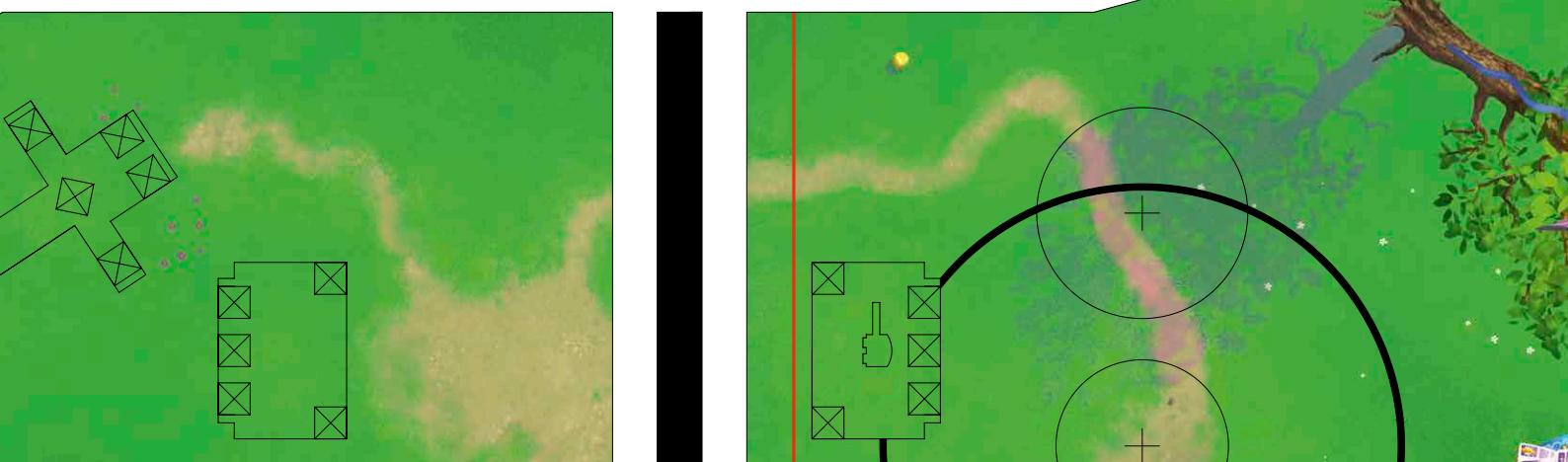
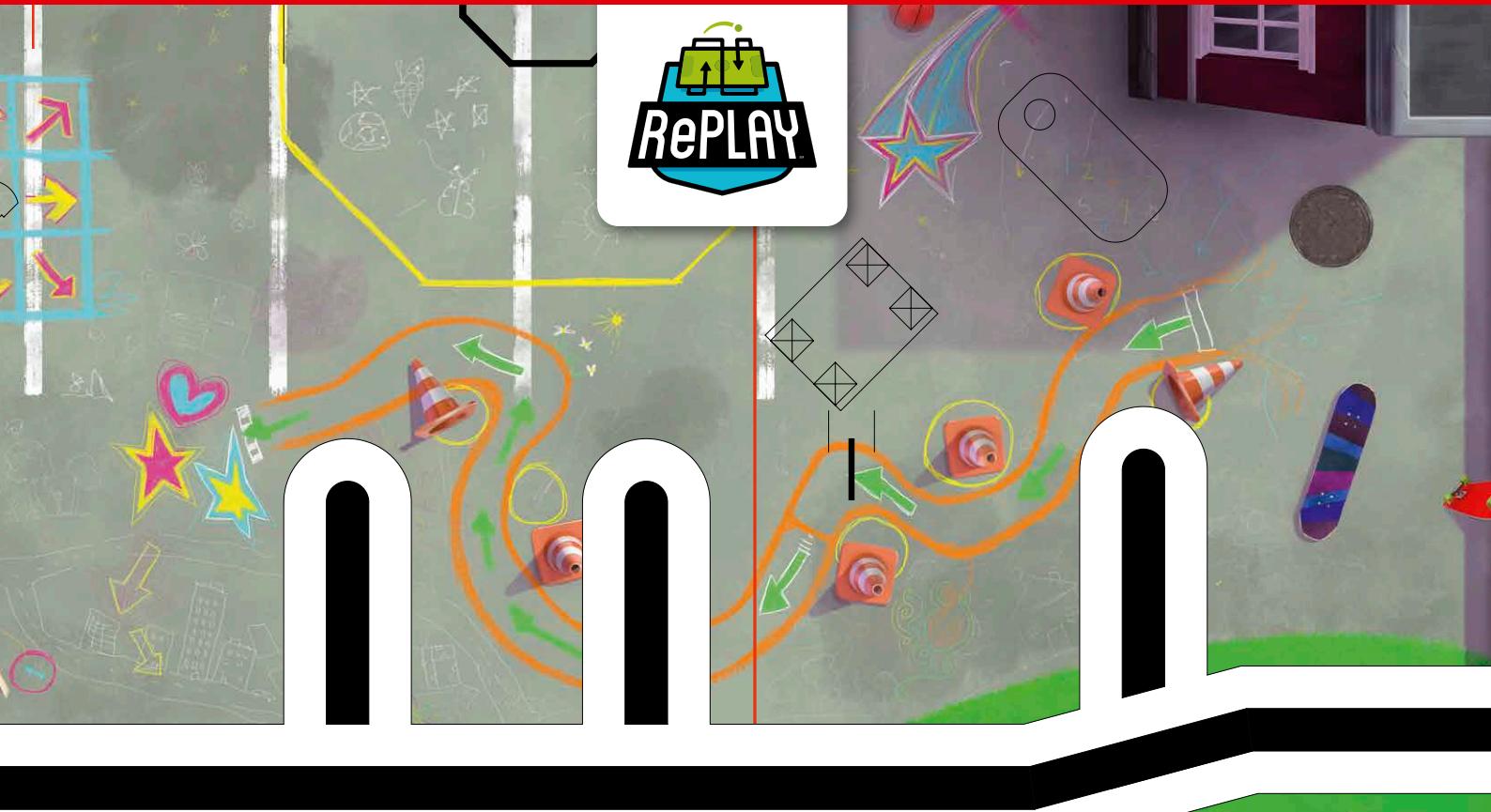


NOP肉翻 中英对照 非官方



# 机器人比赛 规则手册

ROBOT GAME RULEBOOK



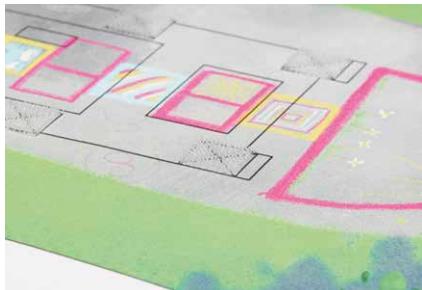
# 粘扣 DUALLOCK™

在你的场地套装里，找到3M™ 粘扣的棕褐色薄板。

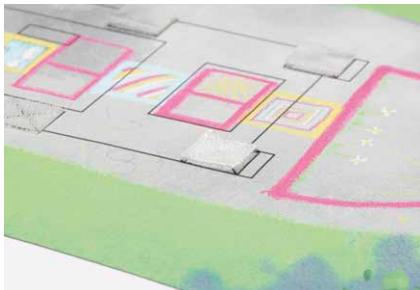
**固定模型**-“X”方块显示将模型双重锁定到垫子的位置。使用粘扣，如本例所示，方便精确定位。

Find the tan sheets of this recyclable fastening material from 3M™ in your challenge set.

**SECURING MODELS** – “X” squares show where to Dual Lock models to the mat. Use the Dual Lock as in this example and be very exact.



第一步：粘面朝下  
Step 1: sticky side down



第二步：粘面朝上  
Step 2: sticky side up



第三步：对齐模型，按下  
Step 3: align model, press down

**模型应力**-按下模型时，请按压其底部，而不要压碎整个模型。同理，如果需要将模型与场地分开，请提起底部。

**MODEL STRESS** – When pressing a model down, press on its lowest solid base instead of crushing the whole model. Lift that same part if you need to separate the model from the mat.

## 任务模型位置

MISSION MODEL PLACEMENT

**松散模型**-按此处所述或所示放置松散模型。HOME区域外的模型需要准确地放置在其轮廓标记内，并与方向标记对齐。

**LOOSE MODELS** – Place loose models as described or shown here. Models outside home need to be placed exactly within their outline marks and aligned with any directional marks.



