



**FIRST**  
**TECH**  
**CHALLENGE**

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**CHALLENGE**



**FIRST** **RISE**

POWERED BY  
**STAR**  
**WARS**  
FORCE FOR CHANGE



FTC 2019-2020  
12.11\_教練會議

隕石造鎮

社團法人台灣玉山機器人協會  
鄭慶滄 / Richard  
[richard@era.org.tw](mailto:richard@era.org.tw)

**<RG02> Maximum Starting Size** - The maximum size of the *Robot* for starting a *Match* is 18 inches (45.72 cm) wide by 18 inches (45.72 cm) long by 18 inches (45.72 cm) high.

**<RG04> Maximum Robot Weight** – *Robots* must not weigh more than 42 pounds (19.05 kg) including battery.

**<RE07> Control Module Quantities** - *Robot* control module quantities are constrained as follows:

- Exactly one (1) *Core Power Distribution Module* is required for *Teams* using any *Modern Robotics Core Control Modules*.
- No more than two (2) *Core Device Interface Modules* are allowed.
- Any quantity of *Core Motor*, or *Core Servo Controllers* are allowed.
- Any quantity of *REV Servo Power Modules* is allowed.
- No more than two (2) *REV Expansion Hubs* are allowed.
- Any quantity of *REV SPARK Mini Motor Controllers* are allowed.
- The REV Control Hub is not allowed.**
- The *Core Legacy Module* is not allowed.





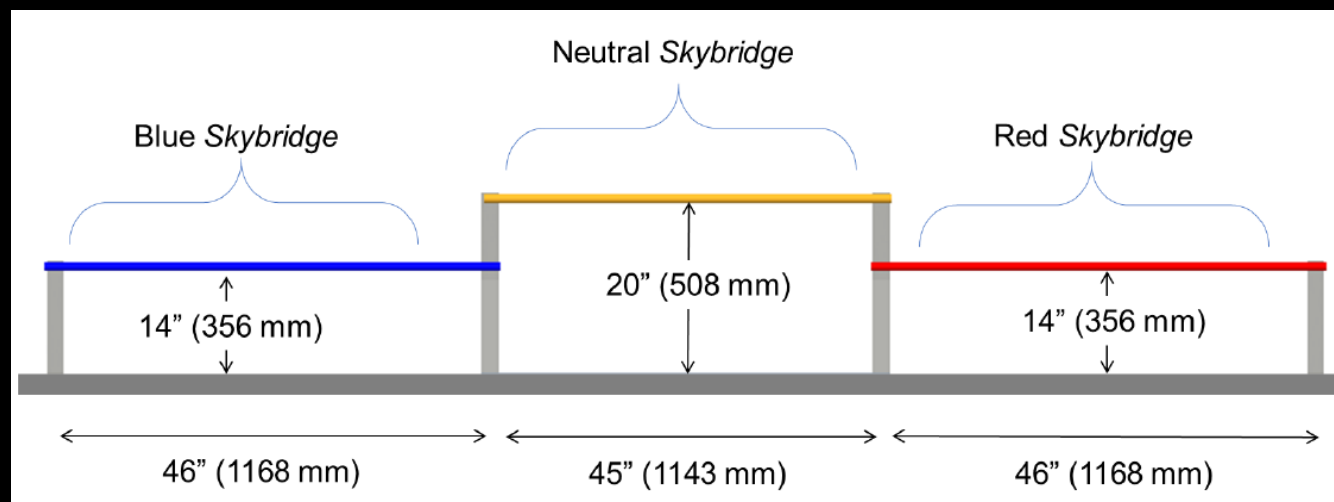
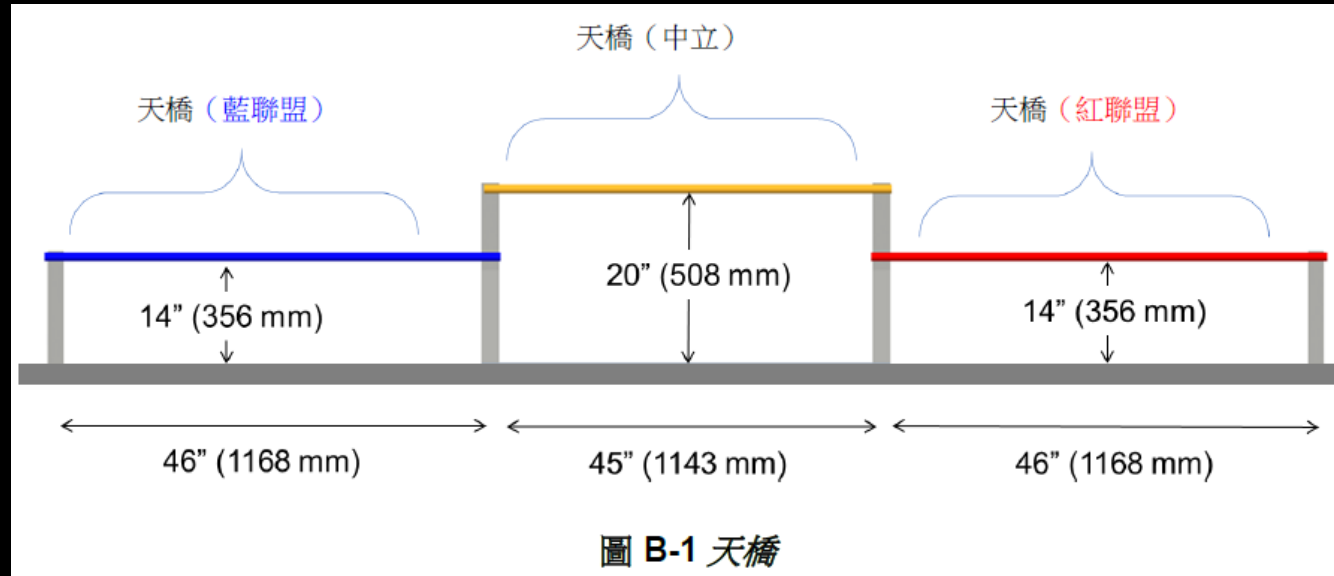
**<TE02> Size Constraints** - The maximum size of the *Team Scoring Element* is 4 inches (10.16 cm) by 4 inches (10.16 cm) by 8 inches (20.32 cm). The minimum size of the *TSE* is 3 inches (7.62 cm) by 3 inches (7.62 cm) by 4 inches (10.16cm).

