

13. Place all the metal balls (part N) in the spiral track. They will roll along the channel in the base until they reach the turning wheel.  
14. Turn on the marble machine. One by one the balls will be raised by the turning wheel and run around the spiral track.

### E. TROUBLE SHOOTING

If the motor doesn't run: check that the bare wires are touching the terminals and that you have used a fresh battery.  
If the turning wheel turns in the wrong direction in step 14: check that the wires are the correct way round in step 6.

### F. HOW DOES IT WORK?

The battery operates the motor, which turns the worm gear on its shaft. This turns the small gear slowly, which turns the large gear. The large gear turns the drive gear which operates the turning wheel. When a slot in the wheel passes the bottom of the track, a ball falls into it. When the ball reaches the top position it can fall out and enter the spiral. Gravity makes the ball roll around the spiral until it reaches the hole at bottom.

### G. FUN FACTS

- The Marble Machine is an example of a machine called a marble run.
- When the ball leaves the wheel it rolls around the spiral instead of straight towards the centre. The shapes of the spiral means that gravity keeps the ball rolling downwards as though it were on a long spiral ramp.
- The ball drops lower and lower on the spiral because friction gradually slows it down.
- If there were no friction between the ball and the spiral, the ball would keep going around in a circle, like a planet orbiting a star.
- There are lots of different types of energy, including heat, light and sound.
- As a marble travels around the marble machine it has two different types of energy: gravitational potential energy and kinetic energy.
- Gravitational potential energy is the energy that an object has because of its vertical position. The higher up an object is, the more potential energy it has.
- Kinetic energy is energy that an object has because it is moving. The faster an object is moving, the more kinetic energy it has.
- When a marble is moved up by the wheel it gets potential energy. Then when it rolls down the track the potential energy is converted to kinetic energy. This is an example of an energy change, where one type of energy changes to another.
- When a marble reaches bottom of the track and stops, all its energy is gone. The energy it had gets changed into heat because of friction, and also sound.
- Energy is needed to give the marbles potential energy at the start of the run. This comes from chemical energy in the batteries that power the motor.

### QUESTION AND COMMENTS

We treasure you as a customer and your satisfaction with this product is important to us. In case you have any comments or questions, or you find any parts of this kit missing or defective, please do not hesitate to contact our distributor in your country, whose address is printed on the package. You are also welcome to contact our marketing support team at Email: infodesk@4M-IND.com, Fax (852) 25911566, Tel (852) 28936241, Web site: WWW.4M-IND.COM

# ELECTRIC MARBLE RUN

PLEASE SCAN THE QR CODE TO VIEW MULTI-LANGUAGE INSTRUCTIONS



FR. Veuillez scanner le code QR pour afficher les instructions multilingues pour ce kit. DE. Bitte scannen den QR-Code, um die mehrsprachige Anleitung für dieses Set anzusehen. NL. Scan de QR-code om de instructies voor deze set in verschillende talen te bekijken. IT. Scansiona il codice QR per visualizzare le istruzioni multi-lingua per questo kit. ES. Escanea el código QR para ver instrucciones en varios idiomas para este kit. JA. QRコードをスキャンして、本キットの多言語説明書をご覧ください。

**WARNING:**  
**CHOKING HAZARD - Toy contains small parts & small balls.**  
**Not for children under 3 years.**

TO PARENTS: PLEASE READ THROUGH THESE INSTRUCTIONS BEFORE PROVIDING GUIDANCE TO YOUR CHILDREN.