重型及轻型轮胎  
Heavy and light tires



手机  
Cell phone



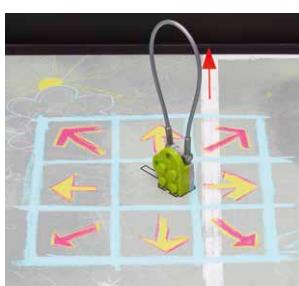
HOME区域  
Home

**HOME区域**-区域内任何地方放置: 3个健身器材，1个黄色立方体，2个红色立方体，2个蓝色立方体，8个绿色立方体和您的创新项目（此处未显示）。

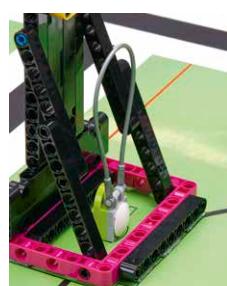
**HOME** – Anywhere in home, place: 3 health units, 1 yellow cube, 2 red cubes, 2 blue cubes, 8 green cubes, and your Innovation Project (not shown here).



西北区域的健身器材  
Health unit north west



舞池区域的健身器材  
Health unit dance floor



上举器西部的健身器材  
Health unit pull-up bar west



南区中部的健身器材  
Health unit south center



东区中部的健身器材  
Health unit east center

尽力保持环状策略物对称且垂直。机器人设计时，应考虑遇到不完美的环状策略物。

Keep loops mostly symmetrical and vertical. Robots should be designed to encounter imperfect loops.

**安装模型**–按此处所述和/或所示进行固定和准备。

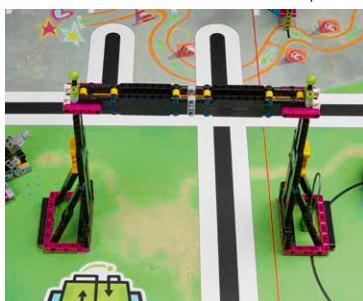
**SECURED MODELS** – Secure and prepare as described and/or shown here.



计步器–绿色面板向西拉到头  
Step counter – green panel is all the way west



称重机–见任务M13  
Weight machine – see mission M13



单杠  
Pull-up bar



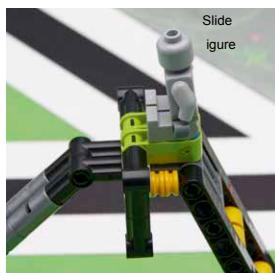
划船机图示  
Row machine as shown



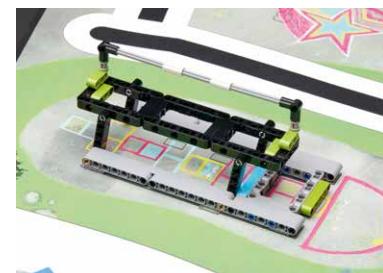
跑步机–拨盘逆时针旋转到头  
Treadmill – dial is all the way counterclockwise



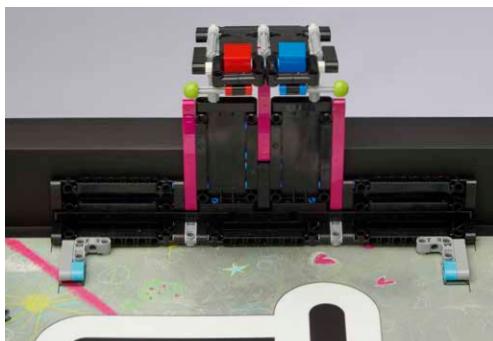
篮球架  
Basketball



滑梯–人仔放置如图所示  
Slide – slide figures are placed exactly as shown



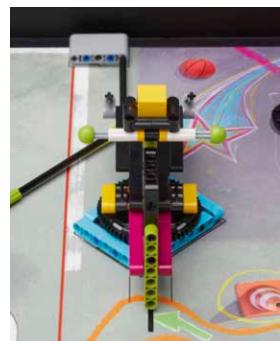
长椅  
Bench



地滚球释放器及每种颜色的立方体按图示匹配  
Bocce share model and matching cube in each color



地滚球球场框架  
Bocce frame



地滚球瞄准器和黄色立方体  
Bocce aim model and yellow cube

如果你参加比赛，记住这一点：志愿者们努力工作以确保场地正确，但你在设计时，应该预料到并考虑场地缺陷，比如垫子下的凹凸或光线的变化。

If you compete, remember that volunteers work hard to get the fields just right, but you should expect and design for rare imperfections, like bumps under the mat or changes in light.



# 机器人比赛

RobotGame

团队将使用乐高元件和技术制造一个机器人。并通过编程让它在2.5分钟的机器人比赛中自主完成一系列任务来得分。机器人从出发区开始，按照团队选择的顺序尝试任务，然后返回HOME区域的任何地方。

The team will build a robot using LEGO® elements and technology. They program it to autonomously complete a series of missions in a 2.5-minute Robot Game to score points. The robot starts in the launch area, tries missions in the order chosen by the team, and then returns anywhere into home.

当机器人在HOME区域里时，比赛队伍可以在它再次出发前对其进行修改。如果需要的话，可以用手把机器人带回家，但是团队会丢失一个精准标记。每队将进行几场比赛，但只取最高分数。

The team can modify the robot when it is in home before launching it again. If needed, the robot can be brought home by hand, but the team will lose a precision token. The team will play several matches but only the highest score matters.



## 场地视图

FieldLayout



# 任务

Missions

接下来是机器人可以完成的任务。细节很简单，但是有很多。为了充分理解，请反复阅读，并在实践中参考理解。

These are the tasks the robot can perform for points. The details are simple, but there are many of them. For full understanding, read and re-read them as a team, next to an actual field.

下面为“MXX”任务的示例文本，根据其位置和颜色，告诉您任务文本的每个部分的作用。

Below, example mission "MXX" tells you what each part of a mission's text is for, based on its location and color.

## MXX 示例布局 Example Layout

模型图片  
Model Picture

每个任务的基本描述。  
不用于评分。

Basic description of each mission.  
Not used for scoring.

· 任务说明下的常规黑色文本列出了主要要求: **xx 分数用红色粗体显示**

Regular black text under the mission description lists the main requirements: **XX points are in bold red**

· 如果裁判员认为这些事情已经完成或完成: **如所述, 得XX分**

If the referee sees these things performed or completed: **XX points as described**

每项得分要求后的蓝色斜体为非常重要的附加要求或宽松处理, 以及有帮助的事实依据。

*Blue italic text after the bullets is for very important added requirements, leniency, or other helpful facts.*

有时会用图片展示一个得分例子。

*Sometimes pictures teach you with an example score.*

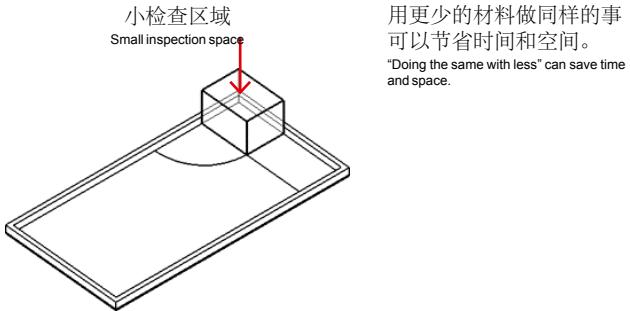
有时会用图片描述来帮助解释

*Sometimes the pictures have a description to help explain it.*

这些图片可能不会显示所有得分的可能性, 仅是一些示例!

*The pictures may not show you all the scoring possibilities, just some examples!*

## M00 设备检查奖励 Equipment Inspection Bonus



- 如果您所有的设备都适合在狭小的检查空间内: **25**

If all your equipment fits in the small inspection space: **25**

当您进行每场比赛时, 请将所有设备取出, 并向裁判员证明您可以将其全部安放在较小的检查区域中。详细信息, 请参见规则09。  
When you get to each match, remove all your equipment from any containers and show the referee you can fit it all in the small inspection space. See Rule 09 for details.

## M01 创新项目 Innovation Project



创新项目示例  
Example Innovation Project

机器人将您的创新项目移至RePLAY徽标区域或长椅 (M04) 周围的灰色区域。

The robot moves your Innovation Project onto the RePLAY logo or the gray area around the bench (M04).

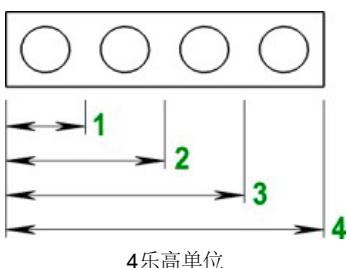
如果您的创新项目:

If your Innovation Project:

- 由至少两块白色乐高积木制成。  
Is made of at least two white LEGO pieces.
- 在一个方向上有4个乐高单位的长度。  
Measures at least as long as four LEGO studs in at least one direction.
- 使其任何部分接触RePLAY徽标或长椅周围的灰色区域: **最多20**  
Has any part of it touching either the RePLAY logo or the gray area around the bench: **20 max**

建立一个单一的模型来代表你的创新项目的解决方案。这里显示的只是一个例子。注意: 你的创新项目算作设备。在工程笔记本的第9课时中建议建立你的创新项目模型。经常仔细阅读规则R01和所有的规则, 以免在比赛中出现意外。

Build and bring a single model that represents your solution to the Innovation Project. The one shown here is just an example. CAUTION: Your Innovation Project counts as equipment. Building of your Innovation Project model is suggested in Session 9 in the Engineering Notebook. Read rule R01 and all the rules carefully and often so you can avoid surprises at competitions.