**<TE03> Team Number** - **The *Team Scoring Element* must be labeled with their *Team number* (numerals only, for example “12345”)** The letters must be legible when viewed from 12 inches away. The *Team* number needs to appear only once on the *Team Scoring Element*.

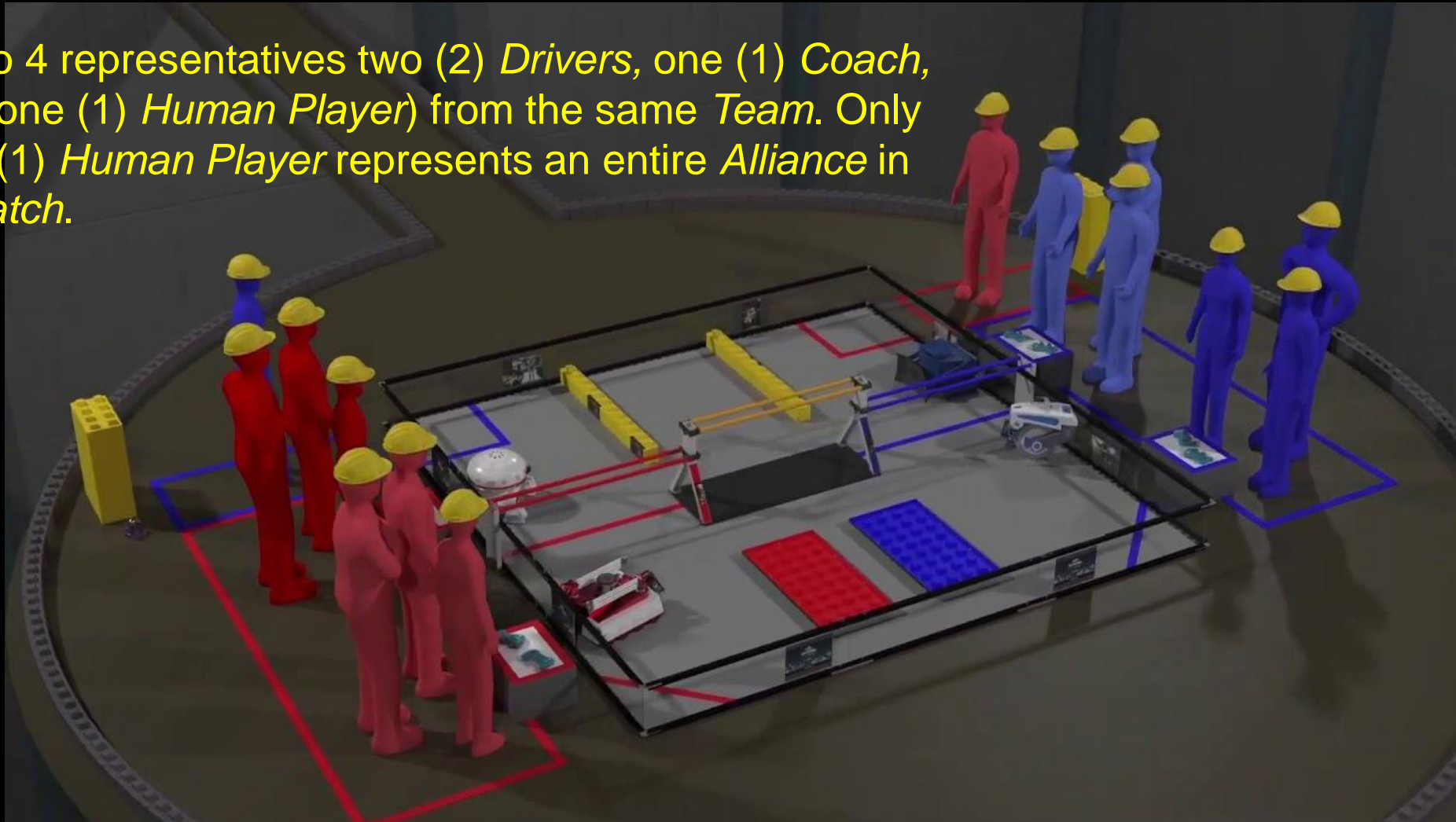
**<TE05>** Current season’s *Scoring Elements* may not be used as the *Team Scoring Element*.

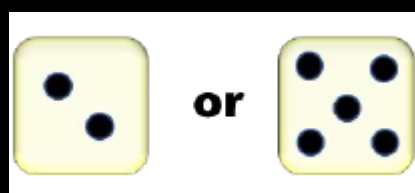
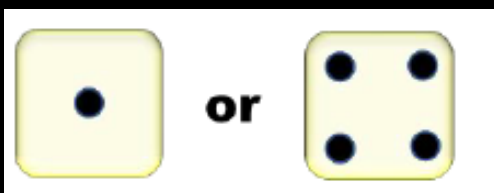
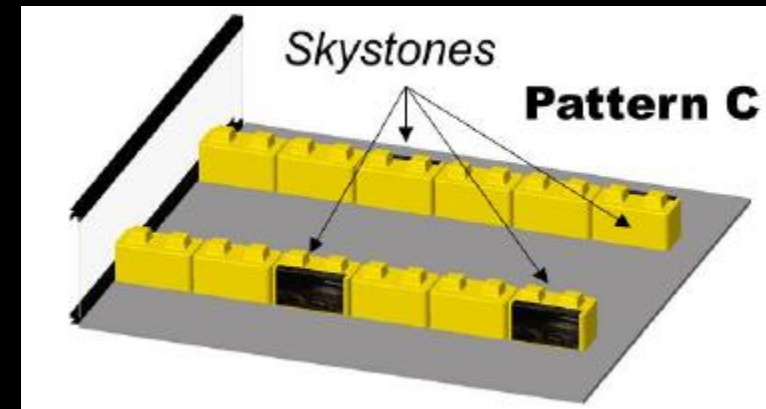
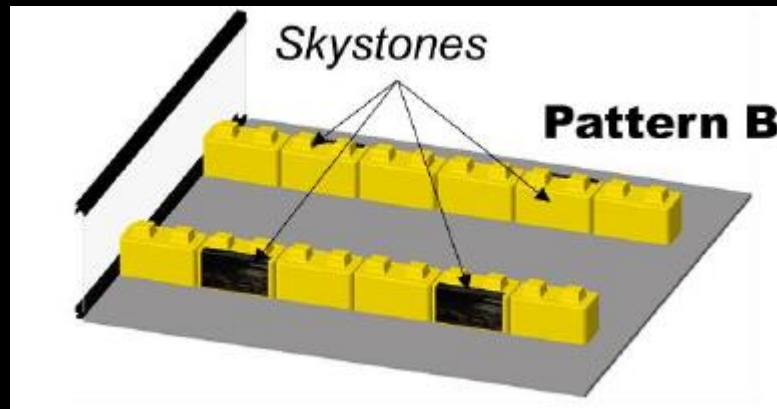
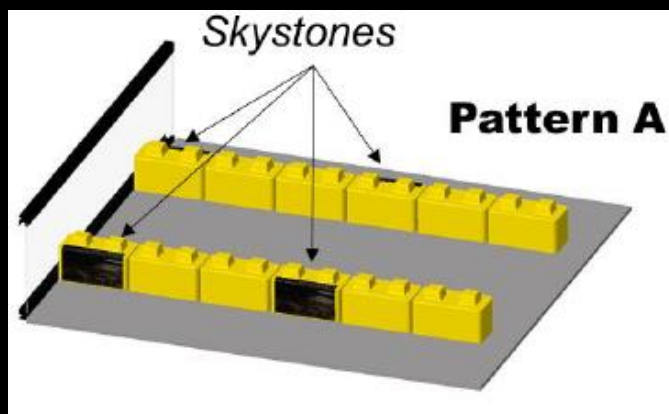




