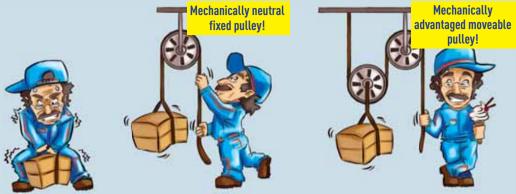


PULLEYS

A pulley is a simple machine capable of lifting weights.

It consists of a wheel that can rotate about an axle passing through its centre, with a groove (also called a throat) along its outer edge for holding a rope.



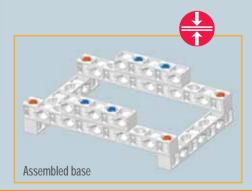
A pulley is a machine that can be used to lift a weight by applying effort in the easier direction, i.e. from top to bottom, therefore making the work easier.

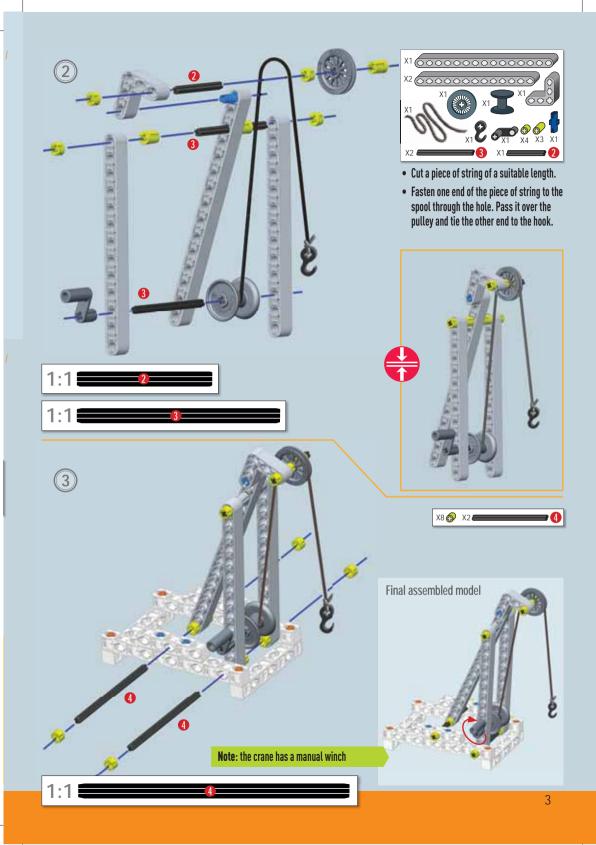
3 Assemble a crane with a fixed pulley

><u>/////</u>

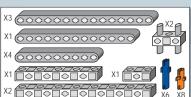
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Example: with a fixed pulley, lifting a weight of 10 kilogrammes (symbol kg - or more accurately, 10 kilogramme-force for all you scientists, symbol: kgf), will require a force of 10 kg. X2 Х2 X2 0 I O I



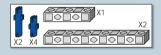


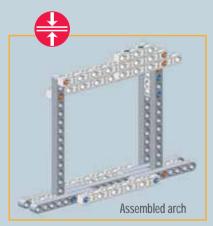
🔁 Build a crane with a movable pulley |

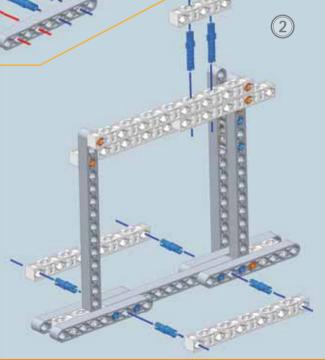


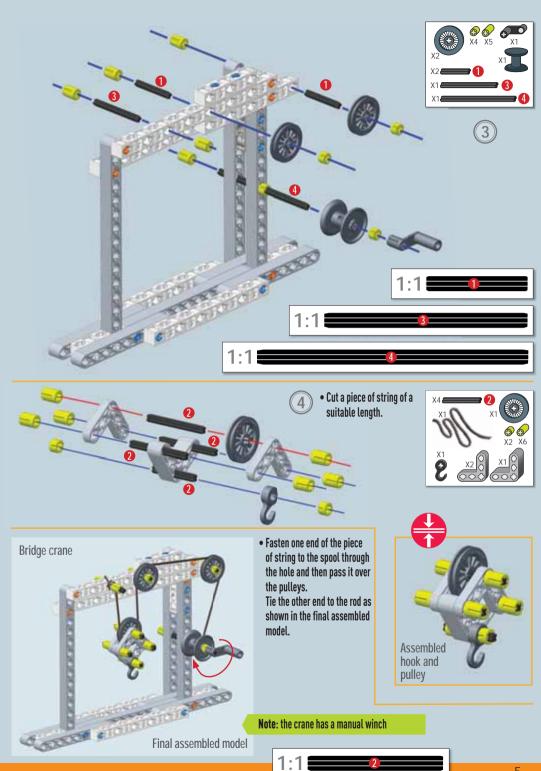
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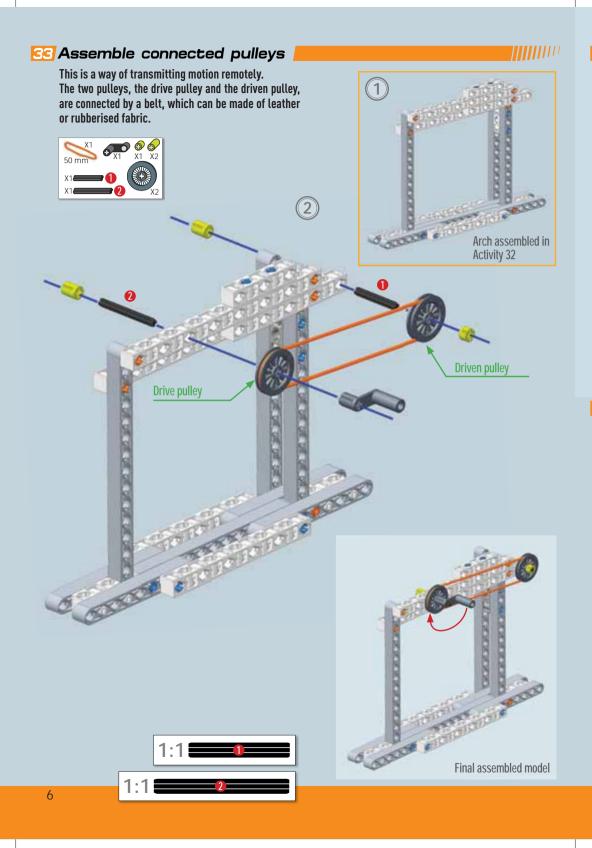
Example: in this case, lifting a weight of 10 kilogrammes (symbol kg - or more accurately, 10 kilogramme-force for all you scientists, symbol: kgf), will require a force of 5 kg. It is a simple machine that provides a mechanical advantage by reducing the physical effort of man.





