



計畫簡介

今年的能源拼圖挑戰讓我們更了解，我們每天所使用的能源量正不停的增加。隨著時代不斷的進步和改變，我們所使用的能源也必須隨之變化。能源拼圖挑戰讓所有 FLL 的團隊仔細想想，我們可能運用的所有能源正怎樣影響著這個世界。藉著這個計畫，你和你的隊伍擁有一個很棒的機會去研究、分析一些能源的選擇與利用，或者有沒有更好的方法去利用這些能源。

我們所選擇的每一項能源，不論就環境、經濟、社會或文化方面來說，都有正面的影響；但相對的在某些地區或環境裡，也有負面的影響。這次的挑戰就是在考慮所有表面和潛在的作用下，找出一個對你的社區或甚至對這個世界最實際且有效的解決方法。你必須意識到，當你試著找出一個平衡點以利用這些資源時，你所想出的方法將是你的家、你的社區、你的國家或甚至全世界獨一無二的方法！！

當我們將許多的能源拼湊在一起時，我們必須考慮到所有的使用層面，包括資源是如何形成的？怎樣儲存？我們如何使用它？消耗量有多少？我們怎樣分配這些資源？

你的這塊能源拼圖要如何完成呢？有沒有一個終極的解決方法呢？

研究計畫

1. **選擇**一個你社區裡的建築物並且**評估**一下它的能源使用。

和你的隊伍好好討論，在你的社區裡有哪些不同的能源可供使用，以及現在社區裡有哪些關於能源使用上的議題。然後選擇一個建築物，例如學校或市政府，連絡建築物的負責人，討論你們的計畫，並請求他/她的幫助以檢視建築物在運用能源方面的表現。在檢視的過程，你和你的隊伍要仔細留意建築物使用哪些類型的能源、怎樣運用以及總數是多少。請教這領域的專家，檢測不同的能源怎樣醞釀而成以及它的消耗量、可用量、對環境的影響帶來什麼不一樣的結果。

參考"研究資源"的網頁，以獲得更多有關能源測量的資訊和工具材料。

2. 和專家們仔細**討論**並且**計畫**一個可以減少或轉換能源使用的方案。

一旦你知道你選擇的建築物對能原有什麼需求，試著找出這區域裡更適合的能源提供方案。能源使用的效率如何？可以讓它變得更好嗎？或者試試看改變能量的來源呢？

搜尋所有可以用的潛在資源，並試著擬定短期以及長期的解決方案以逐步實現能源節約的目標。你可以想到一個創新的方式以減少能源的消耗嗎？或者轉換至一個更耐用持久的能源？有沒有什麼新的科技對於某些需求提供有效的資源？也許你可以連絡一個正在從事這方面工作的科學家或工程師。顧及建築物中的所有區域，結合所有改變所會帶來的影響，並想出你所要的解決方案。你必須指出你的方案對於這棟建築物怎樣帶來了正面的改變。

3. 和你的社區**分享**你為建築物做的計畫與改變。

當你完成你的研究並推出你的解決方案，抬頭挺胸地向你的社區展示你的成果吧！裁判將會希望你說明你的短期和長期計畫，以及你所擁有的資訊以便可以擁有你計畫的備份。利用這個計畫的機會，看看你可以為自己、你的團隊、你的社區或甚至全世界帶來多大的影響！

注意：解釋如何完成以上三部分的計畫，包括議題和解決方案。和大家分享你的資料以取得冠軍賽的資格。

參考“FIRST LEGO League 教練手冊”以獲得更多的幫助和想法。請先演練好你的簡報，以便時間能掌握於 5 分鐘內(包含準備時間)。



Project Introduction

This year's Power Puzzle challenge is about understanding the elements of energy use in a world that uses more and more energy every day. As our world grows and changes, so do our energy needs. The Power Puzzle missions get FLL teams to consider some of the energy choices we have available and how those choices affect the world. With the Power Puzzle project, your team has the opportunity to look at many types of energy choices, analyze the possibilities, and work to improve energy use.

Whether it is environmental, financial, social, or cultural, each energy choice can have positive impacts in some areas while having negative consequences in others. The challenge is to find practical solutions in your community without ignoring the larger impacts your action or inaction can have on your life or around the world. As you work to find the balance between all these issues, realize that the solution for your home, community, country, or world will be unique.

As we work to make the puzzle pieces fit, we must consider all parts of energy use, including how energy is made, how it is stored, how we use it, how much we consume, and how we dispose of associated waste.

How will the pieces of your puzzle fit together? What is your energy solution?

The Project

1. **Select** a building in your community and **evaluate** the energy use.

With your team, discuss the different energy sources used in your community and what the current energy issues are in the area where you live. Then choose a building in your community, like a school or municipal building. Contact the manager of that building, discuss the project, and ask for his/her help in performing an energy audit. In this audit, your team should look at the types of energy used throughout the building, how it is used, and the amount used. Contact experts in the field and examine the process by which different types of energy are made and the important effects of producing and using them, such as costs, availability, and environmental issues.

Consult the "Project Resources" page on the website for instructions and sample materials of what is needed to perform an energy audit.

2. **Talk** to experts and **propose** solutions to reduce consumption or move toward alternative energy use.

Once you know the energy needs of your chosen building, look at the areas of improvement to find solutions. How efficient is the energy use? How could you make it better? What about their sources of energy?