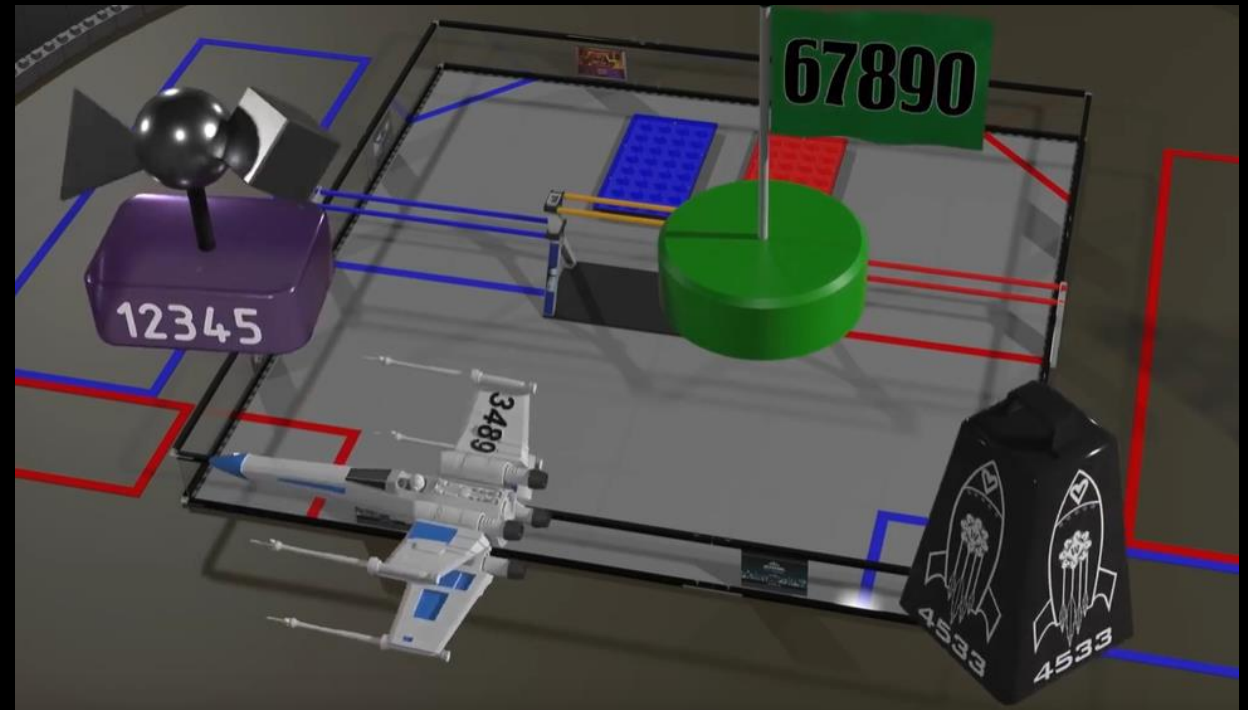
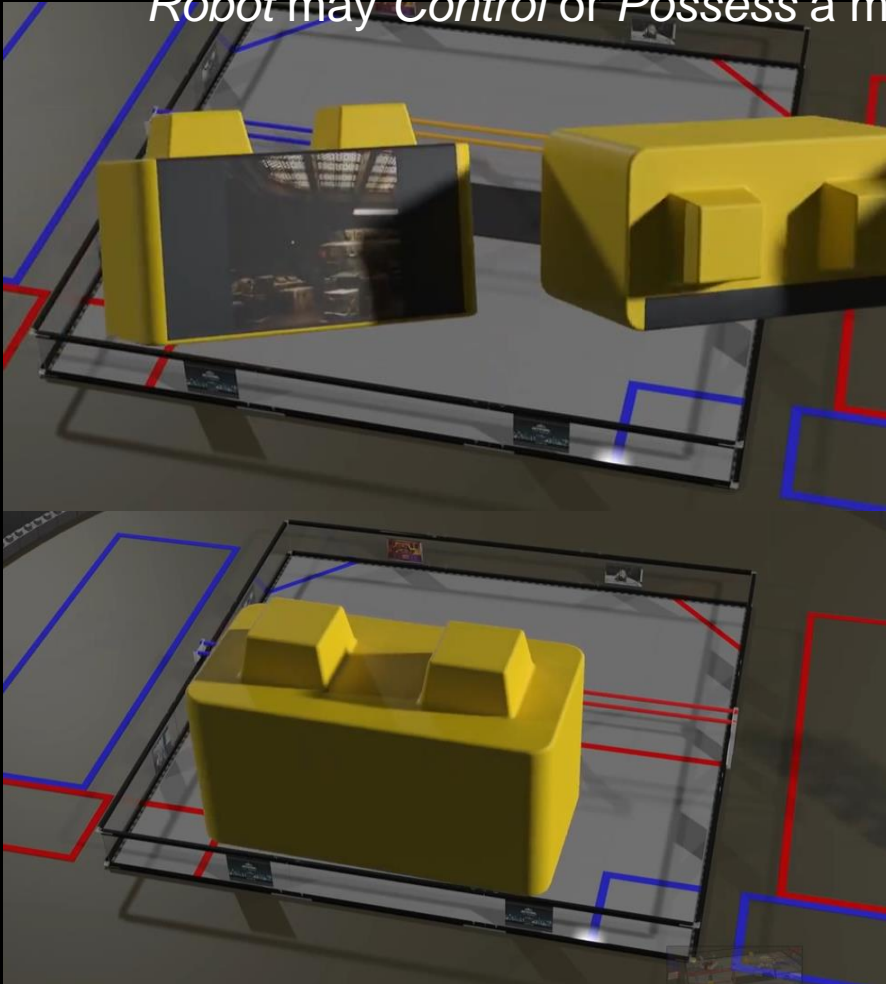


Up to 4 representatives two (2) *Drivers*, one (1) *Coach*, and one (1) *Human Player* from the same *Team*. Only one (1) *Human Player* represents an entire *Alliance* in a *Match*.



