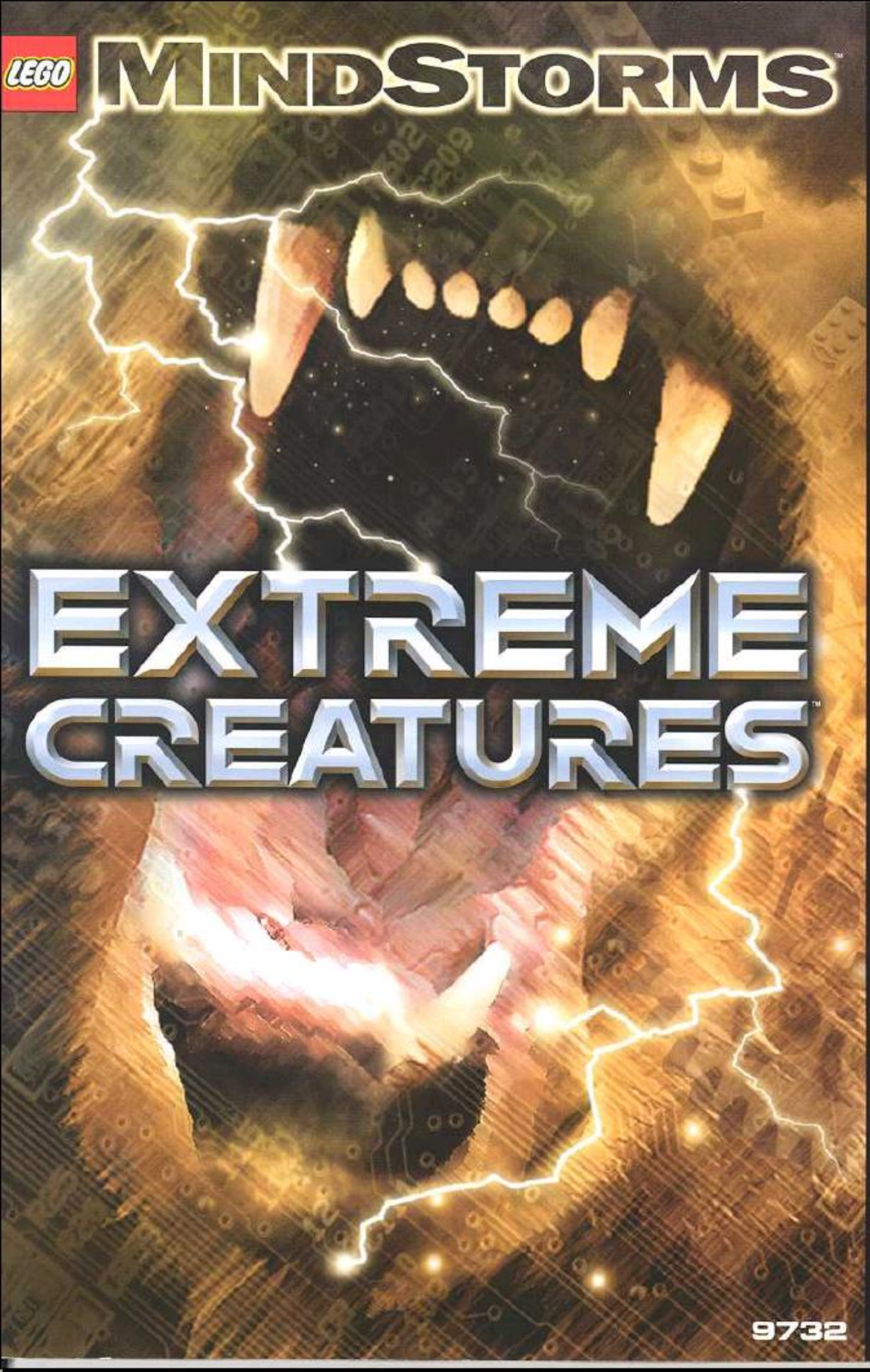
LEGO

MINDSTORMS



EXTREME CREATURES

CONSTRUCTOPEDIA

9732

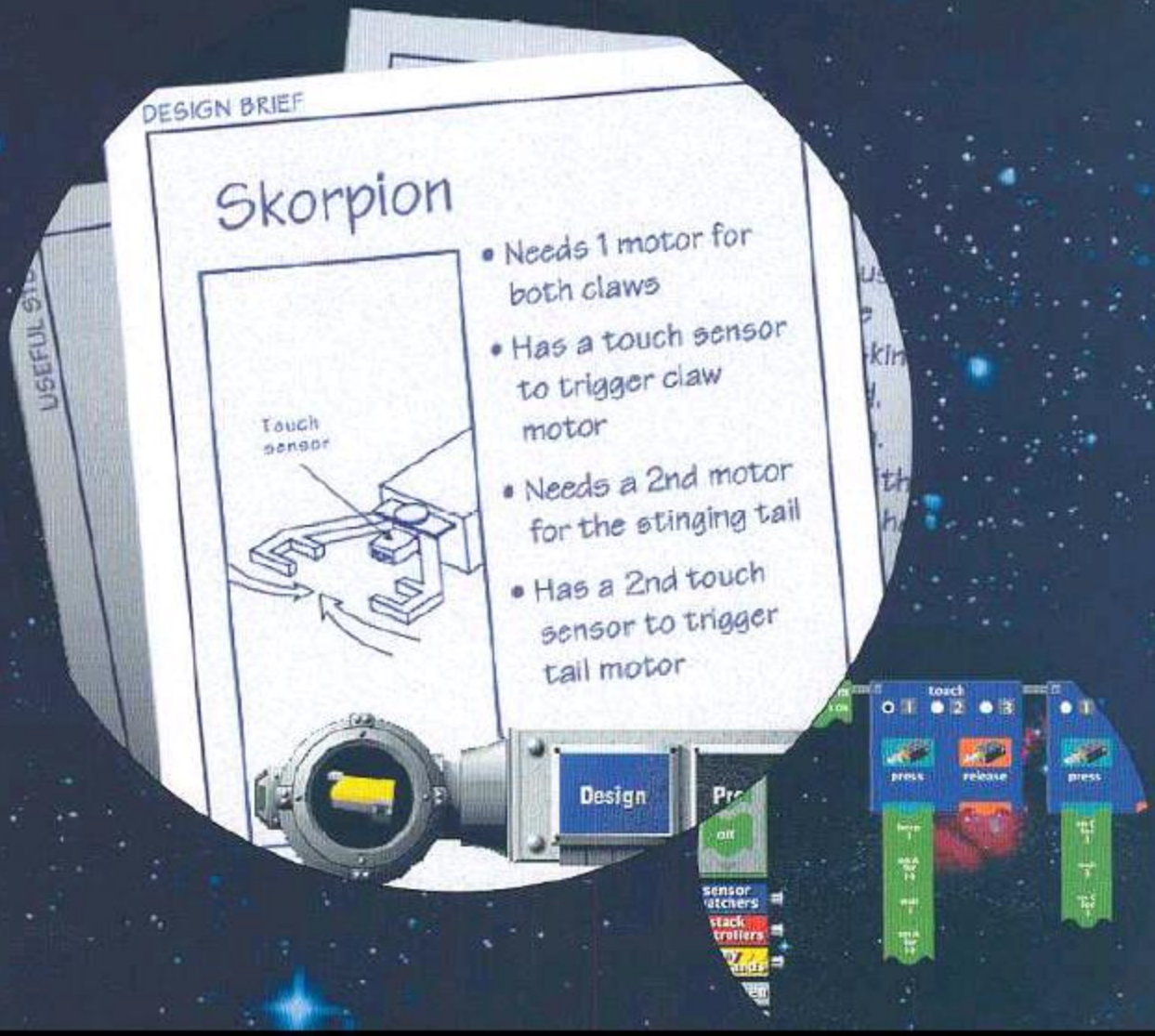
This Constructopedia™ is a building guide for Extreme Creatures™ that offers suggestions, hints, and tips to get you started on the Extreme Creatures™ CD-ROM Challenges and Creatures of your own design.

To master a Challenge, you must follow three basic steps:

1. Construct – To start, review the Design Brief. Then gather the pieces you need to meet the Challenge and start building.

2. Program – Once your robot is built, you can program it using the simple, but powerful, programming language included on the CD-ROM. Your program will determine how your creature reacts to its environment.

3. Test – Now it's time to test your program and design. Once you have downloaded your program from your PC to your RCX™ using the infrared transmitter, your robot can run independent of your computer. Now let it loose and watch what happens!



CONTENTS

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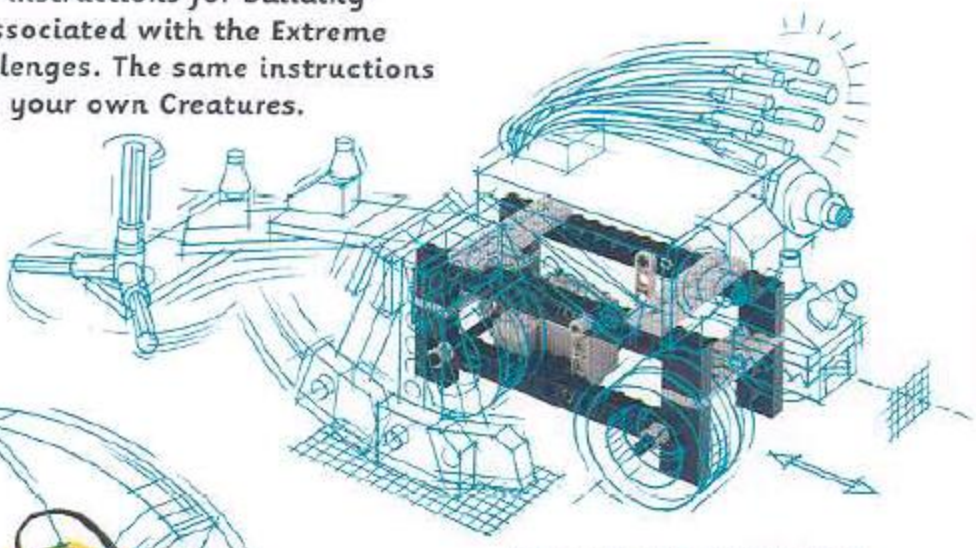
www.legomindstorms.com

Project Ideas

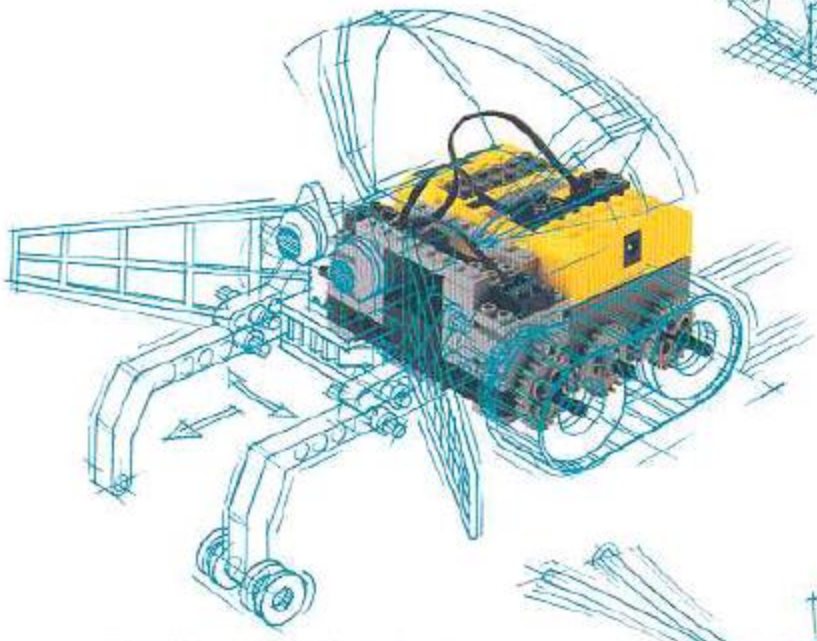
What follows are basic instructions for building the six subassemblies associated with the Extreme Creatures™ CD-ROM Challenges. The same instructions can be used for building your own Creatures.



CREATURE MOVER 1

- Slowly moves back and forth.
- Requires one motor.

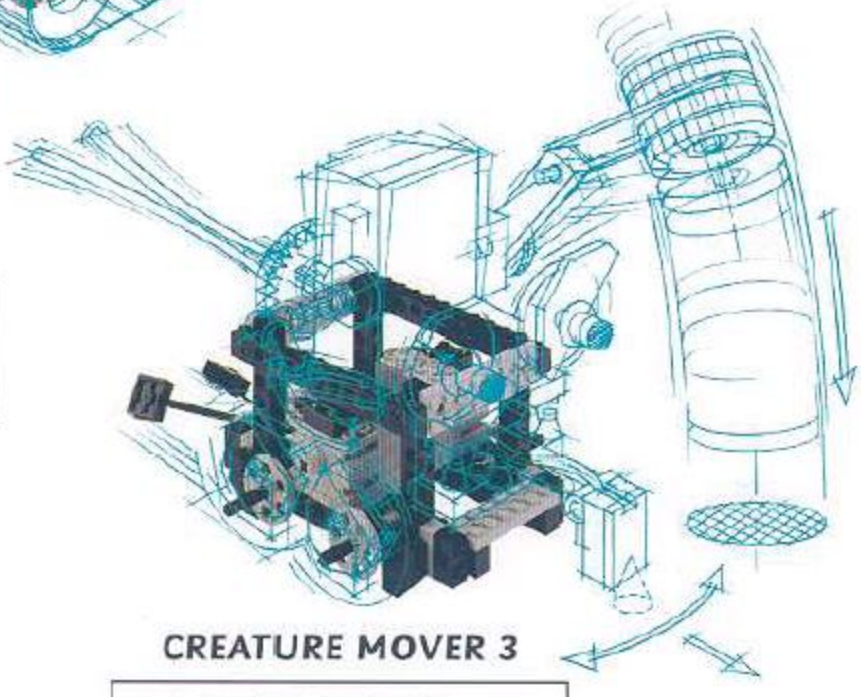
PAGE 6



CREATURE MOVER 2

- Uses gears to slowly turn left and right.
- Requires two motors.

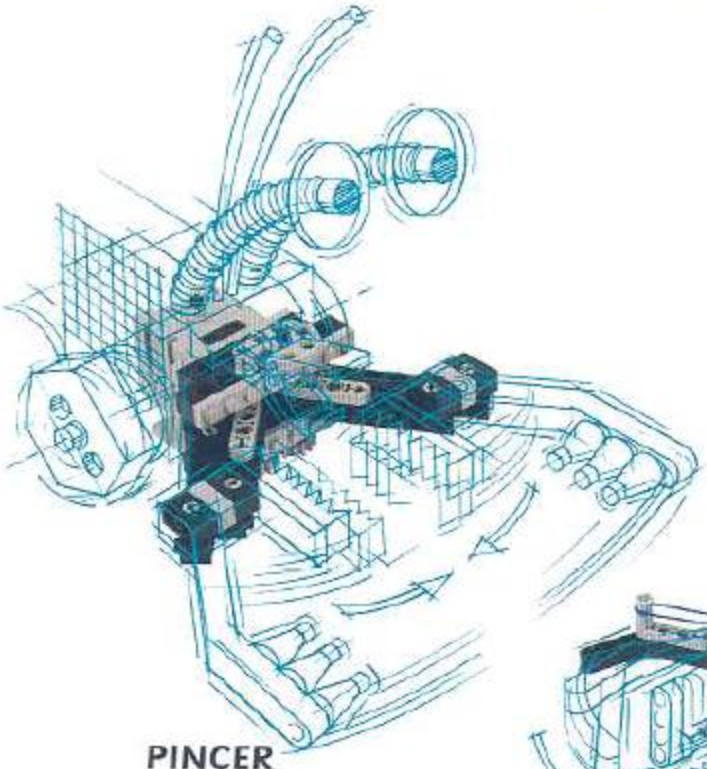
PAGE 9



CREATURE MOVER 3

- Uses pulleys to slowly turn left and right.
- Requires two motors.