Research potential alternate energy solutions and propose short-term and long-term changes that can be made to move toward renewable energy or reduced consumption. Can you find an innovative way to reduce energy use or change to a more sustainable energy source? Is there a new technology that could be developed to better support specific needs? Maybe there are scientists or engineers that you could contact who are already working on such a solution. Consider all areas of the building and community this change might impact and how realistic your solution is. You should show exactly how your solution would create a positive change.

3. **Share** the changes for your building with the community.

Once you have researched and developed your solution, get out there and share it with your community! Event judges will expect you to explain how you showed the community your short- and long-term solutions and the information you have to back up your ideas. Use this project as an opportunity to see just how big an impact you and your team can have on your community and your world.

Note: Explain how you completed all THREE parts of the Project, its purpose, and solutions. Share your presentation in order to qualify for project awards at qualifying and championship tournaments.

Refer to the "The Project," chapter 5, of the "*FIRST* LEGO League Coaches' Handbook" for help and ideas. Practice your presentation so it takes no more than five minutes, including setup time.

任務



- 屋頂太陽能板:

任務：將太陽能板搬到在海邊房舍的屋頂之上 可以得到 15 分。

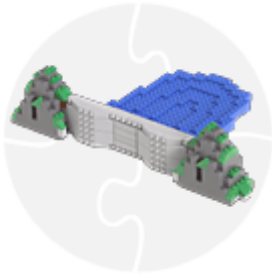
【補充說明】 太陽能板一定要放在屋頂上才能得分。



- 選擇個人交通工具

任務：將氫汽車搬到在海邊房舍的白色區域或是黑色馬路上，並且將卡車搬到停車場上回收或者是搬到農場上再使用。當氫氣車放置在指定位置以及卡車放置在其中之一的指定位置，就可得到 25 分。停車場是指基地上西側的白色區域。農場是指二條河間的白色島型區域。

【補充說明】 氫氣車及卡車必需同時都在指定位置才能得分。



• **水壩:**

任務: 將水壩直立的放置在基地東側上的任何河段邊, 並確實地觸碰到河岸兩邊, 即可得到 25 分。當比賽結束, 裁判人員將會在水壩的上游引發洪水。如果有任何的房舍被水壩或是洪水觸碰到, 將會倒扣 10 分。水壩不視為雜散物件。

【補充說明】

1. 水壩 (指的是灰色的壩體, 不包含左右兩座山) 必需直立的橫跨河兩岸才能得分 (壩體不分正面或反面)。山如果壓在河上 (即壩體, 不算得分。如果很難分辨得分與否時, 由裁判認定)。
2. 水壩含兩座山及洪水都不可以觸碰到房舍, 否則倒扣 10 分。



• **風力發電:**

任務: 確實將風力渦輪發電機直立地放置在基地上 觸碰到白色的區域, 而不是在基地之外。成功放置每一座風力渦輪發電機即可得 15 分。

【補充說明】

1. 風車必需是直立的, 且放置於河流北岸任何地方 (不管風車有無壓到房舍或其他圖形) 即能得分。
2. 允許利用策略物件將兩台風車一起送出去, 唯風車本體 (含底座) 必需完全接觸地面才能得分。
3. 風車零件掉落不算分。

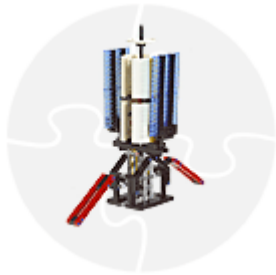


• 電力輸送網格的連結:

任務: 請直立的放置電力線裝置，並確實 觸碰到發電廠和周圍社區的白色部份。社區使用這個方式連結到發電廠即可得 5 分. 每一個連接的社區如果有 觸碰到已得分的水力發電站或是已得分的風力渦輪發電機，可得到額外 5 分.

【補充說明】

1. 電力網必需直立且確實觸碰到發電廠及觸碰到社區的白色部份，才能得分。
2. 如果觸碰到發電廠且同時碰觸到兩個社區，則可得到兩個 5 分。如果又同時碰觸到風車或水壩，可得到額外 5 分。
3. 電桿倒塌不算分



• 太陽能衛星:

任務: 將衛星面板放下來可得 15 分. 第一個達成此任務的機器人,可獲得額外加 5 分.

【補充說明】

1. 衛星面板必需放下來才可得 15 分，如果有碰到衛星但衛星面板未放下，事後檢查確實為大會準備的機台故障，則視為得分。（與教練會議結論不同，做此修正，請注意）

• 波浪渦輪發電機:

任務: 各隊伍請自行設計的波浪渦輪發電機帶至比賽場地(一隊一個) 並且將它搬到沙灘西側的海中。波浪渦輪發電機模型至少需包含二個能夠彼此獨立運作的零組件。波浪渦輪發電機可得到 25 分. 特別的設計是值得花時間去做，但並無加分作用，因此不得有異議。

