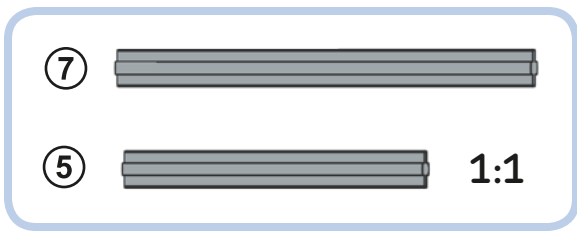
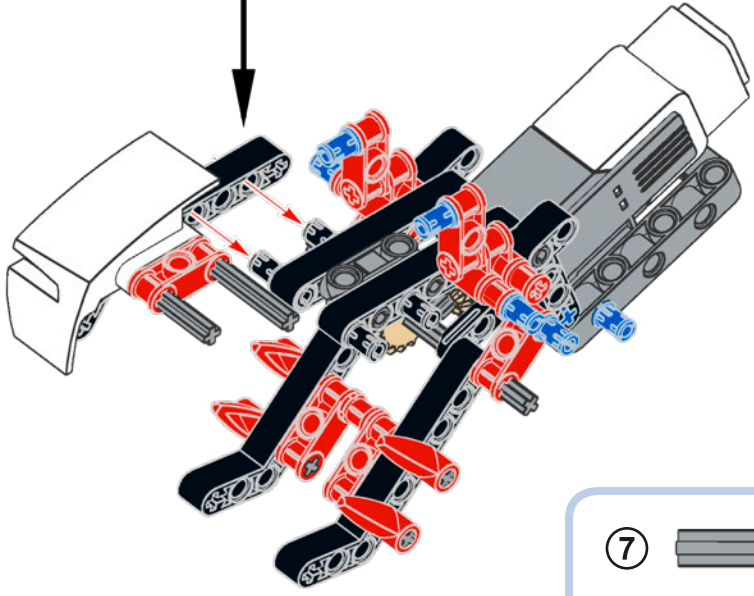
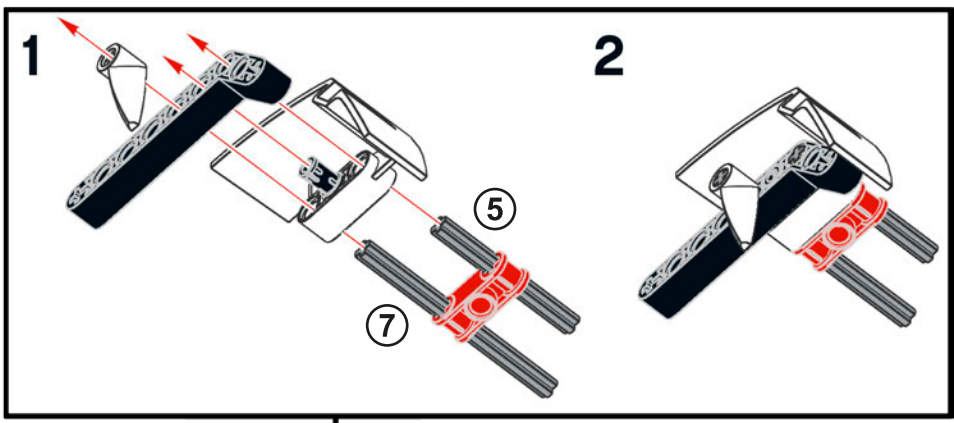
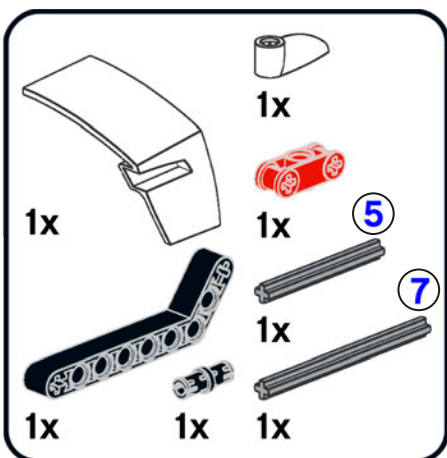
