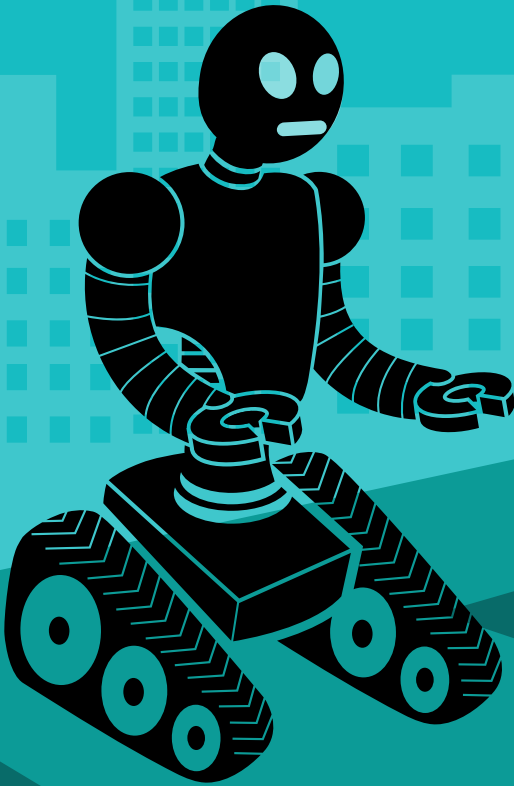




// CODE

PROGRAMMING GAME SERIES

// ON THE BRINK



Instruction Manual

**AGES 8
to Adult**

// CODE ON THE BRINK

PROGRAMMING GAME SERIES //

Coding is like a superpower. It might be the reason you can make a robot work. It might even help you do something really big for the world, like send a rocket to Mars. One thing is for sure, if you learn to code, you will never be out of things to do with your new super skill.

ON THE BRINK is the first in a series of games designed to build the mental skills needed to fully grasp the concept of coding. All of the games are screen-free for a unique, unplugged play experience. Take them anywhere you go, and before you know it, you'll be ready to CODE!

Visit www.thinkfun.com/learn-coding for video instructions, solution strategies, and more great resources from the inventor!

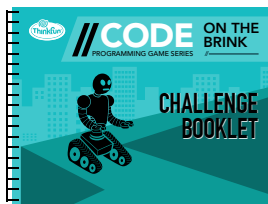
// Includes



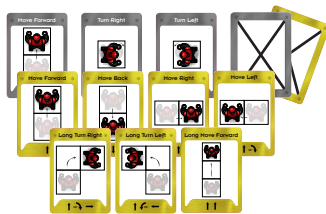
Control Panel



1 Robot



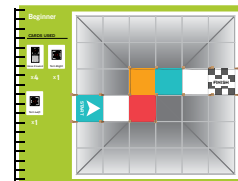
40 Game Boards



18 Movement Cards

Game Boards

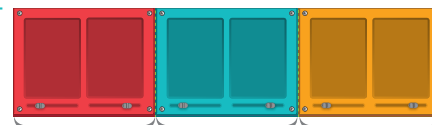
There are 40 different Game Boards within the Challenge Booklet which contains leveled challenges from Beginner to Expert. Each Game Board consists of a path made up of a combination of red, blue, orange, and white squares.



Game Board

Control Panel

The Control Panel consists of three colored panels which correspond with the colored squares on the Game Boards. Each panel holds two Movement Cards.



Red Panel

Blue Panel

Orange Panel

Control Panel

Movement Cards

The two Movement Cards placed into each colored panel of the Control Panel combine into a list of simple instructions which together form a Procedure. For the Robot to move to another square, it must execute a complete Procedure, following all the instructions listed in the chosen color panel of the Control Panel. See the next page for a breakdown of the Movement Cards.

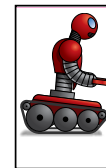


Movement Cards

Robot

Activate your Robot to execute the proper Procedures and move along the colored paths on the Game Boards from START to FINISH.

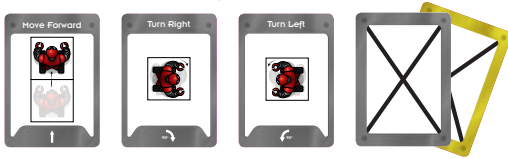
See [page 10](#) for a Sample Challenge that shows how a Robot executes the Procedures outlined in the Control Panel.



