



8+
88-90188



INNOVATIVE DETECTOR CHALLENGE

INSTRUCTIONS



INNOVATIVE DETECTOR CHALLENGE

WARNING

Adult supervision and assistance is required. This unit is only for use by children aged 8 years and older. Not suitable for children under age 3 years old due to small part(s) and component(s) – CHOKING HAZARD. Read and follow all instructions in the manual before use. This toy contains small parts and functional sharp points on components. Keep away from children under age 3 years. 4 x AA size batteries are required (not included) Please retain the information and this manual for future reference. Instructions for parents are included and have to be observed. Warning. Do not use close to the ear! Misuse may cause damage to hearing. Do not aim at eyes and face. Do not use improvised projectiles.

CAUTION!

When experiment is finished, make sure the batteries are disconnected and switch off the unit before you clear away the wires. Do not apply any components or parts to the unit other than those provided with this kit. Do not lock the motor or other moving parts. Otherwise it may cause overheating. The toy is not to be connected to more than recommended number of power supplies.

BATTERY INFORMATION

Use 4 x AA size batteries (not included) For best performance, always use fresh batteries and remove batteries when not in use Batteries must be inserted with the correct polarity Non-rechargeable batteries are not to be recharged Re-chargeable batteries are only to be charged under adult supervision Re-chargeable batteries are to be removed from the toy before being charged Different types of batteries or new and used batteries are not to be mixed. Exhausted batteries are to be removed from the toy The supply terminals are not to be short-circuited Only batteries of the same or equivalent types are to be used Do not dispose of the batteries in fire Do not mix old and new batteries Do not mix alkaline, carbon zinc and re-chargeable batteries

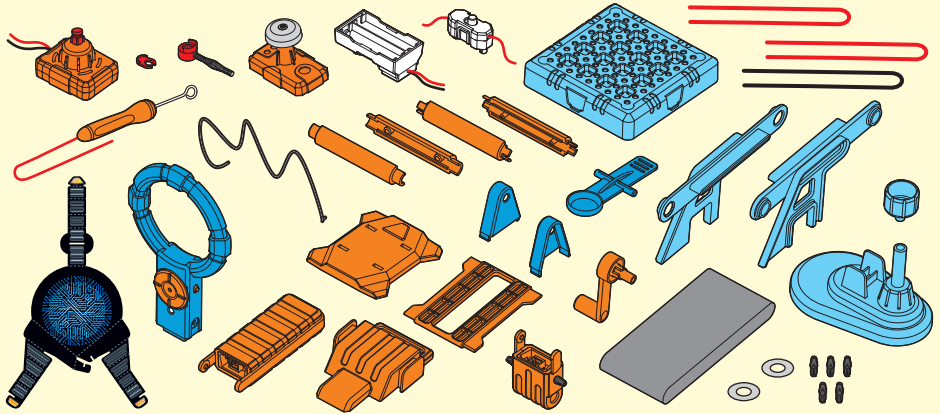
How does the metal detector work?

To understand the working principle of the metal detector, first you will need to know the relationship between electricity and magnetism. When an electric current flows through a wire, a magnetic field will be generated at the same time. So people round up a wire to form a coil, in order to concentrate the magnetic field at the center of the coil. When electricity is flowing in the coil, a concentrated magnetic field will be there. And the reverse holds true: when the coil passes through a magnetic field, current will be induced in the coil (if the two ends of the coil are connected). Now this is the basic principle of electricity and magnetism, called electromagnetism. This metal detector makes use of such principle to detect metallic object. When the ring (containing the coil) moves near a metallic object, the magnetic field generated by the coil will induce eddy currents inside the metallic object. Eddy currents will induce magnetic fields of their own, and there is a second set of coil in the metal detector. The magnetic fields of the eddy currents will induce electricity in the second coil, so thereby reflecting the fact that there is a metallic object detected! This is the basically working principle of how the metal detector works.

How does the maze experiment work?

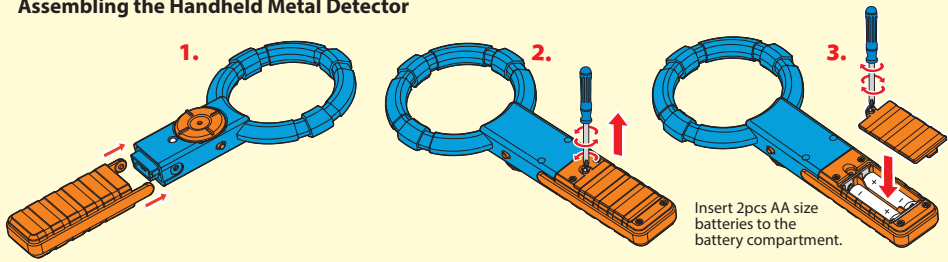
The maze experiment works base on some simple electronic circuit principles. Note that after you have constructed the maze experiment, no electricity is flowing through the kit yet. During the maze experiment, if your wand touches the metal wire, then the circuit will be connected. The bell will then ring because electricity is flowing through the circuit and activates the motor which makes the spring rod hit the bell. Test your hand skills on the maze experiment by passing the wand through the maze from one end to the other. If your wand touches the metal wire, the bell will ring. This means you fail in the experiment. As a result, electric current flows through the circuit and thus the motor will start working and ring the bell. If the wand does not touch the metal wire, the circuit is not connected and thus no bell ring will be made.