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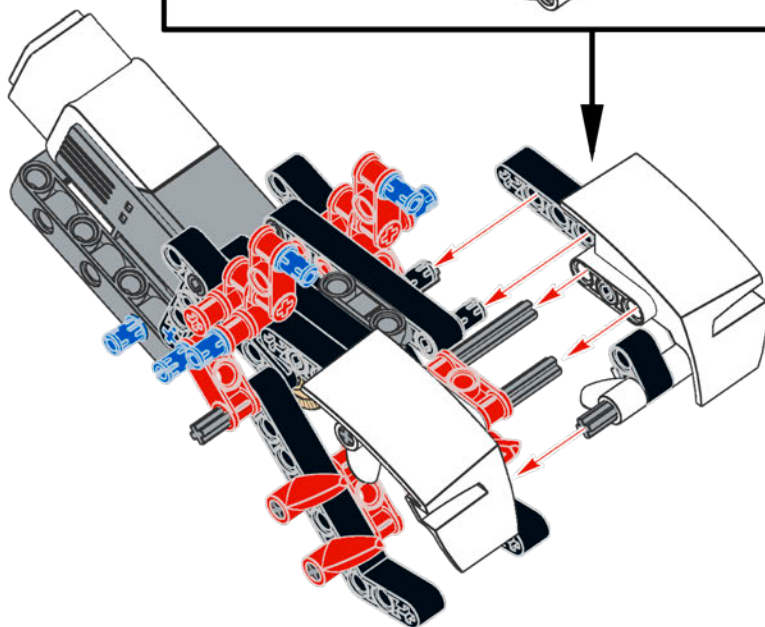
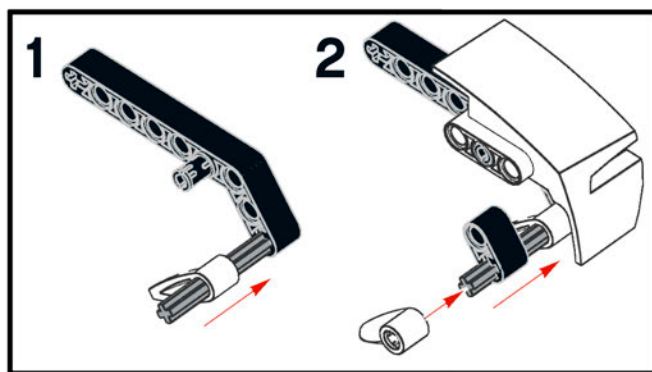