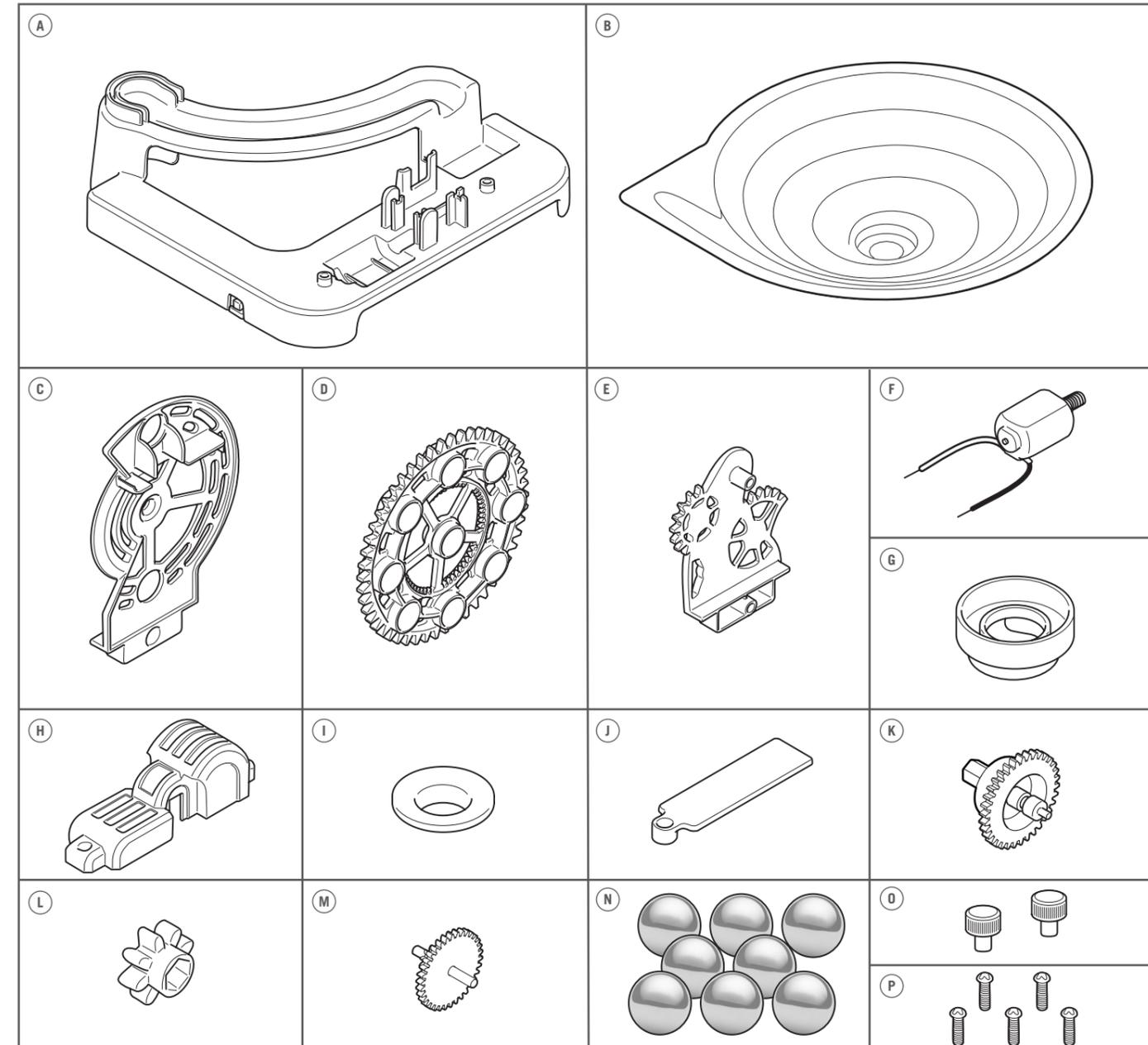
### A. SAFETY MESSAGES

1. Please read through all the instructions and keep them since they contain important information. 2. Adult assistance and supervision are required. 3. This kit is intended for children 5 years or older. 4. This kit and its finished product contain small parts and small balls which may cause choking if misused. Keep away from children under 3 years old. 5. To prevent possible short circuits, never touch the contacts inside the battery case with any metal. 6. Only install batteries after the kit is assembled. Adult supervision is required.