【補充說明】

1. 波浪渦輪發電機模型至少需包含二個能夠彼此獨立運作（或旋轉）的零組件。只有一個不算分。
2. 沙灘西側的海中，經決議只要場地西側全部的海面都算。



• **煤礦開採:**

任務: 取得載貨用的軌道車，並且從鐵軌上滑下來。當載貨用的軌道車確實觸碰到終點的停止器時，即可用手將軌道車放回到基地上，完成後可得到 **10** 分。

【補充說明】 如果軌道車上的煤礦掉落在地上，則不可以用手拿回基地。只能用手將軌道車放回基地。



• **石油鑽探:**

任務: 將全部的油桶(包含紅色的油桶)搬離開鑽油平台，完成後可得到 **10** 分。

【補充說明】 如果油桶掉落在海上，要扣 **40** 分。



• **穀物收割處理器:**

任務: 將所有的穀物(包含紅色的)搬到基地上。最少要有一個油桶先搬到農場上之後，穀物被移動到指定的位置才能得到 **25** 分。

【補充說明】

1. 這是有先後順序的，必需先放油桶，再搬穀物才能得分，次序弄錯不算分。油桶必須放在農場才算。
2. 必需將所有的穀物搬到基地才算分，穀物站著或倒著都算。



• 鈾礦開採:

任務: 將所有的鈾礦(包含紅色的)都搬到農場之外完成後可得 15 分。

【補充說明】

1. 鈾礦站著或倒著都算。



• 樹木栽種:

任務: 將樹木移到 主要河流北方的任一區域。樹木必需是直立放置的。樹木可與組成的部份連接或緊貼在一起。每栽種一棵樹木就能得到 10 分。如果樹木被搬運到發電廠區域,應該以燃料的分數計算,而非是樹木栽種的分數計算。

【補充說明】

1. 樹木必需是直立的,且放置於河流北岸任何地方(不管樹木有無壓到房舍或其他圖形)即能得分。
2. 允許利用策略物件將數個樹一起送出去,唯樹木本體(含底座)必需完全接觸地面才能得分,樹木站在策略物件上而沒有完全接觸地面不算分。
3. 搬運到發電廠區域的樹木站著或倒著都算燃料分數。



• 發電廠供電:

任務: 將燃料搬到發電廠區。

樹木: 每棵樹木可得 10 分(最多二棵,因為當已經有二棵樹當作燃料的情形下,其他的樹就必須以樹木栽種來計分)。

黑色煤礦: 最少為原本裝載的一半 10 分

綠色鈾料: 每一個得 10 分

白色油桶: 每一個得 5 分

既然我們需要燃料以產生能源,而且在處理及消耗這些燃料的同時,也會產生負面的影響及副作用。紅色的燃料是一種無效率與會產生負面影響的模型。因此,我們要盡量避免使用紅色燃料。在這個任務中,在發電廠的紅色燃料是不予計

分的。分散各地的紅色燃模型是由機器人處理或是由手放置在基地的範圍之內。

【補充說明】

1. 所有燃料允許以策略物件搬到發電廠區，唯燃料必需完全進入發電廠區才算得分。
2. 策略物件未完全進入發電廠區，其上的燃料已進入發電廠區的算分。如果很難分辨得分與否時，由裁判認定。



• 油桶:

將每一種顏色的油桶放置在基地的範圍之內 作為儲油桶，都能得到 **10** 分。但是當參賽隊伍營救機器人時，油桶放置在基地的範圍之內 裁判人員可以拿走一個油桶，並且不予計分。在拿走油桶時，會先拿走白色的油桶。如果當營救機器人時，基地的範圍之內 沒有油桶，則參賽隊伍不會失去任何分數。如有任何油桶 觸碰到水或是房舍的任何部份，一次最高會扣 **40** 分。

【補充說明】

1. 一開賽 5 個油桶可以放在基地或停車場，唯放在停車場之油桶必需用機器人搬回基地，不能用手拿。
2. 比賽結束，在基地內的油桶不論顏色，都能得到 **10** 分。
3. 在基地內之油桶允許用手搬動位置，唯不能搬離基地。
4. 油桶未在基地，不管幾個落在水中或海中或碰觸到房舍，扣 **40** 分
5. 搬到發電廠區的油桶，白色得 **5** 分，紅色不算分。



• 停車場:

指定停車場為一個儲存的區域並遵循家用規則。因此隊員可以用手將儲存用的物件移入及移出此區域。機器人也可以出入此區域，但是不能與該區域中的計分物件或是策略物件有所接觸。

【補充說明】如果很難分辨得分與否時，由裁判認定。

- 公平額外加分:

基於 2006 大會的計分方式，公平的額外加分適用於使用 RCX 平台的隊伍。因此，在這裡我們採用相似的計分方式如下：每 5 原始積分至 100 分以內者加 8 分。原始積分介於 105 至 325 加 60 分。而原始積分介於 330 至 395 則分別調整到 386 至 399 之間。



2007 FIRST LEGO® League



台灣區選拔賽

Missions



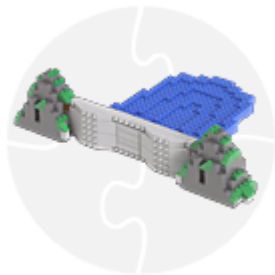
• Roof Solar Panel:

Mission: Move the Roof Solar Panel ONTO the roof of the house by the sea for **15** points.



• Personal Vehicle Choice:

Mission: Move the Hydrogen Car TO the white property or all-black driveway of the house by the sea and move the truck either TO the parking lot to be recycled, or TO the farm to be re-purposed. The car in its target is worth **25** points only if the truck is in one of its targets. The parking lot is the white area directly west of Base. The farm is the white area isolated between both rivers.