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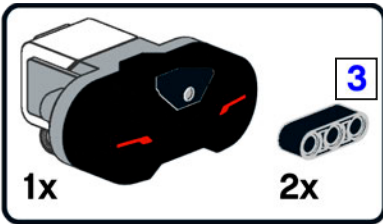


5

- 2x [Small black curved piece]
- 1x [Long black Technic beam with 6 holes]
- 1x [Black axle connector]
- 1x [White L-shaped bracket]
- 1x [Black axle connector]
- 1x [Grey axle]



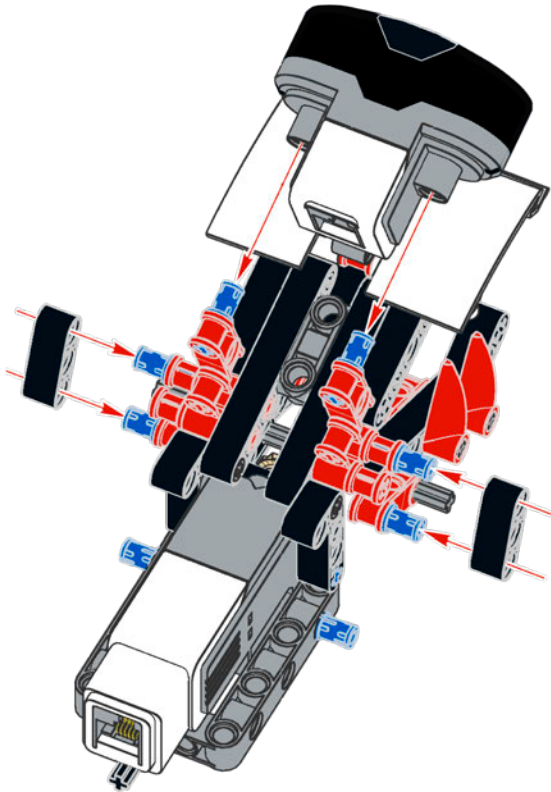
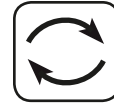
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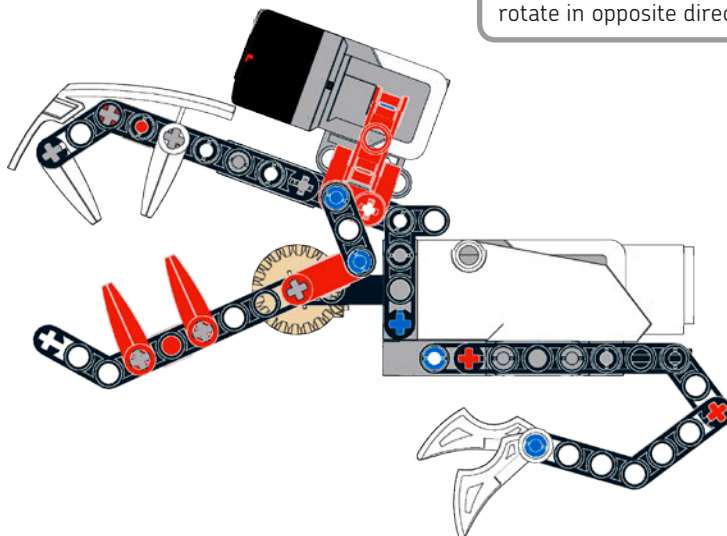
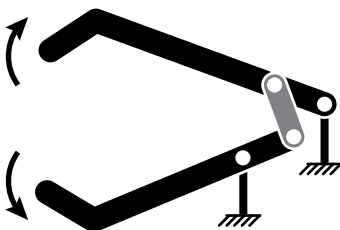
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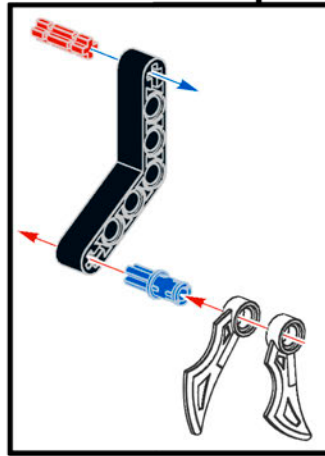
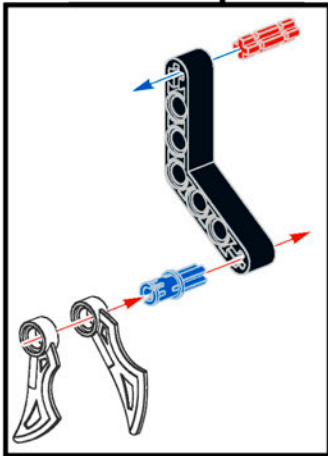
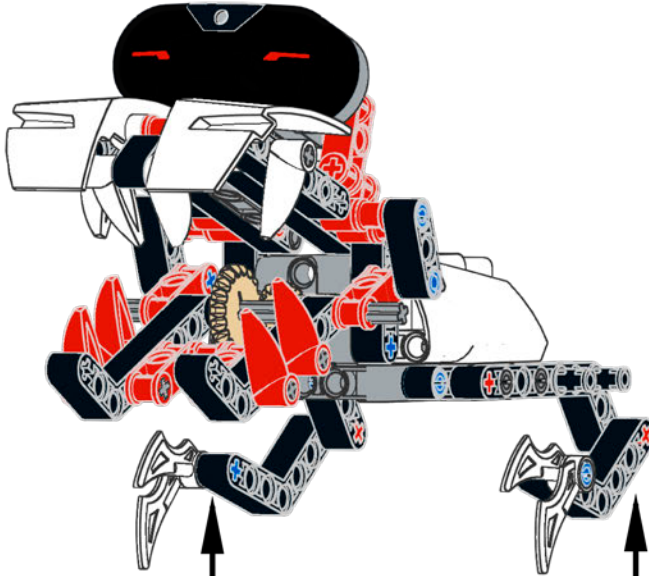
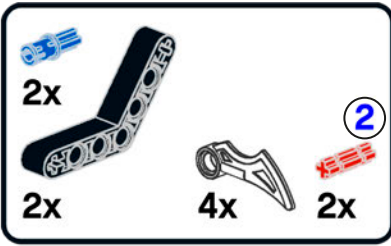
The bottom jaw is moved by the motor. The 3M beams that carry the movement to the upper jaw are connected to the opposite side of the pivot (compare its attachment points with those of the bottom jaw), so the jaws rotate in opposite directions.