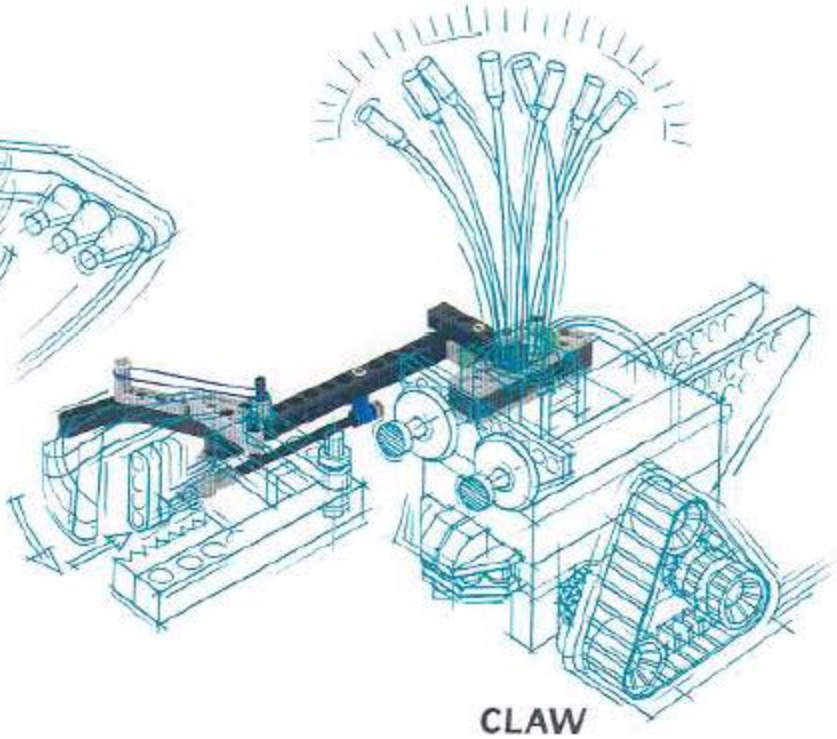
PAGE 12



PINCER

- Grabbing mechanism opens and closes.
- Requires one motor.

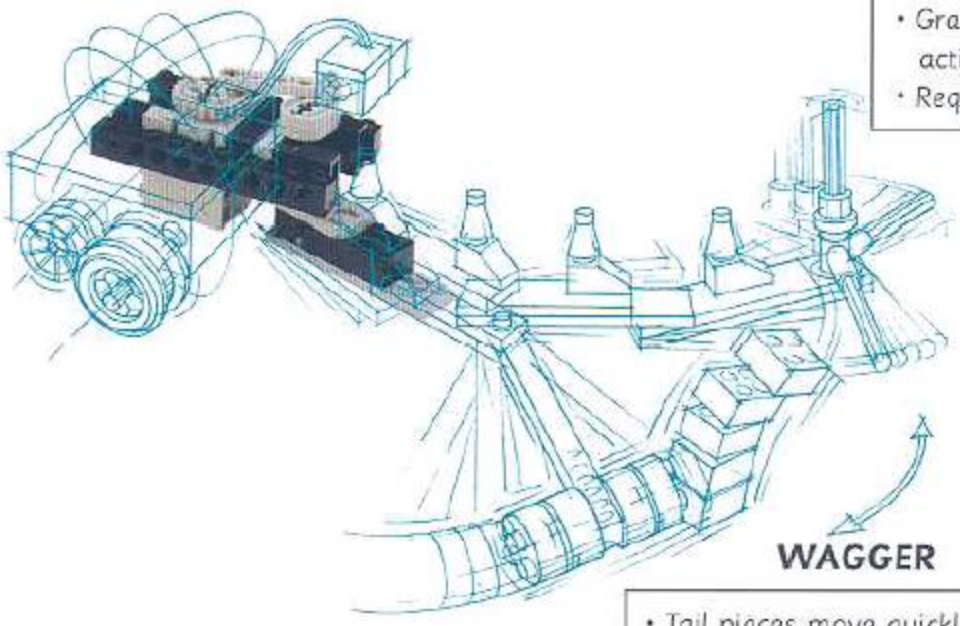
PAGE 16



CLAW

- Grabbing mechanism is activated by a trigger.
- Requires no motor.

PAGE 18



WAGGER

- Tail pieces move quickly from side to side.
- Requires one motor.

PAGE 21

Creature Mover 1

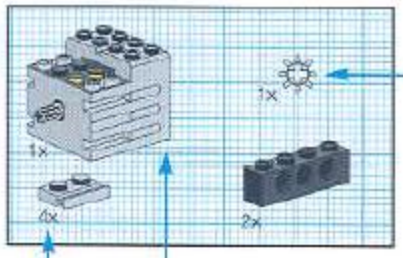
To get started on Creature Mover 1, follow these 5 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

1

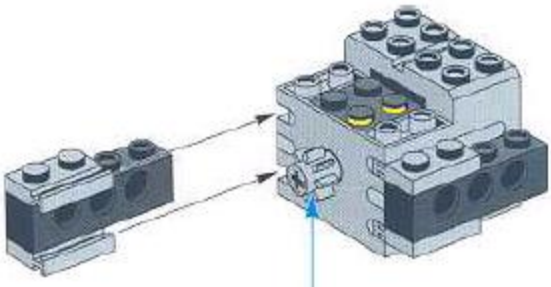
For this step, you need:



8-tooth gear

4x means you need 4 of these.

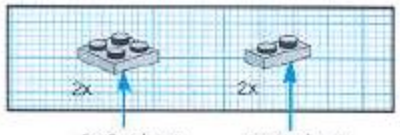
Motor



Put the 8-tooth gear onto the motor.

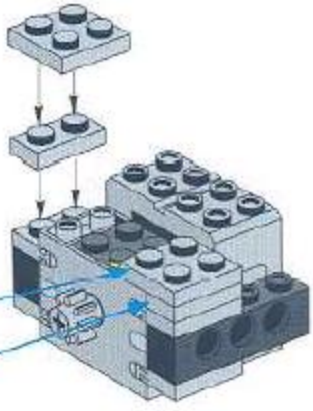
2

For this step, you need:



2x2 plate

1x2 plate

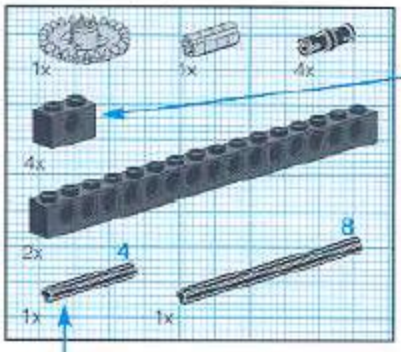


Put the 2x2 plate here.

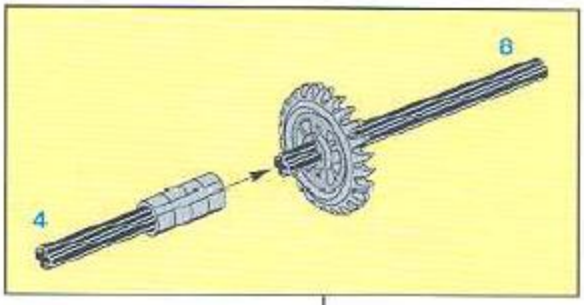
Put the 1x2 plate here.

3

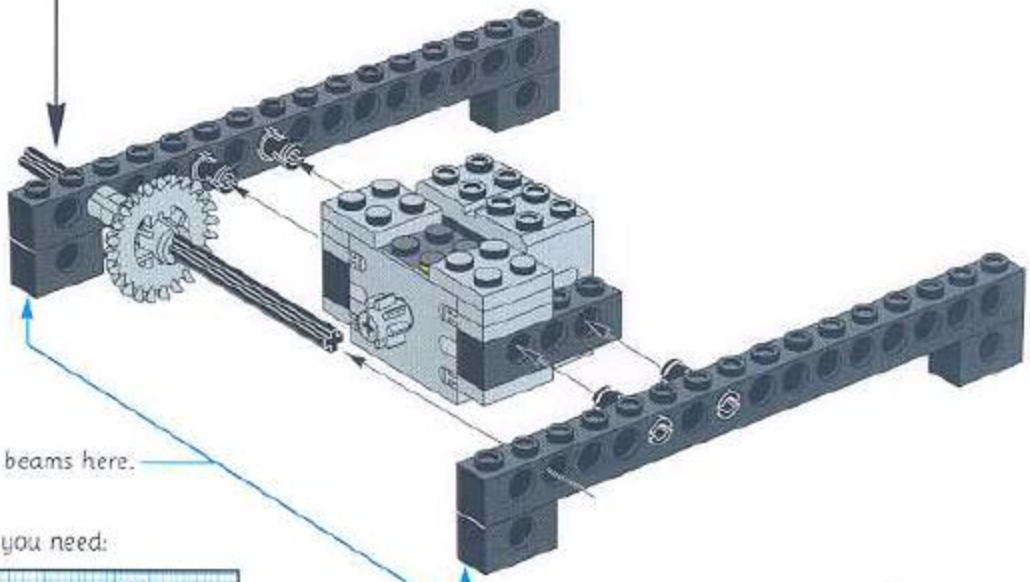
For this step, you need:



1 x 2 beam



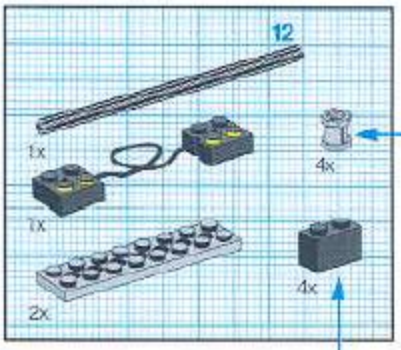
To measure an axle, see page 34.



Put the 1 x 2 beams here.

4

For this step, you need:

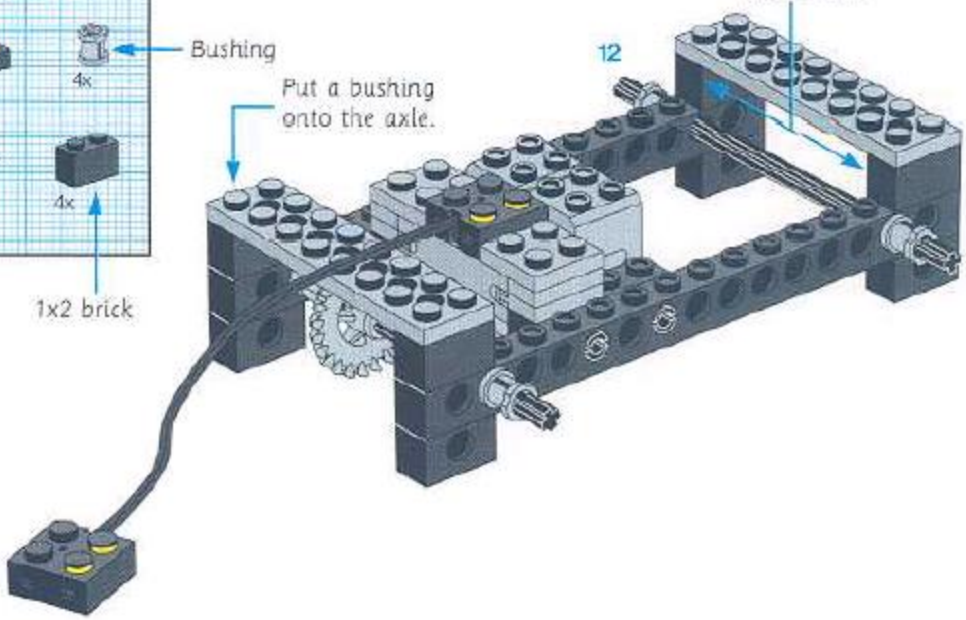


Bushing

1x2 brick

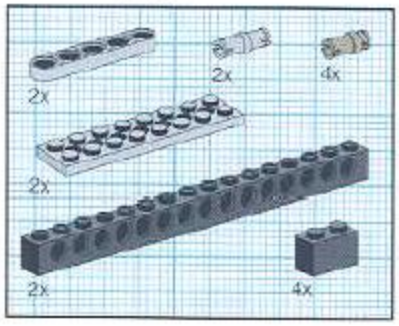
Put a bushing onto the axle.

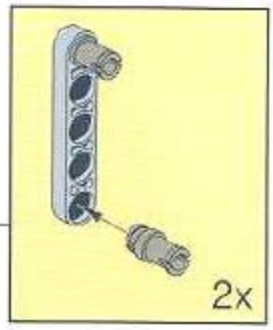
Put the 1x2 bricks here.

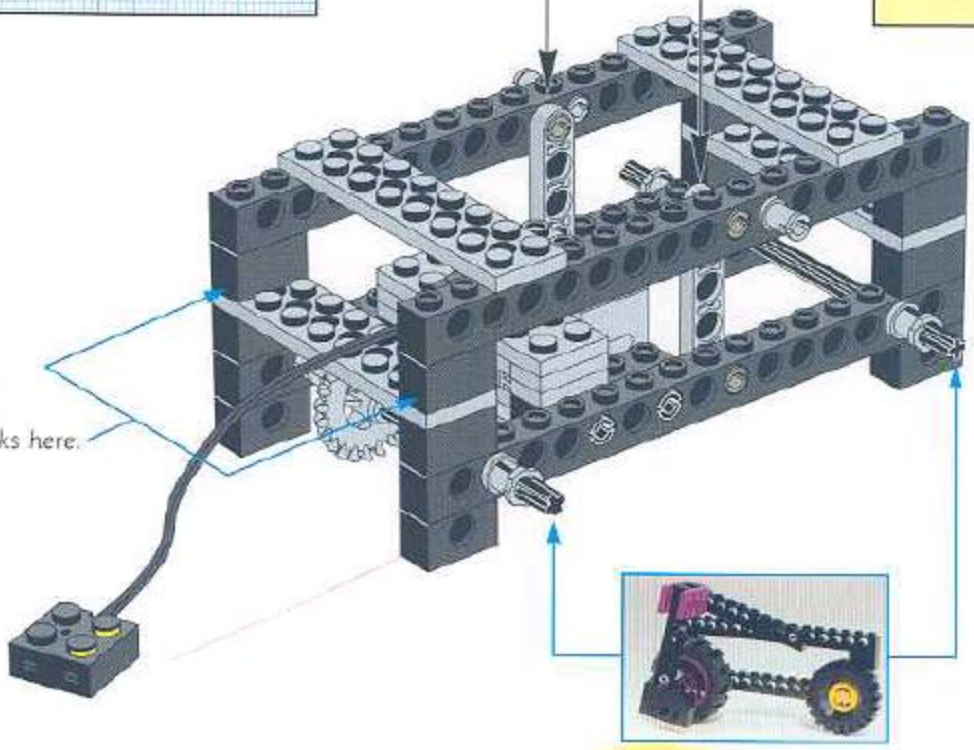


5

For this step, you need:







Do this first!
Put the 1 x 2 bricks here.