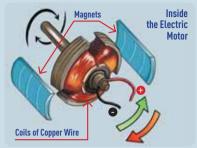






THE ELECTRIC MOTOR

An electric motor is a machine capable of converting electrical power into mechanical power. The electric current, supplied by a battery and sent to the coils of a rotor, interacts with the magnetic field generated by the magnets of the stator. *This generates a force that makes the motor axle turn*.



• Gears joined to the electric motor

The electric motor is connected and joined to a box containing a series of gears which serve to reduce the speed of rotation of the motor axle.



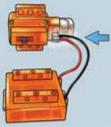
34 Crane with motor winch

Connecting the battery chamber to the motor

Insert the Molex connector of the battery chamber into the opening on the side of the switch, making sure the connector is positioned correctly.

Make sure the wires coming out of the battery chamber do not bend or twist above the cover so as to ensure they are the correct length.

Gently push and pull the wires to resolve any issues before installing the battery chamber.



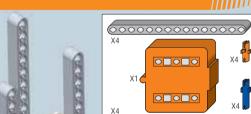
• Electric motor switch

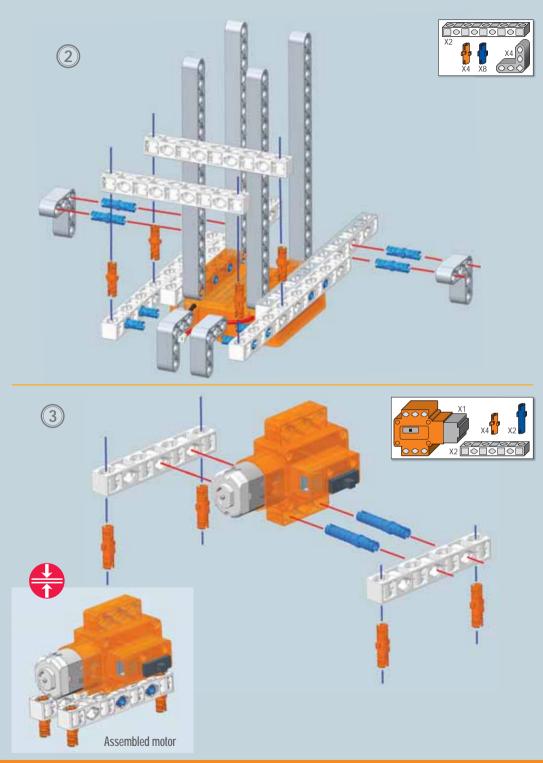
Sliding the switch to the **central** position turns the motor **OFF**

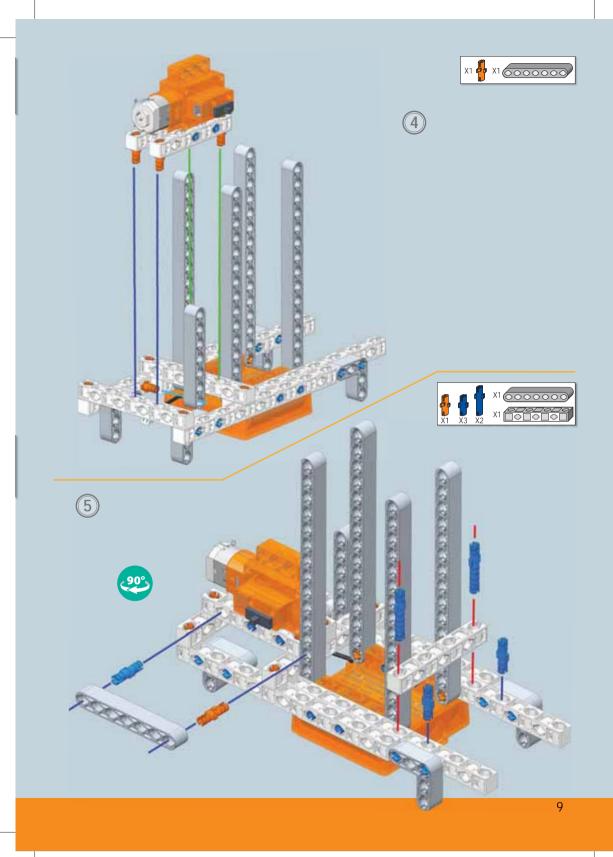
Sliding the switch to the **side** positions turns the motor **ON**