• Hydro-Dam:

Mission: Place the Dam so it is TOUCHING both banks of any river section east of Base for **25** points. The Dam must be upright. When the match is over, the referee places (or projects) the Flood upstream of the Dam and there is a single maximum **10** point deduction if any houses are being TOUCHED by the Dam or Flood. The Dam is never considered a stray object.



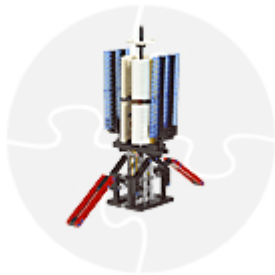
- **Wind Turbines:**

Mission: Place Wind Turbines so they are TOUCHING any white area not directly outside Base. The Wind Turbines must be upright. Scoring Wind Turbines are worth **15** points each.



- **Grid Connection:**

Mission: Place the Power Lines so they are TOUCHING the white of the Power Plant's property and the white of surrounding communities. The Power Lines must be upright. Communities connected to the Power Plant's property in this way are worth **5** points each. Each connected community that is in turn TOUCHING a scoring Hydro-Dam or scoring Wind Turbine is worth an added **5** points



- **Solar Power Satellite:**

Mission: Lower one of the Satellite's panels for **15** points. If your robot is the first to do this, **5** points are added.

- **Wave Turbine:**

Mission: Bring your own team-designed Wave Turbine (one per team) and move it TO the ocean directly west of the sandy beach. Your Wave Turbine model must consist of at least two pieces that move independently of each other. A scoring Wave Turbine is worth **25** points. A meaningful design is worth your time, but not worth points, and won't be judged.



- **Coal Mining:**

Mission: Get the loaded Rail Car to roll down the Railroad tracks. Only if and when the loaded Rail Car TOUCHES the stoppers at the end, the team is allowed to retrieve it TO Base by hand for **10** points



- **Oil Drilling:**

Mission: Move all the Oil Barrels (including the red version) OFF the Oil Platform for **10** points.



- **Corn Harvest and Processing:**

Mission: Move all the Corn (including the red version) TO Base. The corn in its target is worth **25** points only if at least one Oil Barrel has been moved TO the Farm.



- **Uranium Mining:**

Mission: Move all the Uranium (including the red version) OUT of the farm for **15** points.



- **Tree Planting:**

Mission: Move Trees TO any area north of the main river. Trees must be upright. Pieces may be connected or attached to the Trees. Planted Trees are worth **10** points each. Trees moved to the Power Plant area could score as fuel, but do not score as planted

- **Power Plant Supply:**

Mission: Move fuel TO the Power Plant's property.

Trees: **10** points each (Maximum of two, because... For each Tree to score as fuel, another Tree must score as "Planted")

Black Coal: **10** points for at least half of the original load

Green Uranium: **10** points each

White Oil Barrels: **5** points each

Since energy is needed in order to find and process fuels, and since the processing and consumption of fuels often involves undesirable effects and by-products, the red versions of the fuel models represent inefficiency and negative impacts, which need to be minimized. There must be no red fuel models IN the Power Plant area for this mission to count. The separation (processing) of

red fuel models from others may be done by the robot anywhere, or by hand IN Base.



- **Oil Barrels:**

Oil Barrels of either color are worth 10 points each IN [Base] as unused reserves, but... If you rescue the robot while there are Oil Barrels IN Base, the referee takes one away so it does not score. White will be taken before red. If there are no Oil Barrels IN Base at the time of the rescue, there is no loss. There is a single maximum 40 point deduction if any Oil Barrel from anywhere is TOUCHING any water or property with a house.

- **Parking Lot:**

The parking lot is designated as a storage area with respect to the Housekeeping rule, so the team is allowed to move objects to and from the parking lot by hand for storage only. The robot is allowed to enter and exit the parking lot, but it is not allowed to make contact with scoring objects nor strategic objects there.

- **Fairness Bonus:**

Based on well documented scoring data from the 2006 FLL tournament season, a fairness bonus is applied to the non-perfect raw scores earned by teams who are still using the RCX platform so that similar amounts of effort are reflected by similar scores as follows: Every 5 raw points up to 100 are worth 8 points. Raw scores from 105 to 325 get 60 points added. Raw scores from 330 to 395 are replaced by scores of 386 to 399 respectively.



參賽必讀

當每年公告規則後，還是會有許多參賽隊伍閱讀完「任務說明」頁面後，就開始組裝機器人並編寫機器人程式，而忽略了網站上其它重要的頁面，就參加比賽了。

這些隊伍在比賽時都經歷了不必要的困擾和沮喪，並在競賽期間經常遇到令人驚訝且不愉快的事情。

爲了避免上述情況發生並使您的隊伍得到最好的成績，請多花一些時間閱讀所有網站上的頁面，並時常注意最新消息。其中「場地設置、任務說明、規則說明以及 Q&A」四大頁面是必須要閱讀的。

FLL 核心價值

- 我們是一個團隊。
- 我們在教練與老師的引導下，共同找出解決方案。
- 我們推崇和諧競賽的運動家精神。
- 我們在學習過程中所發現的遠比我們在競賽中所贏得的重要。
- 我們樂於與其他隊伍分享經驗。
- 我們做每一件事的時候，都會表現得非常專業。
- 我們在整個學習及參賽過程中，玩得很開心！

FLL 教練誓詞

下載並列印



FLL 教練誓詞



Read This First

Every year, after reading and printing the Missions page, some teams just jump right into building and programming without giving equal attention to the many important details on the other pages.

