# **EXPERIMENT MANUAL**



# Lesson Plan and Experiment Manual

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# **IMPORTANT INFORMATION**

# **Safety Information**

**Warning!** Not suitable for children under 3 years. Choking hazard small parts and small ball may be swallowed or inhaled.

Keep the packaging and instructions as they contain important information.

Warning. Do not discharge an object other than the projectile provided with this toy.

This product requires the Kids First Coding & Robotics base kit. Refer to the safety information on the packaging and in the instructions for that kit.

Store the experiment material and assembled models out of the reach of small children.

MARNING: CHOKING HAZARD — Small parts. Toy contains a small ball. Not for children under 3 yrs.

# **ASSEMBLY TIPS**

#### **ANCHOR PINS AND CONNECTORS**



Take a careful look at the different assembly components. Blue anchor pins, pink shaft plugs, blue joint pins, and gray long joint pins all look pretty similar at first glance. When you assemble the models, it's important to use the right ones.

### CONNECTING FRAMES AND RODS

Use the anchor pins to connect frames and rods.



#### AXLES

The building system contains axles (also called shafts) of various lengths. When assembling the model, always be sure that you're using the right one.



#### PART SEPARATOR TOOL

If any of the building pieces are stuck together and too hard to separate with your bare hands, use the part separator tool like a crowbar to pry them apart. Use the narrow end of the lever to remove the anchor pins. You can use the wide end to pry out shaft plugs.

#### **PULLEYS AND GEARS**

If pulleys or gears are mounted too tightly against other components, they can be hard to turn. If you leave a gap of about 1 mm between the gear or pulley and an adjacent component, it will turn easily.



### **INTRODUCTION**

# Dear Parents, Teachers, and Other Supervising Adults,

This kit offers additional parts for models and coding challenges for the Kids First Coding & Robotics Kit, which is required to build all the models and perform the coding activities.

Together with the base kit, this kit is designed to teach children the basic principles of programming in a fun, interactive, and experimental way. This kit picks up where the base kit leaves off, offering more challenging builds with more technical features. The coding lessons are presented as challenges that the child must attempt to solve before the answers are given.

We recommend you use this kit after your child has mastered the lessons in the base kit, or for children who are ready for a more difficult challenge.

With your help, children will build robots and program them to complete a specific challenge. Children will likely need help from a parent or adult while using this product. They may need your help interpreting terms that are new to them. They may need your help assembling difficult models or programs. And they may need your help explaining what the robot is doing and why.

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# **KIT CONTENTS**



# Checklist: Find, Inspect, Check off

~	No.	Description	Qty.	Item No.
Ο	1	Short anchor pin	20	7344-W10-C2B
Ο	2	Shaft plug	6	7026-W10-H1K
Ο	3	Joint pin	12	7413-W10-T1B
Ο	4	Long joint pin	2	7413-W10-U1S
Ο	5	90-degree converter X	2	7061-W10-X1S2
Ο	6	3-hole cross rod	1	7026-W10-X1S2
Ο	7	3-hole wide rounded rod	4	7404-W10-C1S
$\overline{O}$	8	7-hole wide rounded rod	4	7404-W10-C2S
$\overline{O}$	9	7-hole flat rounded rod	4	7404-W10-C3S
$\overline{O}$	10	5-hole rod	2	7413-W10-K2S1
Ο	11	5-hole cross rod	2	7413-W10-R1S1
Ο	12	9-hole rod	2	7407-W10-C1S
Ο	13	11-hole rod	2	7413-W10-P1B1
Ο	14	Square frame	2	7413-W10-Q1B
Ο	15	Trapezoidal plate	2	7408-W10-A1Y
Ο	16	Trapezoidal cover	1	7408-W10-B1Y
Ο	17	Motor axle	2	7026-W10-L1S1

V	No.	Description	Qty.	Item No.
Ο	18	Axle, 35 mm	2	7413-W10-O1D
Ο	19	Axle, 70 mm	2	7061-W10-Q1D
Ο	20	Small gear	6	7026-W10-D2K
$\overline{O}$	21	Medium gear	4	7408-W10-D2YG
$\overline{O}$	22	Worm (for worm drive)	1	7344-W10-A1S1
Ο	23	Cube block, orange	2	880-W10-A1O3
$\overline{O}$	24	Convex block, orange	1	880-W10-R1O3
$\overline{O}$	25	Polystyrene ball	1	K30#7366-2
$\overline{O}$	26	Gripper	2	7411-W10-G1D
$\overline{O}$	27	Part separator tool	1	7061-W10-B1Y
Ο	28	Map cards, set of 6	1	K16#7442-A-1

## **Missing Parts?**

If you are missing any parts, please contact Thames & Kosmos customer service.

- US: techsupport@thamesandkosmos.com UK: techsupport@thamesandkosmos.co.uk
- ...



# **FORKLIFT**

9

10







# You will also need a piece of paper raised up on a small stand.

# **CHALLENGE 1**

Set up the map cards as shown. Place a piece of paper on the card as shown, with a small stand under it that will allow the forks to slide under the piece of paper to lift it up.

Create a program with the code cards to move the forklift robot from the Start card to the event map card A, where it will lift up the piece of paper. With the paper lifted, program the robot to move to map card B.

# **LIFT THE CARGO**



Start with the forks down (not up as shown).

Use the Start and event map cards and code cards from the base kit. Disregard the arrows on the Start map card for this challenge.







Set up the map cards as shown. Place the ball in the ball holder on the card as shown.

Create a program with the code cards to move the claw robot from the Start card to the event map card A, where it will extend its grabber claw and try to grab the ball. With the ball gripped in its claws (if possible), program the robot to move to map card B.

#### **GRAB THE BALL**



Use the Start and event map cards and code cards from the base kit. Disregard the arrows on the Start map card for this challenge.



## PREPARATION

Build this model and then complete the coding challenge on page 10.



Use the robotic base unit from the base kit.









Set up the map cards as shown. Place the basket on the card as shown.

Create a program with the code cards to move the catapult robot from the Start card to event map card A, where it will shoot the ball into the basket. After that, program the robot to move to map card B.







Set up the map cards as shown. Place any object as an obstacle on the card as shown.

Create a program with the code cards to move the walker robot from the Start card to the event map card A, where it will light up and play a sound. Then, program the robot to move around the obstacle to map card B.

## WALK AROUND THE OBSTACLE







Set up the map cards as shown. Place some small objects to be pushed by the bulldozer on the map card as shown.

Create a program with the code cards to move the bulldozer robot from the Start card to the event map card A, pushing the load with its blade in the process. At the event card, it should raise its blade and move to map card B.

#### **PUSH THE LOAD**







#### **RAISE THE PLATFORM**

Set up the map cards as shown.

Create a program with the code cards to move the scissor lift robot from the Start card to the event map card A, where it will raise its platform up into the air, lower it, and raise it up again. With the platform raised, program the robot to move to map card B.







Set up the map cards as shown. Place a small object for the hammer robot to hammer on the map card as shown.

Create a program with the code cards to move the hammer robot from the Start card to the event map card A, where it will hammer the object a few times (or pretend to). Then, program the robot to move to map card B.

#### **HAMMER THE OBJECT**





#### PREPARATION

Build this model and then complete the



1

x2



Set up the map cards as shown. Place some small, loose parts along the map cards as shown.

Create a program with the code cards to move the plow robot from the Start card to the event map card A, pushing the small objects off the card in the process.

At the event card, the robot should raise its plow up in the air and then move to map card B.

#### **PLOW THE FIELD**



## SOLUTIONS

There are multiple solutions to each coding challenge. Here is an example of one correct solution for each challenge.





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