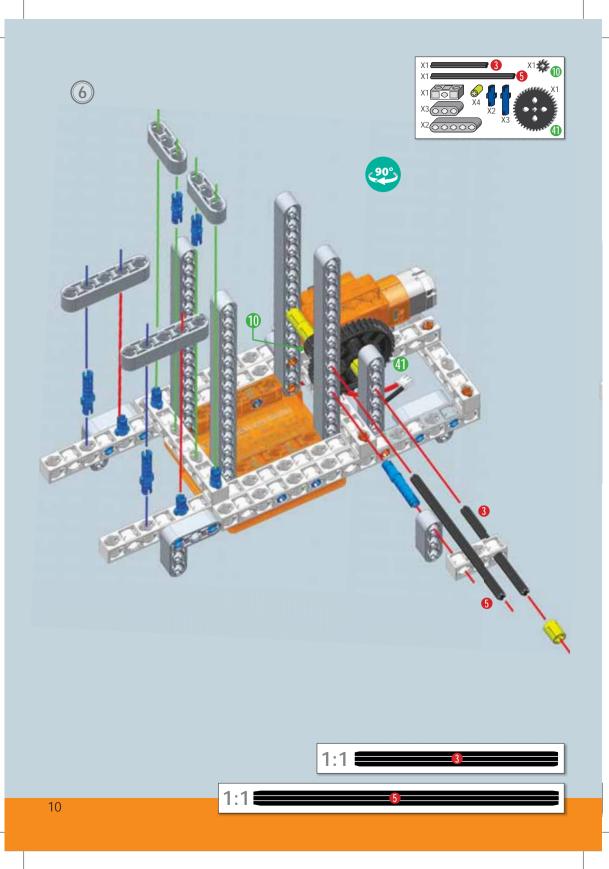
N.B.: please look at the safety warnings on the cover pages of manual no. 1 for instructions with respect to the motor.



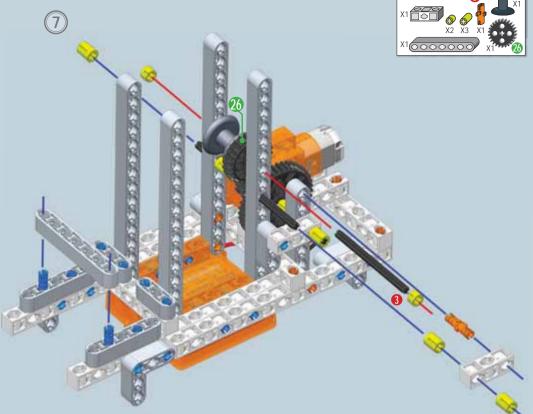






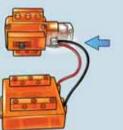






Connect the battery chamber to the electric motor.

• Connecting the battery chamber to the motor Insert the Molex connector of the battery chamber into the opening on the side of the switch, making sure the connector is positioned correctly.