### B. USE OF BATTERY

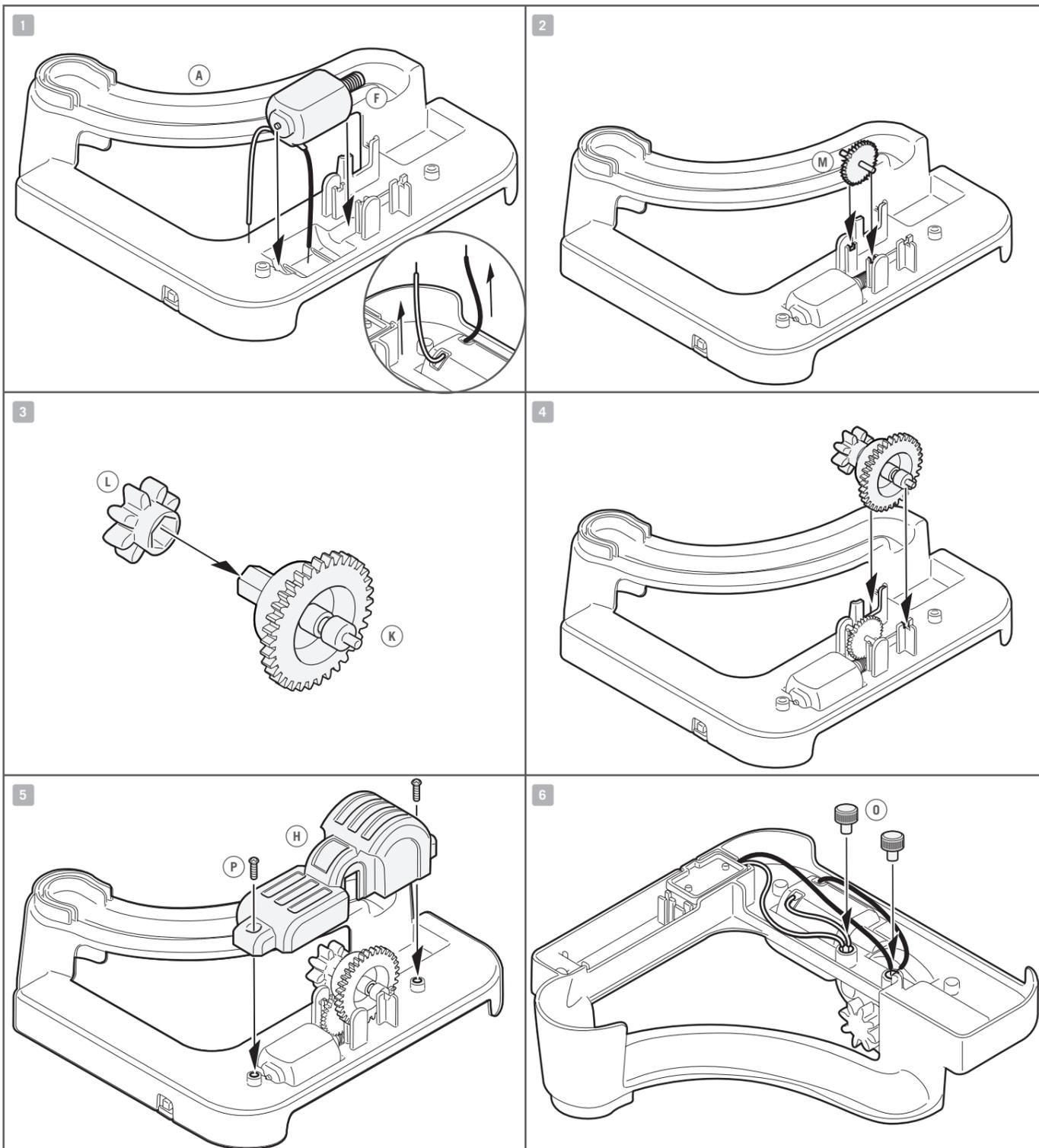
1. Requires one 1.5V AAA battery (not included). 2. For best results, always use a fresh battery. 3. Make sure you insert the battery with the correct polarities. 4. Remove the battery from the kit when not in use. 5. Replace an exhausted battery straight away to avoid possible damage to the kit. 6. Rechargeable batteries must be removed from the kit before recharging. 7. Rechargeable batteries should be recharged under adult supervision. 8. Make sure that the supply terminals in the battery case are not short circuited. 9. Do not attempt to recharge non-rechargeable batteries.