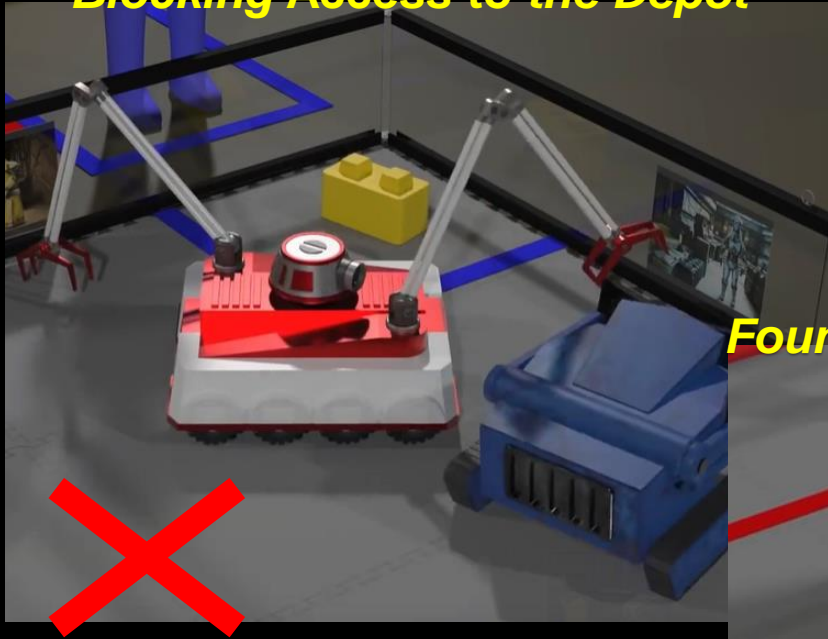


**<GS3> Control/Possession Limits of Stones/Capstones** – Once a Match begins; a Robot may Control or Possess a maximum of one (1) Stone and/or one (1) Capstone.

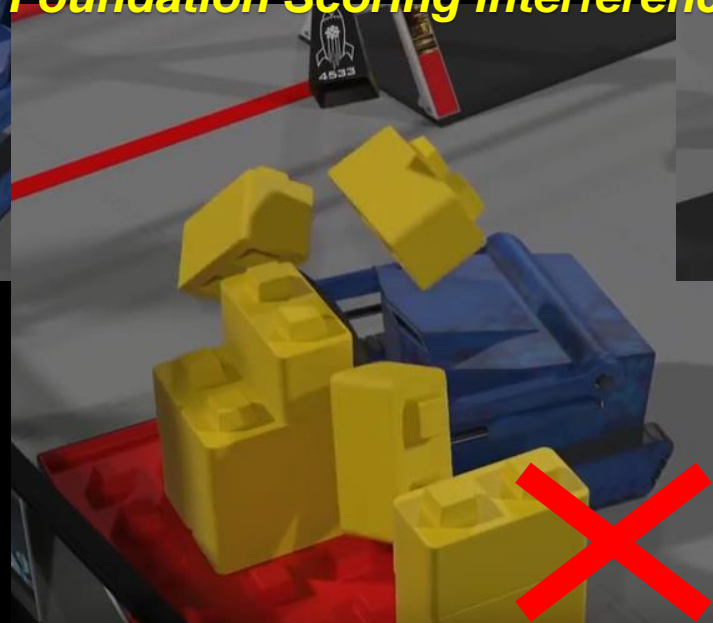




**Blocking Access to the Depot**



**Foundation Scoring Interference**



**Launching of Game Elements**



**<GS7> Skybridge Specific Penalties –**

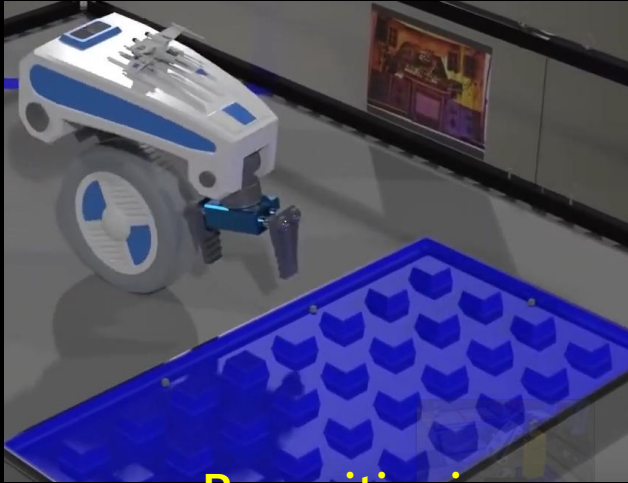
**a) Robots may not grab, grasp, or hang on the Skybridge pipes. Each occurrence will result in a Major Penalty.**

**b) Robots may not move from one Zone to another via the opposing Alliance's Skybridge section. Each occurrence will result in an immediate Major Penalty.**

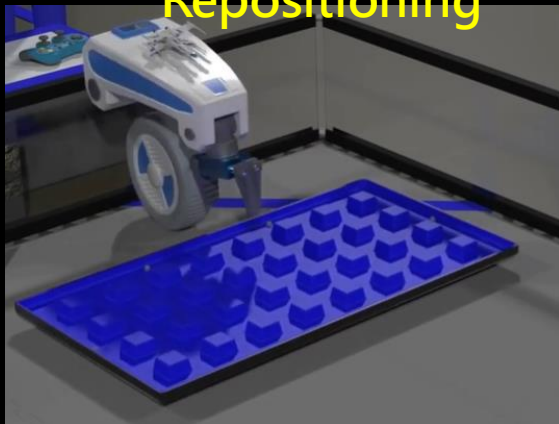
**c) Robots may not prevent an Opposing Alliance Robot from moving between one Zone to another via the Neutral Skybridge. This is considered Blocking and will be penalized per <G18>.**