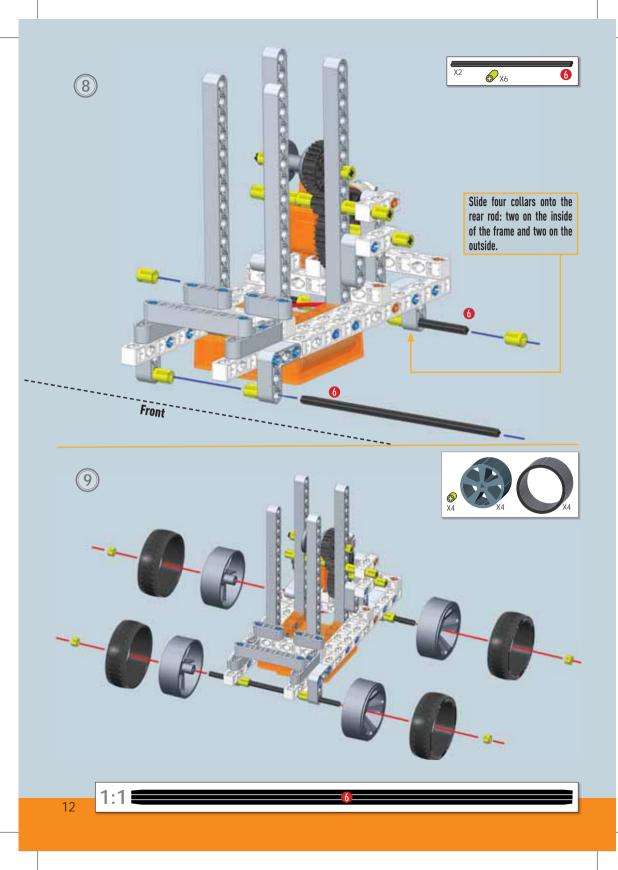


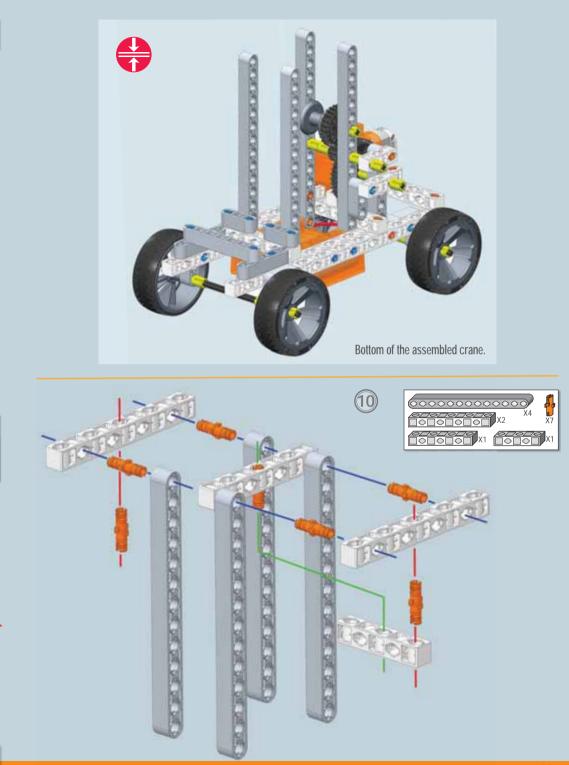
• Electric motor switch Sliding the switch to the central position turns the motor **OFF** Sliding the switch to the side positions turns the motor ON

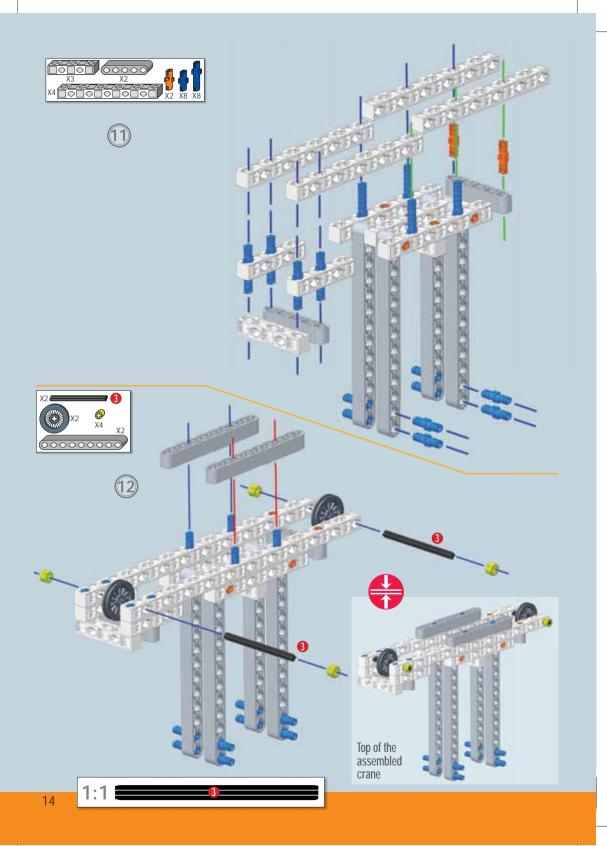


Note: if the motor is not working, check all the contacts inside the battery chamber.

WARNING! Only operate the electric motor after you have completed the model.









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Cut a piece of string of a suitable length.
Fasten one end of the

13

piece of string to the spool through the hole. Pass it over the pulleys and tie the other end to the hook.