COMPONENTS



ASSEMBLY

Assembling the Handheld Metal Detector



How to use

Sensitivity Adjuster

Use the Adjuster to alter its sensitivity. Keep away from metal objects. To start, push the mode selector to normal mode, then switch on the sensitivity adjuster in a clockwise direction to activate the metal detector. Switch the sensitive adjuster to fine-tune its sensitivity, by doing so the detector will make noise if it's too sensitive but it will not react either if it's not sensitive. You will need to switch to clockwise and anti-clockwise to find a sensitive point in between. You might need to test out a few times to make sure that the adjuster is a the point which the detector will make noise between noise to no noise level. Right after the sound disappears is the best sensitivity level to experiment. To test it you can put a metal piece near the detector ring to see any sound. Remarks: When you are done experimenting, switch the adjuster to anti-clockwise direction to the end to turn off the metal detector mode.

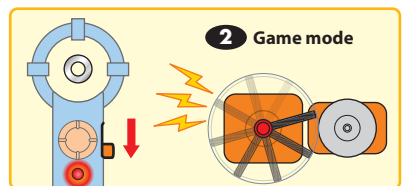
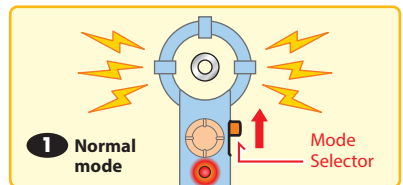
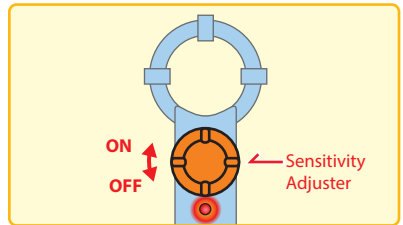
There are two modes for the metal detector:

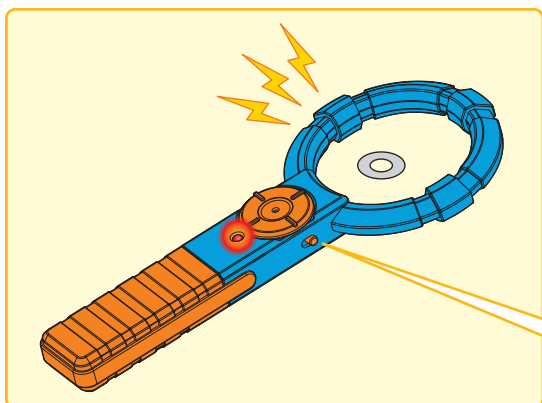
1. Normal Mode

Push up the Mode Selector. When there is a metal piece near the detector ring, the detector will make noise and LED will light up to indicate that it detects a metal. When the metal piece is removed from it, noise and LED will stop. (This mode is used for **Model A**, **Model B** and **Model C**)

2. Game Mode

Push down the Mode Selector. When there is a metal piece near the detector ring, the spring pole will start rotating, the bell will ring and LED will shine to indicate it detects a metal piece. When the metal piece is moved away, the rotation will stop after seconds and LED will go off. (This mode is used for **Model D** and **Model E**)

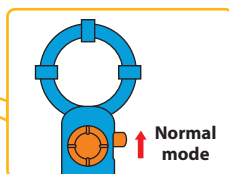




Model A

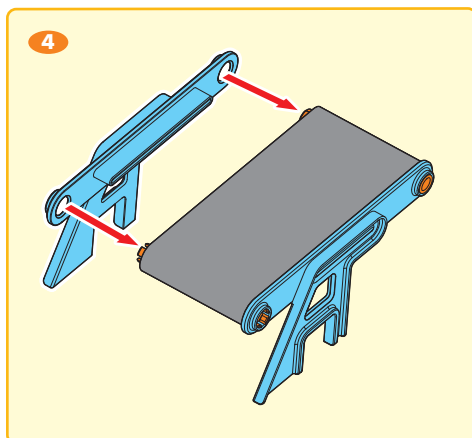
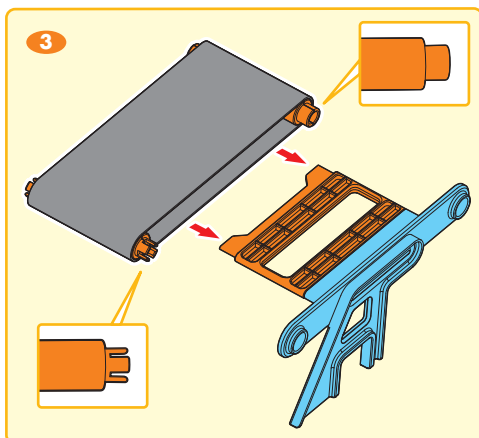
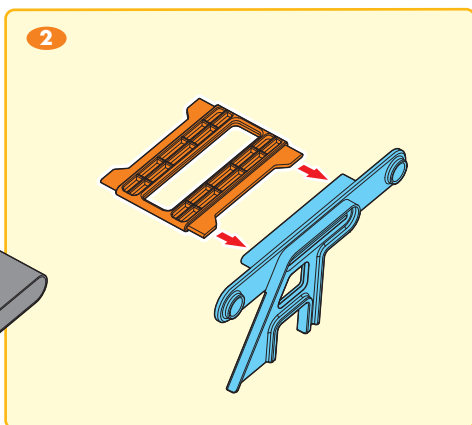
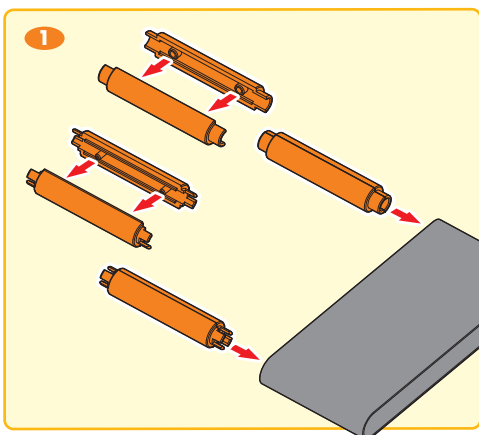
Let's go try the Handheld Metal Detector!