Robot Token

Movement Cards

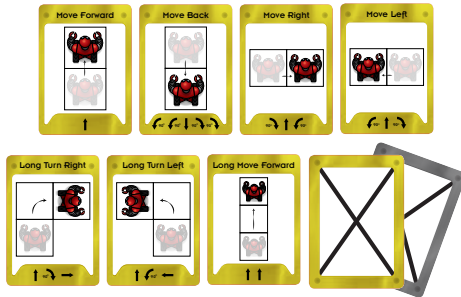
Beginner Set



- (4) Move Forward • (1) Turn Right • (1) Turn Left • (3) Double-Sided X Cards
 (“X” Cards are “Pass” cards; they are placeholders that mean no movement)

Challenges 1-20, use the Gray Beginner Card Set to build Procedures out of simple instructions.

Advanced Set



- (1) Move Forward • (1) Move Back • (1) Move Right • (1) Move Left
 • (2) Long Turn Right • (2) Long Turn Left • (1) Long Move Forward

Challenges 21-40, use the Gold Advanced Card Set to build Procedures out of simple and compound instructions.

- Solutions at the back of this book

How to Play

Your Robot must navigate a treacherous path from START to FINISH - and it needs your help! Your Robot moves by following instructions; for each move, instructions are based on the color of the square where the Robot is currently standing. The specific instructions are contained in the two Movement Cards placed into the color panel that matches the color of the square where the Robot is located.

The only problem is...the Control Panel starts out empty with no instructions.

Your Goal

Place the six Movement Cards into the six slots in the three color panels of the Control Panel to build Procedures and activate the Robot so it will move from START to FINISH without falling over the brink.

Set-Up

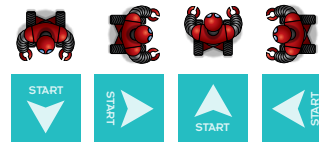
Step 1: Select a Challenge.

Step 2: Gather the six Movement Cards listed under “Cards Used.”

Note: Expert Challenges 31-40 do not list “Cards Used.” Choose from the complete Advanced Card Set to build your procedures.

Step 3: Place your Robot in the space marked “START,” facing the direction indicated by the arrow.

Example of four Robot orientations:



// Movement Cards, Instructions, and Procedures

Each move your Robot must make is determined by the colored square that the Robot is on to begin that move; if the Robot is resting on an orange square, the next move will follow each of the instructions contained in the two Movements Cards located in the orange panel of the Control Panel.

Taken together, the instruction set contained in these two Movement Cards is called a Procedure.

To move from one square to another, your Robot must execute all of the instructions contained in the Procedure, while staying on the path and not going over the brink at any time.

Once a Procedure has been fully executed, the Robot will have moved to a different square. The Robot's next move will follow the Procedure specified by the Movement Cards in the color panel that corresponds to the color of this new square.

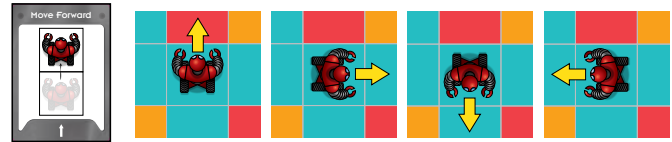
// Strategy Tips and Hints for Building Procedures

- For the first 10 Challenges, orange squares do not appear on the path. Fill both spaces in the orange section of your Control Panel with “X” Cards, which are placeholders that mean no movement.
- If using the Turn Left or Turn Right Cards, always include another Movement Card in the Procedure; otherwise the Robot will just turn in place, never reaching the finish line.
- To use a single movement in a Procedure (i.e. “Move Forward” only or “Move Left” only), fill the second space in the Control Panel with an “X” Card, which is a placeholder that means no movement.
- Survey the entire path and play out in your head your Robot's various movement options. Then choose a color and begin to build a Procedure.

- For the earlier Challenges, you may find that the first color on the path is a good place to start building Procedures.
 - For the more advanced Challenges, you may find that a Procedure for a color in the middle of the path may be the easiest to figure out.
- * As you test out your Procedures for each color, make sure to follow the Movement Rules on pages 7 & 8.

// Movement Rules

1. The Robot must remain on the path of a Game Board at all times, traveling only over white, red, blue, and orange squares. Don't let your Robot fall off the brink!
2. The Movement Cards show movement relative to the direction the Robot is facing. For example, a “Move Forward” instruction moves the Robot forward one square in the direction the Robot is facing.