NONDACION

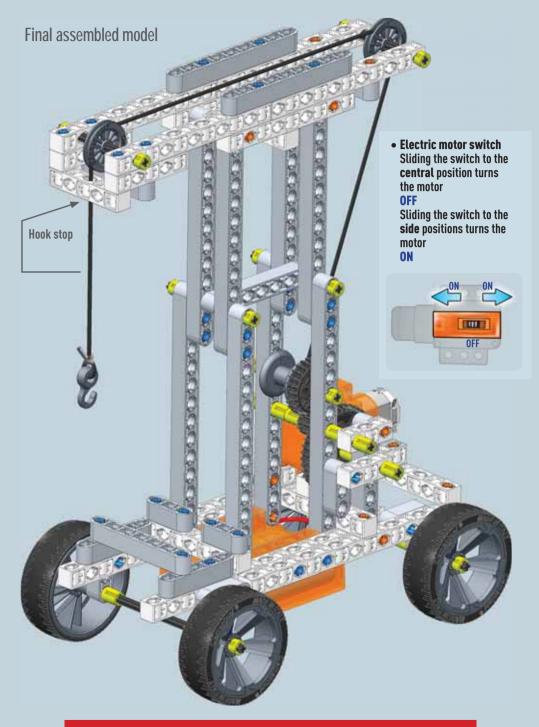
8

CHORDROW

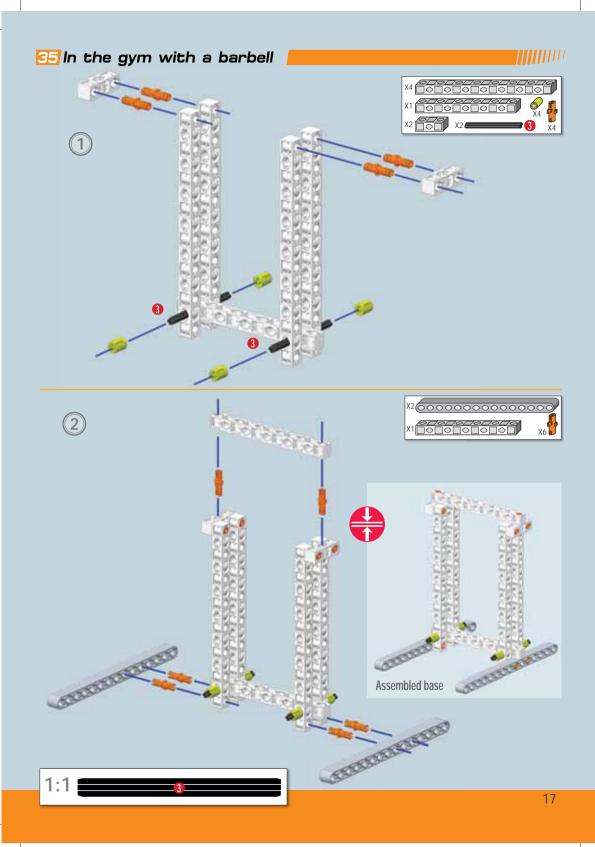
Technical and scientific information

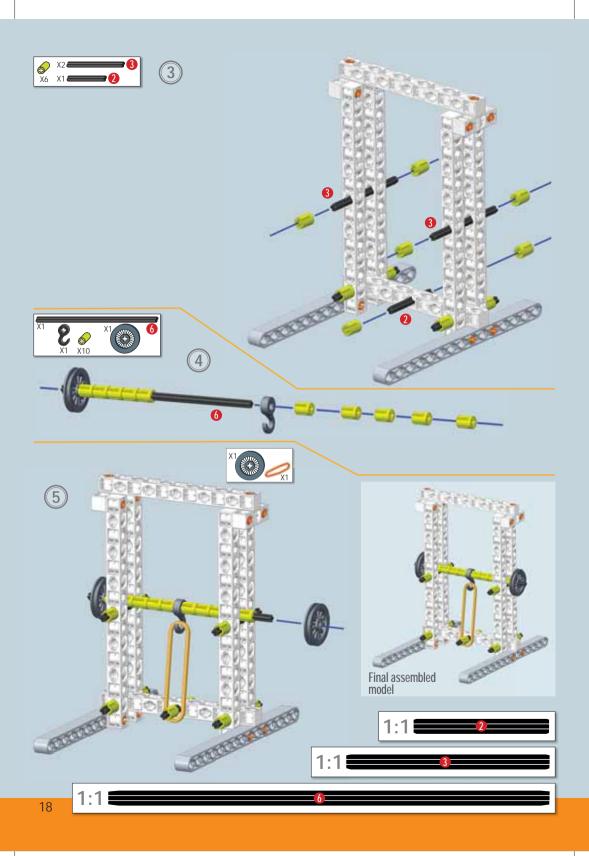
The tower crane has an electric motor winch which raises or lowers the weight. The electric motor, which converts electrical energy into mechanical energy, with the help of the gears, turns the spool (winch drum) around which the string of the crane hook is wound.