Switch the metal detect to "Normal mode" and adjust sensitivity. You can experiment it on daily life objects: coins, metal ruler, key and etc. Try to cover the metal piece with a cloth or a piece of wood. Does it work?

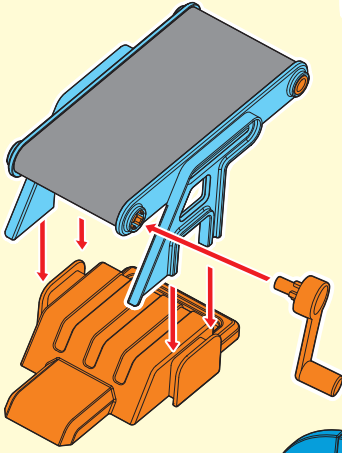


Model B

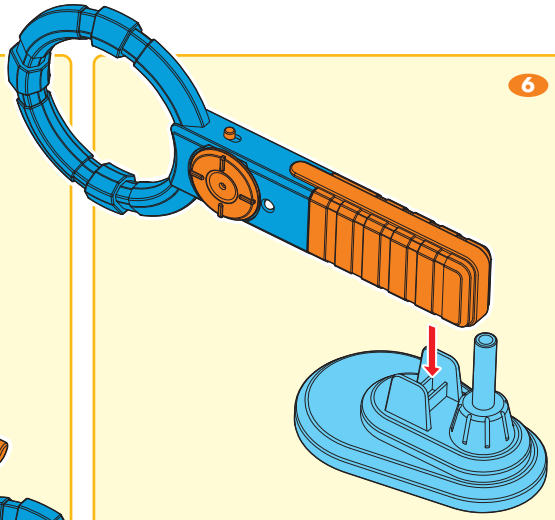
Assembling the Metal Detector Security Check System - 1