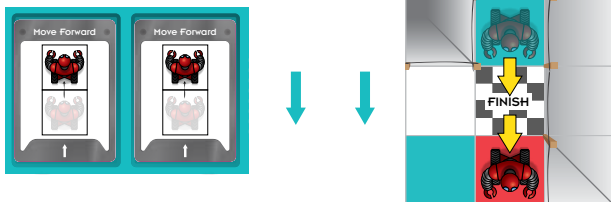


Note: All the examples above use a “Move Forward” Procedure to move the Robot to the next square.

3. Once the Robot begins performing the Procedure associated with a given color, it must finish that Procedure.

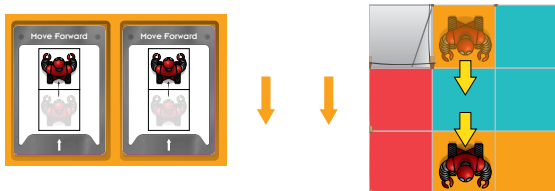
This means:

- Your Robot may pass over the Finish Line while performing a Procedure, but it is not a win until it lands on the Finish Line at the end of a Procedure.



Note: In the example above, if the blue squares were given the Procedure “Move Forward,” then “Move Forward,” again, your Robot would pass over the Finish until it reaches the red square.

- If your Robot is in the middle of performing the Procedure for one color and you pass over another color, you must finish the Procedure for the first color; do not switch to the Procedure for the second color.



Note: In the example above, if the orange squares were given the Procedure “Move Forward,” then “Move Forward,” again, your Robot would pass over the blue square until it reaches the next orange square. It would NOT stop to execute the Blue Procedure.

4. No movements are associated with white squares. Your Robot can pass over these, but if your Robot lands on a white space at the end of a Procedure, your Robot is now stuck. This means the Control Panel has one or more mistakes and you must rearrange one or more cards to debug your Procedure.

Executing the Procedures

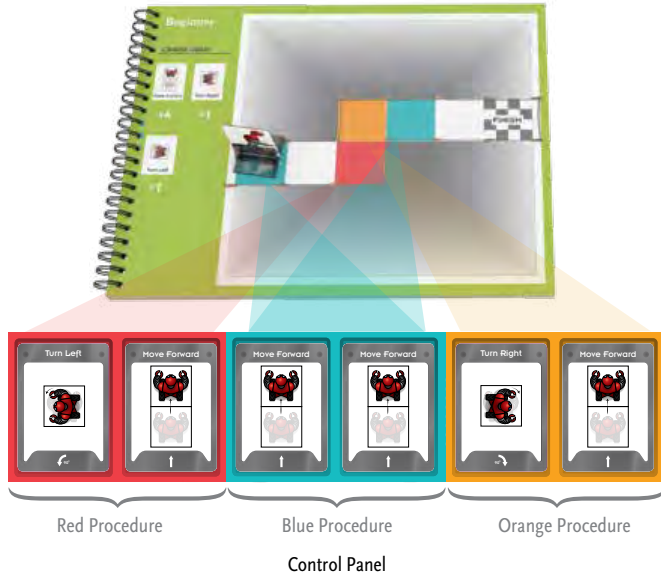
Once your Control Panel has been filled, see if your Robot can successfully reach the Finish!

1. Make sure your Robot is at the Start position and pointing in the same direction as the arrow.
2. Beginning at Start, execute the Procedures laid out in your Control Panel.
 - Start by executing the Procedure that is the same color as the Start location. Make sure to follow the instructions on both Movement Cards for that color Procedure.
 - Next, execute the Procedure for the color you just landed on.
 - Continue this process until you land at the Finish. If at any point your movements lead you to land on a white space at the end of a Procedure, or move off the path, there is an error in one or more of your Procedures. Rearrange two or more Movement Cards to correct the Procedure(s).
3. If you execute the Procedures determined by the colored squares along the path and arrive at the Finish-**YOU WIN!**

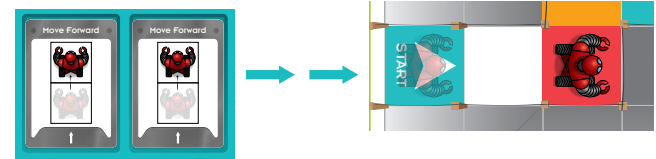
IMPORTANT: It does not matter which direction you are facing when you land at the Finish.