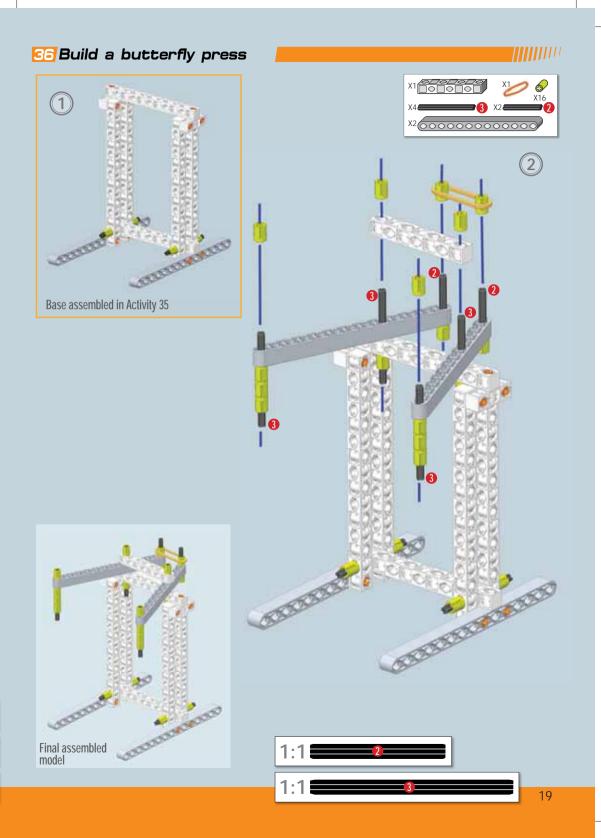


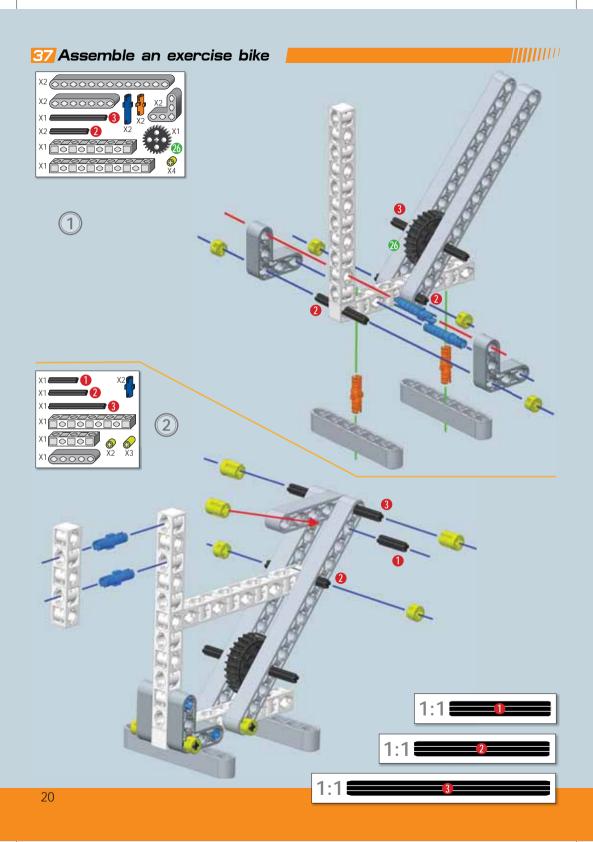


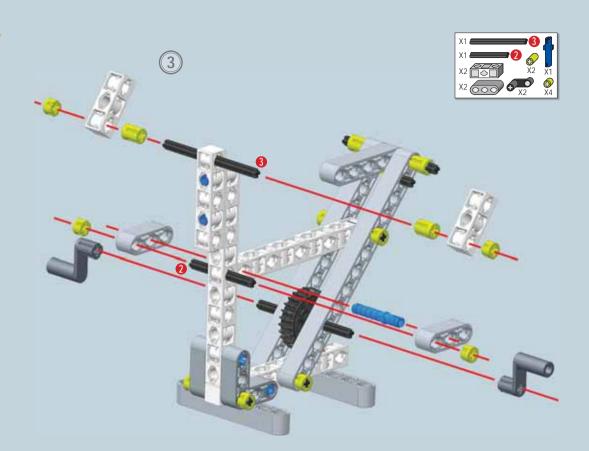
Take care when operating the electric motor.











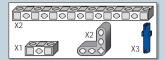
Technical facts and curiosities

1968 The "bike" without wheels found in homes and gyms around the world is a recent invention. The mastermind behind it was American inventor **Keene P. Dimick**, who came up with the idea of a stationary bike that could be pedalled even though it didn't have wheels.





🖅 Assemble an ultralight aeroplane

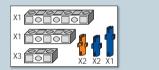


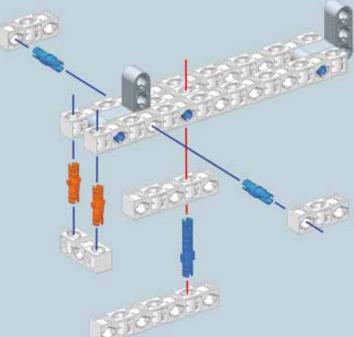
Technical and scientific information

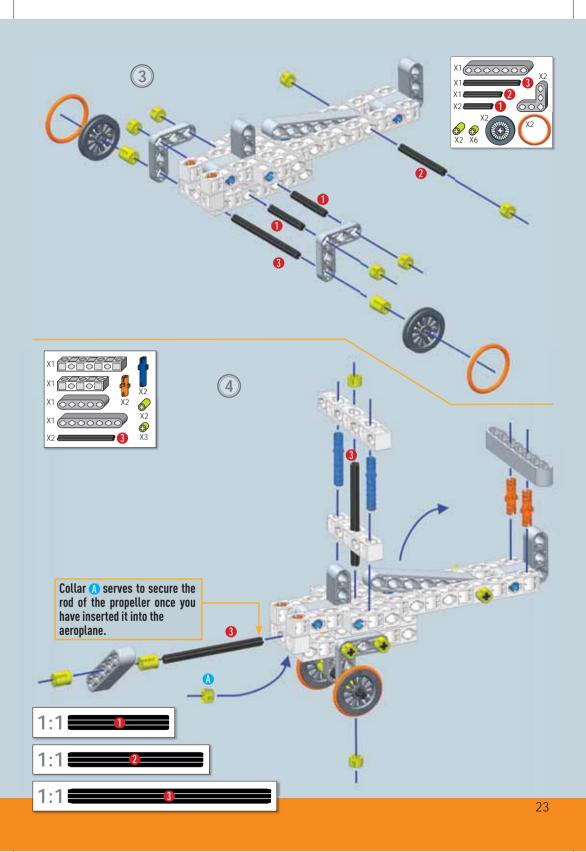
Aeroplanes can fly because of the presence of air. Air is a gaseous fluid made up of particles-mostly molecules of nitrogen and oxygen. An aeroplane is "suspended" in this fluid by its two wings which generate a force called lift, supporting the aircraft in flight. The amount of lift depends on the speed of the aeroplane, the shape of the wing section and the density of the air. Lift is generated by the air particles above the wing moving faster than those below. creating a lower pressure over the top surface of the wing with the effect of supporting the aeroplane in flight.

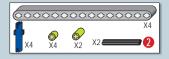
TRY IT OUT!

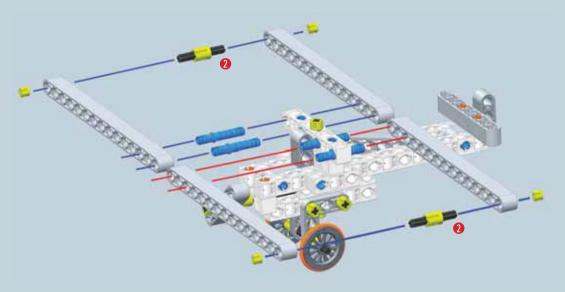
To better help you understand how aeroplanes fly and the effect of the air on the wing hold your hand outside a window on a windy day. With your hand held flat, tilt the palm of your hand up slightly (thumb facing the wind), your hand will be forced upwards.