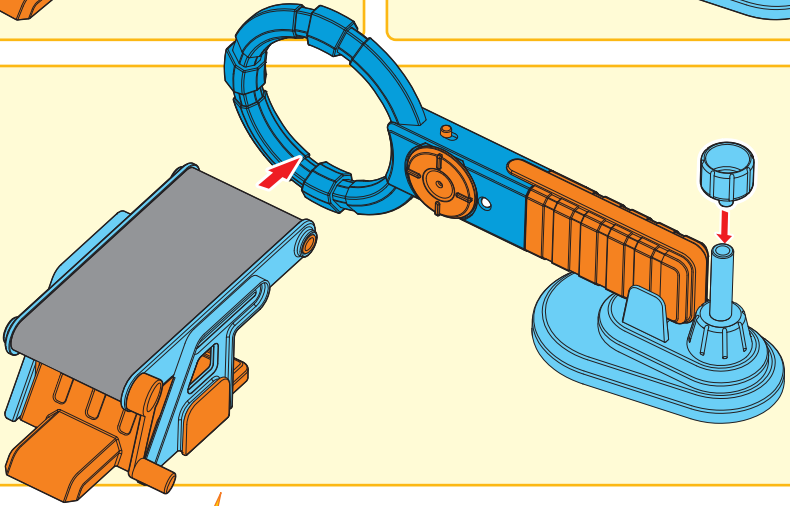
5



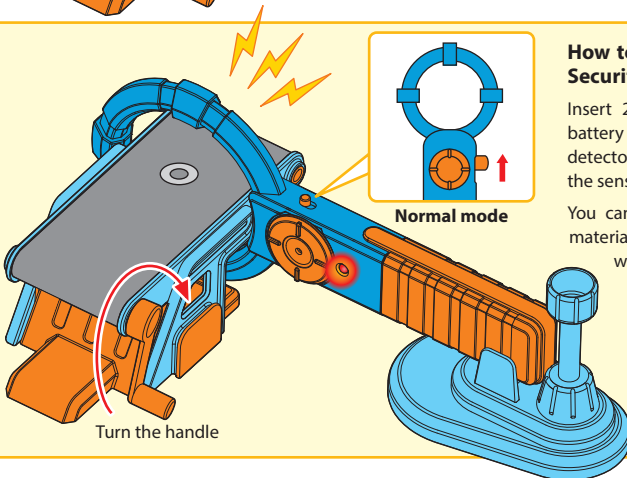
6



7



8



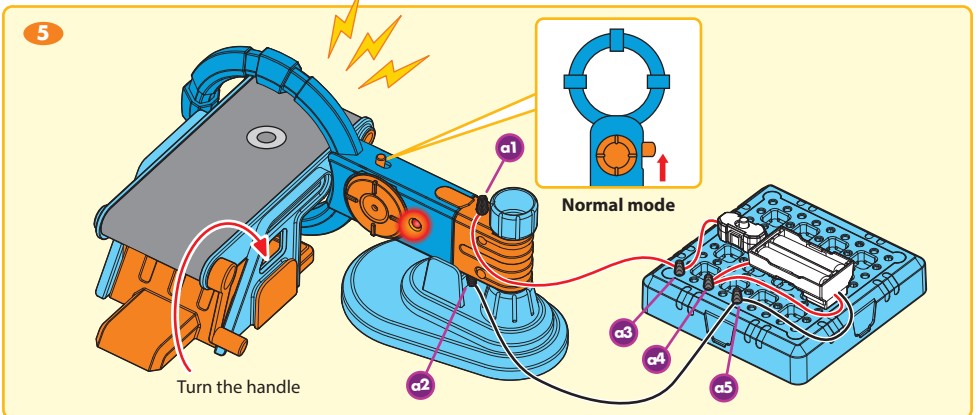
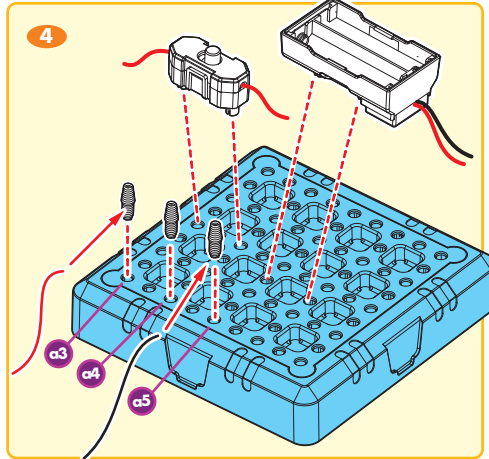
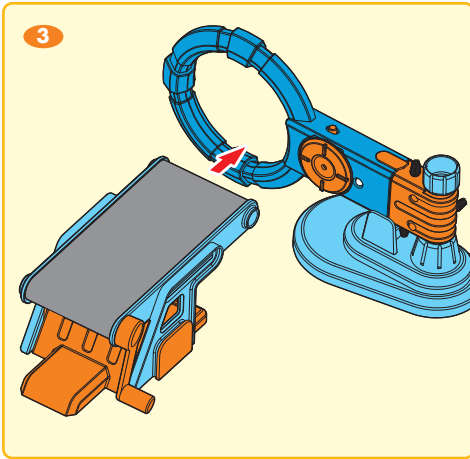
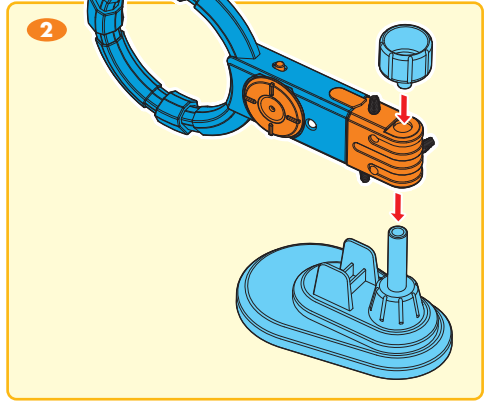
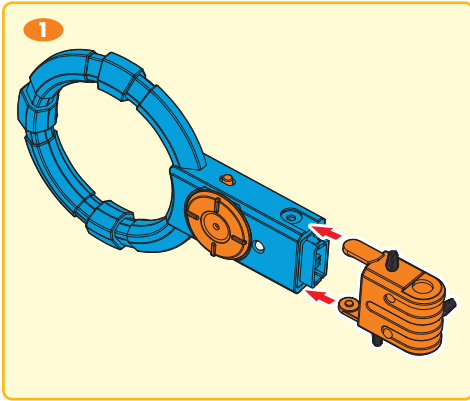
How to play the Metal Detector Security Check System - 1

Insert 2pcs AA size batteries to the battery compartment. Switch the metal detector to "Normal mode" and adjust the sensitivity adjuster.

You can use a metal coin and other materials to test. Try to turn the handle, when a metal piece has passed through the ring, the detector will respond to indicate that it detects a metal piece.

Model C

Assembling the Metal Detector Security Check System - 2



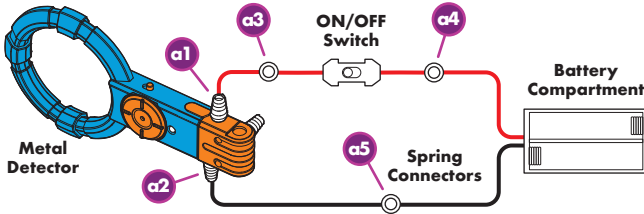
BASIC CONNECTION PRINCIPLE

| Wiring connections | Spring (a3) | Spring (a4) | Spring (a5) |
|------------------------------|-------------|-------------|-------------|
| Metal Detector - Spring (a1) | red | | |
| Metal Detector - Spring (a2) | | | black |
| ON/OFF switch | red | red | |
| Battery Compartment | | red | black |