HINT: Try these wheels.

IF YOU NEED HELP COMPLETING YOUR ROBOT...

- Check out "Special Features" on page 24.
- Turn to "Tips and Tricks" on page 30.

TO PROGRAM YOUR CREATURE...

- Go to one of the following challenges on the CD-ROM: Trapdragon, Bomberfly, Hammerphist, Stegoclubber or Tyrannolifter.

Creature Mover 2

To get started on Creature Mover 2, follow these 6 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

1

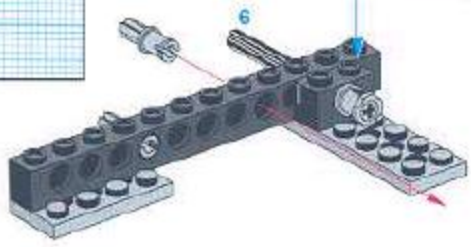
For this step, you need:

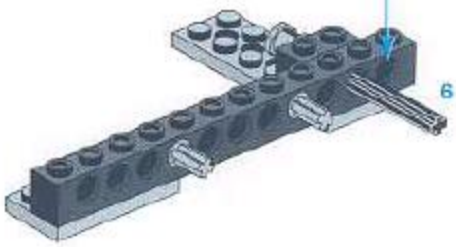
4x means you need 4 of these.

2x6 plate with holes

To measure an axle, see page 34.

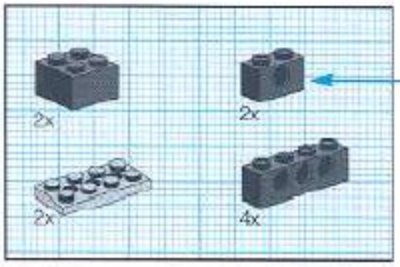
Do this first!
Put the beams onto the 2x6 plate with holes.



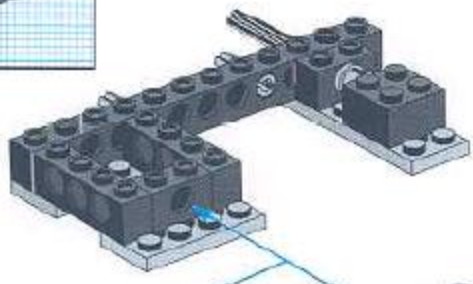


2

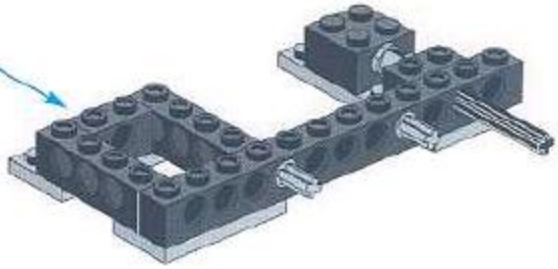
For this step, you need:



1x2 beam

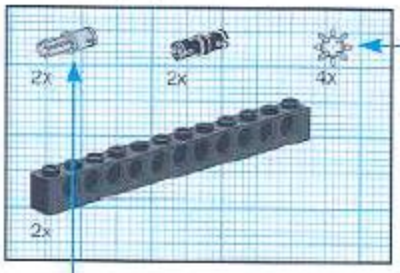


Put the 1x2 beams here.



3

For this step, you need:

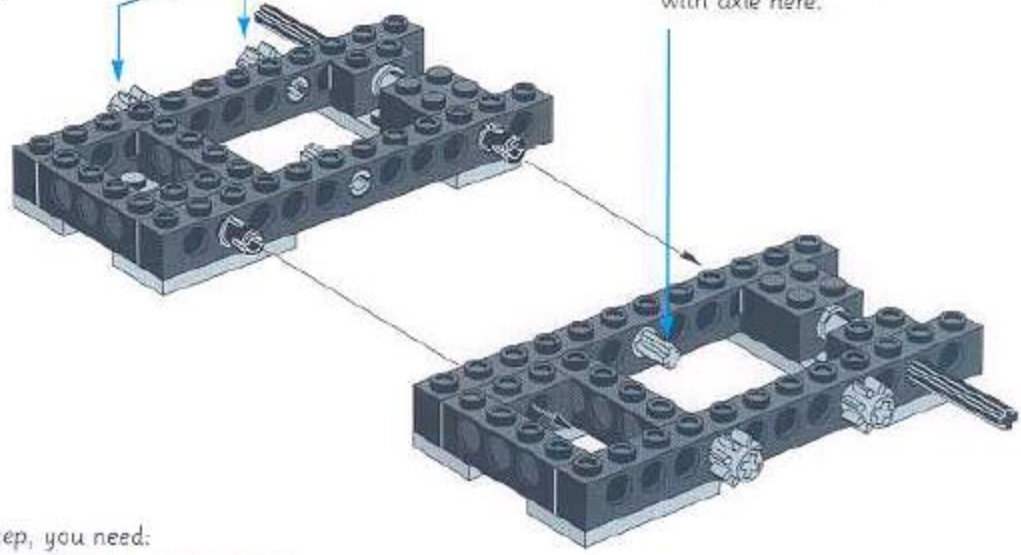


8-tooth gear

Connector peg with axle

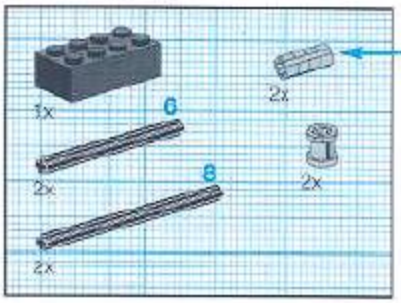
Put the 8-tooth gears here.

Put a connector peg with axle here.



4

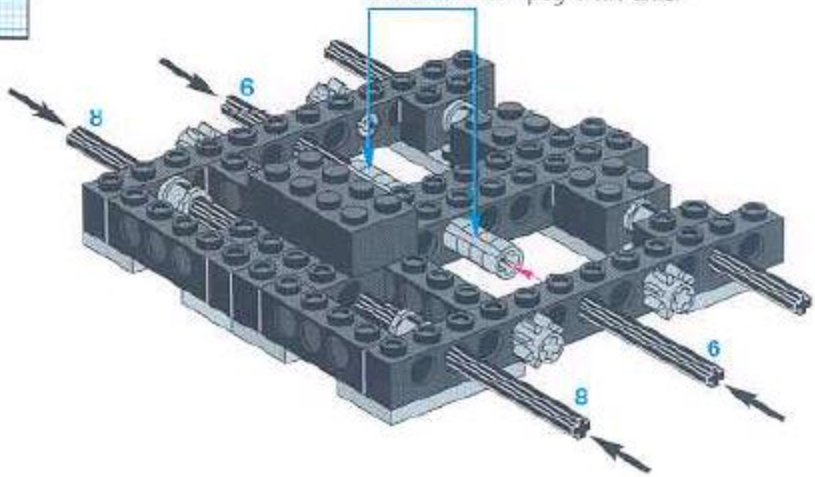
For this step, you need:



Axle extender

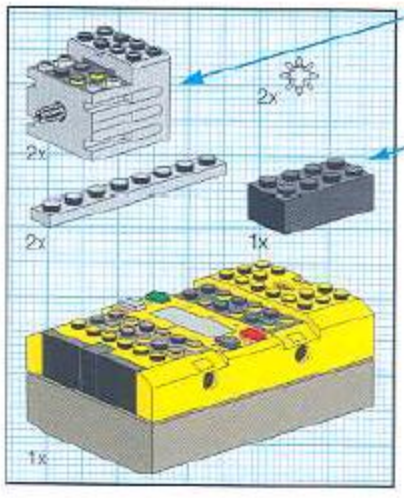
Do this first!

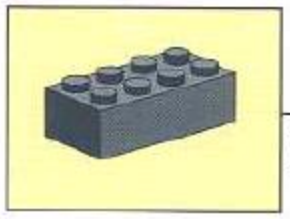
Put the axle extenders onto the connector peg with axle.



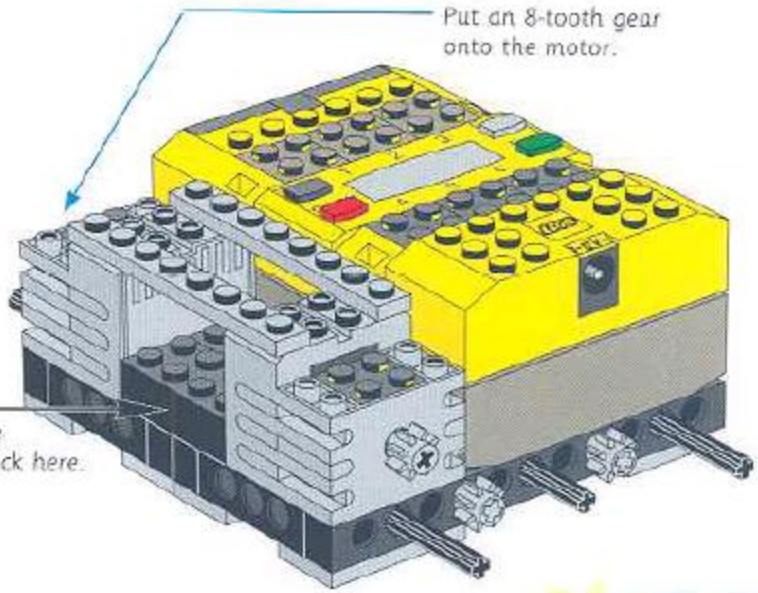
5

For this step, you need:



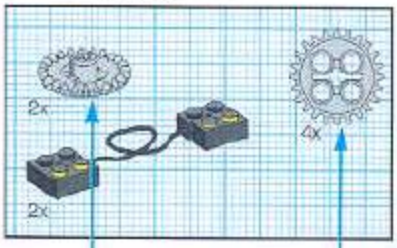


Put the 2x4 brick here.



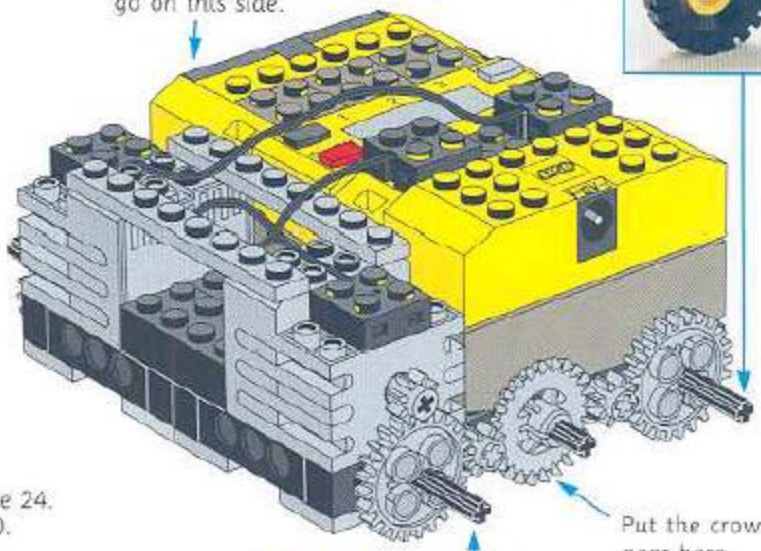
6

For this step, you need:



Crown gear

24-tooth gear



HINT: Try this wheel.

IF YOU NEED HELP COMPLETING YOUR ROBOT...

- Check out "Special Features" on page 24.
- Turn to "Tips and Tricks" on page 30.

TO PROGRAM YOUR CREATURE...

- Go to one of the following challenges on the CD-ROM: Touchmole, Glyptotank or Triceradozer.

HINT: Try this wheel.

Creature Mover 3

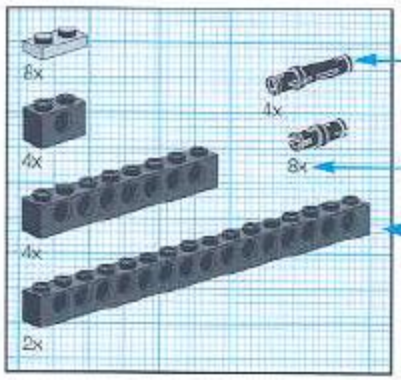
To get started on Creature Mover 3, follow these 6 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

1

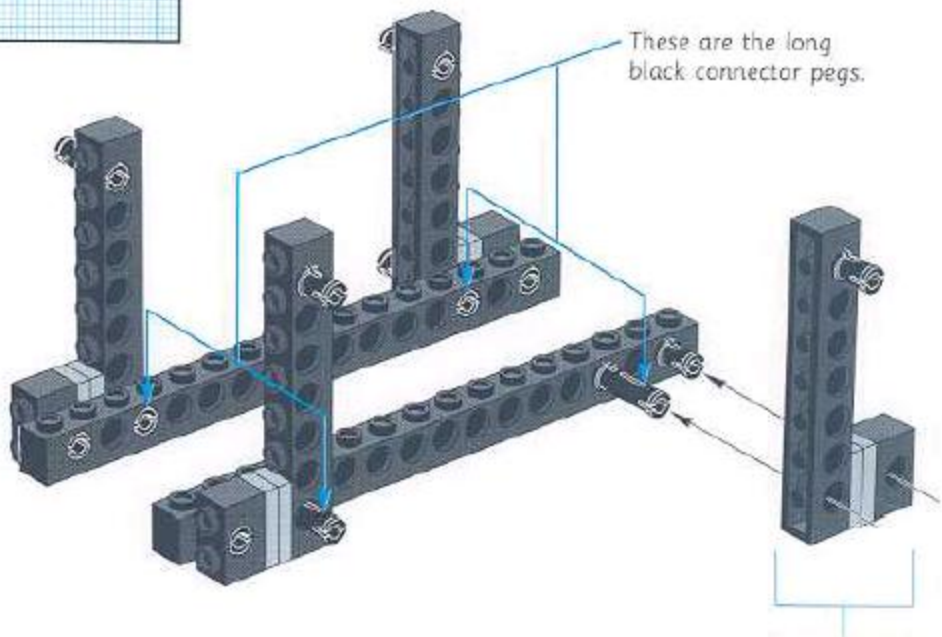
For this step, you need:



Long black connector peg

8x means you need 8 of these.

1 x 16 beam.

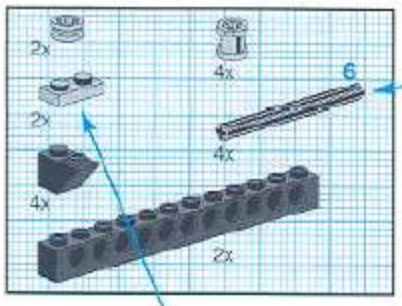


These are the long black connector pegs.