**<GS10> Foundation Movement – Foundations must remain Completely In the Building Zone. A Minor Penalty will be assessed for every 5 seconds that the Foundation is not Completely In the Building Zone.**

## 30 seconds



Repositioning



Stone Delivery



Navigating



Placing



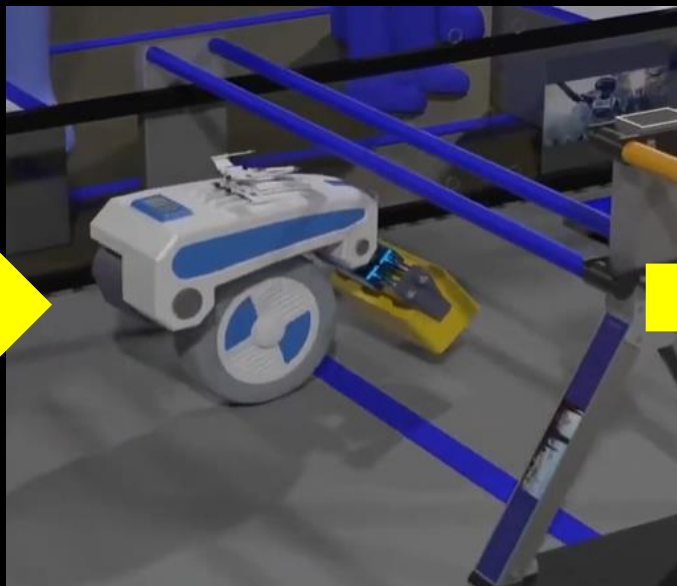
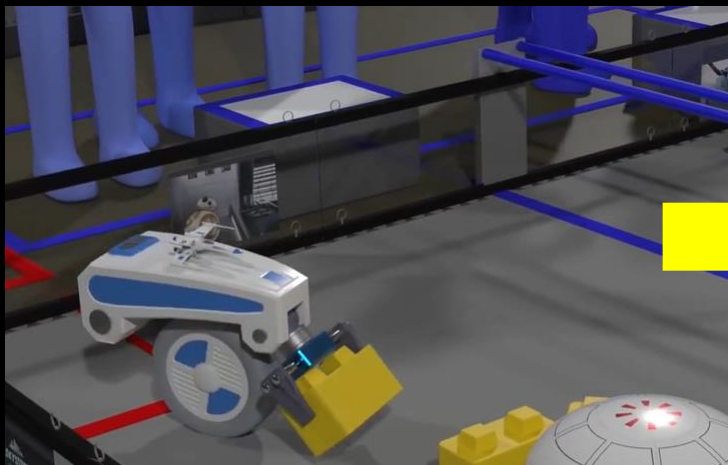


## 2 minutes

Directly following the end of the *Autonomous Period*, *Drive Teams* have five (5) seconds plus a "3-2-1-go" countdown to prepare their *Driver Stations* for the start of the *Driver-Controlled Period*.

### (1) Stone Delivery

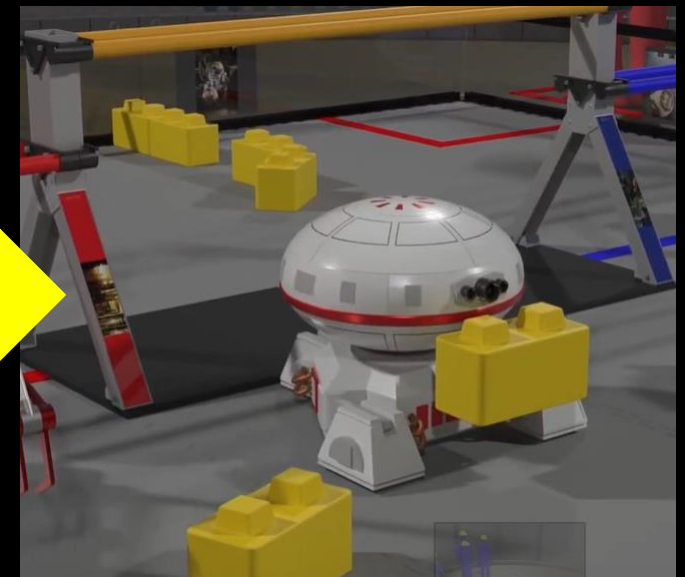
Each *Stone (Stone or Skystone) Delivered* by going under the corresponding *Alliance Skybridge* for the *Robot* is worth one (1) point to the *Alliance* that *Delivered* the *Stone*.





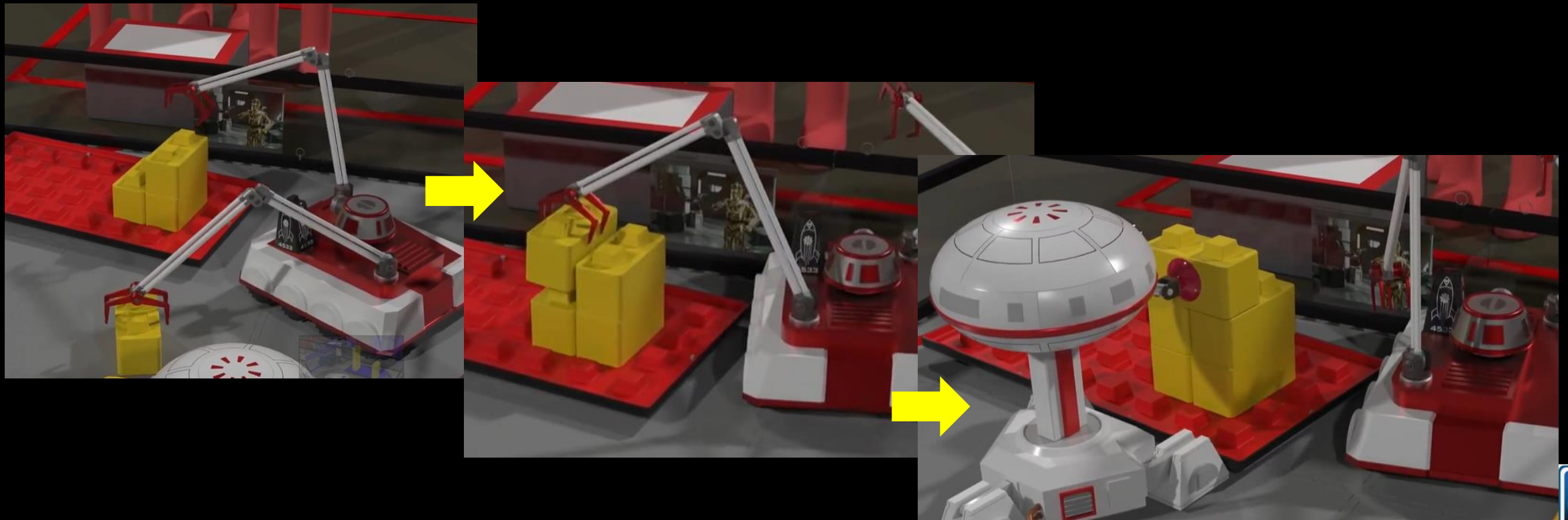
## 2 minutes (1) Stone Delivery

*Stones Delivered under the Alliance neutral Skybridge are worth zero (0) points for this task.*