20



20

## M02 计步器 Step Counter



机械装置缓慢而稳定地滑动计数器。“走”得越多越好。

The robot slides the step counter slow and steady. The farther the "walk," the better.

- 如果指针的底部位于 洋红色: 10, 黄色: 15, 蓝色: 20

If the bottom of the pointer is on magenta: 10, yellow: 15, blue: 20

### 指针位置示例:

Example pointer positions:



洋红色  
Magenta



黄色  
Yellow



中间状态, 参考规则R25 (疑判从益)  
Middle – see rule R25 (Benefit of the doubt)

## M03 滑梯 Slide



机器人将人偶（称为“滑梯人仔”）滑落到滑梯下方，然后将其移动到其他区域。

The robot slides the people (called "slide figures") down the slide and moves them to other areas.

- 如果只有一个滑梯人仔脱离滑梯: **5分**

If only one slide figure is off the slide: 5

- 如果2个滑梯人仔都脱离滑梯: **20分**

If both slide figures are off the slide: 20

- 如果一个滑梯人仔完全处于HOME区域: **最多10分**

If a slide figure is completely in home: 10 max

- 如果一个滑梯人仔被重型轮胎完全支撑并脱离地面, 且不与其他物品接触: **最多20分**

If a slide figure is held completely off the mat by the heavy tire and is touching nothing else: 20 max



一个脱离  
One off



2个都脱离  
Both off

如果滑梯人仔的黑色框架通过/低于滑梯灰色部分的顶端，则为“脱离滑梯”。在2个人偶脱离时, 记20分, 而不是25分。

"Off the slide" scores if the slide figure's black frame is past/below the tip of the slide's gray slide part. Notice the score for two slide figures off is 20, not 25.



进入HOME区域  
In home



在重轮胎上, 离开地垫  
Off mat, on heavy tire

## M04 长椅 Bench



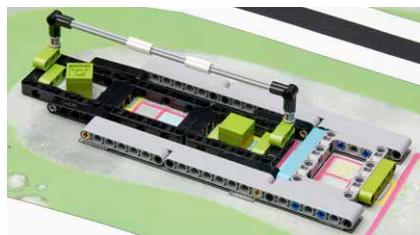
机器人移开靠背，压平长椅，把立方体放进跳房子的空间。

The robot removes the backrest, flattens the bench, and gets cubes into the hopscotch spaces.

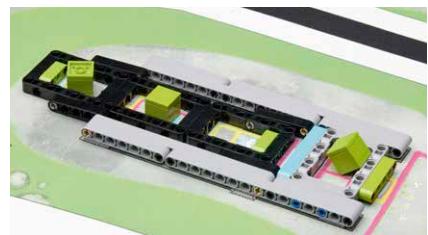
- 如果长椅平放: **10**
- If the bench is down flat: **10**
- 如果长椅平放，跳房子空间里有触碰地垫的立方体: **每个空间10**
- If the bench is down flat and there are cubes touching the mat in hopscotch spaces: **10 each space**
- 如果靠背完全脱离所在的2个孔: **15**
- If the backrest is completely out of both of its holes: **15**



**10 + 0 + 0**



**10 + 20 + 0**



**10 + 30 + 15**

## M05 篮球 Basketball



机器人把篮筐举起来，然后把一个立方体放进去。

The robot raises the crate up the post and gets a cube into it.

- 如果篮球筐中有立方体: **15**
- If there is a cube in the crate: **15**
- 如果篮球筐在中间高度的白色挡块上: **15**
- If the crate rests on the middle height's white stopper: **15**
- 如果篮球筐在顶部高度的白色挡块上: **25**
- If the crate rests on the top height's white stopper: **25**

只有一个立方体能在板条箱里得分，且篮球筐只有在顶部或中部得分，不能两者都得分。

Only one cube can score in the crate. Score top height or middle height, not both.



**15 + 15**



**0 + 15**



**0 + 25**

## M06 单杠 Pull-Up Bar



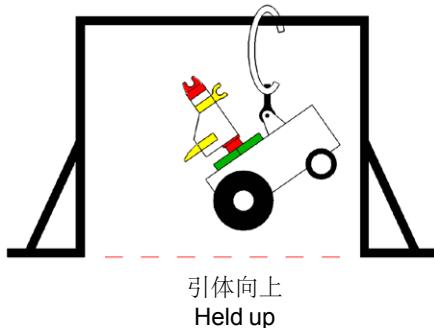
机器人随时都可以单杠下通过。另外，比赛结束时，机器人通过单杠离开地面。

The robot passes completely under the bar any time. Separately, it is held off the mat by the bar at the end of the match.

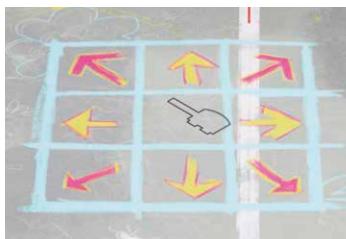
- 如果机器人在任何时候完全通过单杠立架: **最多15**  
If the robot passes completely through the pull-up bar's upright frame at any time: **15 max**
- 如果单杠能在比赛结束时100% 支撑机器人离开垫子 (引体向上) : **30**  
If the pull-up bar holds 100% of the robot up off the mat at the end of the match: **30**

“通过”可以向北或向南得分，但只能以一种方式得分，只有一次。且在“通过”发生时的记分。这是R22规则例外。

对于“引体向上”记分，不能在同一场比赛中与M07一起记分。  
A "pass through" can score northward or southward, but only one way and only one time. A "pass through" scores at the time it happens. This is a rule R22 exception.  
For the "held up" score, you cannot score this and M07 in the same match.



## M07 机械人舞蹈 (机械舞) Robot Dance



舞池  
Dance Floor

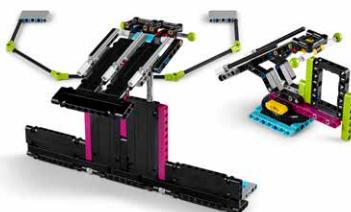
比赛结束时，机器人在舞池里跳舞。

The robot is dancing on the dance floor at the end of the match.

- 如果机器人的控制器在比赛结束时至少有一部分在舞池上方跳舞: **20**  
If the robot's controller is at least partly over the dance floor in a "dancing" motion at the end of the match: **20**

任何初级或专业的重复动作都被视为跳舞—做点有趣的事！对于M07，您无法在同一场比赛中M06的“引体向上”兼得分数。  
Any silly or skilled repetitive action counts as dancing—do something fun! For M07, you cannot score this plus the "held up" score from M06 in the same match.

## M08 硬地滚球 Boccia



地滚球释放器 地滚球瞄准器及框架

Boccia Share

Boccia Aim & Frame

地滚球是对方的互动任务。与其他队沟通，让机器人把相匹配的彩色立方体送到对面的场地。

Boccia is an interactive mission with the opposing team. Talk with the other team so the robots send matching colored cubes onto the opposite field.

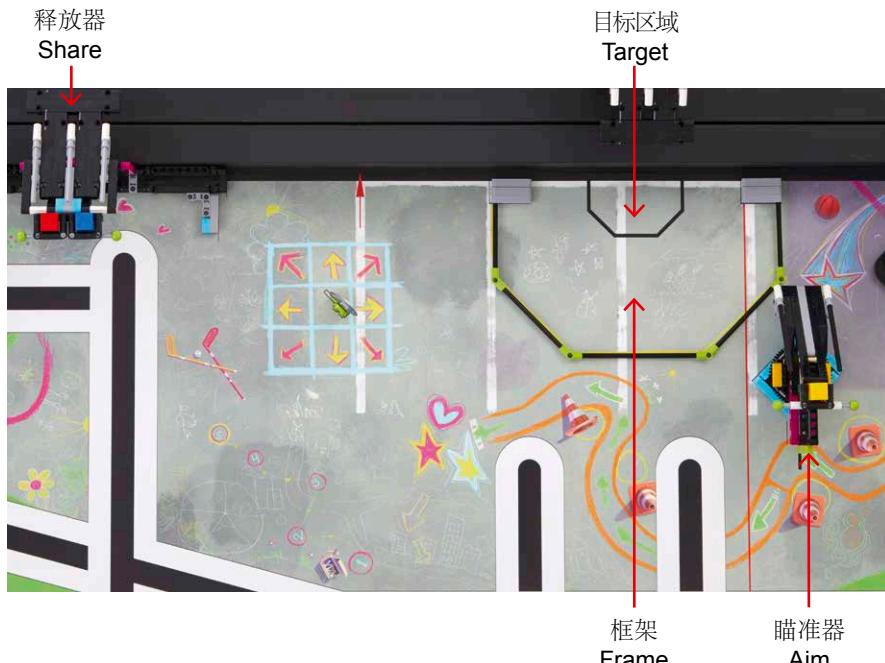
- 如果两个共享模型都只将一个立方体发送到对方场地的任何地方，并且这两个立方体颜色匹配：**每个团队25分**  
If both share models have sent only one cube anywhere onto the opposing field and those cubes color-match each other: **25 for each team**
- 如果有立方体完全在你的框架或目标区域：**5每个立方体**  
If there are cubes completely in your frame or target: **5 each cube**
- 如果至少有一个黄色的立方体完全在你的目标区域：**10分**  
If there is at least one yellow cube completely in your target: **10 added**