1

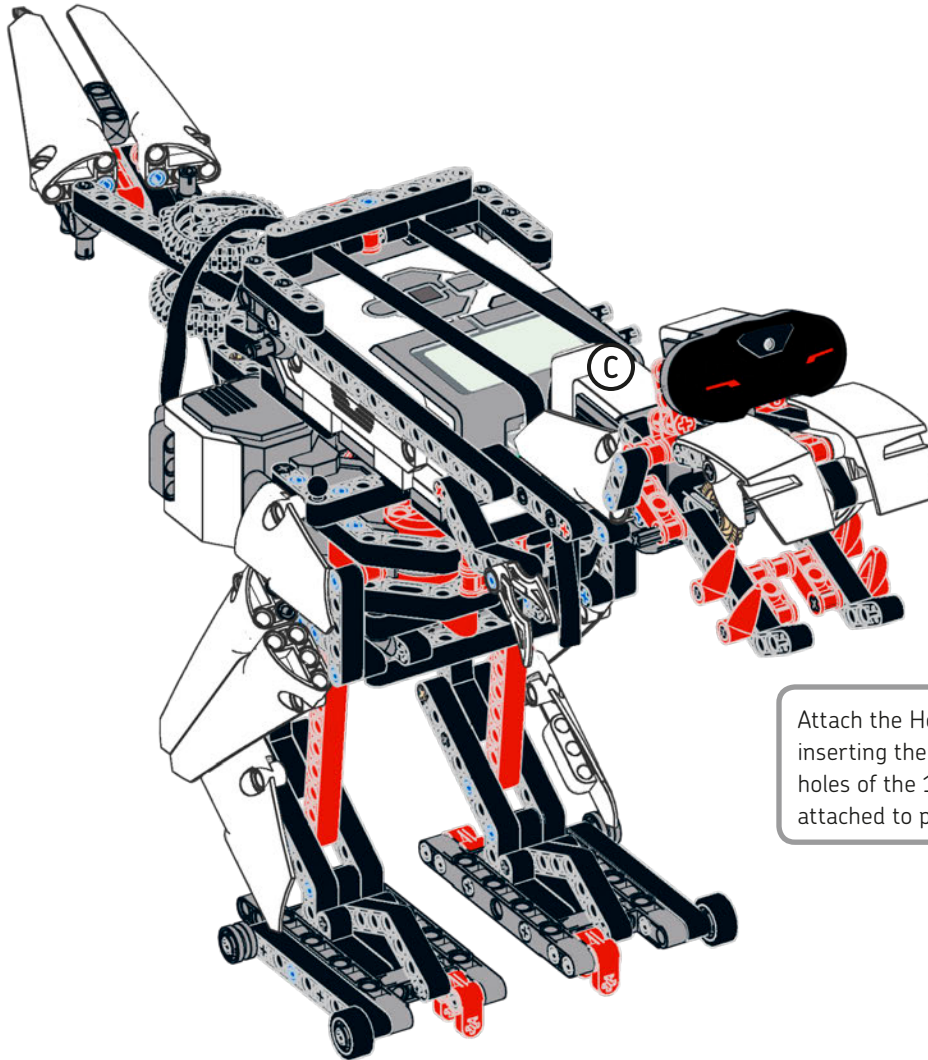


14



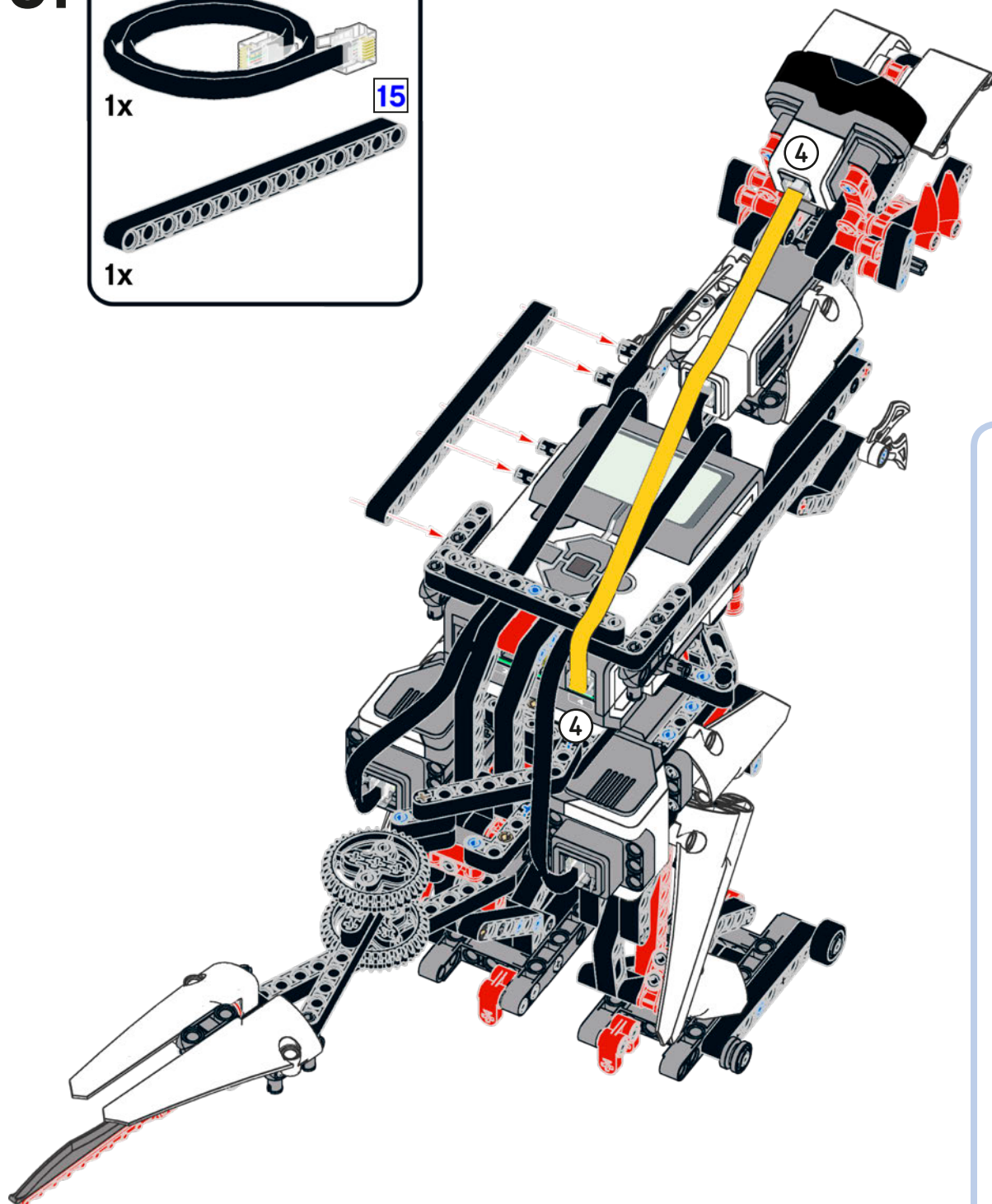
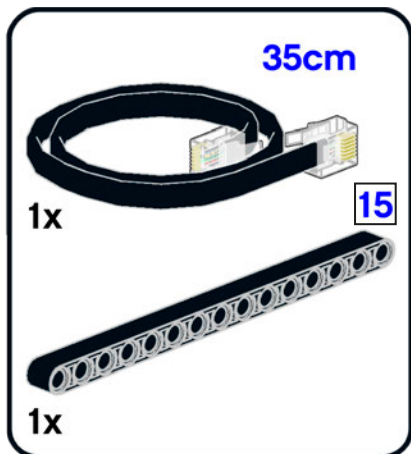
main assembly

30



Attach the Head and Torso Assembly, inserting the two black pins into the last holes of the 15M beam. Connect the cable attached to port C to the Medium Motor.