These teams experience unneeded confusion and frustration, and are often unpleasantly surprised at tournaments.

To avoid all that and maximize your team's performance, please invest the time needed to read ALL of the Challenge pages and refer back to them often. The Field Setup, Missions, Rules, and Questions & Answers pages are all critical to team success.

:: Mission Model building instructions update -  **Download** update containing 2 corrections (posted 8/31/07)

FLL Core Values

- We are a team.
- We do the work to find the solutions with guidance from our coaches and mentors.
- We honor the spirit of friendly competition.
- What we discover is more important than what we win.
- We share our experiences with others.
- We display gracious professionalism in everything we do.
- We have fun!

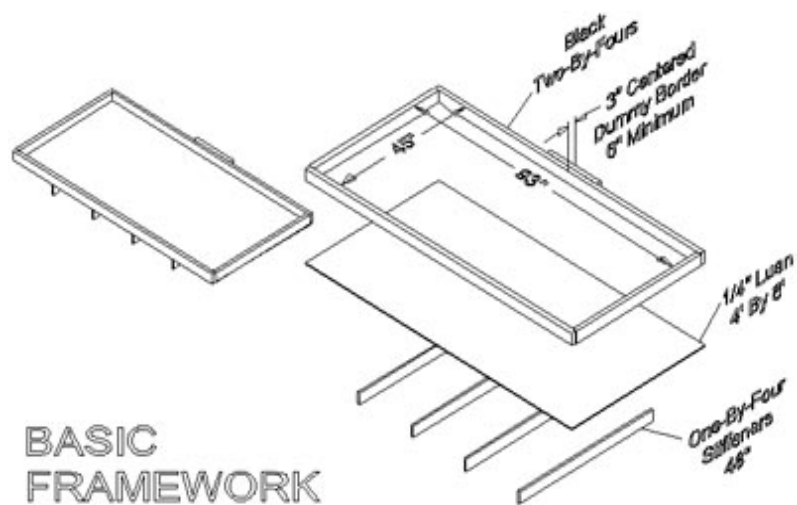
FLL Coaches' Promise

Download and Print



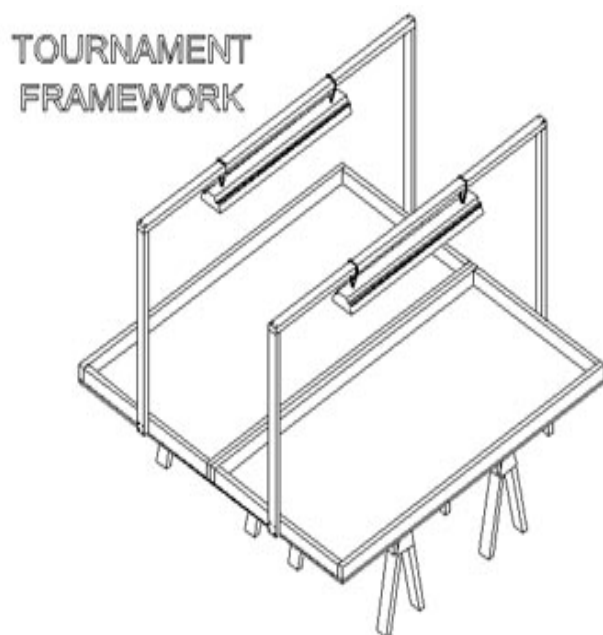
FLL Coaches' Promise

比賽底圖與邊框



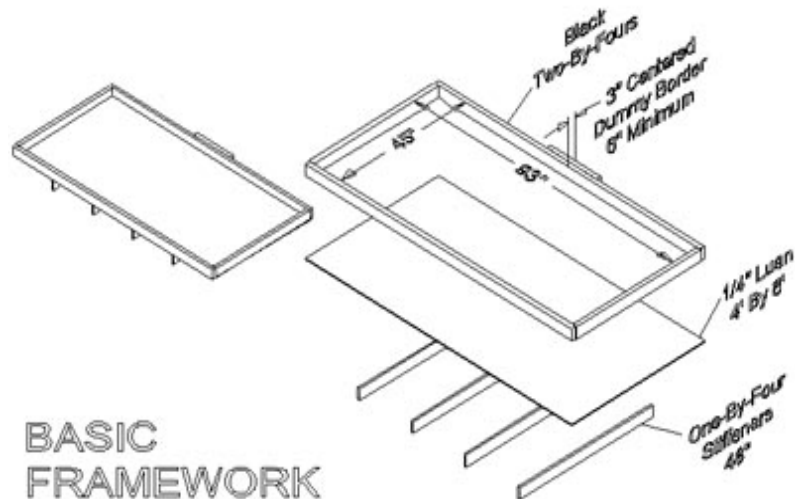
組裝一放置比賽場地的桌台，將比賽底圖（塑膠墊）放置於一光滑之平面上，再將邊界牆以上圖所示之方式置於其四周。為方便起見，您也可以把上述的物品放在一平滑的地板上。

要達到與大會相同之設置，請將場地設於離地 2 英尺高並加上如下圖所示之照明光源（注意：在賽程進行期間，兩座比賽桌台將背對背放置）。如果您想要更了解本部份，請參照「比賽桌台」之說明。