如果任何设备在（部分在）地滚球框架中，M08得分为零（对方球队不受影响）。

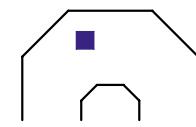
如果像大多数团队一样，你只有一个赛台，你发送的立方体将在练习期间简单地越过你的北墙。

(研究期间评分按两个模型都只投放一个立方体计算。)

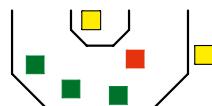
If there is equipment even partly in your frame, M08 scores zero for you (the opposing team is not affected). If, like most teams, you have only your one practice table, your sent cube will simply go over your north wall during practice.  
(Study the scoring examples as if both share models did share only one cube.)



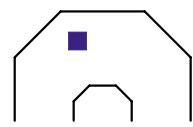
完整场地示意  
Competition setup with view of the opposing field



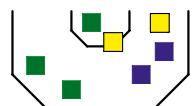
Frame



**0 + 25 + 10**



Aim



**25 + 35 + 0**

## M09 翻转轮胎 Tire Flip



机器人翻转轮胎，使其白色中心朝上，并将其移动至大目标圈内。

The robot flips tires so their white centers face up and moves them into their large target circle.



- 如果轻(蓝色胎面)轮胎是白色中心向上: **10**
- If the light (blue tread) tire is white center up: **10**
- 如果重(黑色胎面)轮胎是白色中心向上: **15**
- If the heavy (black tread) tire is white center up: **15**
- 如果白色中心向上轮胎完全在大目标圆内: **每个5**
- If white-center-up tires are completely in the large target circle: **5 each**
- 对于所有分数计算,必须以轮胎在垫子上为前提。
- For all scores, the tire needs to be resting on only the mat.

如果重轮胎在任何时候越过红线,哪怕只是部分越过,它都不会得分。这条线从北到南一直延伸。图示里只有一部分显示出来。

If the heavy tire crosses the red flip line at any time, even partly, it scores zero. The flip line runs all the way north to south. Only part of it is shown.



**10 + 15 + 5**



**10 + 0 + 5**



**0 + 15 + 5**



**10 + 15 + 5 + 5**

## M10 手机 Cell Phone



机器人翻转手机，使其白色一面朝上。

The robot flips the cell phone white side up.

- 如果手机是白色一面朝上,且只在垫子上:**15**
- If the cell phone is white side up and resting on only the mat: **15**



**15**

## M11 跑步机 Treadmill



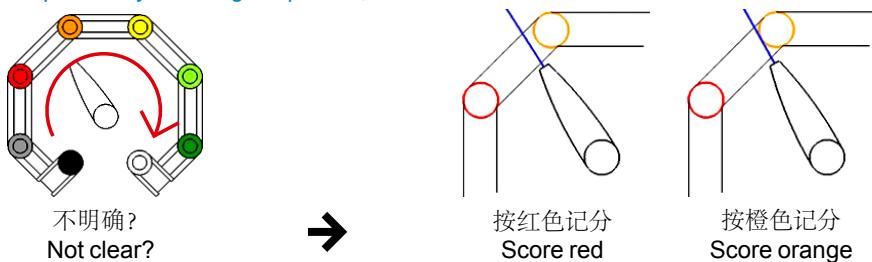
机器人旋转滚轴，使指针顺时针移动。

The robot spins the rollers to move the pointer as far clockwise as possible.

- 如果机器人旋转滚筒，指针指向 灰色: **5**，红色: **10**，橙色: **15**，黄色: **20**，浅绿色: **25**，深绿色: **30**
- If the robot spins the rollers so the pointer points to gray: **5**, red: **10**, orange: **15**, yellow: **20**, light green: **25**, dark green: **30**

如果位置不明确，想象一下指针的末端有一根针延伸出去，触碰到一种颜色的边缘即以该颜色记分。如果机器人通过触摸指针移动了指针，则M11得分为零。

If a position is not clear, imagine a needle at the end of the pointer. The edge of a color counts as that color. If the robot moves the pointer by touching the pointer, M11 scores zero.



## M12 划船机 Row Machine



机器人将轮子移出大圆圈并移入小圆圈。

The robot moves the free wheel out of the large circle and into the small target circle.

如果轮子是：

If the free wheel is:

- 完全在大圆圈外: **15**  
Completely outside the large circle: **15**
- 完全在小圆圈: **加15**  
Completely in the small circle: **15 added**



**15**



**30**

## M13 称重机 Weight Machine



比赛前，手动设置机器的杠杆状态。

在比赛中，机器人移动杠杆，直到黄色限位器下落。

Before the match, you hand select the machine's lever setting.  
During the match, the robot moves the lever until the little yellow stopper falls.

- 如果限位器在杠杆下方，并且杠杆设置为蓝色：10，洋红色：15，黄色：20

- If the stopper is under the lever and lever setting is blue: 10, magenta: 15, yellow: 20

比赛开始前，将滑杆滑到自定位置，且限位器在上方。这是规则R12的例外。杠杆设置颜色按转动设备右侧绿色连杆东部的颜色判定。

Before the match starts, you slide the lever where you want, with the stopper on top. This is an exception to rule R12. The lever setting is the color under the east face of the east green bar.



示例：蓝色杠杆设置颜色  
Example: lever set to blue



10 (蓝色)



20 (黄色)

## M14 健身器材 Health Units



机器人从场地收集健身器材并将其移动到目标区域。

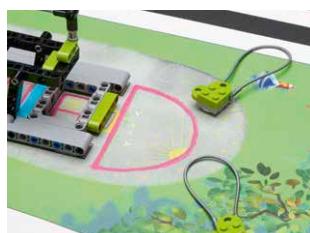
The robot collects health units from around the field and moves them to target areas.

如健身器材为：  
if health units are:

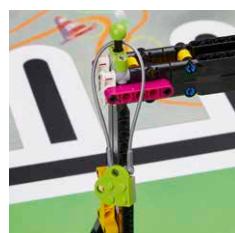
- 触摸RePLAY徽标或长凳周围的灰色区域：每个5  
• Touching either the RePLAY logo or the gray area around the bench: 5 each
- 如图所示，在上拉杆柱上绕圈 - 最多四个 - 不碰任何设备：每个10  
• Looped over a pull-up bar post as shown – maximum of four – and touching no equipment: 10 each



10



10



10



你在HOME区域外  
打断机器人的次数  
越少，你得到的分  
数就越多。

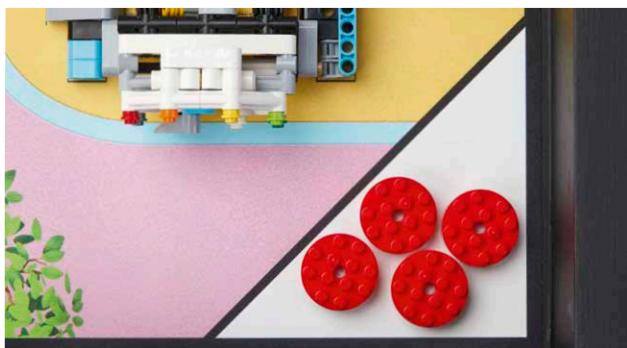
The less often you interrupt the robot  
outside home, the more points you  
keep.