Do this first!
Build this, then attach it to the 1 x 16 beam.

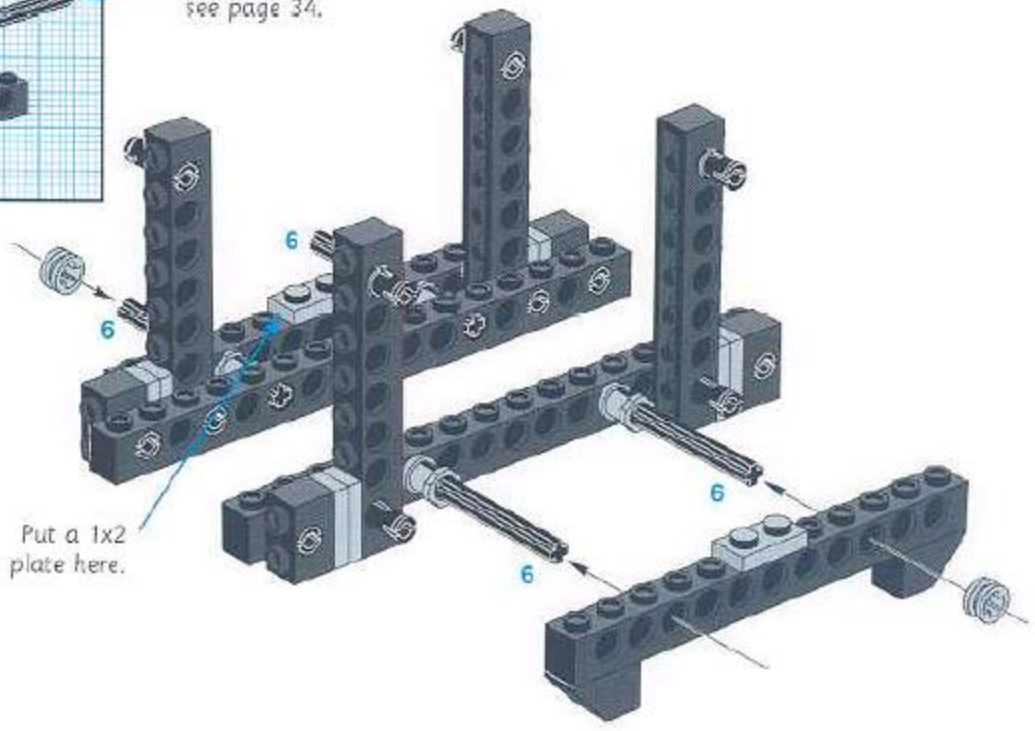
2

For this step, you need:



To measure an axle, see page 34.

1x2 plate

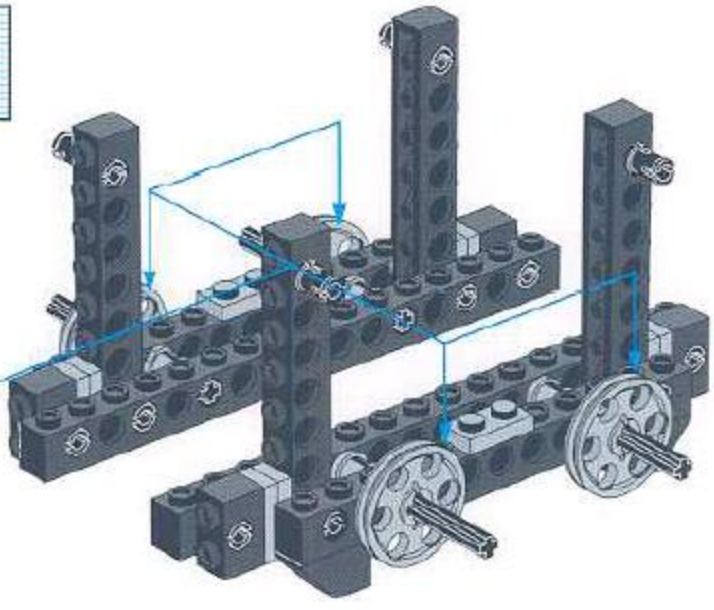


Put a 1x2 plate here.

3

For this step, you need:

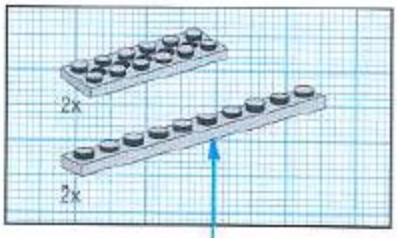
Large pulley



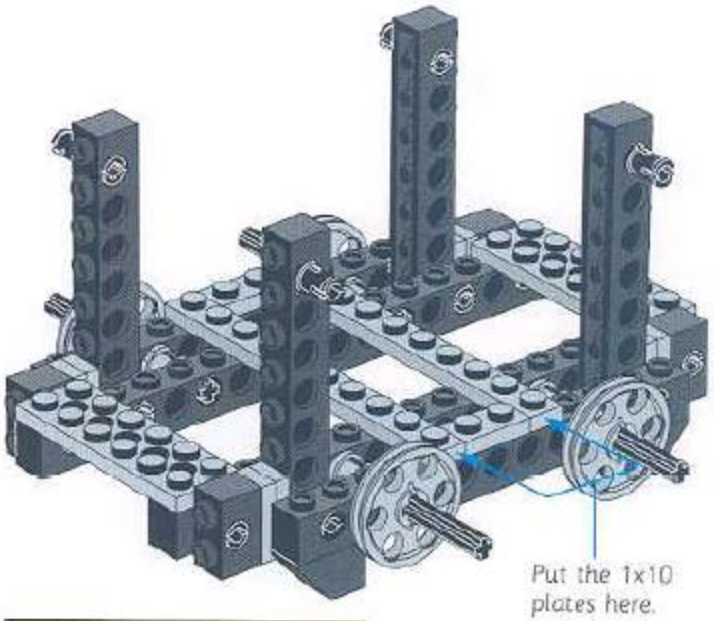
Put a large pulley onto each axle.

4

For this step, you need:



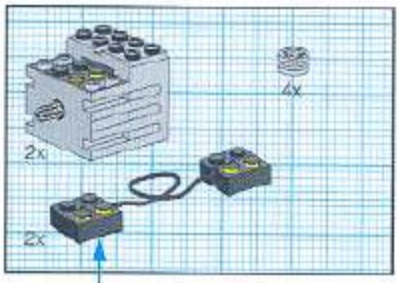
1x10 plate



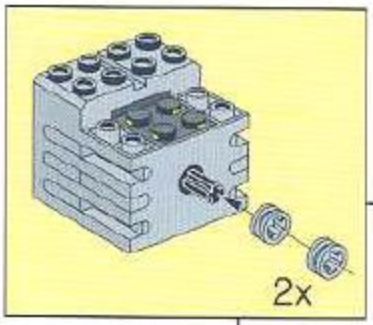
Put the 1x10 plates here.

5

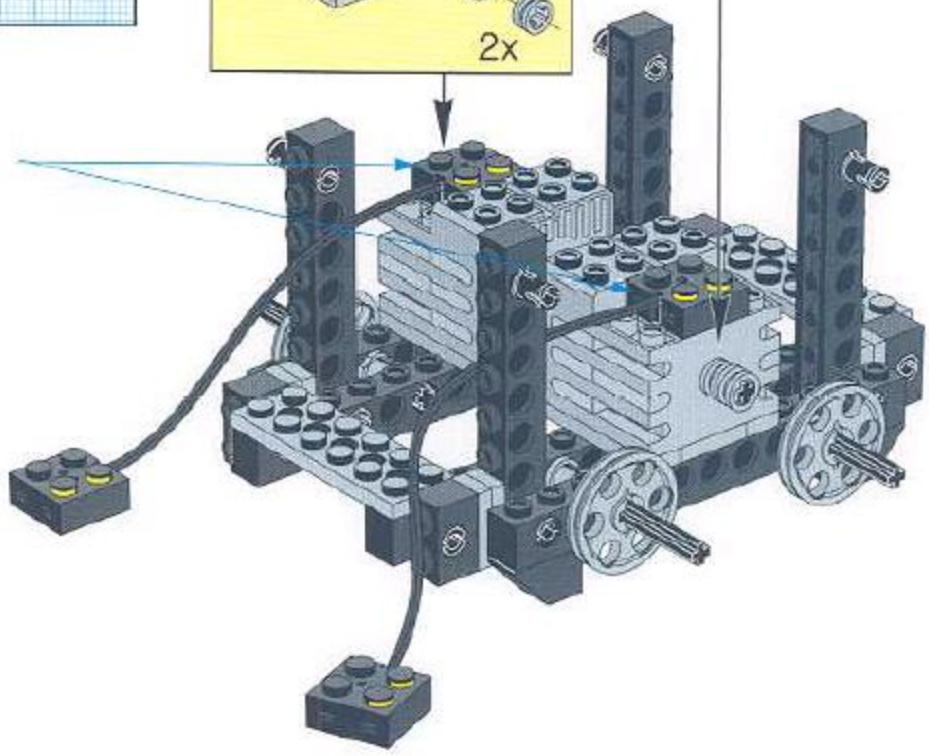
For this step, you need:



Electrical wire

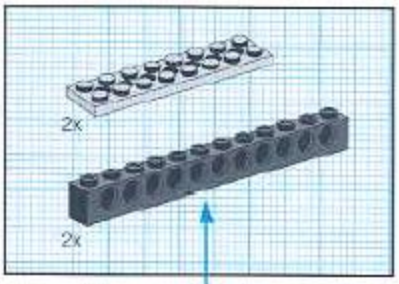


Put the electrical wire onto the motors.



6

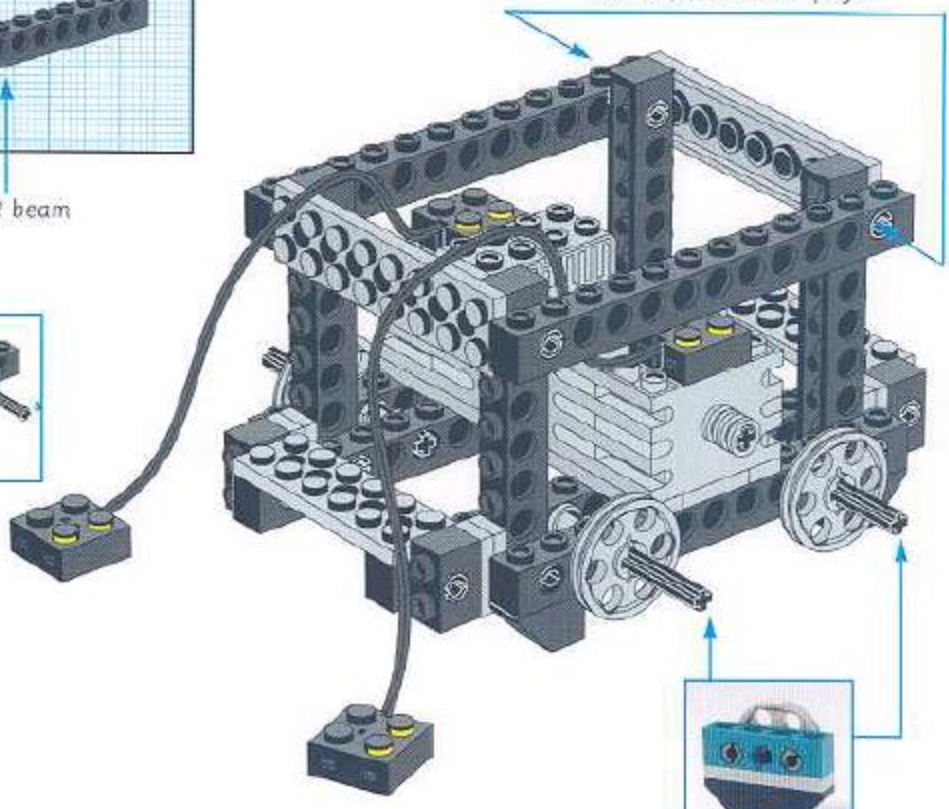
For this step, you need:



1x12 beam

Put the 1x12 beams onto the black connector pegs.

HINT: Try this.



HINT: Try these wheels.

IF YOU NEED HELP COMPLETING YOUR ROBOT...

- Check out "Special Features" on page 24.
- Turn to "Tips and Tricks" on page 30.

TO PROGRAM YOUR CREATURE...

- Go to one of the following challenges on the CD-ROM: Touchmole or Triceradozer.

Pincer

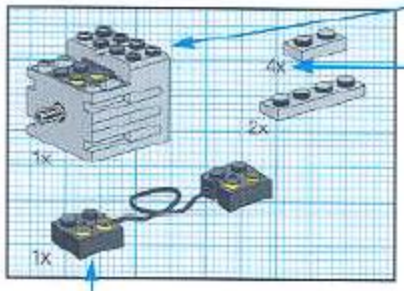
To get started on the Pincer, follow these 3 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

1

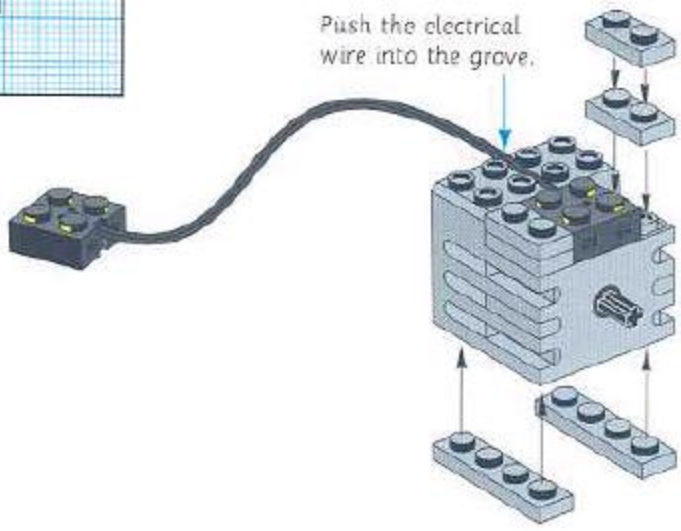
For this step, you need:



Motor

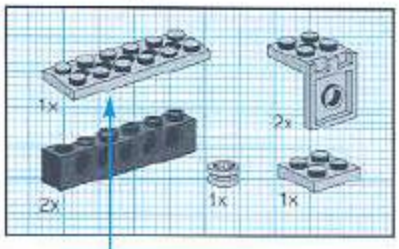
4x means you need 4 of these.

