

# Competition Task Examples

- \* The competition tasks listed here are for service-robotics track.
- \* The items described here may not be the items in the competition due to availability.
- \* The contestants should provide the workspace before the competition.
- \* No hardware or software changes are allowed once the competition has started.
- \* Robots are allowed to automatically use predefined tools.

## 1. Use a spoon to pick up peas

### Items:

1. 20 green peas similar to the peas in the link  
[https://www.amazon.com/Food-Live-Green-Vatana-Pounds/dp/B00L0MAM8W/ref=sr\\_1\\_1\\_s\\_it?s=grocery&ie=UTF8&qid=1468454021&sr=1-1&keywords=peas](https://www.amazon.com/Food-Live-Green-Vatana-Pounds/dp/B00L0MAM8W/ref=sr_1_1_s_it?s=grocery&ie=UTF8&qid=1468454021&sr=1-1&keywords=peas)
2. Spoon  
[https://www.amazon.com/gp/product/B0009PUR86/ref=oh\\_aui\\_search\\_de\\_tailpage?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B0009PUR86/ref=oh_aui_search_de_tailpage?ie=UTF8&psc=1)
3. Plates  
[https://www.amazon.com/gp/product/B0009PUR86/ref=oh\\_aui\\_search\\_de\\_tailpage?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B0009PUR86/ref=oh_aui_search_de_tailpage?ie=UTF8&psc=1)

### Competition setup:



Figure 1: A half-full bowl with peas and an empty plate are randomly on the table.

1. A 6-inch bowl has green peas.
2. A spoon is placed in a cup with the spoon's handle out. The location of the cup is random.

### Competition:

1. Grasp the spoon from the cup
2. Pickup peas from the bowl
3. Transfer the peas to the plate
4. If needed, the robot can repeat multiple times.
5. Successfully transferring each pea is worth 2 pts until reach to 10 pts.

6. The competition is terminated if the robot knocks over any object.
7. Dropping peas outside of the plate is allowed.

## 2. Transfer a cup on its saucer

### Items:

A set of plastic cup and saucer

<https://www.amazon.com/Aspire-Plastic-Espresso-Break-resistant-Cappuccino/dp/B01N4U5XHQ/>



### Setup:

One target location on the table is defined and marked in the robot's workspace. A cup and a saucer are placed randomly in the robot's workspace. Their locations are unknown.

### Rules:

- The robot should first grasp and place the cup on the saucer (10 pts)
- The robot grasps the saucer with the cup on it, lifts, transfers and places them on the defined target location. (10 pts)
- Dropping the cup will terminate the task.

## 3. Use a spoon to stir water in a cup

### Items:

Spoon and cups are the the same as used in Task 1.

### Setup:

The cup is placed on the table randomly.  
A spoon is placed in a cup with the spoon's handle out.

### Competition:

1. The robot picks up the spoon in the empty cup
2. Submerge the bowl of the spoon in the other cup half-full of water
3. Stir water using the bowl of the spoon for two cycles. Completing each cycle gains 5 pts.
4. The competition is terminated if the cup is tipped over.
5. 3 pts will be reduced if any water is spilled



1. Mount the power strip to a surface using the VELCRO tape and plug into an AC power source.
2. Plug one AC night light into one outlet of the power strip.
3. Manually plug one USB light into one USB port of the power strip.
4. The location of the power strip is random.

**Competition:**

1. Extract the both lights completely from the outlet. (If plug cannot be removed, consider loosening them in order to proceed to the next step)
2. Grasp and plug one light at a time into the sockets to minimum depth for electrical contact.
3. Scoring is based on the following for each plug:
  - a. Light removal - 5 points per light
  - b. Light insertion (light on) - 5 points per light

**6. Peg in hole insertion**

**Items:**

One wood sorting board

[https://www.amazon.com/VolksRose-Creative-Wooden-Geometric-Sorting/dp/B01AUPF5A4/ref=pd\\_day0\\_21\\_3?encoding=UTF8&pd\\_rd\\_i=B01AUPF5A4&pd\\_rd\\_r=JXF7A4RTQDF08J468AXS&pd\\_rd\\_w=1zNq4&pd\\_rd\\_wg=ZbtT8&psc=1&refRID=JXF7A4RTQDF08J468AXSWe](https://www.amazon.com/VolksRose-Creative-Wooden-Geometric-Sorting/dp/B01AUPF5A4/ref=pd_day0_21_3?encoding=UTF8&pd_rd_i=B01AUPF5A4&pd_rd_r=JXF7A4RTQDF08J468AXS&pd_rd_w=1zNq4&pd_rd_wg=ZbtT8&psc=1&refRID=JXF7A4RTQDF08J468AXSWe)



**Setup:**

The main board is attached with Velcro to the table.

Six puzzle pieces are placed besides the board randomly.