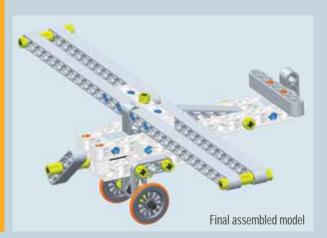






Technical facts and curiosities

- 1903 American brothers and bicycle makers Orville and Wilbur Wright, after years of study and research, built a motor-driven aeroplane with two propellers (wingspan: 12 metres, length: 6.50 metres and weight: 275 kg). Their first flight lasted 12 seconds, during which time they travelled 36 metres at a height of 3 metres.
- 1927 The first New York Paris flight. In May, American aviator **Charles Augustus Lindbergh** became the first person to fly across the Atlantic Ocean. He travelled the approximately 6,000 km in 34 hours.





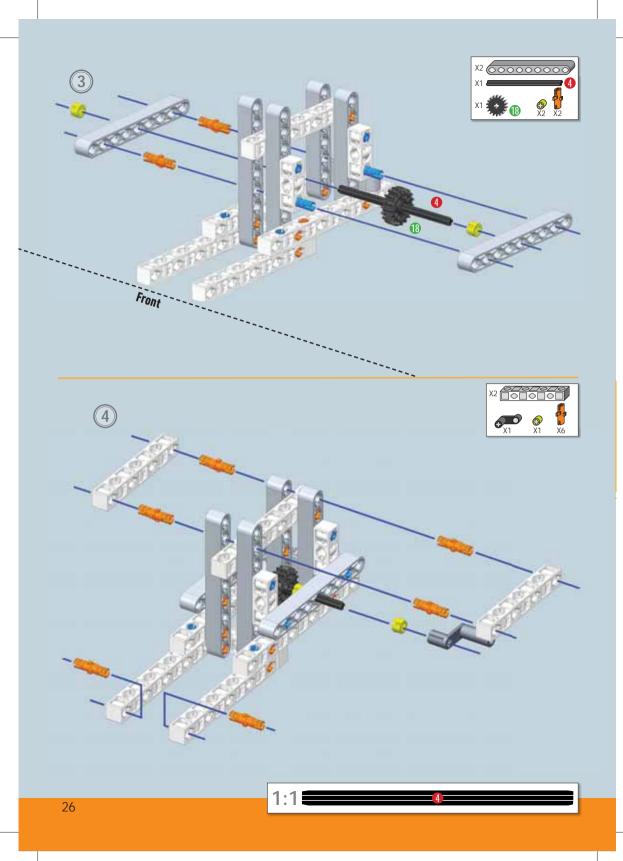
3 Build a helicopter

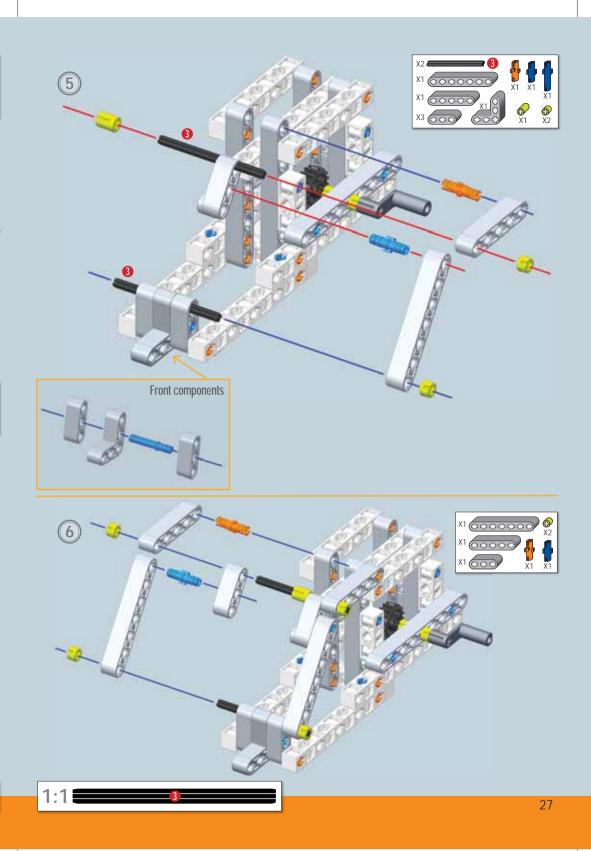
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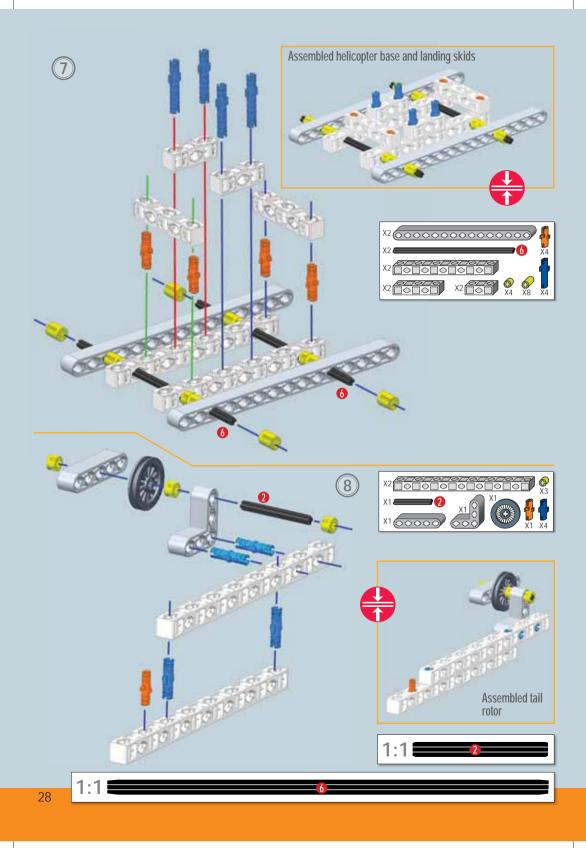
Technical and scientific information