## 2 minutes (2) Placing

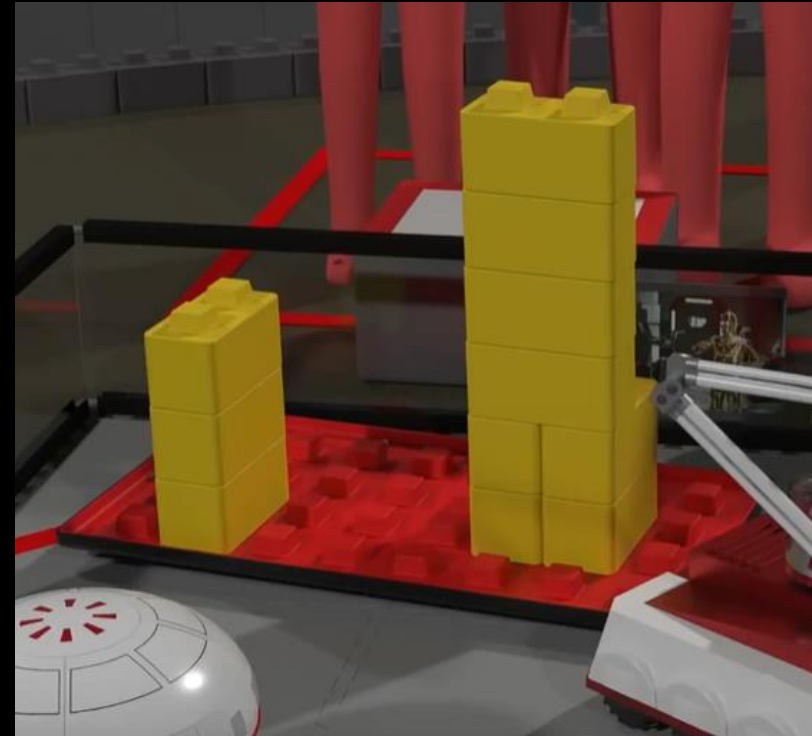
At the end of the *Match*, each *Stone* (*Stone* or *Skystone*) that is *In the Foundation* and not in contact with an *Alliance Robot* when all *Scoring Elements* have come to rest earns one (1) point.



## 2 minutes

### (3) Skyscraper Bonus

An Alliance will earn two (2) points for each *Skyscraper Level* of their tallest *Skyscraper* that is not in *Contact* with an *Alliance Robot* when all *Scoring Elements* have come to rest after the *End* of the *Driver-Controlled Period*. If there are multiple *Skyscrapers* at the same height, only one *Skyscraper Bonus* will be earned.

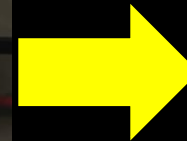
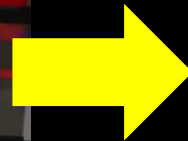
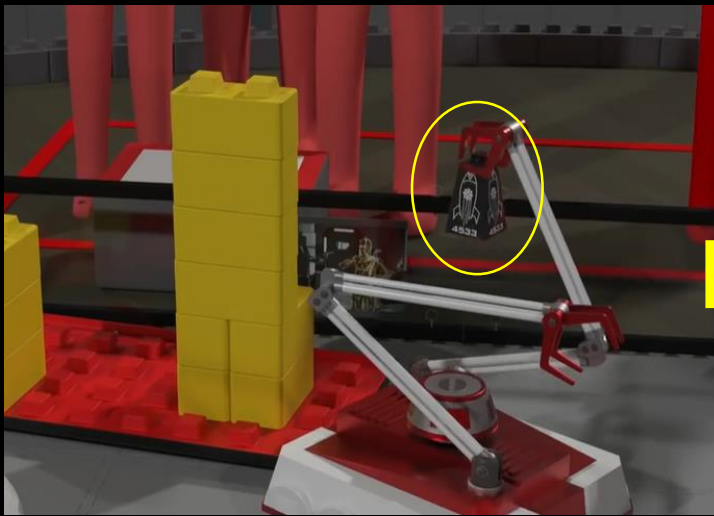




## The last 30 seconds of the *Driver-Controlled Period*

### (1) *Capping*

An *Alliance* will earn points for placing a *Capstone* On their *Foundation* or any *Skyscraper* on their *Alliance' s Foundation*. A *Robot* cannot be in contact with the *Capstone* in order for the points to count.