How to play the Metal Detector Security Check System - 2

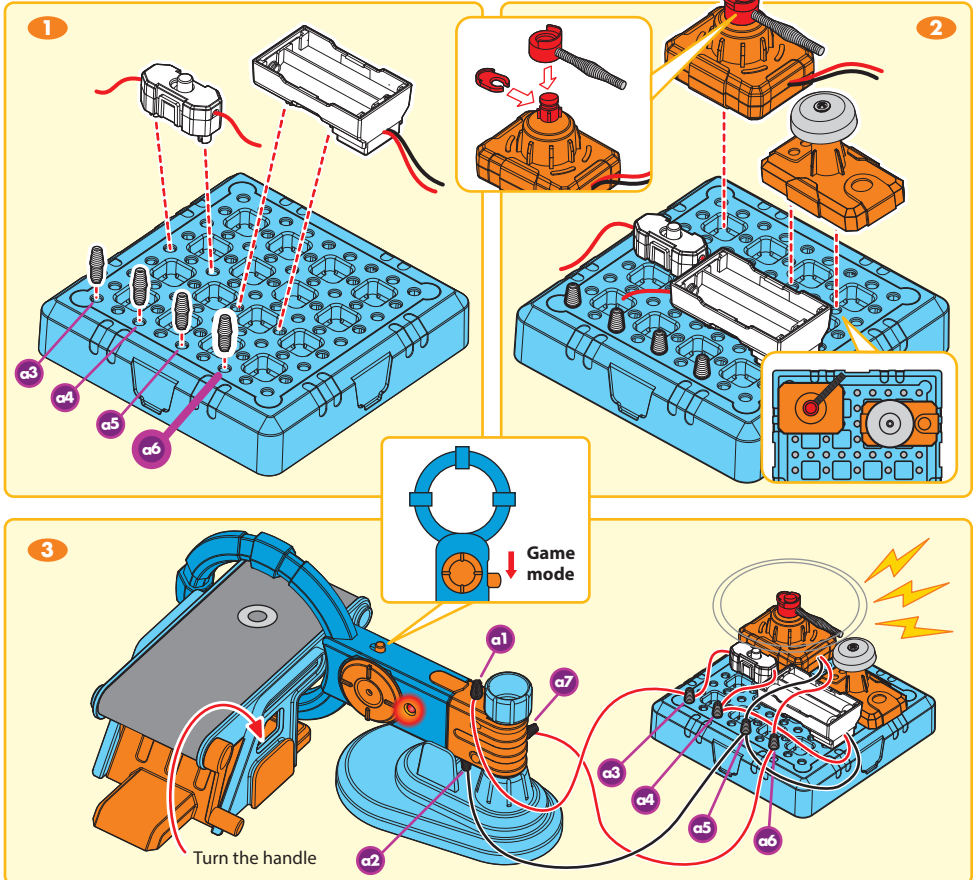
Insert 2pcs AA size batteries to the battery compartment. Put the metal detector to "Normal mode" and switch on the ON/OFF switch. Then adjust the sensitivity adjuster.

You can use a metal coin and other materials to test. Try to turn the handle, when a metal piece has passed through the ring, the detector will respond to indicate that it detects a metal piece.



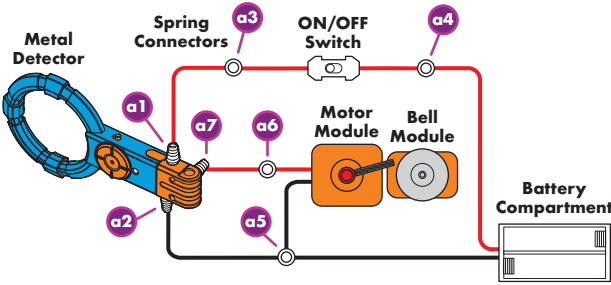
Model D

Assembling the Metal Detector Security Check System -3



BASIC CONNECTION PRINCIPLE

| Wiring connections | Spring (a3) | Spring (a4) | Spring (a5) | Spring (a6) |
|------------------------------|-------------|-------------|-------------|-------------|
| Metal Detector - Spring (a1) | red | | | |
| Metal Detector - Spring (a2) | | | black | |
| Metal Detector - Spring (a7) | | | | red |
| ON/OFF switch | red | red | | |
| Battery Compartment | | red | black | |
| Motor Module | | | black | red |



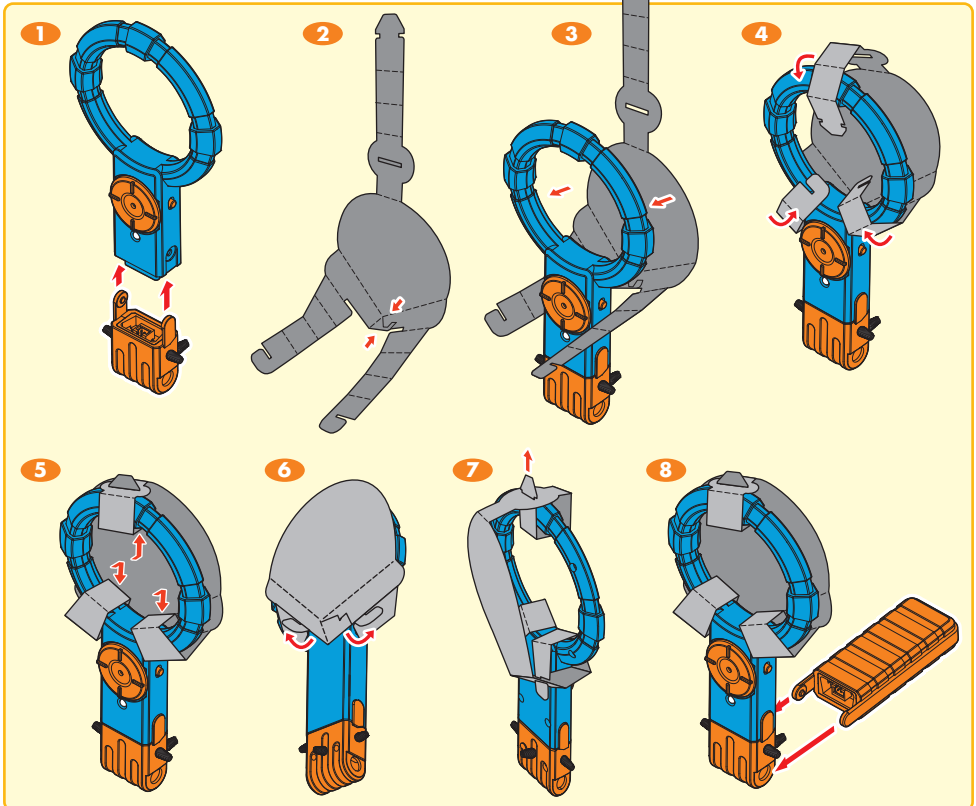
How to play the Metal Detector Security Check System - 3