- 如果场上剩余的精度令牌数为 1:**5**、2:**10**、3:**20**、4:**30**、5:**45**、6:**60**

If the number of precision tokens left on the field is 1:**5**, 2:**10**, 3:**20**, 4:**30**, 5:**45**, 6:**60**

请参阅规则 R05、R15、R16 和 R19。

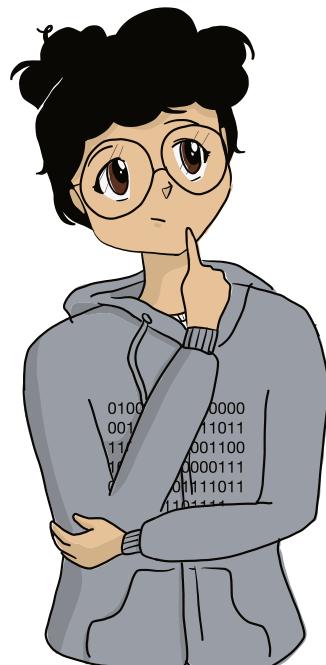
See rules R05, R15, R16, and R19.



30

这就是**RePLAY**机器人游戏的所有任  
务。请记住，您可以按任何顺序处理  
它们，但是您可能没有时间完成所有  
这些操作，因此请对所选择的对象保  
持策略性！

That's all the missions for the **RePLAY** Robot Game. Remember, you can tackle them  
in any order, but you might not have time to complete them all, so BE STRATEGIC  
about the ones you choose!



# 规则 Rules

为了在比赛中获得最大的自信和乐趣，请务必在实际比赛场地旁仔细阅读这些内容。每周重新阅读它们以获得更精准的理解，并阅读挑战赛的更新！您可以在[firstinspires.org/resource-library/fll/challenge-and-resources](https://firstinspires.org/resource-library/fll/challenge-and-resources)中找到挑战赛更新。

For the highest possible levels of confidence and fun at your competitions, be sure to read these carefully next to an actual field. Re-read them every week or so to catch the finer details and read the Robot Game updates too! You can find Robot Game updates at [firstinspires.org/resource-library/fll/challenge-and-resources](https://firstinspires.org/resource-library/fll/challenge-and-resources).

## RXX Example Layout 示例布局

**紫色文本**介绍或总结了规则上下文，以便在需要帮助时快速理解。它不用于评分。

*Purple text introduces or summarizes rule context for faster understanding where helpful. It is not used for scoring.*

紫色下的**黑色文本**表该规则的主要内容。

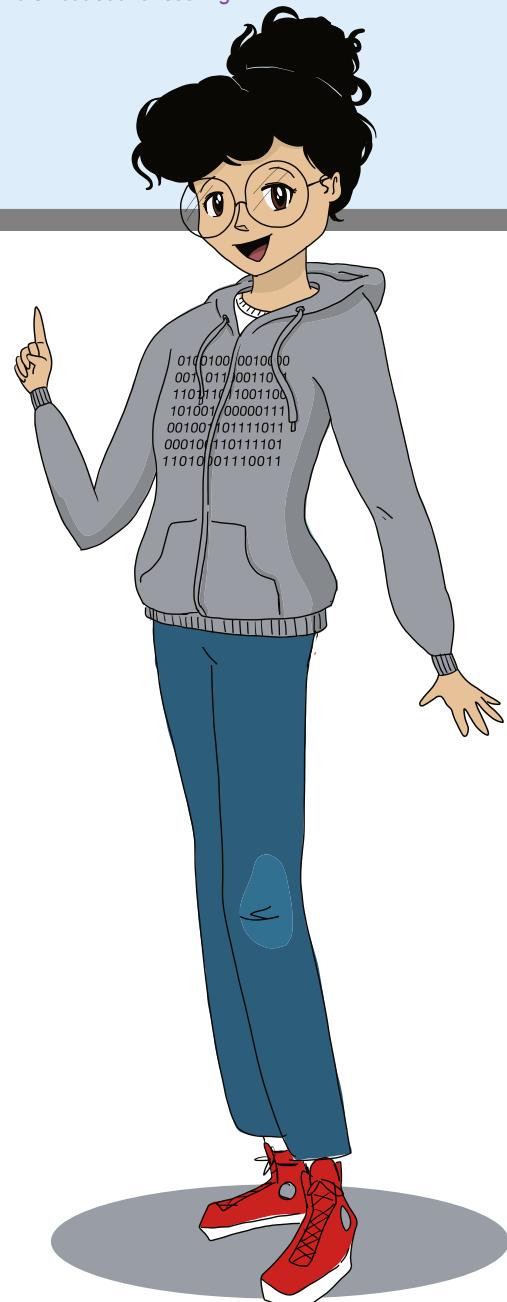
**Black** text under purple is for the main facts of the rule.

黑色下方的**蓝色文本**表示非常重要的附加事实、宽松处理或其他有用的依据。

**Blue** text under black is for very important added facts, leniency, or other helpful.

别忘了仔细阅读这些规则，并经常留意机器人游戏更新！

*Don't forget to read these rules very closely and check frequently for Robot Game updates!*



# 准备 | 定义和规则

## PREPARATION | DEFINITIONS AND RULES

### R01 EQUIPMENT 设备

**R01**告诉你机器人和它的配件可以用什么材料制造。

*R01 tells you what the robot and its accessories can be made from.*

你带去参加比赛活动的任何东西。这包括您的机器人、任何附件、任何策略配件和您的创新项目。

Anything you bring to a match for mission-related activity. This includes your robot, any attachments, any strategic accessories, and your Innovation Project.

- 所有设备都必须是乐高制造，并保持出厂状态。

**例外1：**乐高线绳和管材可以裁剪成一定长度。

**例外2：**您可以在隐藏区域放置识别标记。

- 不允许使用乐高制造的发条“马达”。

- 不允许使用额外的/重复的场地任务模型。

- 非电动乐高设备可以任意放置，且不限数量。

· 仅能使用乐高搭建零件，不可用包装材料、布料等。

· 仅允许按照乐高积木制造说明中最初显示的方式使用贴纸。

· 一个记事本只可以用作程序注释，且不算作设备。

All equipment needs to be LEGO made, in original factory condition.

**Exception 1:** LEGO string and tubing can be cut to length.

**Exception 2:** You can put identification marks in hidden areas.

Factory-made wind-up/pull-back “motors” are not allowed.

Additional/duplicate mission models are not allowed.

Non-electric LEGO pieces are allowed from any set. You may use as many as you like.

• Use only building pieces – not packaging, clothing, and so on.

• Stickers are allowed only as originally shown in LEGO building instructions.

• One sheet of notebook paper is okay for program notes only and does not count as equipment.

- 仅允许按照此处所述和所示使用电动LEGO设备（显示了LEGO Education SPIKE™ Prime和MINDSTORMS® EV3，但也允许使用等效的NXT和RCX）。

Electric LEGO equipment is allowed only as described and shown here (LEGO Education SPIKE™ Prime and MINDSTORMS® EV3 shown, but equivalent NXT and RCX are also allowed).

#### 控制器：

任何一场比赛中最多一个。

#### Controller:

Maximum of one in any one match.

#### 马达：

任意混合，任何一场比赛最多4个。

**Motors:** Any mix, maximum of four in any one match.

#### 传感器：

只能以任何组合和任意数量使用触摸/力度，颜色，距离/超声波和陀螺仪传感器。

#### Sensors:

Only touch/force, color, distance/ultrasonic, and gyro sensors are allowed in any mix and any number.

如果您有多余的控制器或马达，请把它们放在维修区。

*If you have any extra controllers or motors, leave them in the pit area.*

- 你也可以使用乐高的电线，一个控制器电源或六节AA电池，和一张SD卡。

- You can also use LEGO wires, one controller's power pack or six AA batteries, and one SD card.



SPIKE Prime

EV3

## R02 SOFTWARE AND CONTROL 软件及控制

- 可以使用任何允许机器人自主移动的软件，这些软件只能由加载到控制器上的程序运行。
- 比赛区域禁止远程控制，必须关闭蓝牙。
- Use any software that allows the robot to move autonomously (on its own), run only by programs that are loaded onto the controller.
- Remote control is not allowed in the competition area. Turn Bluetooth off.

## R03 ROBOT 机器人

*R03 将通过加装或拆除的设备，定义某一时刻的机器人。*

*R03 defines the robot by what is added or removed from it at the moment.*

用手工将控制器及任何与其连接的设备组装起来，除非手动将其拆除的整体。

Your controller and any equipment currently combined with the controller by hand and intended not to separate from it, unless by hand.

*示例1：可拆除的叉车附件算作机器人的一部分，但仅限于其附着的时候。*

*示例2：挂载要放置的物品不是机器人的一部分。那是货物。*

*Example 1: A removable forklift attachment counts as part of the robot, but only while it is attached.*

*Example 2: A weight the robot is carrying out to drop on something is not part of the robot. That is cargo.*

## R04 MISSION MODEL 任务模型

*R04 限定了场地中那些设备可以操作，且不视为你自己的设备。*

*R04 defines and limits what you can do with the game objects on the field that are not your equipment.*

当你到达场地时，场地上的任何乐高物品。

Any LEGO object already on the field when you get there.