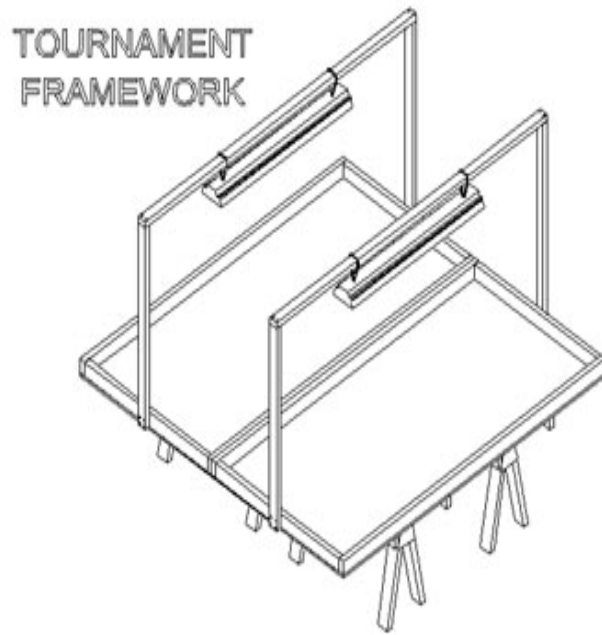
一旦您已經將基本架構組裝完成，就可以準備進行「場地設置」的部份了。

Surface & Borders



To have the basic framework needed to hold your practice field, place the Field Mat from your Field Setup Kit on a smooth, flat surface, and put Border Walls around it as shown in the diagram labeled BASIC FRAMEWORK. Note that the Field Mat and Border Walls could simply be placed on a smooth floor.

To have nearly the same exact setup as at a tournament, elevate the field about 2 feet off the ground and add fluorescent lights as shown in the diagram labeled TOURNAMENT FRAMEWORK (Note: At the tournament, two tables are placed back to back). For ideas on how to proceed in building, go to the OPTIONAL TABLE instructions. .



Once you have at least the Basic Framework, you're ready to go to FIELD SETUP.

場地設置

概述

比賽場地是在墊子上的障礙任務。障礙稱為任務模型，墊子稱為場地墊。某些模型用 3M 魔鬼沾固定在場地墊上。場地墊必須放在一個堅固平整的表面上，周圍必須有一圈邊框。

需求條件

在設置場地以前，你首先需要...

- 按照頁面「比賽底圖與邊框」的步驟製作一個桌台；
- 按照場地套件中光碟裏的步驟，建構任務模型；
- 將場地墊和魔鬼沾準備好。

場地墊的設置

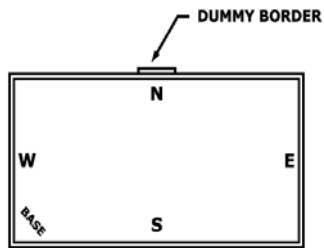
第 1 步: 清理要放置場地墊的表面。即使是一個很小的雜物在場地墊下面，也會造成機器人的困擾。請用吸塵器清理表面，再用你的手觸摸表面，把所有突起的小雜物去除。

第 2 步: 打開場地墊將它鋪到場地上去，有圖案的一面朝上。有商標的地方置於你的左下角（西南角）。詳見下列「桌台/場地墊方位簡圖」(Table/Mat Orientation)

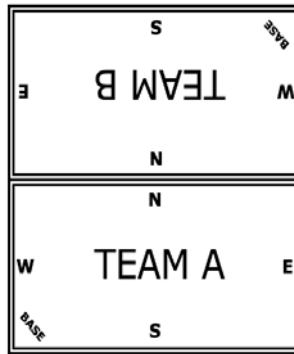
第 3 步: 移動場地墊，使場地墊「BASE」角的兩邊與桌台西、南邊框之間沒有縫隙。在場地北邊和東邊的縫隙是可以接受的。

第 4 步: 讓夥伴由另一邊拉著場地墊，從東向西將場地墊上的波紋撫平，再重新檢查第三步。之後，有一些波紋可能還會存在，不過一段時間以後它們就會消失。

Table/Mat Orientation



PRACTICE SETUP



TOURNAMENT SETUP

</在運輸或儲存的時候，場地墊

上的任務模型可以另外儲存。某些模型是放在場地墊上的，其他模型則是用 3M 魔鬼沾粘在場地上的。當你拿到任務模型套件的時候，這些魔鬼沾就與樂高積木放在一起。當兩個魔鬼沾面對面按在一起的時候，它們就會互相粘住，不過你還是可以再將它們分開。

當任務模型需要使用魔鬼沾時，在場地墊上這個模型的位置中就會有 X 形標記。每一個 X 形標記，都粘上一片魔鬼沾，帶粘性的一面朝下。當使用在矩形標記上時，方形的魔鬼沾就需要裁成兩半。接著，將一片相同尺寸的魔鬼沾按在粘好的魔鬼沾上，有粘性的一面朝上。

提示： 因為第二片魔鬼沾粘在你手上的粘力比它們彼此鎖住的力量大，所以當您將第二片按到第一片上的時候，使用魔鬼沾提供的蠟紙墊著你的手指，扣好以後再將蠟紙剝掉。

最後，將每個需要粘住的模型，沿著場地墊上的邊界準確的粘在場地墊上，完全蓋住標記。仔細地將模型與魔鬼沾按緊。按的時候是按在模型最接瑤場地墊的結構，而不是整個模型。使用魔鬼沾的這個過程只需要進行一次，之後，模型就可以很容易的粘在場地墊上或者拉開。