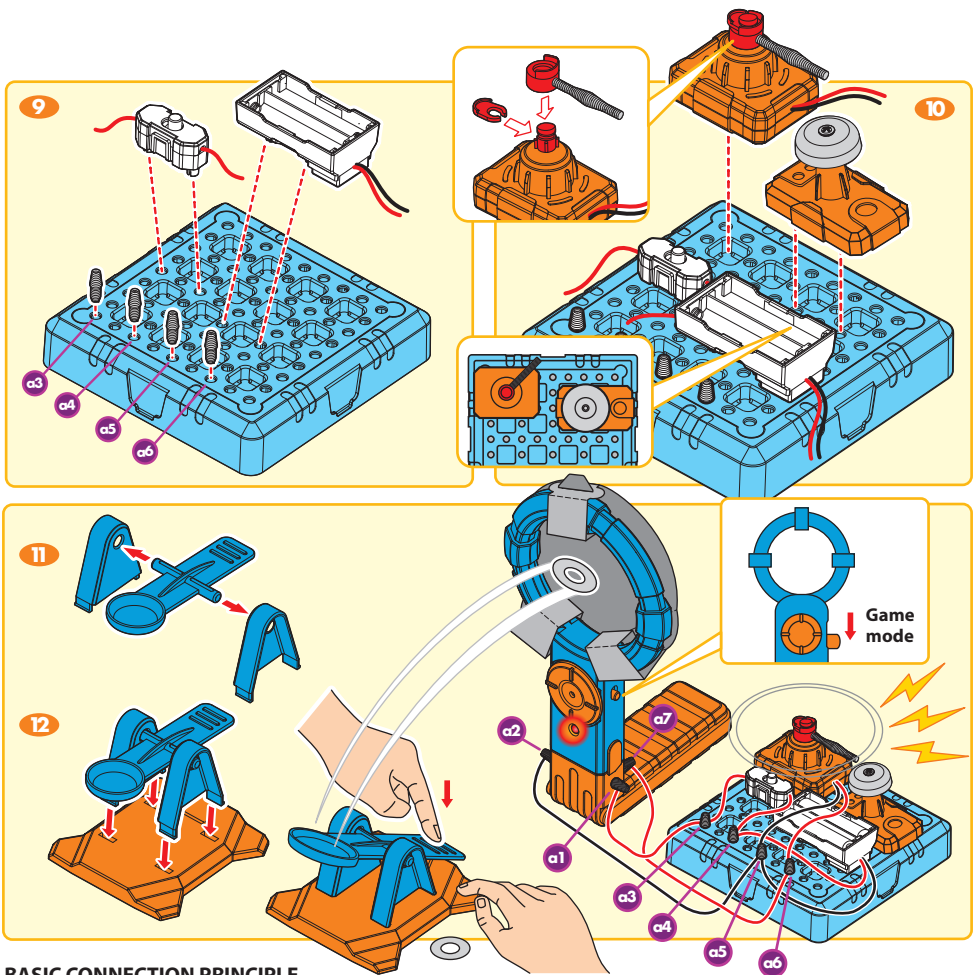
Insert 2pcs AA size batteries to the battery compartment. Put the metal detector to "Game Mode" and switch on the ON/OFF switch. Then adjust the sensitivity adjuster.

You can use a metal coin and other materials to test. Try by turning the handle. So that the bell rings only when a metallic material has passed through the ring.

"Metal Detector Security Check System" is an example like a metal detection security check system in the airport. When someone passes through the security check point hiding a metal knife or gun, then the system will offset and warn the airport security!

Model E Assembling the Metal Detector Shooting Game





BASIC CONNECTION PRINCIPLE

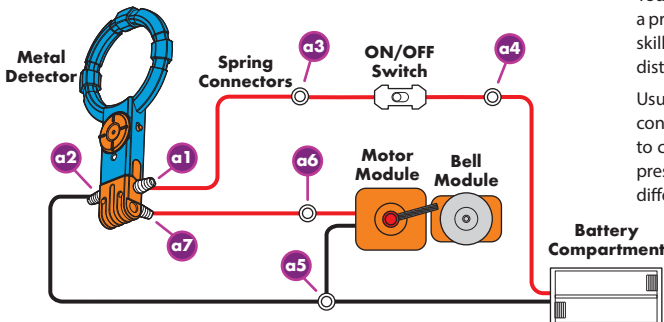
| Wiring connections | Spring (a3) | Spring (a4) | Spring (a5) | Spring (a6) |
|------------------------------|-------------|-------------|-------------|-------------|
| Metal Detector - Spring (a1) | red | | | |
| Metal Detector - Spring (a2) | | | black | |
| Metal Detector - Spring (a7) | | | | red |
| ON/OFF switch | red | red | | |
| Battery Compartment | | red | black | |
| Motor Module | | | black | red |

How to play the Metal Detector Shooting Game

Insert 2pcs AA size batteries to the battery compartment. Put the metal detector to "Game Mode" and switch on the ON/OFF switch. Then adjust the sensitivity adjuster.