- 你不可以拆开任何任务模型，即使是暂时的。
- 如果你将模型与任何物品连接（包括机器人），连接方式必须是足够宽松、简单的。当被要求释放时，必须可以立即完成，并保持其完整的原始状态。
- 模型包含本体所有的部件。举例：框架、底座和环带。
- You cannot take mission models apart, even temporarily.
- If you combine a model with anything (including the robot), the combination needs to be loose or simple enough that, if asked to, you could free the model in perfect original condition immediately.
- All parts of a model count as the model. Examples: frames, bases, and loops.

## R05 PRECISION TOKENS 精准标记

六个红色圆盘模型。当比赛开始时，他们是可以直接获得的分数，但可以被裁判一次一个地删除，直到他们消失。参见规则R15、R16和R19。

The six red disc models. They are worth free points when the match starts but can be removed by the referee one at a time until they are gone. See rules R15, R16, and R19.

## R06 MISSION 任务

机器人可以一次完成一个或多个任务。并可按你自己喜欢的顺序尝试。

One or more tasks the robot can complete for points. Try them in any order you like.

## R07 MATCH 比赛

当两支队伍对战时，两个场地北部与北部相连（北北相连）。在2.5分钟内，机器人重复出发、返回，尝试完成尽可能多的任务。

When two teams play opposite each other on two fields joined north to north. For 2.5 minutes, the robot launches, returns, and repeats, trying as many missions as possible.

## R08 TECHNICIANS 技术人员

团队中在比赛时处理机器人的成员。

The team members handling the robot during the match.

- 一次只能允许两名技术人员进入比赛现场。
- 替代技术人员可以随时与当前技术人员切换。
- 其他团队成员在比赛工作人员的指导下退开。
- Only two technicians are allowed at the field at once.
- Substitute technicians can switch with current technicians at any time.
- Other team members stand back as guided by competition officials.

## R09 EQUIPMENT INSPECTION 设备检查

**R09** 告诉您有关设备体积的限制，何时、如何检查它们，是否通过检查，以及对应的奖惩。

*R09 tells you about equipment volume limits, when and how they are checked, and what happens if you pass or not.*

当您进行每场比赛时，请将所有设备从任何容器中取出，并向裁判员证明您可以将所有设备完全放入以下所示的两个（假想）检查空间之一。每个空间都有一个高12.0英寸（305毫米）的天花板。

When you get to each match, remove all your equipment from any containers and show the referee you can fit it all completely into one of two (imaginary) inspection spaces shown below. The spaces each have a ceiling 12.0 in. (305 mm) high.

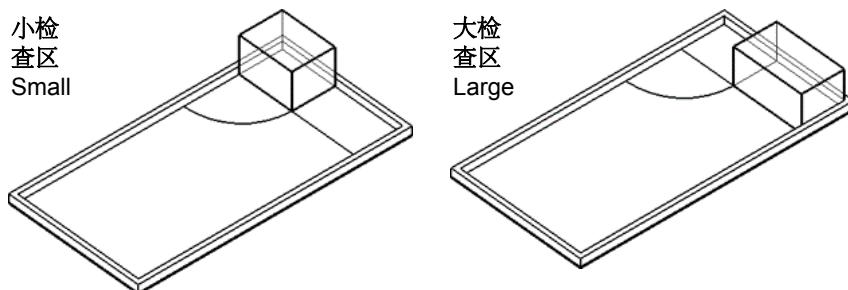
- 如果适合大检查空间，您可以通过。如果适合小检查空间，则可通过并获得任务积分加成。
- 如果不适合大空间，则将多余的部分分解或将其送到维修区。
- 检查后，检查空间不再存在。可将设备随便放在HOME区域。
- If it fits in the large space, you pass. If it fits in the small space, you pass and get a mission point bonus.
- If it does not fit in the large space, break the excess down or send it to the pit area.
- After inspection, the inspection space no longer exists. Spread things out in home as you like.

你的手可以用来辅助设备以符合检查空间。

如果与检测失败或违反R01规则的设备比赛，你本场比赛的分数将取消。

*Your hands can be used to help equipment fit in the inspection space.*

*If you compete with equipment that fails inspection or breaks rule R01, your score for that match does not count.*



## R10 COMPLETELY IN 完全进入

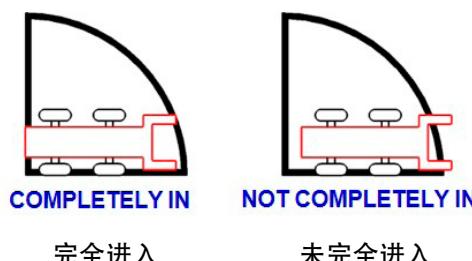
**100%** 包含在由地面区域和一定高度（如果给出）的天花板之间形成的空间中。

100% contained in the airspace above the area and under the ceiling height if one is given.

- **100%**包括所有设备—不只是接触垫子的零件。
- 构成区域的绘制线属于该区域的一部分。
- 100% includes every bit of something – not just the parts that touch the mat.
- Drawn lines that form an area are part of that area.

这些例子是出发区域的俯视图：

These examples shown are the launch area, from above:



完全进入

未完全进入

## R11 FIELD CHECKS 现场检查

R11有助于防止光学传感器读数问题和任务模型故障。

*R11 helps prevent problems with optic sensor readings and mission model failure.*

在设备检查和首次出发之间，您可以在任何需要的地方校准传感器，还可以要求裁判员检查您关心的任何现场设置。

Between inspection and the first launch only, you can calibrate sensors anywhere you like, and you can ask the referee to check any field setups you are concerned about.

## R12 HOME HOME区域

R12定义了机器人在两次任务之间的运行位置，并告知其他允许或不允许的操作方式。

*R12 defines where the robot goes between missions and tells what other handling is or is not allowed.*

R13中标记为“HOME”的（虚构）空间。它没有天花板，且不包括白色赞助商徽标区域。

The (imaginary) space labeled “Home” in R13. It has no ceiling and does not include the white sponsor logo band.

- HOME区域是您随时随地处理和存储允许的物品的空间。
- HOME区域也是在出发之前和出发之间处理和准备机器人的地方。
- 出发后，如果要操作机器人而又不丢失精确令牌，则机器人需要完全返回家中。
- 机器人只能从出发区离开HOME区域，但可以在任何地方回HOME区域。
- 除规则R15和R19之外，请勿与其他人互动。除非机器人对其进行了更改（请参阅规则R19），否则机器人影响到或完全移动到HOME区域外的任何事物都将保持现状。
- 例外1：如果某样物品意外离开HOME区域，可以快速抓住它以免扰乱比赛场地。
- 例外2：如果设备意外脱离机器人，你可以将要求它收回。
- 除非机器人出发，你不能通过任何策略将任何物品发送或扩展到HOME区域，包括机器人已经部分出发的情况。
- Home is your space for handling and storing allowable things whenever you like.
- It is also the place for handling and preparing the robot before and between launches.
- After any launch, the robot needs to return completely into home if you want to handle it without losing a precision token.
- The robot can leave home only from the launch area, but it can return home anywhere.
- Do not interact with things outside home except by rules R15 and R19. Anything the robot affects or moves completely outside home stays as is unless the robot changes it (see rule R19).  
Exception 1: If something comes out of home by accident, grab it quickly so it does not upset the field.  
Exception 2: If equipment breaks off the robot unintentionally, you can pick it up as needed.
- You cannot strategically send or extend anything even partly out of home except by launching the robot.

## R13 LAUNCH AREA 出发区域

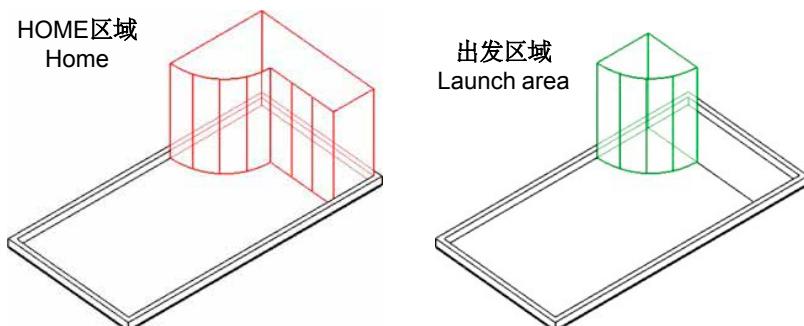
R13定义了机器人从家中的哪个区域出发，并给出了在出发过程中该区域的限制。

*R13 defines what area of home the robot launches from and gives limits for that area during launches.*

下面标记为“出发区域”的（虚构）空间没有天花板。出发区域是HOME区域具有特殊用途的一部分，但仅限于出发时。

The (imaginary) space labeled “Launch area” below. It has no ceiling. The launch area is a part of home with special purpose – but only when launching.