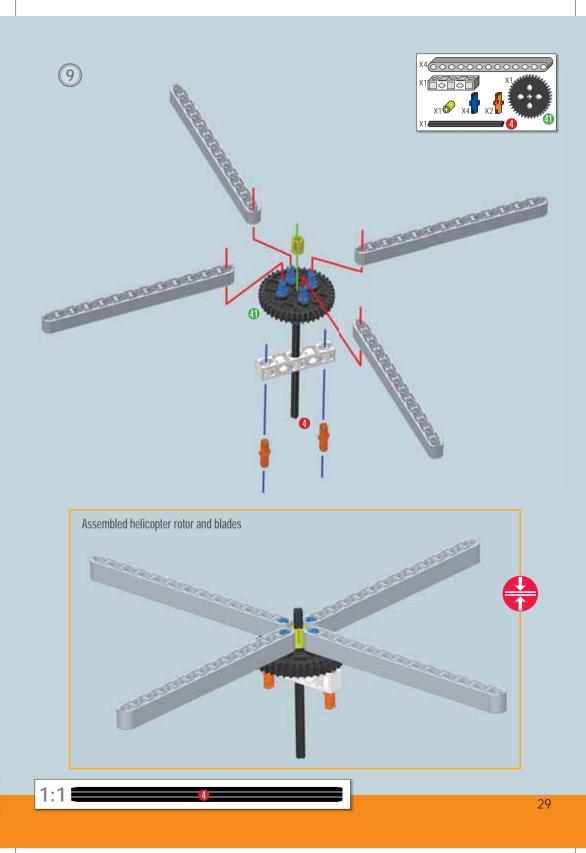
In a helicopter, the main rotor and blades act both as a wing to generate lift (see the Technical and scientific information for Activity 38), and as a propeller to provide thrust or drive. As the main rotor turns, in a clockwise direction, for example, a counter force is generated in an anti-clockwise direction. Helicopters are also fitted with a tail rotor to prevent them from spiralling. X1 60000

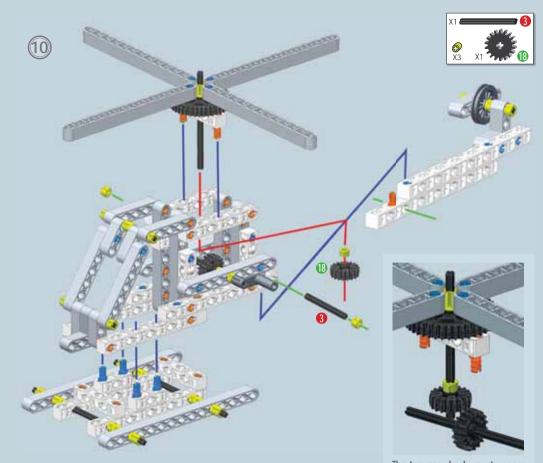
X4 X2









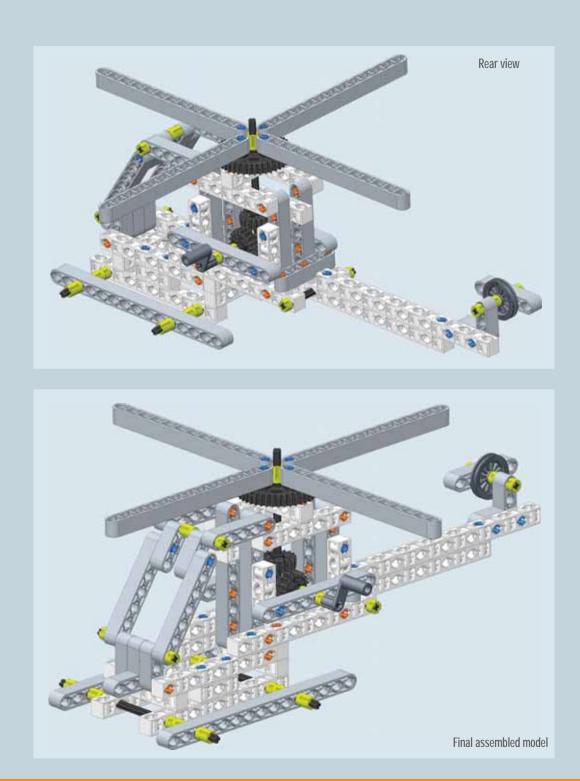


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The two cogwheels must engage with each other at right angles, with the two rods almost touching.

Technical facts and curiosities

- 1877 Unmanned helicopter. In Milan, Enrico Forlanini demonstrated a contraption that
 - rose 15 metres into the air and stayed there for 20 seconds.
- 1907 Manned helicopter. French engineer **Paul Cornu**, built a machine with propellers on independent axles. The helicopter lifted the Frenchman 30 centimetres off the ground for about 20 seconds.
- 1925 Dutch inventor **Albert Gillis von Baumhauer** built the first helicopter with a tail rotor and two independent motors.
- 1930 Italian engineer **Corradino D'Ascanio** designed and built a helicopter piloted in Rome by Marinello Nelli, who kept it in the air for about 10 minutes, travelling 1 km at a height of 20 metres.



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