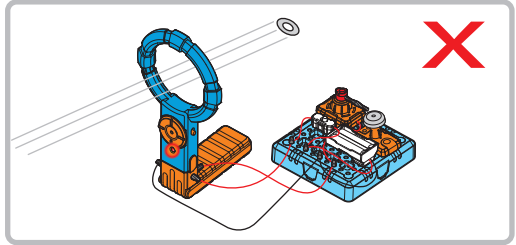
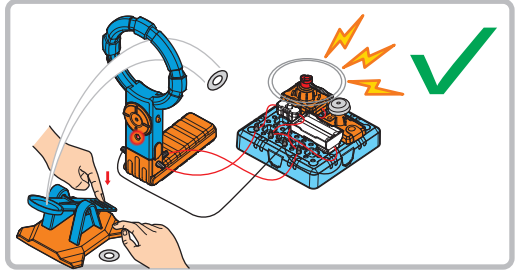
You can use the included metallic object as a projectile for the game. Test out your hand skill and try to shoot into the ring through a distance!

Usually a heavier one will be better to control. If the metal is too light, it is difficult to control because a slight variation on the pressing force will result in a large difference in the projectile path.



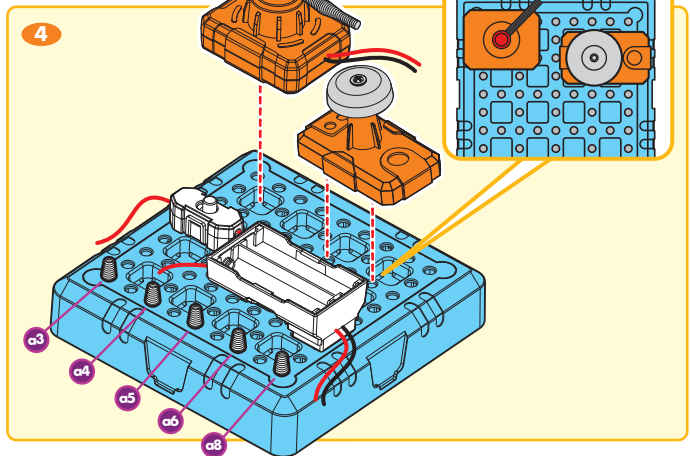
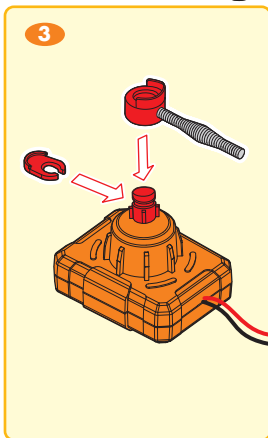
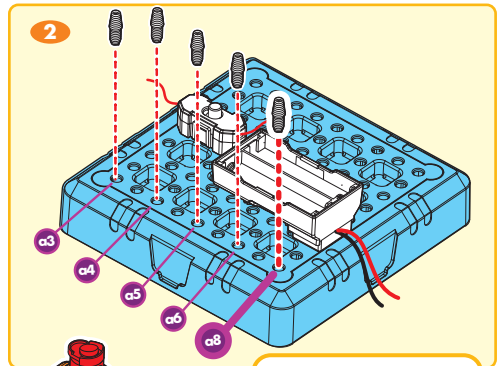
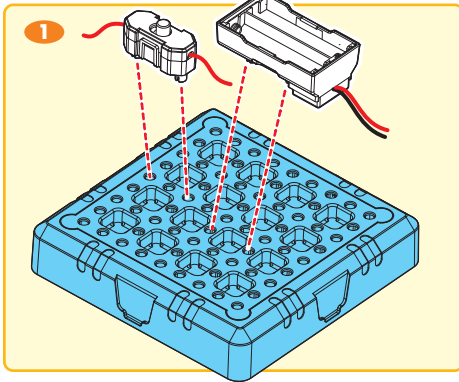
You can also try to remove the paper cardboard behind the ring and use the catapult to shoot the metal piece into the ring. By launching the catapult, the metal object will give projectile motion in a parabolic trajectory and the metal object will fly slower with the chance of metal detector getting higher possibility of detection. When the metal object passes through the detector, the bell will ring for a few seconds. However, using another way to pass through the detector like straight line throw to pass the metal detector, then the possibility of positive detection will be lowered as the metal is projecting too fast to detect its existence.