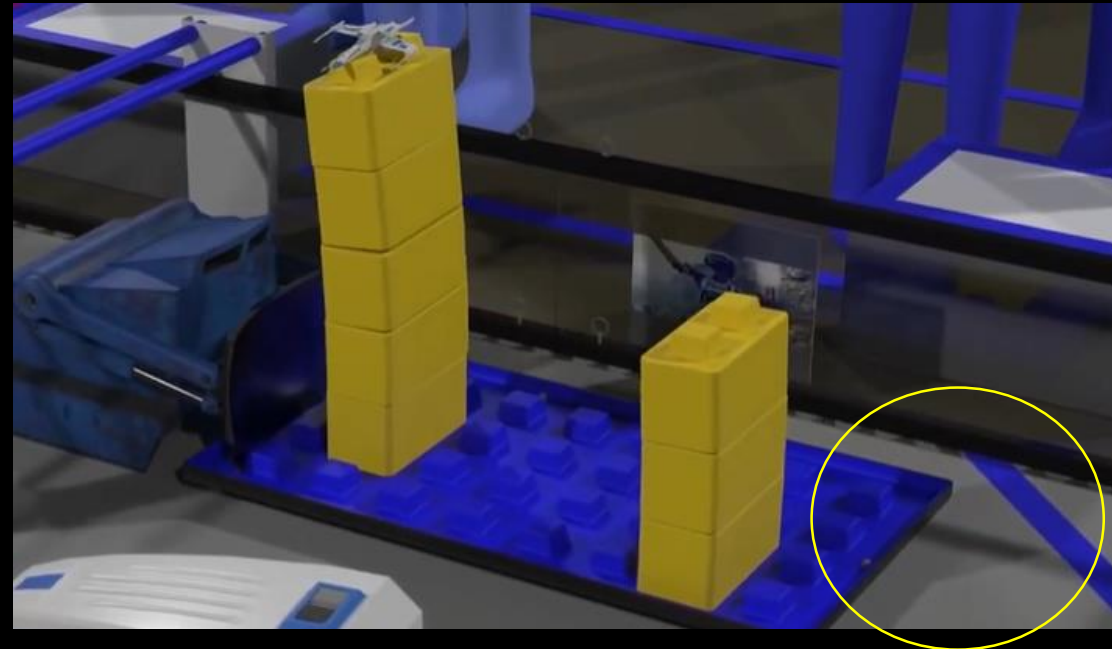
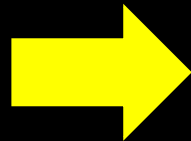
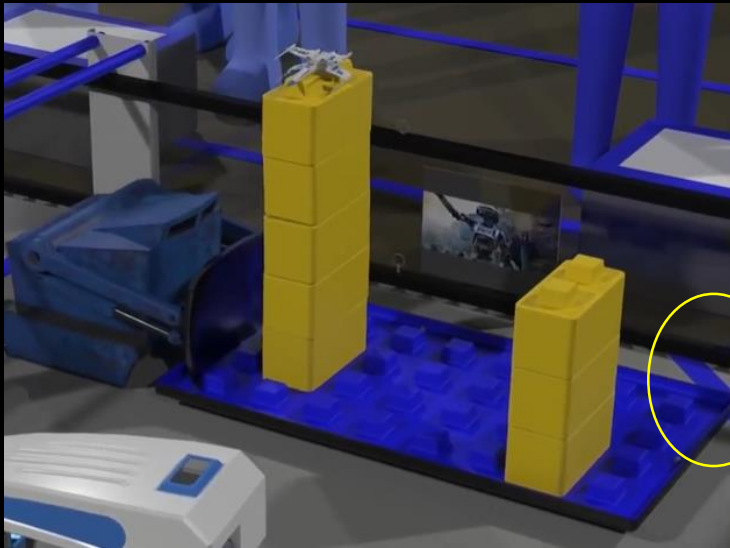




## The last 30 seconds of the *Driver-Controlled Period*

### (2) Foundation Moved

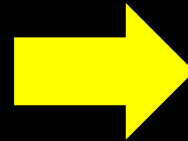
An *Alliance* will earn fifteen (15) points if their *Foundation* has been moved *Completely Out* of the *Building Site* by the End of the *Match*. The *Foundation* must have been *In* the *Building Site* at the start of *End*



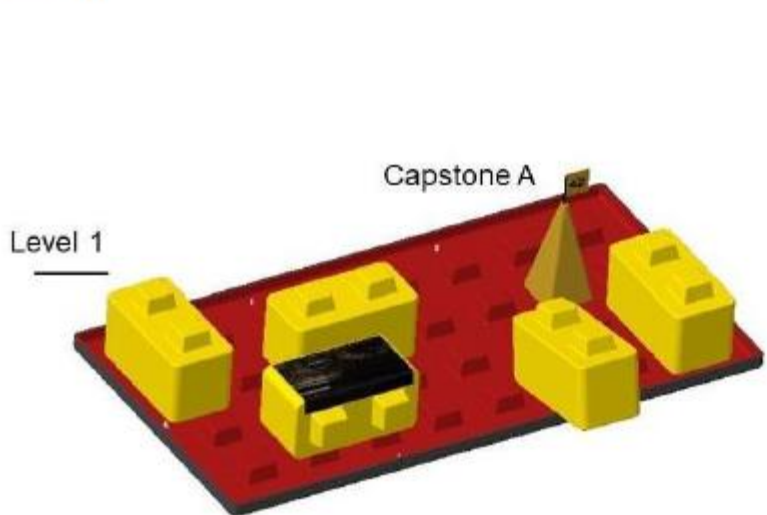
## The last 30 seconds of the *Driver-Controlled Period*

### (3) Parking

An *Alliance* will earn five (5) points for each *Robot* that is *Parked In* their *Alliance's Building Site* at the end of the *Match* ( $T=0:00$ ).