### C. CONTENTS

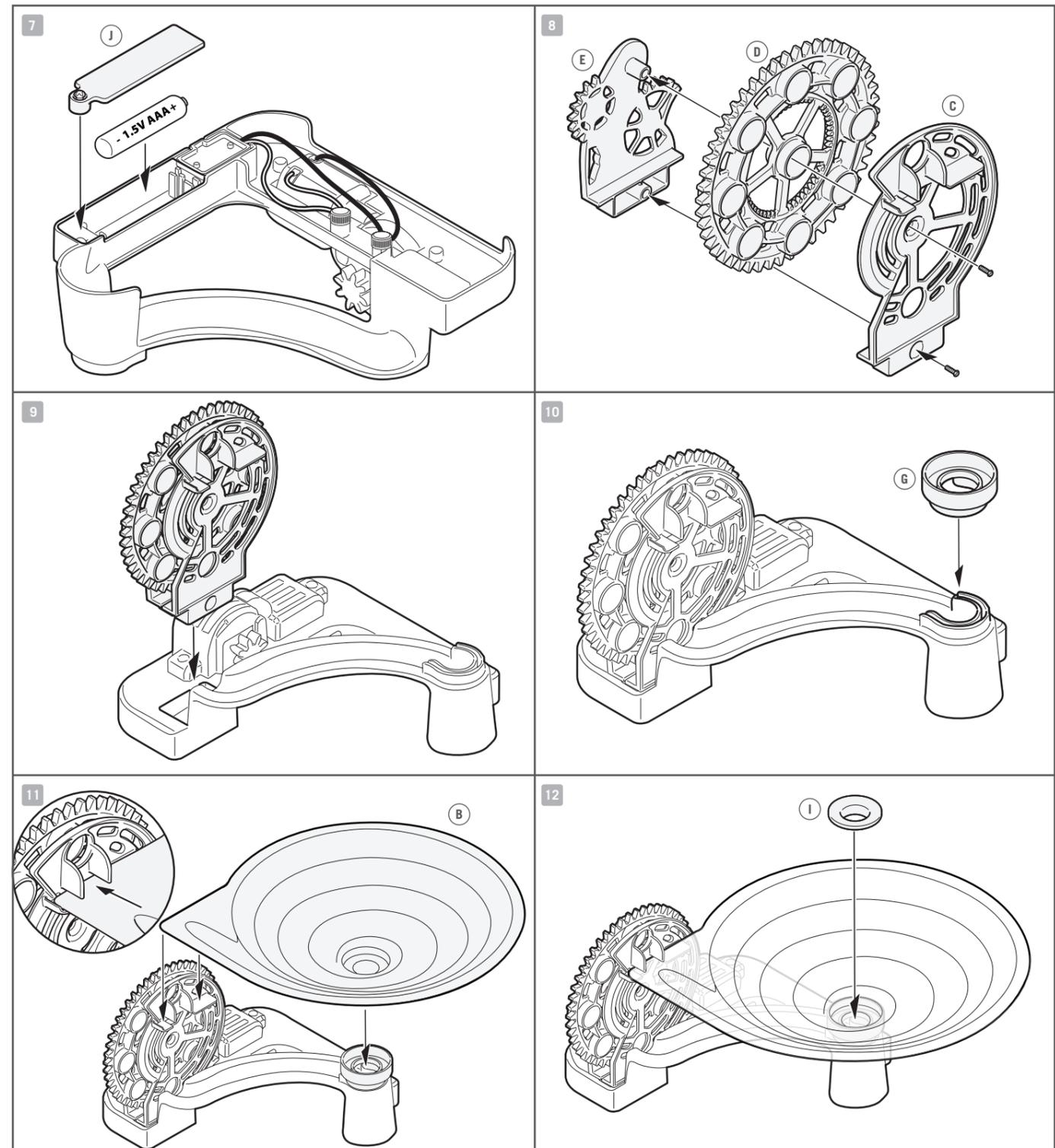


Part A: Base, Part B: Spiral track, Part C: Back plate, Part D: Turning wheel, Part E: Front plate, Part F: Motor, Part G: Track connector, Part H: Motor cover, Part I: Track lock, Part J: Battery cover, Part K: Large gear, Part L: Drive gear, Part M: Small gear, Part N: Metal balls x 8, Part O: Terminal caps x 2, Part P: Screws x 5. Also required but not included in the kit: 1 x 1.5V AAA battery, a small crosshead screwdriver.

## D. INSTRUCTIONS



1. Place the motor (part F) on the base (part A) with the wire side facing downwards. Make sure the red and black wires pass through the holes in the base.
2. Place the small gear (part M) in the base as shown.
3. Slot the large gear (part K) into the drive gear (part L).
4. Place the gear assembly in the base as shown.
5. Place the motor cover (part H) over the motor and gears and secure it with two screws (part P).
6. Push the red and black wires into the terminals as shown and secure them with two terminal caps (part O).



7. Insert an AAA battery into the battery compartment. Add the battery cover (part J) and secure it with a screw.
8. Assemble the turning wheel (part D), the front plate (part E) and the back plate (part C) as shown. Secure the plates together with two screws.
9. Slot the turning wheel assembly onto the base.
10. Push the track connector (part G) onto the end of the track in the base.
11. Place the spiral track (part B) on the base as shown. Make sure that the flat section of the track slots into the supporting plate on the turning wheel assembly.
12. Push the track lock (part I) into the centre of the spiral track.