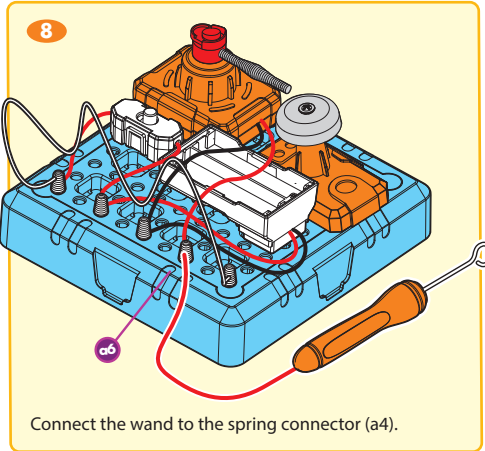
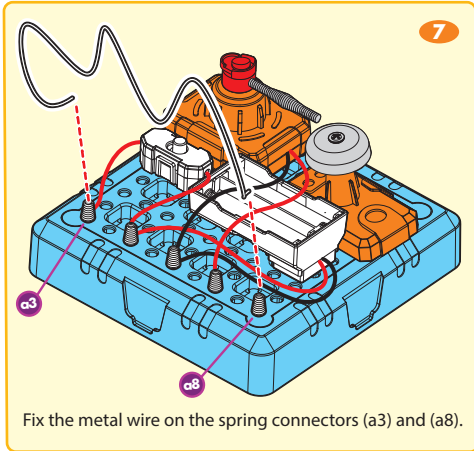
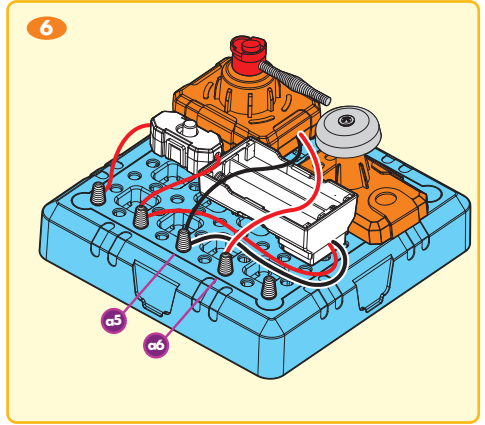
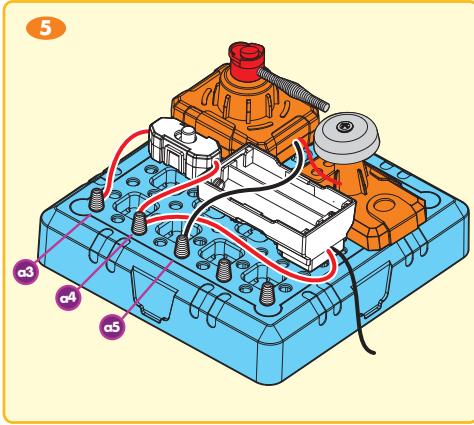
Remarks: The metal detector might not respond well when a metal object passes through if the metal object soars too fast. This can be common and please try again. If there is still no response after a few tries, please follow page two to adjust the sensitivity again.



Model F

Assembling the Maze Experiment





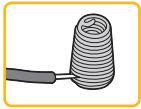
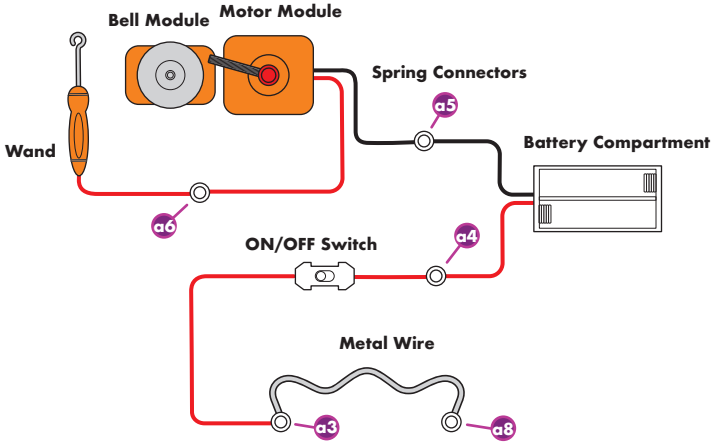
BASIC CONNECTION PRINCIPLE

| Wiring connections | Spring (a3) | Spring (a4) | Spring (a5) | Spring (a6) | Spring (a8) |
|---------------------|-------------|-------------|-------------|-------------|-------------|
| Battery compartment | | red | black | | |
| ON/OFF switch | red | red | | | |
| Motor Module | | | black | red | |
| Metal Wire | silver | | | | silver |
| Wand | | | | red | |

How to play the Maze Experiment

Insert 2pcs AA size batteries to the battery compartment. Turn the switch ON and put the ring of the wand around the metal wire through the open area of the ring. Keep your hand steady and carefully move the ring of the wand through the metal wire. If the ring touches the metal wire, the bell will ring and you lose!

Complete the maze to achieve the fastest time against your friends. Bend the metal wire to create different levels of difficulty. Please ensure the switch is off and batteries are removed from battery compartment before bending the metal wire.



Ensure all wires are correctly connected to the battery terminals and spring connectors as stated in the instruction. Bend the spring connector over and insert the exposed shiny conductor part of wire into the spring connector. If the circuit does not work, make sure the insulated “plastic” part of the wire is not obstructing the connection to the spring connector, and make sure the wires are securely connected.

Warning! Do not short-circuit the battery terminals and spring connectors. Otherwise it may cause overheating. Do not lock the motor or other moving parts. Otherwise it may cause overheating.



© 2021 Explore Scientific, LLC.
 1010 S 48th Street, Springdale, AR 72762
 explorescientificusa.com | 866.252.3811
 All rights reserved. Made in China.



If at any time in the future you should need to dispose of this product please note that waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your local authority or retailer for recycling advice. (Waste Electrical and Electronic Equipment Directive)