Electrical wire

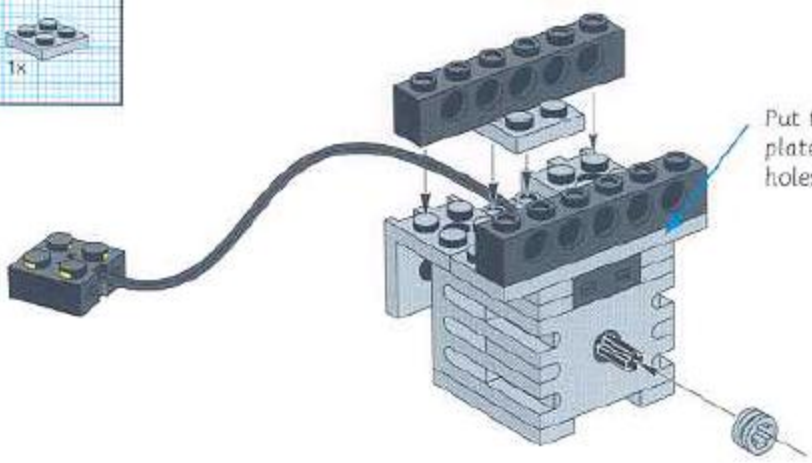


2

For this step, you need:

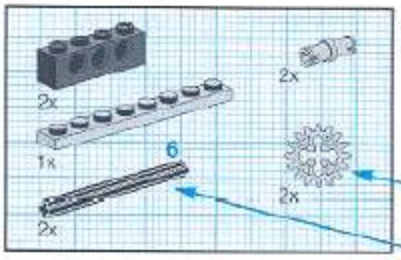


2x6 plate with holes

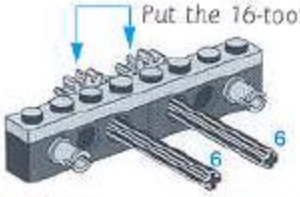


3

For this step, you need:



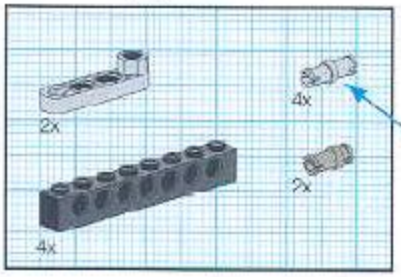
a.



16-tooth gear

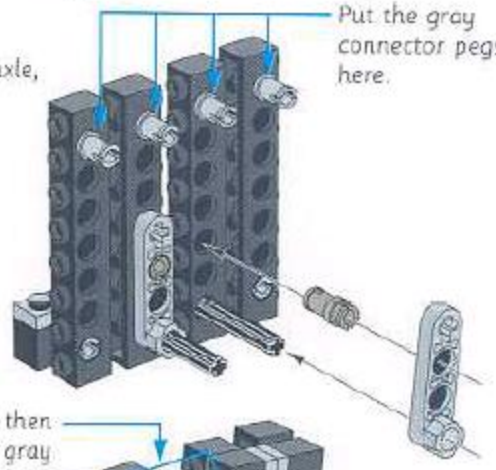
To measure an axle, see page 34.

For this step, you need:

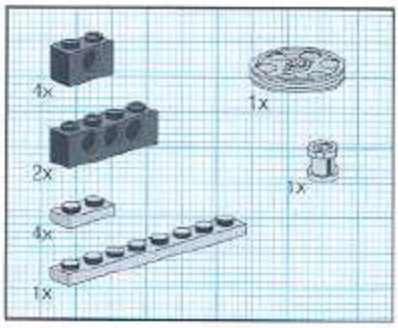


b.

Gray connector peg

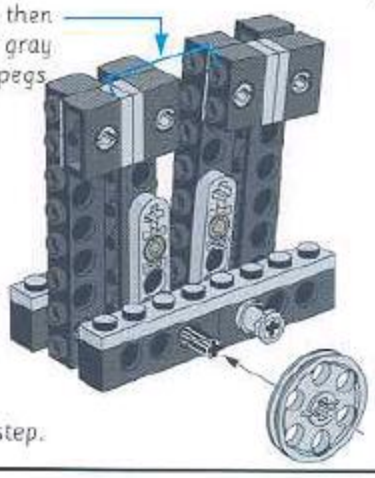


For this step, you need:



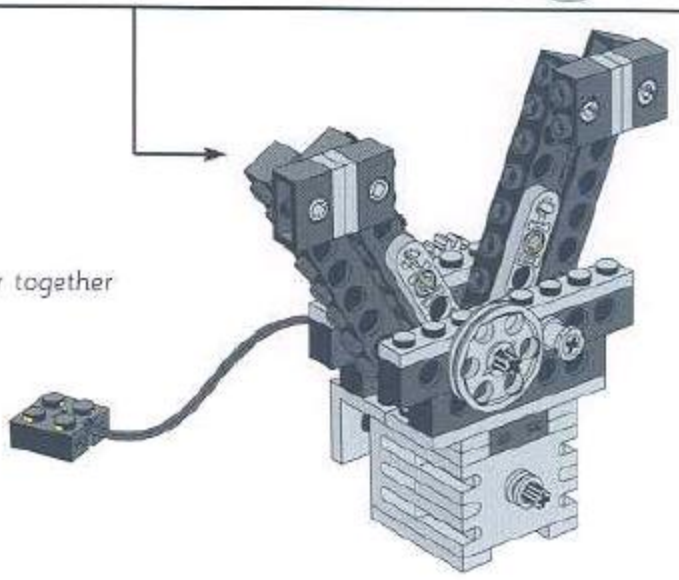
c.

Build this first, then attach it to the gray connector pegs.



Attach this to the previos step.

4



PINCER

- Use the Pincer on your own creature, or together with Creature Mover 1, 2 or 3.

HINT:

- Try one of the following challenges: Bomberfly, Skorpion or Tyrannolifter.

Claw

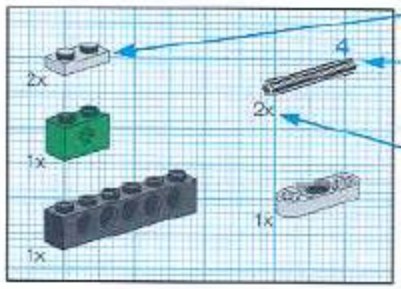
To get started on the Claw, follow these 6 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

1

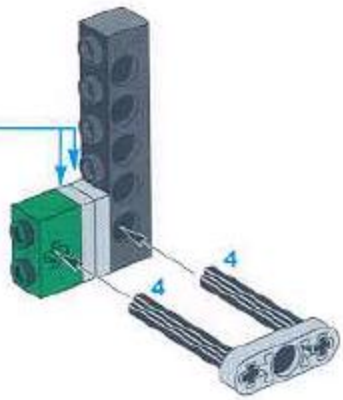
For this step, you need:



1x2 plate

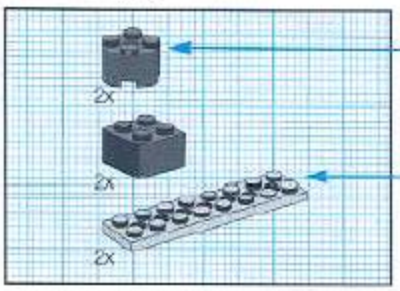
To measure an axle, see page 34.

2x means you need 2 of these.



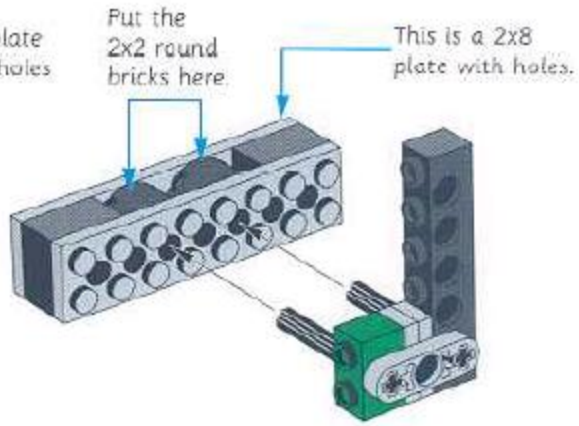
2

For this step, you need:



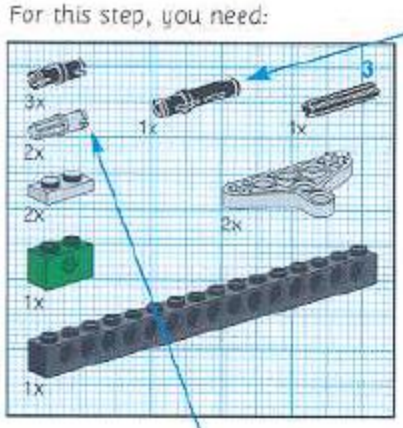
2x2 round brick

2x8 plate with holes



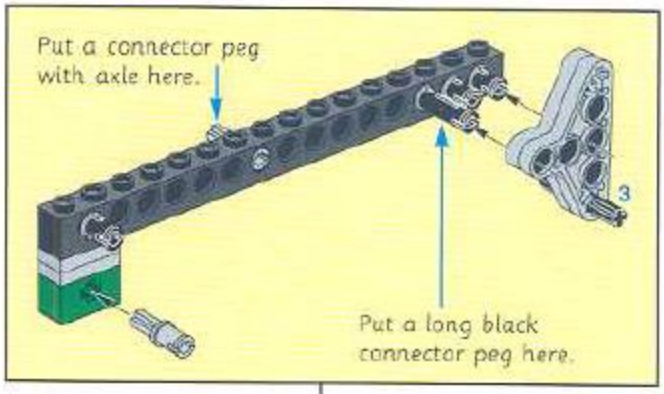
3

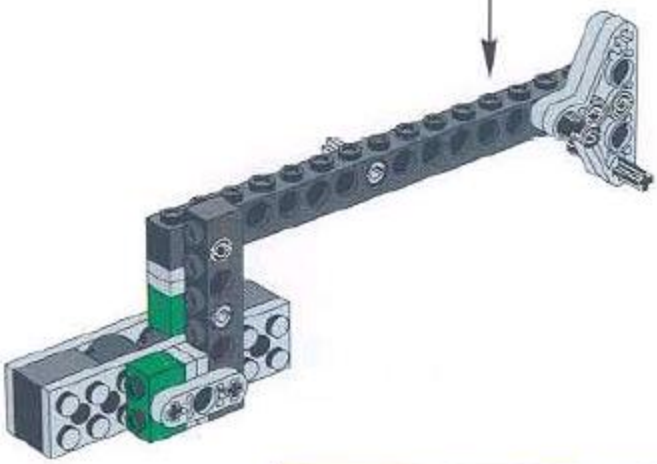
For this step, you need:



Long black connector peg

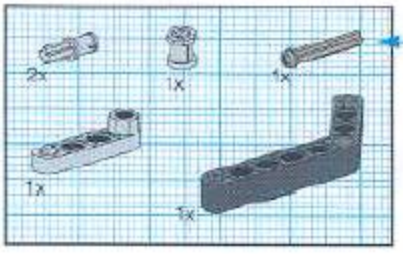
Connector peg with axle



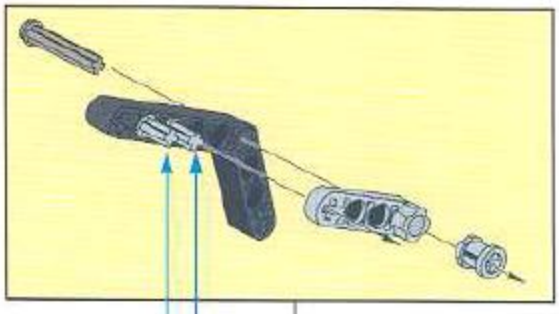


4

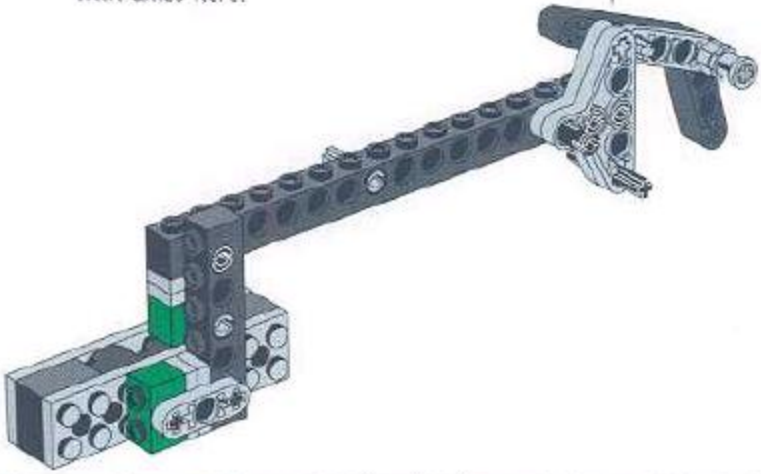
For this step, you need:



Axle with stop

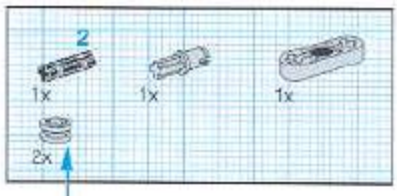


Put the connector peg with axles here.

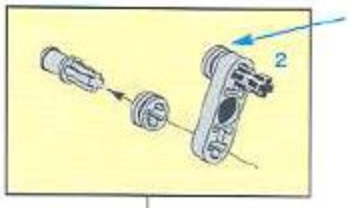


5

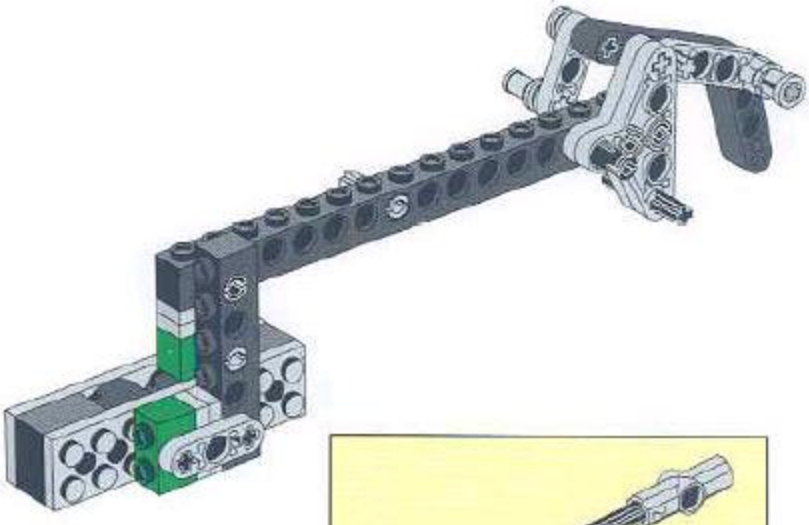
For this step, you need:



1/2 bushing

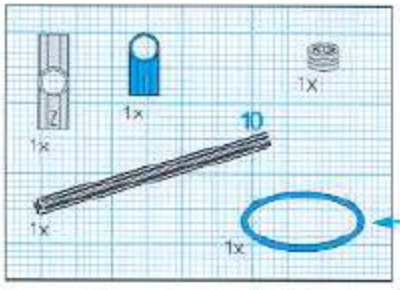


Put a 1/2 bushing here.