模型細節

鑽油平台 以 Dual Lock(魔鬼沾)依照場地墊上的指示粘好，並且固定鑽油平台的位置。油桶將會由西至東運送。安裝時，南邊的黃色手臂要朝上，北邊手臂的長邊要指向北方。並把三個油桶放在黑色的運送帶上，兩個白色還有一個紅色的油桶放中間。將每個油桶上的釘狀面朝南或北放置。而南邊黃色懸吊手臂上下移動的阻力系數可以是任意常數或變數。

房舍： 以 Dual Lock(魔鬼沾)依照場地墊上的指示粘好，並且固定房舍的位置。另外，請放置一個小女孩在走道的東側盡頭，並且將門保持在九十度的開啓狀態。

卡車： (No Dual Lock)(不需要使用 Dual Lock)。請放置一台卡車在場地墊上，並且卡車的輪子會在短線上以及長線之間。放置三個紅色的油桶在卡車的基座上，二個放在駕駛座後面，而另外一個放在輪艙之間。將每個油桶上

的釘狀面朝前或後放置。請勿將油桶連接起來。

太陽能衛星:詳情請參閱 **Table/Mat Orientation**。在大會中，一組太陽能衛星模型放置在大會設置的絕對中心點，由 AB 兩隊共同使用。換句話說，就是模型會放在東西邊的中心點位置，半邊是 A 隊板子的北邊，而另一半邊即是 B 隊板子的北邊。如果你的練習桌(**practice table**)沒有與其他桌子合併成 **Table/Mat Orientation** 的形式，那麼你們需要一些廢木板在你北邊的牆外做一個 **Dummy Border**，詳情請參閱大會提供的圖形。安裝時，藍色的太陽能組以及白色的碟形指針都會朝上。

發電廠: 以 **Dual Lock**(魔鬼沾)依照場地墊上的指示粘好，並且固定發電廠的位置。

鈾: (不需要使用 **Dual Lock**)。放置二組鈾模型，以及一個紅色的鈾模型。將這些模型的環狀部份，垂直地放置在黑色的定位線上。

穀物: (不需要使用 **Dual Lock**)。請放置二個穀物模型以及一個紅色的穀物模型。將這些模型的環狀部份，垂直地放置在黑色的定位線上。

鐵軌及軌道車: 以 **Dual Lock**(魔鬼沾)依照場地墊上的指示粘好，並且固定鐵軌的位置。鐵軌的部份並不方便粘貼，因此你可以粘貼在每一對西側的邊條上。

太陽能板、氫氣車、電力線、水壩及水災、5 個白色油桶、四棵樹、以及二座風力渦輪發電機: (不需要使用 **Dual Lock**)。安裝時，請將這些模型放置在基地上或是白色的停車場。

場地維護

場地邊框: 清除邊框上的碎片，並將明顯的洞補平。

場地墊: 確定場地墊平坦的鋪在南面和西面的邊框底部。避免使用任何可能留下污漬的物質來清潔場地墊。任何污漬，都會造成機器人的表現與在新場地墊上的表現有差別。在比賽中所使用的場地都是新場地。用吸塵器和濕布清除場地墊上的污漬和小顆粒。在運送和存放場地墊的時候，注意不要壓到場地墊甚至彎曲成尖角，所造成的小小凸起會影響機器人運作。反復的練習有可能在場地墊上留下一些痕跡，導致場地墊上圖像的損壞，但是這些圖像損壞不會在比賽場地上出現。

任務模型: 經常調校和壓緊模型，使它們保持原始狀態。確保每根轉軸都能自由轉動，並抽換掉已彎曲的軸。

Field Setup Instructions

Overview:

The Challenge field can loosely be compared to an obstacle course on a mat. The “obstacles” are called mission models, and the mat is called the field mat. Some of the models are secured to the mat using 3M Dual Lock fastening material. The mat must be on a smooth, hard, flat surface, and it must be surrounded by border walls to contain all the action.

Requirements:

This step first requires that you...

- have read and followed the instructions under "Surface & Borders" so you now have an official framework on which to stage your field.
- have read and followed the instructions on the CD that came with your Field Setup Kit so you now have the LEGO mission models built.
- have the field mat and the Dual Lock fastening material that came in your Field Setup Kit.

Field Mat Placement:

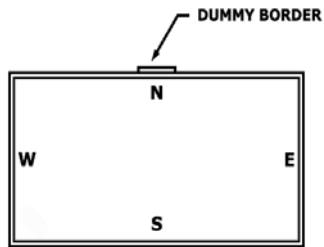
Step 1: Vacuum the surface on which you'll be staging the mat. Even the tiniest particle under the mat can give the robot trouble. After vacuuming, run your hand over the surface and sand or file down any protruding imperfections you find. Then vacuum again.

Step 2: See the sketch labeled Table/Mat Orientation. Never unroll the mat in an area where it could pick up particles. On the vacuumed surface unroll the mat and position it so the image is up and BASE (the area with logos) is at the south center of your surface (the south edge should be one you have easiest access to).