Sample Challenge

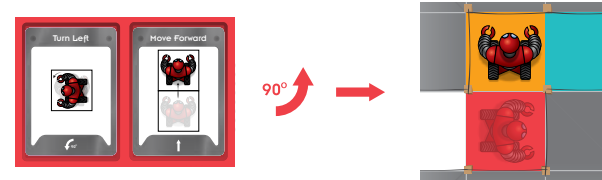
Below is a sample Challenge and a completed Control Panel.



To navigate across the path from Start to Finish, your Robot will execute the movements shown on the next page.



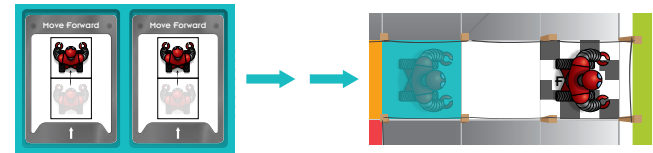
1. The Robot starts on a Blue square, so the Robot begins by following instructions in the blue section of the Control Panel (Blue Procedure). The Robot would Move Forward, then Move Forward again, landing on the Red square.



2. Next, since the Robot is standing on the Red square, it follows the Red Procedure. It would Turn Left, then Move Forward, landing on the Orange square.



3. Standing on the Orange square, the Robot follows the Orange Procedure. It would Turn Right, then Move Forward, landing on the Blue square.



4. Now, standing on another Blue square, the Robot follows the Blue Procedure again. It would Move Forward, then Move Forward once more, reaching the Finish – YOU WIN!

// Message for Parents and Educators

The idea that all kids should acquire coding skills is one of today's fastest growing educational movements; however, the act of learning to code still feels intimidating to many. Our goal is to expose parents and kids to coding concepts in a fun, non-conventional way so that it becomes more approachable and feels like play.

The ThinkFun //Code Programming Game Series

This Programming Game Series is designed to take players on a grand tour of the big ideas in computer science. If you play all the games in our series, you will develop a love for concepts such as Procedures, if/then statements, while loops, for loops, state machines, logic gates, and Boolean satisfiability, while learning how to mentally evaluate logical expressions and control structures the way computers do. Most importantly, these games will start you on a fun and thrilling journey into the realm of computational thinking. Enjoy the ride!

A Closer Look at ON THE BRINK

The true beauty of coding lies in its simplicity. It's pretty remarkable that a binary code of 0's and 1's can generate the many complex outputs that you get from a computer. Who would have ever imagined that these two digits strung together in different ways could hold such power? Here lies probably the most important concept in computer science--that of building reusable components out of very simple instructions. ON THE BRINK exposes players to this critical computational thinking skill by letting them have fun with building Procedures.

Players begin by building Procedures out of three simple instructions: Move Forward, Turn Left, and Turn Right. In later puzzles, players use Advanced Movement Cards to build more complex Procedures. These Cards are actually Procedures themselves comprised of the same simple instructions. For example a "Long Turn Left" is Move Forward, Turn Left, and Move Forward.

The goal of the player is to create a Procedure for each color on a path so that when the Robot encounters the color, it will automatically follow a determined series of movements. Players need to look ahead and exercise critical thinking skills as they develop each Procedure. They need to think like programmers to develop Procedures that can be executed multiple times, in different contexts as the Robot navigates the board and performs the program dictated by the Control Panel. As players journey through the puzzles they will see sophisticated patterns emerging from these basic elements. Some pretty amazing stuff is happening, but when you break it down, it's so simple. This is what computer science is all about.

// About the Inventor

Mark Engelberg is the inventor of ThinkFun's award-winning coding game Code Master as well as one of the challenge developers for ThinkFun's blockbuster game Rush Hour®. To create Code Master™ and the //CODE Programming Game Series he drew on his experience as a programmer of virtual reality simulations for NASA, as well as his many years of experience as a teacher of computer science and mathematical logic. Mark believes that kids of all ages can and should learn how a computer executes programs - entirely through play!