- 对于每次发射，机器人及其将要移动的任何部分都必须完全适合发射区域。
- 在发射之后和发射之间，发射区域是家中的固定部分。
- For every launch, the robot and anything it is about to move needs to fit completely in the launch area.
- Right after and between launches, the launch area is a regular part of home.



# 行动 | 定义及规则

# ACTION | DEFINITIONS AND RULES

## R14 LAUNCHING 出发

R14给出了出发所需的条件，然后给出了出发步骤。

R14 gives the conditions required for launch and then gives the launch procedure.

出发时，向裁判员通过检查1和2，然后按下按钮，发送一个信号给传感器，或通过设定计时器让马达转动起来。  
To launch, show the referee Checks 1 and 2 and then press a button, signal a sensor, or allow a timer to get the motors spinning.

- 检查1：机器人及其将要移动的所有物体完全适合出发区域。
- 检查2：你没有阻止任何物品变化，包括电动机扭矩和存储的能量（例如重力势能）。
- 比赛开始：最早开始比赛的瞬间在倒数第一个单词或声音的开头，例如“3, 2, 1… LEGO!”。
- 只要您向裁判员显示通过检查1和2，就可以进行所有其他出发。
- Check 1: The robot and everything it is about to move fits completely in the launch area.
- Check 2: You are not holding anything from moving, including motor torque or stored energy.
- Match start: The earliest time for the first launch of the match is precisely at the beginning of the last word or sound in the countdown, such as “3, 2, 1… LEGO!” All other launches can happen as soon as you show the referee Checks 1 and 2.

## R15 INTERRUPTION 打断

R15定义并限制了在机器人启动后触摸机器人的动作。

R15 defines and limits the action of you touching the robot after it is launched.

出发后，当你影响机器人或接触任何物体时。

When you interact with a launched robot or any object touching it.

- 您可以随时出于任何原因中断机器人，但请务必研究规则R16和R19。
- 中断机器人的最佳时间和地点是当机器人完全在家中时 (R12)。
- 请勿将中断的准确时间（将您的眼睛用作计时器或传感器）用作产生新评分结果或优势的策略。受益的任务将获得零分。
- 请勿发送或掉落东西，撞击或降落在机器人上。
- You can interrupt the robot any time for any reason, but be sure to study rules R16 and R19.
- The best time and place to interrupt the robot is when it is completely in home (R12).
- Do not use the exact “perfect timing” of an interruption (your eyes doing the work of a timer or sensor) as a strategy to produce a new scoring result or advantage. Missions benefiting will score zero.
- Do not send or drop things to hit or land on the robot.

如果机器人回到HOME区域，你不打断它，它可以自由地与你可能放置在那里的东西进行交互，可以自由地从HOME区域的任何地方离开，而不需要通过出发步骤。

If the robot returns home and you do not interrupt it, it is free to interact with things you might have placed there for it, and it is free to leave from anywhere in home without a launch.

## R16 INTERRUPTION PROCEDURE 中断程序

R16给出了中断机器人的过程和后果，具体取决于机器人当时所在的位置。

R16 gives the procedure and consequences for interrupting the robot, depending on where it was at the time.

要打断机器人，请停止它运行，如果它不在HOME区域，就把它带回去。

To interrupt the robot, stop it and carry it home if it is not there.

- 如果它完全在HOME区域中：没问题。
- 如果不是完全在HOME区域中：丢失一块精准令牌。
- If it was completely in home: No problem.
- If it was not completely in home: Lose a precision token.

错误发射：如果您在出发后立即中断机器人，使其刚好到达出发区域边缘，则需要重新出发，但不会丢失精确令牌。

保护马达的例外情况：如果机器人卡在HOME区域外，使马达受力而又不想再次出发，则可以将其关闭并留在原处，而不会丢失精确令牌。

比赛结束例外：比赛结束时停止机器人不会算作中断。

Mislaunch exception: If you interrupt the robot so soon after launch that it has just barely reached the launch area arc line, you need to relaunch, but you will not lose a precision token.

Motor-saving exception: If the robot is stuck outside home straining its motors and you do not intend to launch again, you can shut it down and leave it in place without losing a precision token.

End-of-match exception: Stopping the robot at the end of the match does not count as an interruption.

## R17 CARGO 货物

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*R17定义了处于机器人的策略性控制之下的物品。*

*R17 defines when things are under the robot's strategic control.*

当物品有目的地从策略上捕获，保留，移动或释放某些东西，它算作“货物”。当机器人显然不再触摸它所控制的东西时，该东西不再被视为货物。

While something is purposefully/strategically being captured, kept, moved, or released, it counts as "cargo." When the robot is clearly no longer touching whatever thing it was controlling, that thing is no longer considered cargo.

## R18 INTERRUPTION WITH CARGO 打断时的货物

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*R18根据货物当时的位置，给出了打断机器人后货物的处理方法。*

*R18 gives the consequences for interrupting the robot with cargo, depending on where the cargo was at the time.*

对于在中断期间完全或部分在家外的货物：如果机器人在出发时有它，你可以收回它。如果没有，由裁判员取走。

For cargo completely or partly outside home during an interruption: If the robot had it when launched, you can keep it. If not, the referee takes it.

## R19 STRANDED CARGO 滞留货物

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*R19给出了遗落货物的处置方法，这取决于货物滞留在哪里。*

*R19 gives the consequences for the robot abandoning cargo, depending on where the cargo comes to rest.*

如果之前的货物滞留在HOME区域外：如果完全在外面，则保持原样；如果部分在外，则你必须收回它，并且丢失一枚精准令牌。

If former cargo is stranded outside home: If it is completely outside, it stays as is. If it is partly outside, you must take it into home and lose a precision token.

- 在决定之前，货物需要停下来。
- 如果用手带回HOME区域的设备附带任务模型，则裁判取回任务模型。
- The cargo needs to come to rest before this can be decided.
- If equipment being taken into home by hand has a mission model, the referee takes the mission model.

## R20 INTERFERENCE 干扰

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*R20会给出干扰对方队伍，场地或机器人的处理方法。*

*R20 gives the consequences for upsetting the opposing team, field, or robot.*

机器人不得因任务之外的任何原因干扰对方场地和机器人，因干扰导致得分失败及失去应有得分状态将自动影响记分。但合作是可以的（NOP理解为有利对方的干扰）。

A robot cannot interfere with the opposing field or robot unless there is a mission exception. Points failed or lost due to interference score automatically. Collaboration is okay.

## R21 FIELD DAMAGE 破坏现场

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*R21给出您自己造成的场地损坏的处理方法。*

*R21 gives the consequences for harm to your own field.*

如果机器人分离了场地粘扣或者破坏任务模型，那么场地就会保持现有状态，任务明显大概率得零分。

If the robot separates Dual Lock or breaks a mission model, the field stays as is, and missions clearly made possible or easier score zero.

（本赛季计步器任务，因为里面的结构设计，必须慢慢推动指针，如果机器人将模型破坏，导致指针推动难度降低，那么……）

# 评分|定义和规则

## SCORING | DEFINITIONS AND RULES

### R22 END OF MATCH SCORING 比赛评分

R22提醒你，如果机器人的成果在比赛结束前被破坏，他们不会得分。

*R22 cautions you that if the robot's accomplishments are wrecked before the match ends, they will not score.*

比赛要求必须在比赛结束时可见任务要求，除非规定某种方法。

Mission requirements must be visible at the end of the match to count unless a method is required.

- 比赛刚好结束时，所有事物都需要冻结以便进行检查。
- 停止机器人，保持原状，然后在裁判为您评分时保持双手离开。
- Precisely as the match ends, everything needs to freeze in place for examination.
- Stop the robot, leave it as is, and then keep hands off everything as the referee scores the field with you.

### R23 DIRECT WORDING 直意文本

R23限制了混淆，并告诫您不要阅读不存在的规则和要求。

*R23 limits confusion and cautions you against reading requirements that are not there.*

比赛规则的文本，语义直接、准确且仅限于它所表述的。

Robot Game text means exactly and only what it says.

- 如果在详细的游戏文本中未定义单词，请使用其常见的会话含义。
- 如果没有提到细节，那就没关系。
- If a word is not defined in the detailed game text, use its common conversational meaning.
- If a detail is not mentioned, it does not matter.

### R24 INFORMATION RANKING 信息排名

R24预先回答了这样一个问题：“如果两个比赛事实不一致怎么办？”

*R24 pre-answers the question “what if two game facts disagree?”*

在所有“机器人比赛”信息源中，最新的“机器人比赛”更新具有最高权限，其次是任务，竞赛规则，然后是场地设置。您可以在[firstinspires.org/resource-library/fli/challenge-and-resources](http://firstinspires.org/resource-library/fli/challenge-and-resources)中找到机器人比赛更新。

Among all Robot Game information sources, the most recent Robot Game updates have highest authority, followed by the missions, the competition rules, and then the field setup. You can find Robot Game updates at [firstinspires.org/resource-library/fli/challenge-and-resources](http://firstinspires.org/resource-library/fli/challenge-and-resources).