**Competition:**

- Locate one of the wood puzzles
- Recognize where should it go within the wood board (depending on the number of holes)
- Put the puzzle on the board.
- Repeat until all puzzles are used.
- Five points for putting one puzzle piece on the board

## 7. Transfer straw into a to-go cup with lid

### Items:

1. Straws  
[https://www.amazon.com/Smoothie-Straws-Extra-Assorted-Colors/dp/B001R3JL5C/ref=pd\\_sim\\_sbs\\_79\\_3?ie=UTF8&dpID=510YB6zbJhL&dpSrc=sims&preST= AC UL160 SR160%2C160 &psc=1&refRID=A8DKCNHNPT9KB99X8F5A](https://www.amazon.com/Smoothie-Straws-Extra-Assorted-Colors/dp/B001R3JL5C/ref=pd_sim_sbs_79_3?ie=UTF8&dpID=510YB6zbJhL&dpSrc=sims&preST= AC UL160 SR160%2C160 &psc=1&refRID=A8DKCNHNPT9KB99X8F5A)
2. Cup with lid  
[https://www.amazon.com/World-Deals-Plastic-Clear-Flat/dp/B010JQLKSA/ref=pd\\_sim\\_79\\_5?ie=UTF8&dpID=41DcNm7awGL&dpSrc=sims&preST= AC UL320 SR238%2C320 &psc=1&refRID=WBMB9GZTH6XYRV2FJKRG](https://www.amazon.com/World-Deals-Plastic-Clear-Flat/dp/B010JQLKSA/ref=pd_sim_79_5?ie=UTF8&dpID=41DcNm7awGL&dpSrc=sims&preST= AC UL320 SR238%2C320 &psc=1&refRID=WBMB9GZTH6XYRV2FJKRG)
3. A cup in task 1.

### Setup:

1. The straws are packed fairly tightly in one upright cup.
2. Another cup has a lid on it, placed upright and 30 cm to the side of the cup holding straws.
3. The cup with lid is full of water

### Competition:

1. The robot picks up one straw from the cup
2. Place it into the straw hole while keeping the cup upright to earn full points
3. The location of the cup can be defined by the contestant.
4. The competition is terminated when the cup with lid is tipped over.
5. Dropping straw is allowed.

## 8. Pour water into a cup (Level 3, 30 pts)

### Items:

One YCB pitcher or other pitcher

<https://www.amazon.com/Rubbermaid-Pitcher-2-25-quart-FG3062PRPERI/dp/B0014CTFPY/>

One cup (without the saucer)

<https://www.amazon.com/Aspire-Plastic-Espresso-Break-resistant-Cappuccino/dp/B01N4U5XHQ/>



**Setup:**

The pitcher is placed at a defined location

Uncertain amount of water is in the pitcher. But it is more than enough to fill three cups.

Three cups are placed at random locations

**Rules:**

- The robot grasps and picks up the pitcher and then pours water into the cup to 90% full (the target water line is marked in the cup, along with 80% full line)
- Pouring is considered successful if the final water line is between the 80% line and completely full
- Over spill is a failure
- Under 80% is a failure
- Ten points for each successful pouring
- The water level in the pitcher is not observable

**9. Fully extend syringe and the fully press syringe****Item:**

A 30cc syringe [https://www.amazon.com/Syringe-30cc-Luer-Lock-Sterile/dp/B000FN65ZG/ref=sr\\_1\\_7?ie=UTF8&qid=1468380638&sr=8-7&keywords=luer+syringe](https://www.amazon.com/Syringe-30cc-Luer-Lock-Sterile/dp/B000FN65ZG/ref=sr_1_7?ie=UTF8&qid=1468380638&sr=8-7&keywords=luer+syringe)

**Setup:**

The syringe lies flat on a table with its plunger fully compressed.

**Competition:**

1. The task is to fully extend the syringe to at least 30ccs (without removing the plunger) and then return it to the fully compressed state.
2. Five pts for partial pass if the syringe is fully extended but not fully compressed.

**10. Use scissors to cut a piece of paper to half along a line****Items:**

1. YCB Tool items: scissors.



Figure 4: Scissors.

2. 20 pieces of A4 paper.

**Setup:**

1. Scissors are placed at the table randomly
2. Shape lines are pre-printed on the paper
3. The contestants can hold a piece of paper without moving it.

**Competition:**

1. The robot picks up the scissors
2. One team member picks up a piece of paper and holds it in the air without moving the paper during the whole process
3. The robot uses the scissors to cut the paper along the shape lines
4. Four patterns are required to complete the task and five pieces of papers are provided for each pattern (for five tries).
5. 10 pts for completing each pattern.

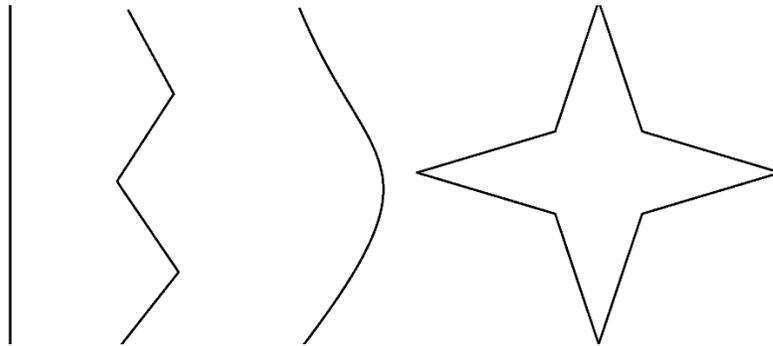


Figure 5: Four patterns