Solutions

Beginner Challenge 01



Beginner Challenge 02



Beginner Challenge 03



Beginner Challenge 04



Beginner Challenge 05



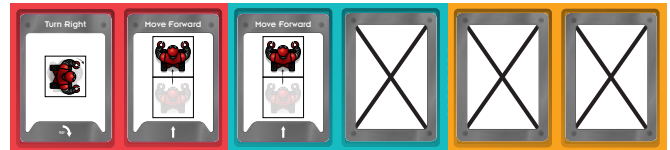
Beginner Challenge 06



Beginner Challenge 07



Beginner Challenge 08



Beginner Challenge 09



Beginner Challenge 10



Intermediate Challenge 11



Intermediate Challenge 12



Intermediate Challenge 13



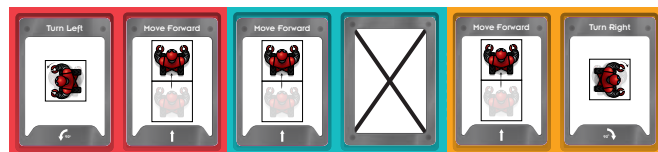
Intermediate Challenge 14



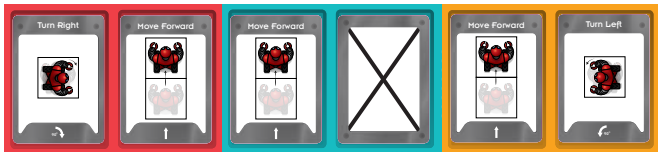
Intermediate Challenge 15



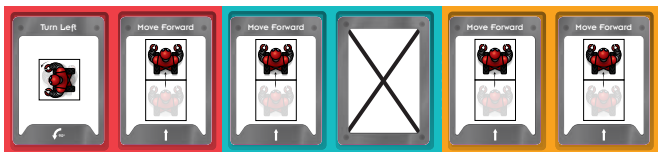
Intermediate Challenge 16



Intermediate Challenge 17



Intermediate Challenge 18



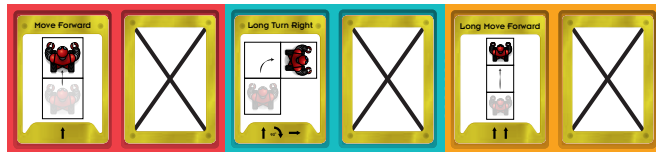
Intermediate Challenge 19



Intermediate Challenge 20



Advanced Challenge 21



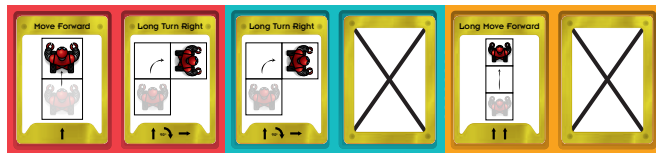
Advanced Challenge 22



Advanced Challenge 23



Advanced Challenge 24



Advanced Challenge 25



Note: You may reverse the cards in the Red Procedure.

Advanced Challenge 26



Advanced Challenge 27



Note: You may reverse the cards in the Red Procedure.

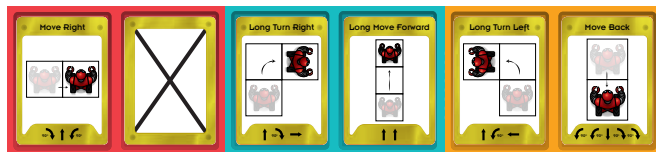
Advanced Challenge 28



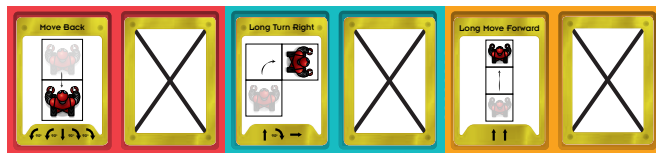
Advanced Challenge 29



Advanced Challenge 30



Expert Challenge 31



Expert Challenge 32



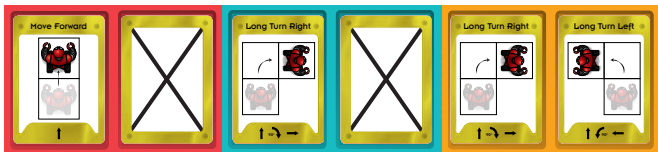
Expert Challenge 33



Expert Challenge 37



Expert Challenge 34



Expert Challenge 38



Expert Challenge 35



Expert Challenge 39



Expert Challenge 36



Expert Challenge 40



ThinkFun's Mission is to Ignite Your Mind!®

ThinkFun® is the world's leader in addictively fun games that stretch and sharpen your mind. From lighting up young minds to creating fun for the whole family, ThinkFun's innovative games and mobile apps make you think while they make you smile.



www.ThinkFun.com



© 2017 ThinkFun Inc. All Rights Reserved.

MADE IN CHINA, 150. #1901. IN01.