- 在任何一个信息来源中，文本比图片更具权威。
- 视频、电子邮件和论坛帖子没有权威性。
- Within any one information source, text has authority over pictures.
- Videos, emails, and forum posts have no authority.

### R25 BENEFIT OF THE DOUBT 疑判从益

R25告诉裁判员如何在混乱或难以判断的情况下做出裁决。

*R25 tells the referee how to rule in confusing or hard-to-tell situations.*

如果裁决在两方向（利、弊）都能解释通过，或裁判员的准备工作、注意力、视角、记忆出现问题，你将获得有利结果。

If the referee's decision "could go either way," or if the referee's preparation, attention, vision, or memory cause an issue, you get the benefit of the doubt.

### R26 FINAL RESULTS 最终结果

R26告诉您分数如何成为生效，包括平局分数。

*R26 tells you how scores become official, including tie scores.*

一旦您同意分数，它将正式生效。

Once you agree with the score, it becomes official.

- 如果需要，主裁判将做出最终决定。
- 只有您在排名比赛中获得的最佳成绩才算入奖项/晋级。根据需要（如平局）将使用第二和第三佳分排名。如果仍未解决，比赛官方将决定该怎么做。
- 季后赛（如果举行）只是为了增加乐趣。
- If needed, the head referee makes final decisions.
- Only your best score from ranked matches counts toward awards/advancement. Ties are broken using second- and third-best scores as needed. If it's still not settled, competition officials decide what to do.
- Playoffs, if held, are just for extra fun.

## 高度检查工具 HEIGHT CHECK TOOL

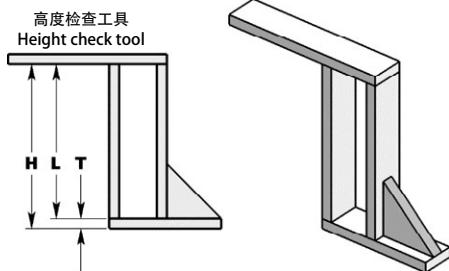
为了在检查时检查设备的高度，这里有一个简单工具的想法，您可以根据需要滑动它进行检查。  
To check the height of equipment at inspection, here is an idea for a simple tool you can slide around as needed.

$H = 12.0 \text{ in. (305 mm)}$

$T = \text{Thickness of your material}$  材料的厚度

$$L = H - T$$

*This is optional. 这不是必须的。*

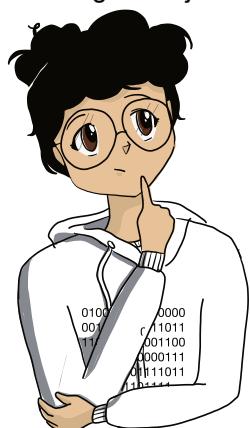


## 本年度规则中的新内容 • NEW IN THE RULES THIS YEAR

再次参赛团队注意事项：以下列表不详细。你仍然需要经常仔细阅读完整的比赛规则。

**Caution to returning teams: The following list is not detailed. You still need to read the full competition rules carefully and often.**

- HOME区域的形状和用途已更改，现在与出发有关。
- 夹具可以延伸到西墙。
- 允许使用LEGO Education SPIKE Prime机器人平台。
- **物品与任务模型结合在一起的规则已经修改，现在基于时点而不是重力。（不确定翻译）**
- 出发高度限制被删除。请勿通过制造高大的重力锤而不是经过深思熟虑的设计来滥用此功能，否则限高天花板将在明年恢复使用。
- 取消发射之前物体必须静止不动的要求。
- **运输，支持和独立这些词已消失。**
- 搁浅的货物规则更易于遵循和应用。现在，您可以将对象部分留在屋外，但会丢失一个精确标记而不是丢失对象。
- The shape and use of home is changed and is now related to launching.
- Jigs can extend to the west wall.
- The LEGO Education SPIKE Prime robotics platform is available and allowed.
- The rule about combining things with mission models is back and is now based on time instead of gravity.
- The launch height limit is removed. Do not abuse this by making tall, dead gravity hammers instead of thoughtful designs, or the ceiling will be back next year.
- The requirement for things to be motionless before launch is gone.
- The words *transport*, *supported*, and *independent* are gone.
- The stranded cargo rule is easier to follow and apply. You now keep objects stranded partly outside home but lose a precision token instead of losing the object.



祝你好运和玩得开心！在运动场上不断测试和改进您的机器人和程序。练习，练习，练习是为比赛做准备的最佳方法！

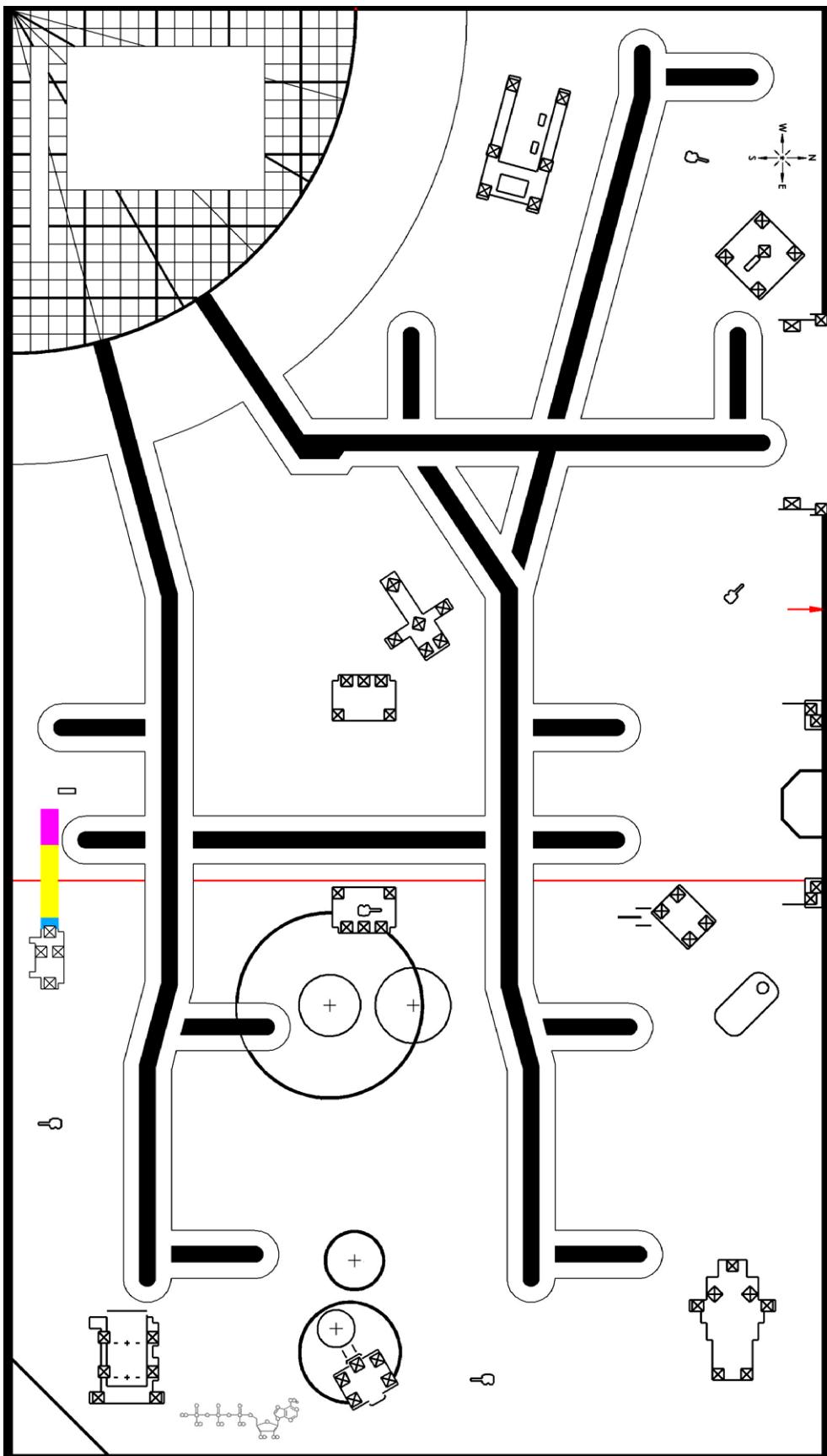
GOOD LUCK and have FUN! Keep testing and improving your robot and your programs on the playing field.

Practice, practice, practice is the best way to prepare for your tournament!

# 机器人路径图

## Robot Path Diagram

绘制机器人完成任务的路线。  
Draw the route your robot will take to complete the mission.





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