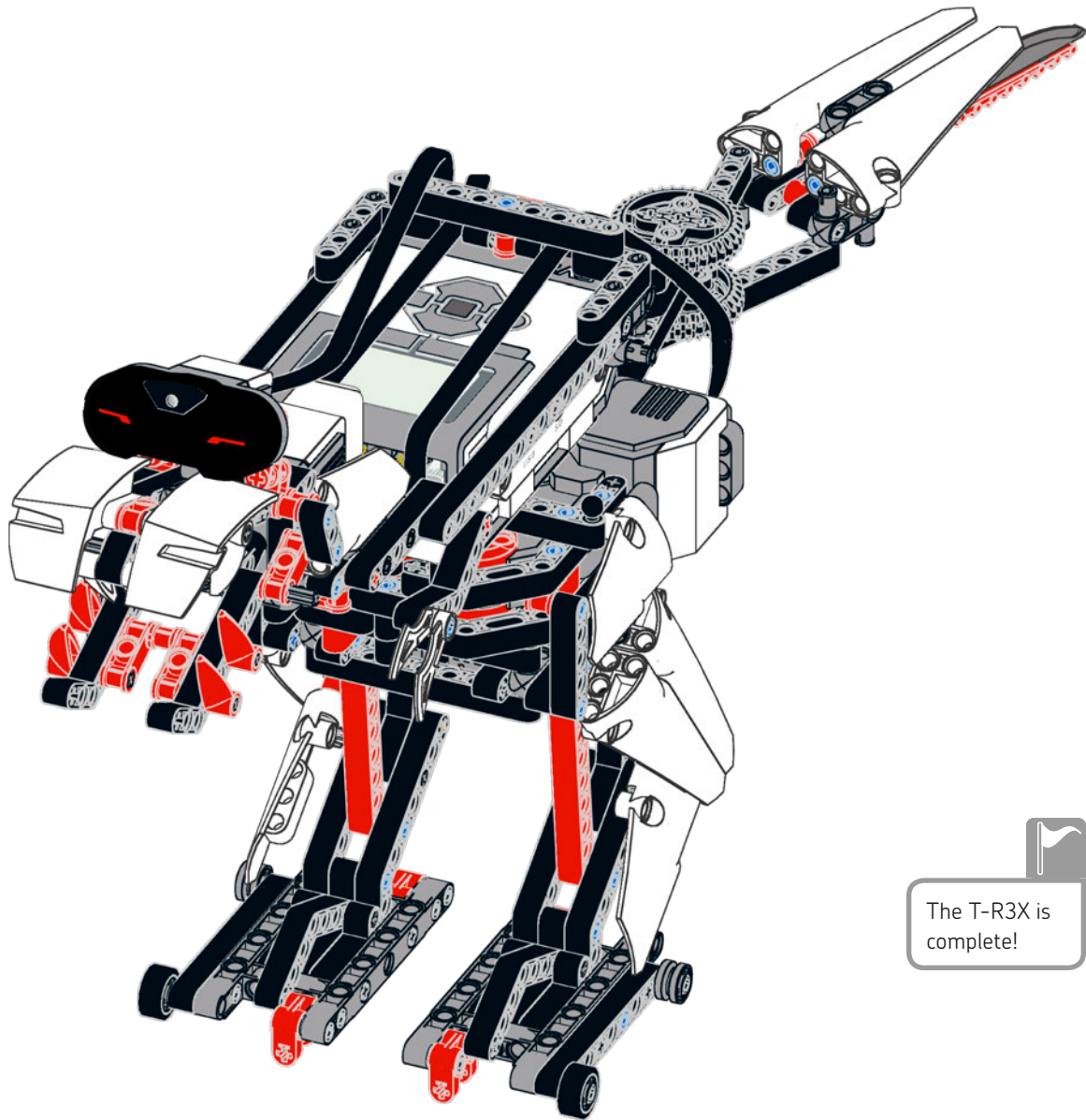
31



1:1



15



The T-R3X is complete!

conclusion

In this chapter, you built the fierce T-R3X and discovered some new building techniques in the process. In the next chapter, you'll program the T-R3X to roam around and explore its surroundings. You'll also learn how to give such a creature autonomous behavior, allowing it to perform different actions based on its "mood," sensor readings, and timers.