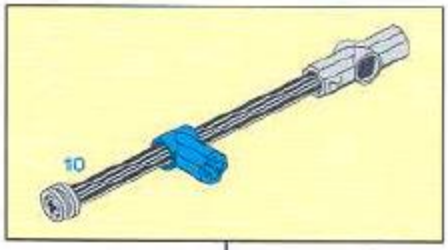


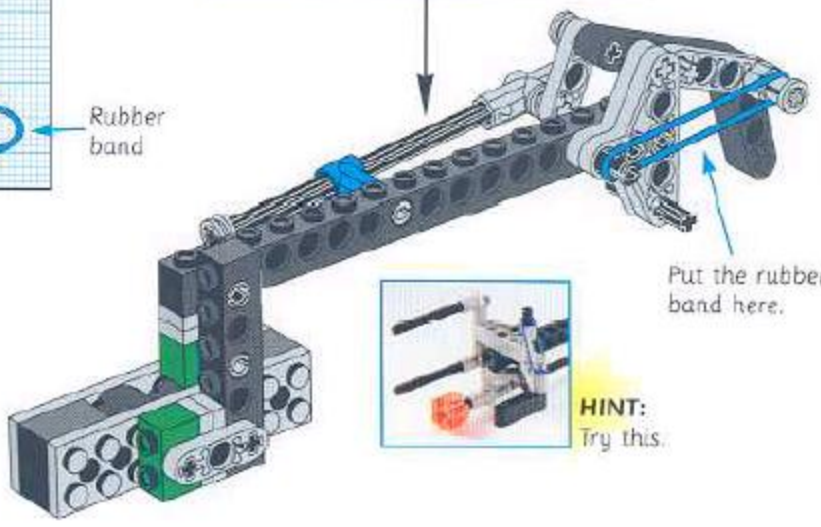
6

For this step, you need:



Rubber band





Put the rubber band here.

HINT:
Try this.

CLAW

- Use the Claw on your own creature, or together with Creature Mover 1, 2 or 3.

Wagger

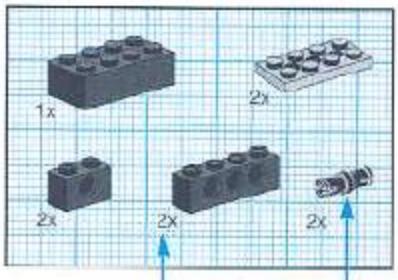
To get started on the Wagger, follow these 5 steps.

BEFORE YOU GET STARTED...

Make sure there are batteries in your RCX. For help installing batteries, turn to page 35.

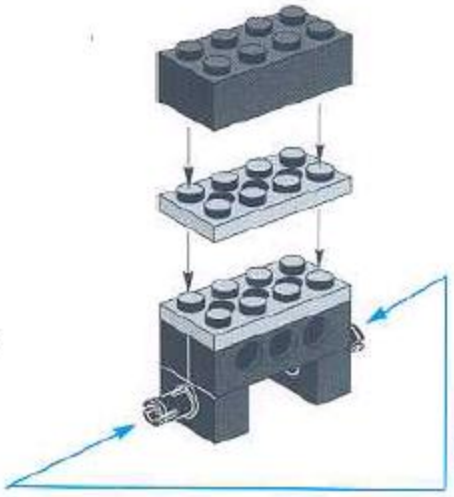
1

For this step, you need:



2x means you need 2 of these.

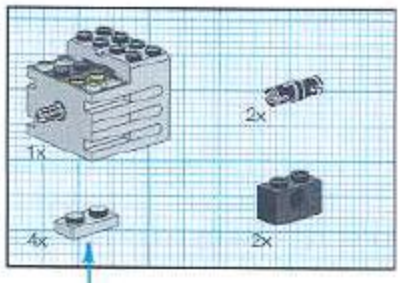
Black connector peg



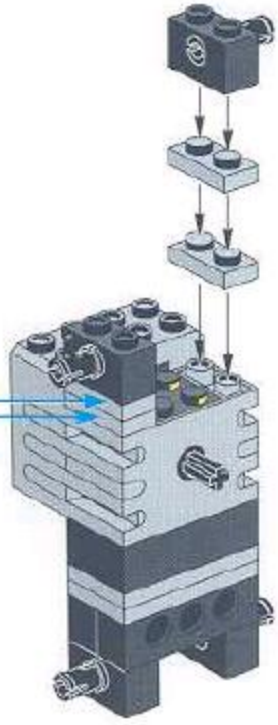
Put the black connector pegs here.

2

For this step, you need:



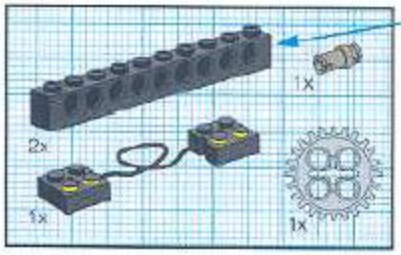
1x2 plate

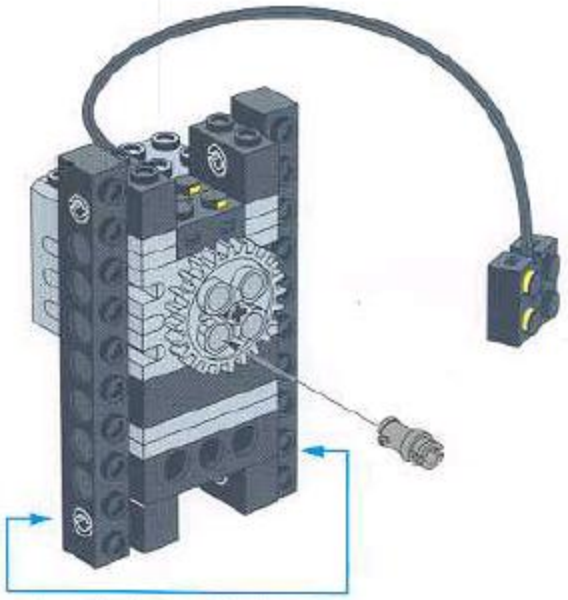


Put the 1x2 plates here.

3

For this step, you need:

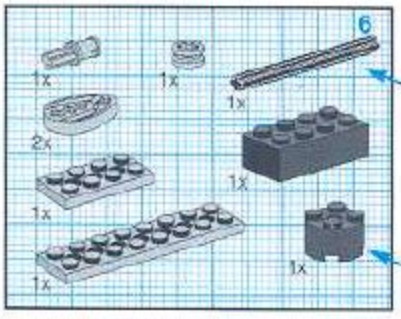




Attach the 1x10 beams to the black connector pegs.

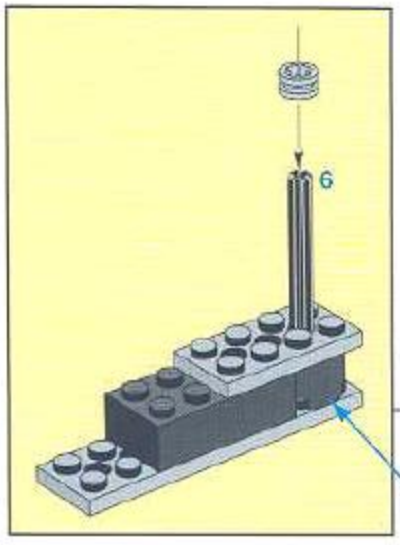
4

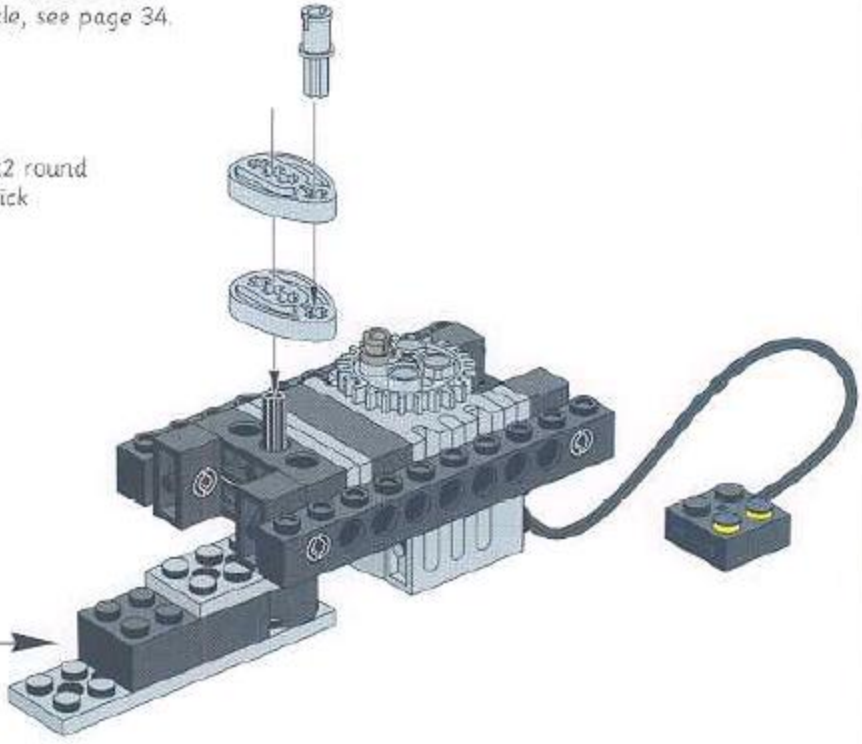
For this step, you need:



To measure an axle, see page 34.

2x2 round brick

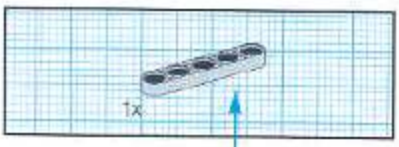




Put the 2x2 round brick here.

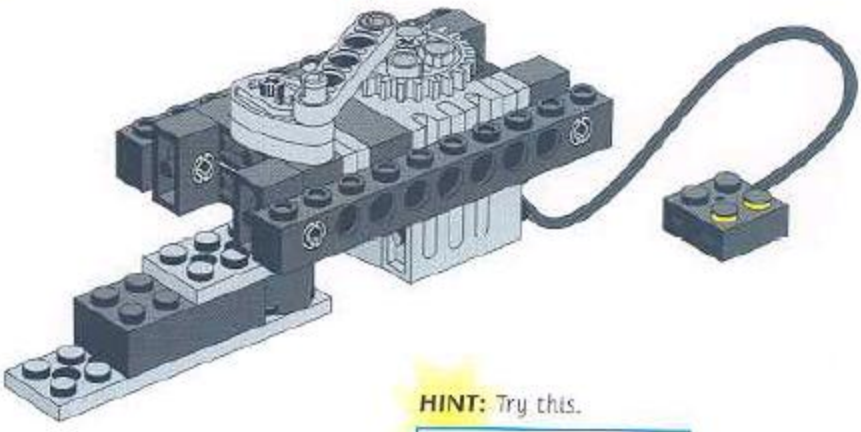
5

For this step, you need:



Half beam

Put the half beam here.



HINT: Try this.

WAGGER

- Use the Wagger on your own creature, or together with Creature Mover 1, 2 or 3.

HINT

- Try one of the following challenges: Pitcher Critter, Skorpion, Hammerphist or Stegoclubber.

Special Features

MOVEMENT

There's more than one way to get things moving. Here are a few ideas to get your mind in gear.

To make your creature limp, attach a foot to the wheel.

1

To make your creature hop, use these lopsided feet.

2

You can use more than one-sized wheel to make your creature move. Try this combination.

3

Now try this one.

4

Use this tread to make your creature move.

5

You can also use a triangular tread.

6

This chassis wobbles as it moves.

7

This chassis lunges as it moves.

8

NATURAL

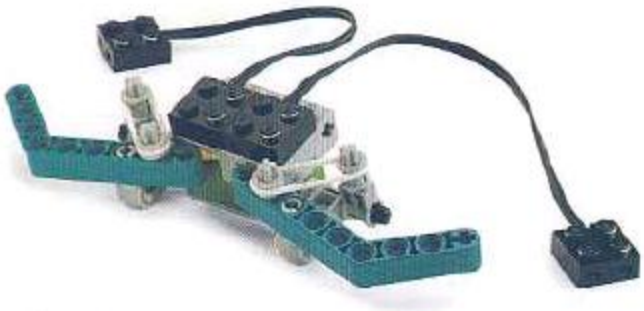
MECHANICAL

Special Features

SENSORS

Sensors make it possible for your creature to respond to its environment. Here are a few ideas on how to use light sensors and touch sensors.

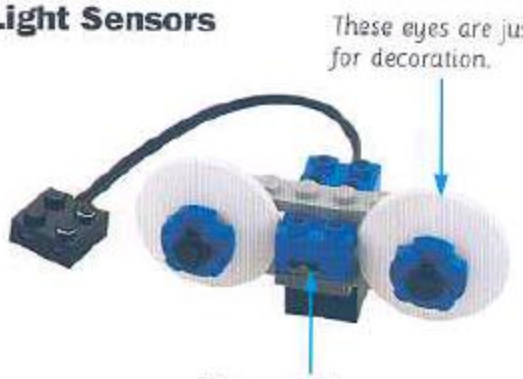
Touch Sensors



Use a bumper to activate your touch sensors.
For help, turn to Tips & Tricks on page 32.

1

Light Sensors

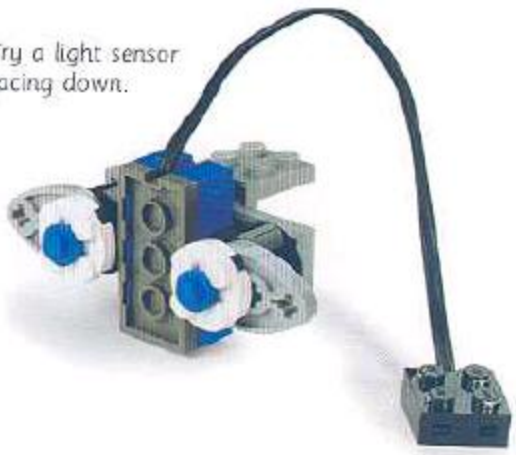


2

Use antennae to activate your touch sensors.

3

Try a light sensor facing down.



4

Use feelers to activate your touch sensors.
For help, turn to Tips & Tricks on page 32.

5

Try a light sensor facing up.

6

Attachments

These can be used as antennae.

7

This can also be used as an antennae.

8

See what your creature looks like with big eyes like these.

9

Try making both one-eyed and two-eyed creatures.

10

Try these wings on your creature.

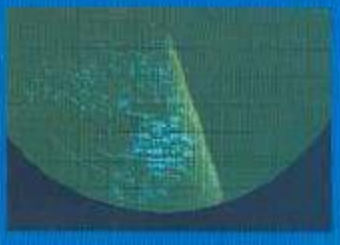
11

These can also be used as wings.

12

NATURAL

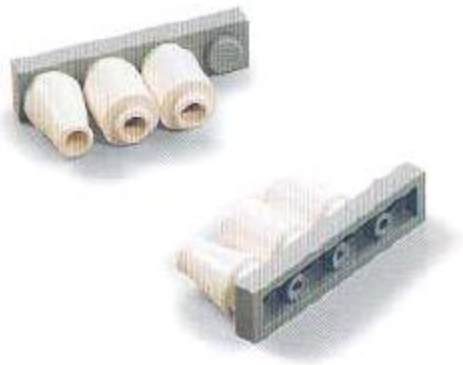
MECHANICAL



Special Features

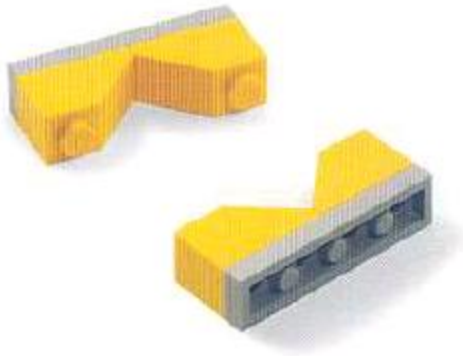
GRABBER ATTACHMENTS

Attachments for the pincer



Add teeth to make a jaw.