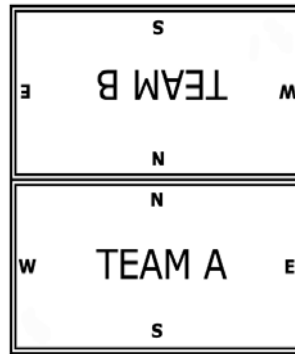
Step 3: Slide and align the mat so there is no gap between the southeast corner's edges of the mat and the corresponding southeast border walls. Gaps are expected and acceptable at the north and west edges.

Step 4: With help from another person, pull the mat at opposite ends, then massage out any waviness from west to east and re-check the requirement of Step 3. It is expected that some waviness will persist, but that should relax over time. Some teams use a hair dryer to speed the relaxation of the waviness.

Table/Mat Orientation



PRACTICE SETUP



TOURNAMENT SETUP

Using Dual Lock: The Mission Models can be taken off the field mat for transport and storage. Some are loose, but others are secured with a re-usable fastening material from 3M called Dual Lock, which comes with the LEGO bricks in your Mission Model Set. Dual Lock is designed to stick or “lock” to itself when two faces of it are pressed together, but you can unlock it too.

When a model’s placement requires Dual Lock, the model’s location mark on the mat will contain boxes with X in them. For each X box, apply a piece of Dual Lock, adhesive side down, to the mat. Square pieces will need to be cut in half for the rectangular boxes. Next, press (lock) a like-sized piece of Dual Lock, adhesive side up, onto to the ones you just finished sticking to the mat.

Tip: Since the second piece of each Dual Lock pair would rather stick to you than lock to its partner, press the second piece onto the first using the wax paper the Dual Lock was supplied on instead of your bare finger, then peel away the paper.

Finally, for each Dual Locked model, line the model up exactly over its location, being sure that all labeled features are facing as labeled. Carefully lower the model and press it down onto the Dual Lock. Try to press down on the lowest solid structure of each model instead of crushing the whole model. This application process for the Dual Lock is only needed once—later, the models can simply be locked onto the mat or unlocked.

Model Details:

Oil Platform: Place Dual Lock and point the Oil Platform as shown on the mat, so that its Oil Barrels would release from west to east. Setup is with the south yellow arm up, and the north yellow arm’s long end pointing north. Place three Oil Barrels (two white ones, and a red version between them) lying down on the black release ramp. The studs on each barrel may point north or south (variable). Resistance against the up/down movement of the south yellow arm is normal and variable.

House: Place Dual Lock and point the House as shown on the mat. Place the girl near the east end of her black walkway, and keep the door opened 90 degrees.

Truck: (No Dual Lock) Place and point the Truck as shown on the mat, with its wheels on the short lines and between the long lines. Place three of the red version of the Oil Barrel lying down on the floor in the bed of the truck, with two behind the cab and one between the wheel wells. The studs on each barrel may point toward front or rear (variable). Barrels must not be connected to each other.

Solar Powered Satellite: See the sketch labeled Table/Mat Orientation. At a tournament, a single Solar Power Satellite model is shared by Team A and Team B at the absolute center of a tournament setup. In other words, the model is centered east/west, then centered half on Team A's north border, and half on Team B's north border. If your practice table doesn't have another table next to it, you need to nail some scrap border wood to the outside of your north border wall to form the Dummy Border seen in the sketch. Setup is with both blue solar arrays and the white-dished pointer all pointing up.

Power Plant: Place Dual Lock and point the Power Plant as shown on the mat.

Uranium: (No Dual Lock) Place the two Uranium models and one red version of this model as shown on the mat, with their loops vertical upright and in line with the small black orientation lines.

Corn: (No Dual Lock) Place the two Corn models and one red version of this model as shown on the mat, with their loops vertical upright and in line with the small black orientation lines.

Railroad and Rail Car: Place Dual Lock and point the Railroad track as shown on the mat. Perfect closure of the Dual Lock is not possible for this model, but a good connection at the west edges of each pair is sufficient. Fill the Rail Car with twenty pieces of black coal and eight pieces of the red version of the coal.

Roof Solar Panel, Hydrogen Car, Power Lines, Dam and Flood, Five White Oil Barrels, Four Trees, and Two Wind Turbines: (No Dual Lock) Setup is with these models in BASE and/or completely in the white area of the parking lot.

Field Maintenance:

Border Walls: Remove any obvious splinters, and cover any obvious holes.

Field Mat: Make sure the mat rests evenly at the bottom of the south and east border walls. Avoid cleaning the mat with anything that will leave a residue. Any residue, sticky or slippery, will affect the robot's performance compared to a new mat. (Many tournaments use new mats). Use a vacuum and/or a damp cloth for dust and

debris, above and below the mat. When moving the mat for transport and storage, be sure not to let the material bend into a sharp kink point, which could affect the robot's movement. Many consistent repetitions of rubbing on the same areas of your practice mat should be expected to cause wear in the image, but such wear is unlikely at a tournament. Tournaments using new mats should unroll the mats as far in advance of the tournament day as possible. For control of extreme curl at the east or west edges of the mat, tape is allowed, with a maximum of $\frac{1}{4}$ " (6 mm) overlap. Do not use tape under the mat.

Mission Models: Keep the models in original condition by straightening and tightening solid connections often. Ensure that spinning axles spin freely by checking for end-to-end play and replacing any that are bent.