範例 E-1



石塊得分 = 5

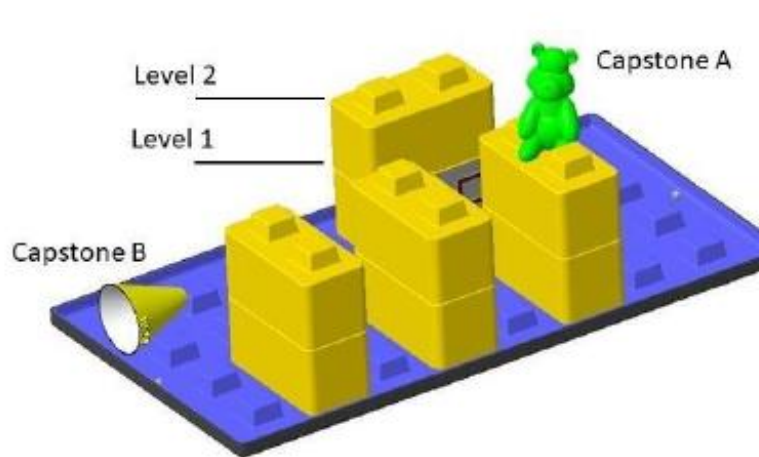
摩天大樓最高層數 =  
額外加分 = 2

頂石A層數 = 0  
頂石加分 = 5  
層數加分 = 0

頂石B層數 = 未放置  
頂石加分 = 0  
層數加分 = 0

總分 = 12

範例 E-2



石塊得分 = 8

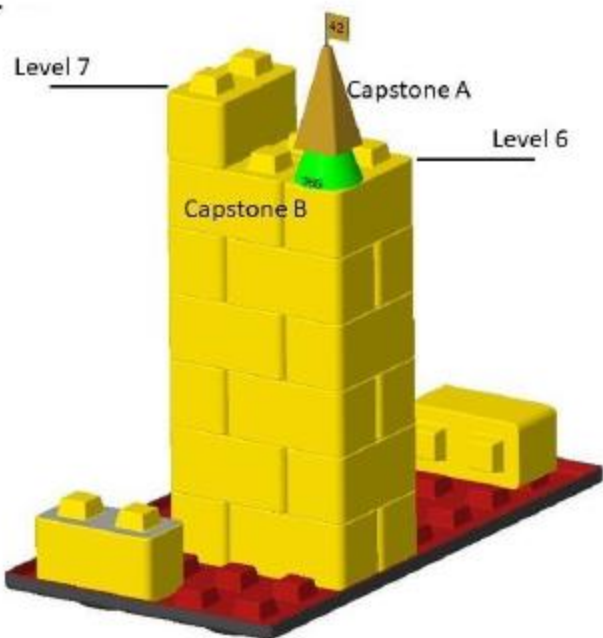
摩天大樓最高層數 = 2  
額外加分 = 4

頂石 A 層數 = 2  
頂石加分 = 5  
層數加分 = 2

頂石B層數 = 0  
頂石加分 = 5  
層數加分 = 0

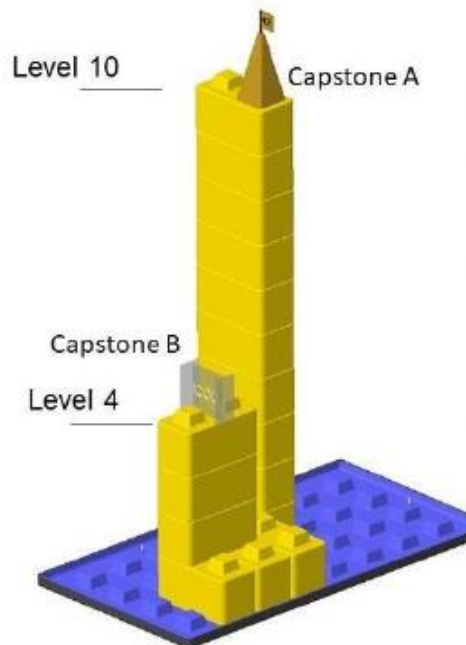
總分 = 24

範例 E-3



石塊得分 = 21  
 摩天大樓最高層數 = 7  
 額外加分 = 14  
  
 頂石A層數 = 6  
 頂石加分 = 5  
 層數加分 = 6  
  
 頂石B層數 = 6  
 頂石加分 = 5  
 層數加分 = 6  
**總分 = 57**

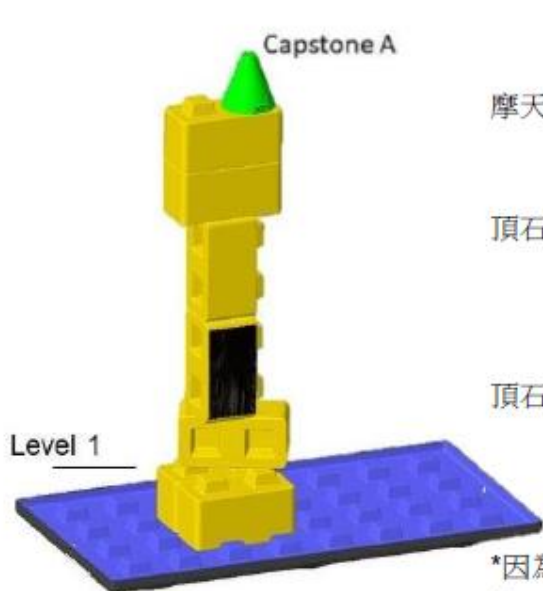
範例 E-4



石塊得分 = 16  
 摩天大樓最高層數 = 10  
 額外加分 = 20  
  
 頂石A層數 = 10  
 頂石加分 = 5  
 層數加分 = 10  
  
 頂石B層數 = 4  
 頂石加分 = 5  
 層數加分 = 4  
**總分 = 60**



## 範例 E-5



石塊得分 = 7

摩天大樓最高層數 = 1  
額外加分 = 2

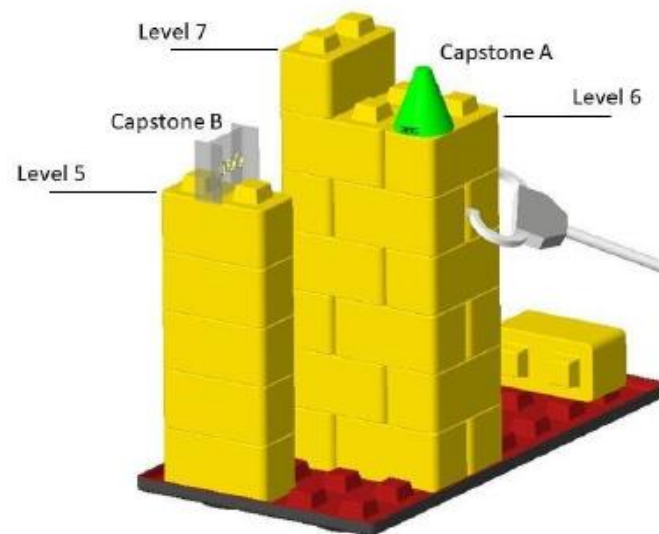
頂石A層數 = 0\*  
頂石加分 = 5  
層數加分 = 0

頂石B層數 = 未放置  
頂石加分 = 0  
層數加分 = 0

**總分 = 14**

\*因為頂石A沒有被合乎規則的大樓所支撐，所以不會有層數加分

## 範例 E-6



石塊得分 = 24\*

摩天大樓最高層數 = 5\*\*\*  
額外加分 = 10

頂石A層數 = 0\*\*\*  
頂石加分 = 5  
層數加分 = 0

頂石B層數 = 5  
頂石加分 = 5  
層數加分 = 5

**總分 = 49**

\*因紅色機器人觸碰其中一塊，所以那塊將不計分

\*\*第6層和第7層將不列入計算，因為紅方機器人觸碰了大樓的石塊

\*\*\*頂石A沒有被合規的大樓所支撐

**Q: If cargo is falling from Opposing Alliance Robot, can our robot pick up it?**

**A: Yes, your robot can do it.**

**Q: If the robot remove or reposition Stones/Capstones from their opposing Alliance's Foundation, does any penalty?**

**A: Robots may not remove or reposition Stones/Capstones from their opposing Alliance's Foundation when the Foundation is In the opposing Alliance's Building Site or at any time during End Game. A double Minor Penalty will be assessed for each Stone that is de-scored. If a Capstone is de-scored, a Major Penalty will also be assessed.**