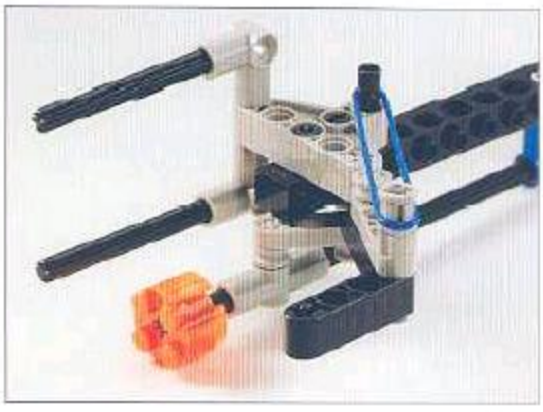
1



Add these pieces to make a claw.

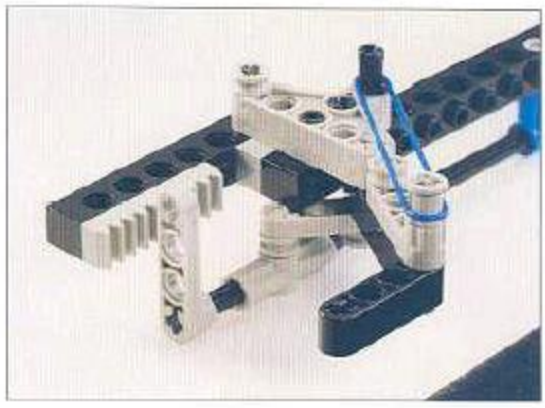
2

Attachments for the claw



This is a hand that grasps when triggered.

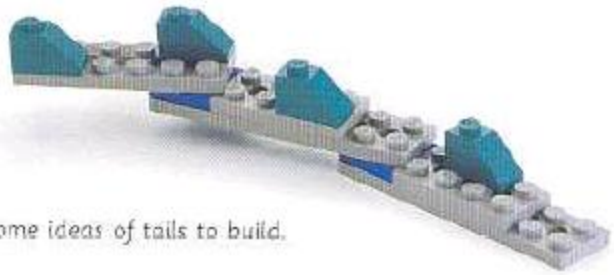
3



This is another trigger-activated hand.

4

Tails



Here are some ideas of tails to build.

5

Here is a long tail.

6

Try this on the Stegoclubber.

7

Try this on the Skorpion.

8

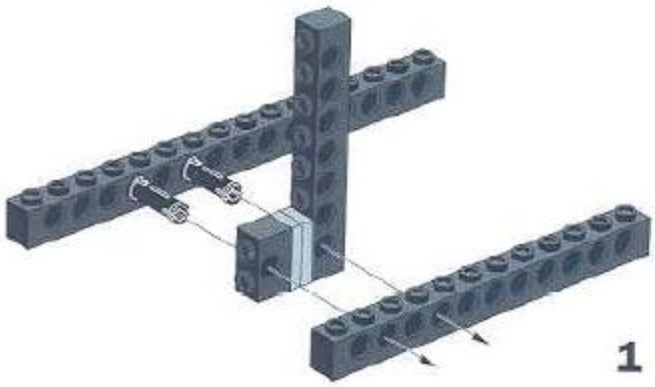
NATURAL

MECHANICAL

Tips & Tricks

If you want to make your invention bigger, stronger, faster, or work even better, try using these tips and tricks.

Adding length

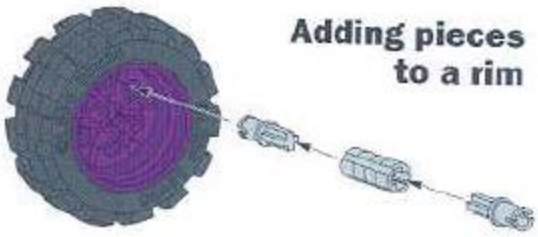


1

Attaching a tube

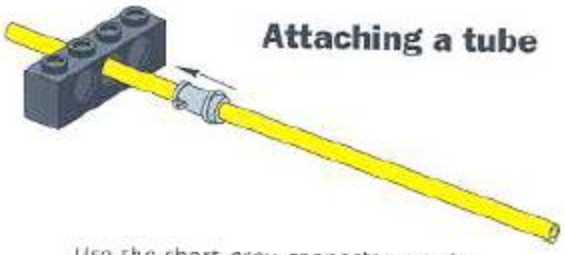
2

Adding pieces to a rim



3

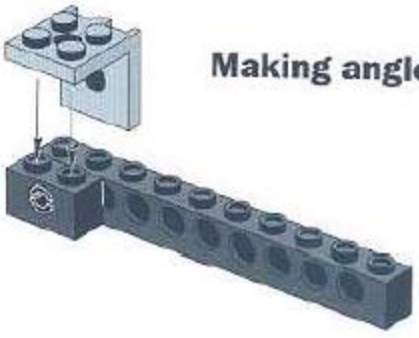
Attaching a tube



Use the short gray connector peg to attach the yellow tube to a brick.

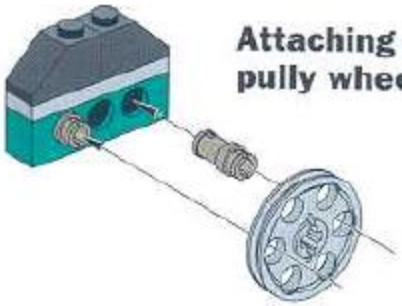
4

Making angles



5

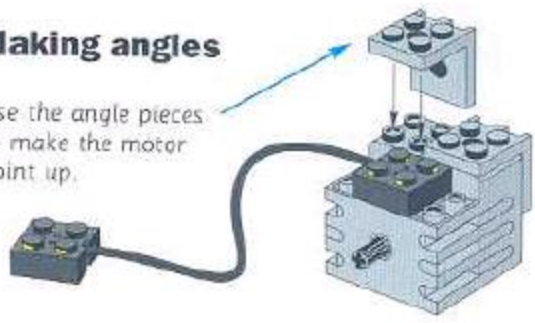
Attaching a pully wheel



6

Making angles

Use the angle pieces to make the motor point up.



7

Making a hinge

8

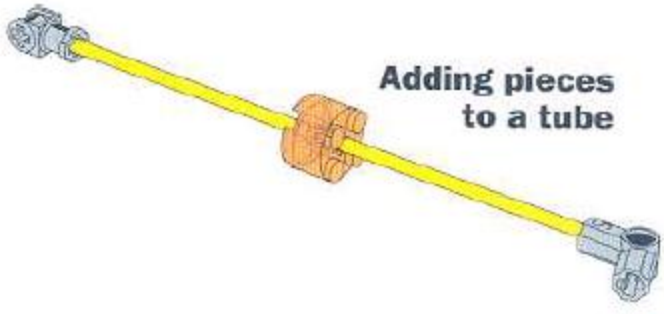
Making a hinge

9

Using a turntable

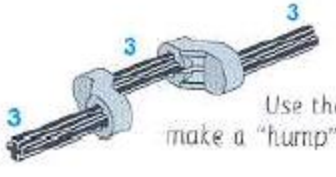
10

Adding pieces to a tube



11

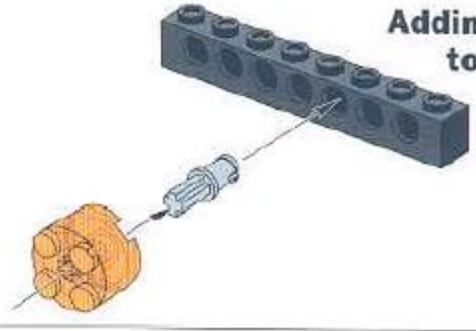
Making a crank shaft



Use these pieces to make a "hump" in the axle.

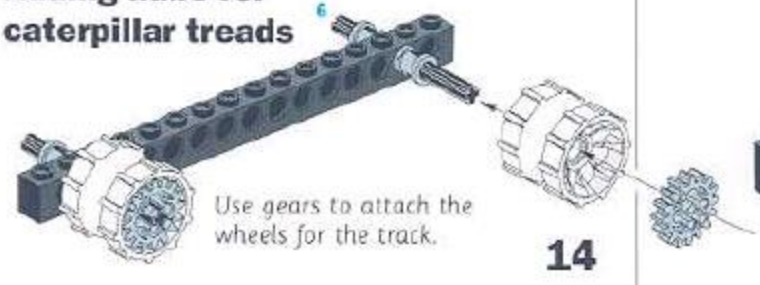
12

Adding bricks to a beam



13

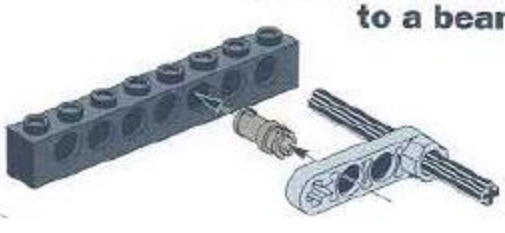
Adding hubs for caterpillar treads



Use gears to attach the wheels for the track.

14

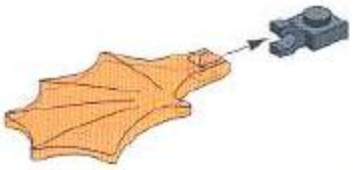
Adding a lift arm to a beam



15

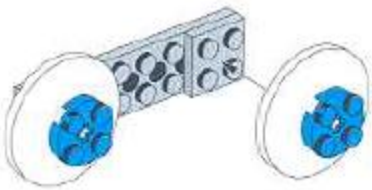
Tips & Tricks

Attaching a wing



16

Adding eyes

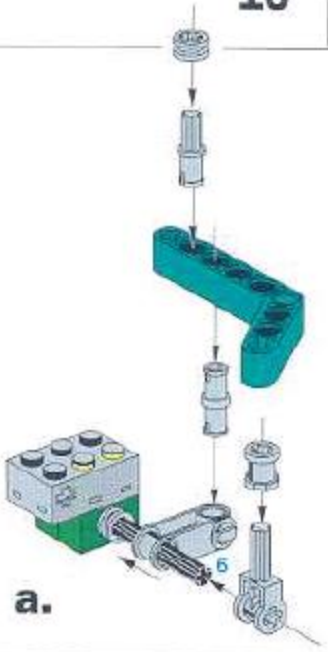


17

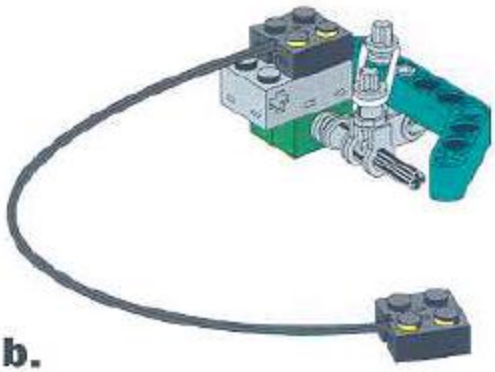
Adding eyes

18

Making a single bumper



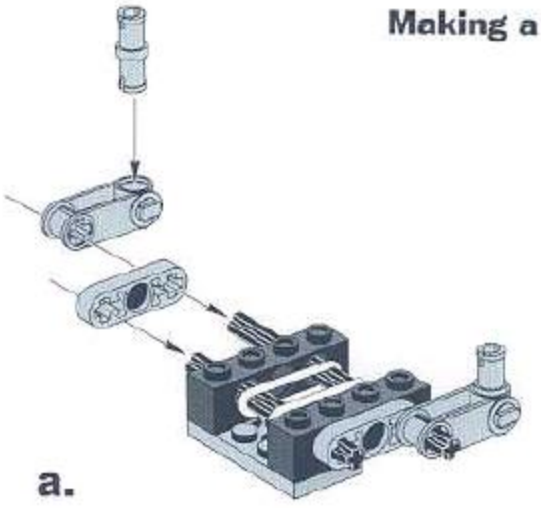
a.



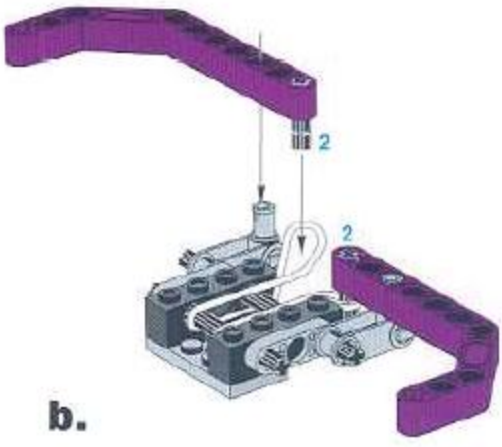
b.

19

Making a double bumper



a.



b.

20

Using gears to turn corners

This is how you can get an axle to spin at a right angle to another.

21

Linking gears

Connecting the gears this way links one axle to another.

22

Linking gears

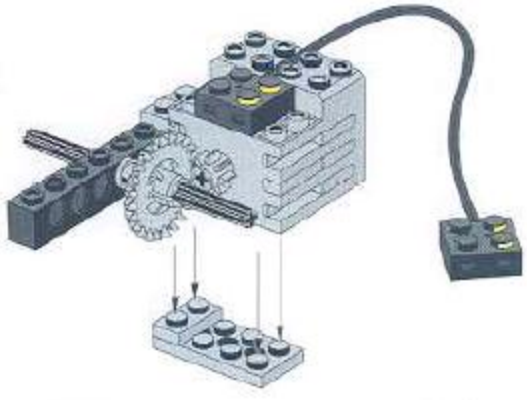
These gears will spin in opposite directions.

23

Using the 24-tooth crown gear

a.

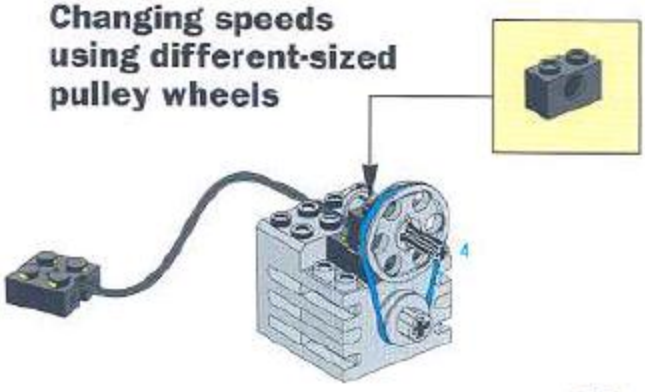
b.



Right angle gears

24

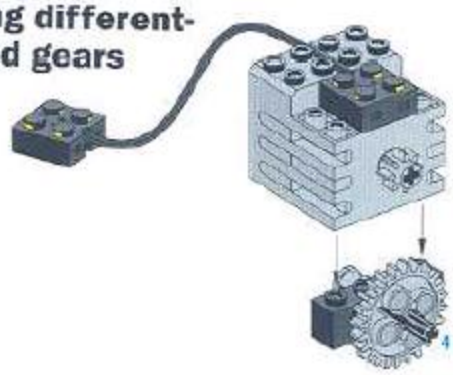
Changing speeds using different-sized pulley wheels



25

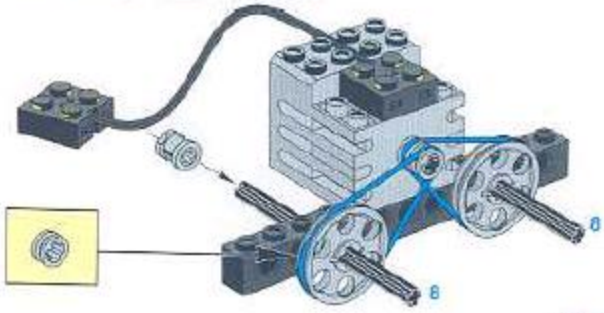
Tips & Tricks

Changing speeds using different-sized gears



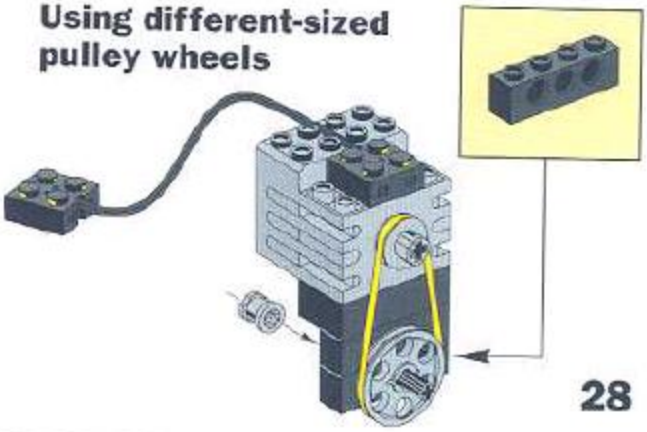
26

Using one motor to drive two axles



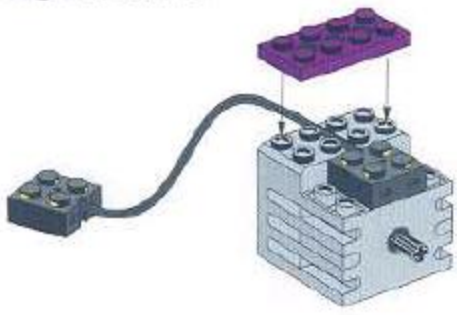
27

Using different-sized pulley wheels



28

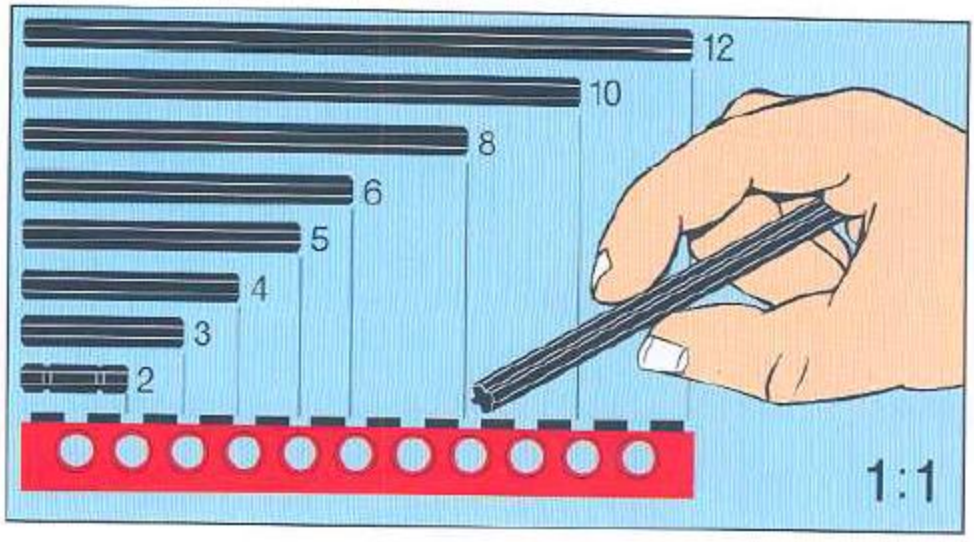
Covering the wire



29

How to Measure an Axle

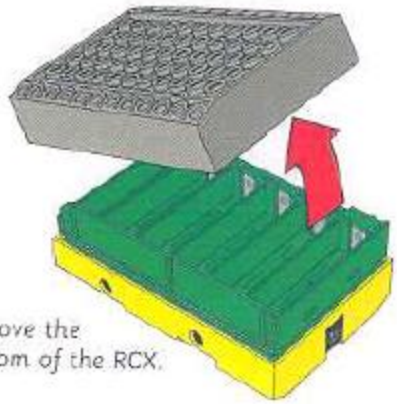
Use this chart to measure the length of an axle



Battery Installation for the RCX

Instructions for use of battery box
Never mix different types of batteries or old and new batteries in one battery box. Always remove the batteries from the battery box for long-term storage or if they have reached the end of their life. Liquid leaking from dead batteries will damage the battery box. Rechargeable batteries can be used but power may be reduced. Do not recharge the batteries in the battery box. Rechargeable batteries are only to be charged under adult supervision.

1

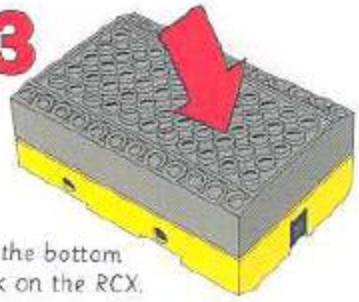


Remove the bottom of the RCX.

2

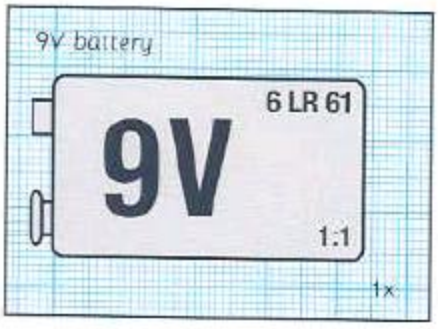
Insert 6 AA (LR6) batteries.

3



Put the bottom back on the RCX.

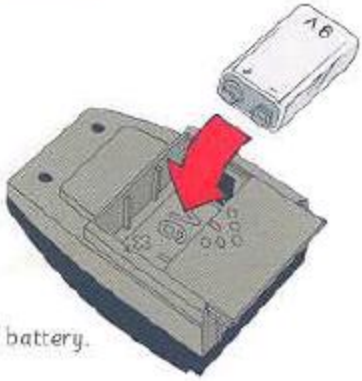
Battery Installation for the Infrared Transmitter



1

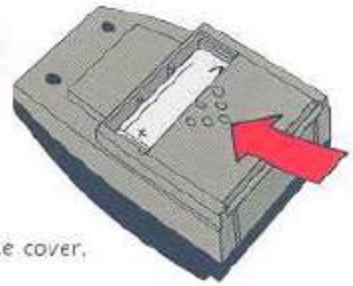
Slide the cover back.

2



Insert the 9V battery.

3



Close the cover.

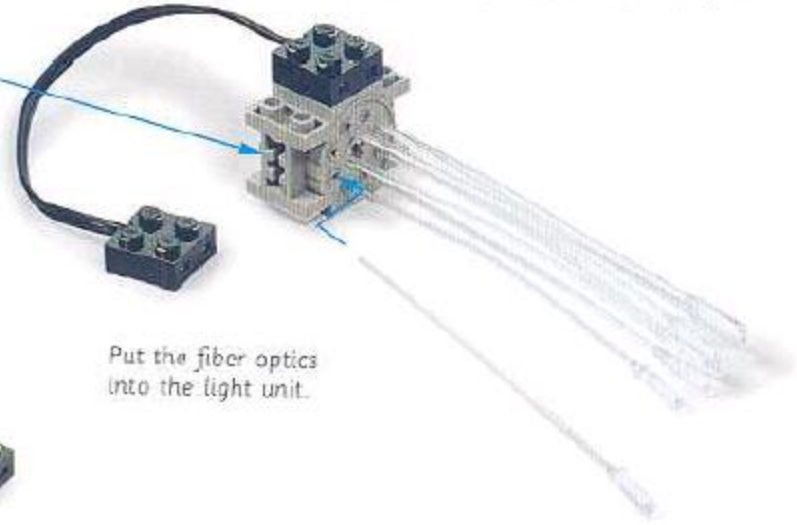
Top Secret Plans

Fiber Optics

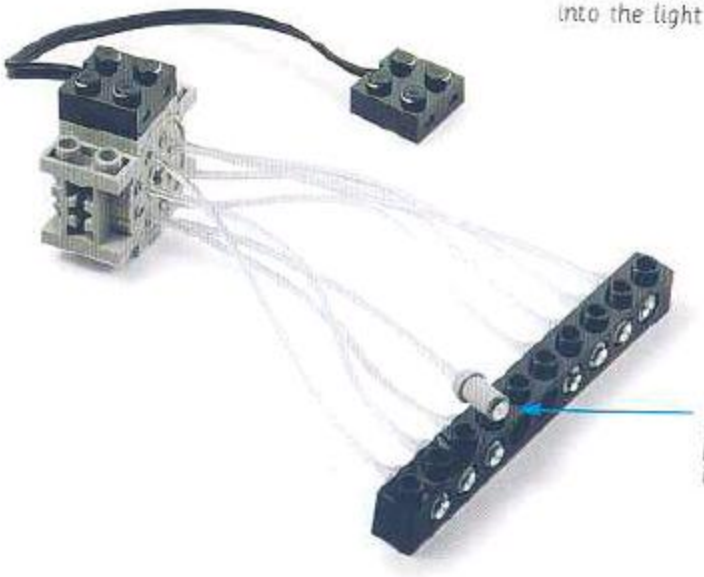
Use *fiber optic* strands to create creatures with *flashing* lights.

How *fiber optics* work.
Fiber optics are thin transparent plastic fibers that transmit light throughout their length.

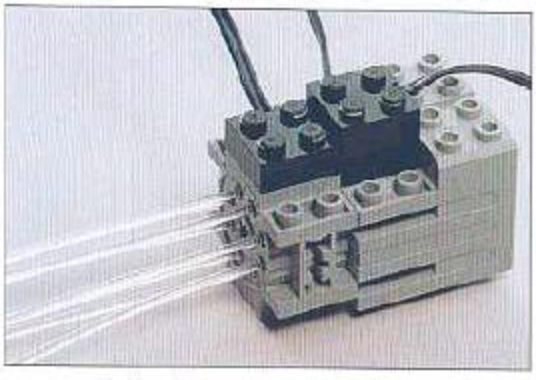
Light unit
The light unit has one "light bulb" and must be rotated to get light into all the different fiber optics.



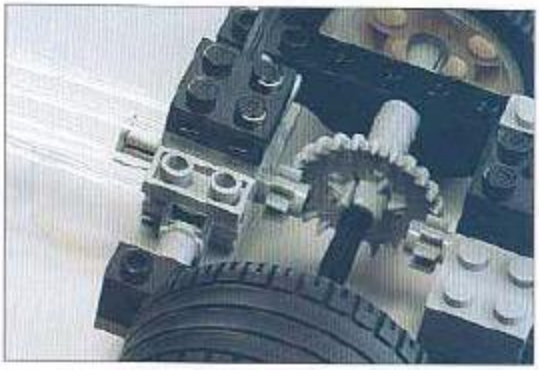
Put the fiber optics into the light unit.



Use the gray half-connector peg to hold the fibre optics in place.



Attach the fiber optics unit to the motor.



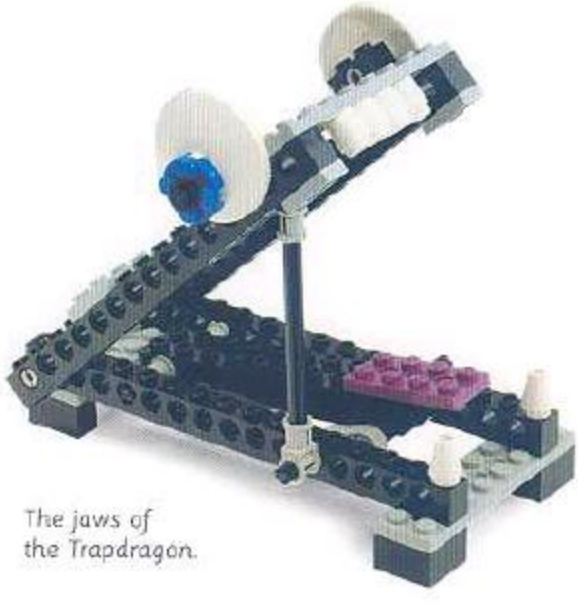
Use a motor to power the wheels and the fiber optics.

Attach the fiber optic light unit to a motor. Then attach the motor to RCX, port A. Turn on the RCX and press run, watch the lights turn on.

Here's one example of how to use the set's fiber optic strands. Now let's see what you can create.

Using hinges for action

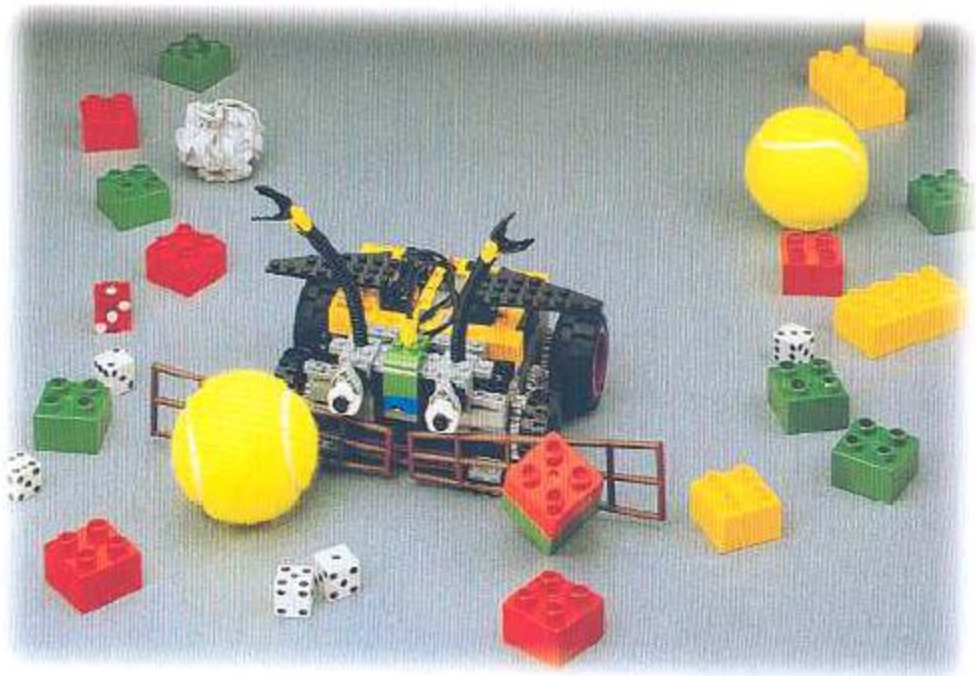
A catapult



The jaws of the Trapdragon.

Top Secret Plans

Testing a Stegoclubber



Testing a Triceradozer

Parts Identification