

RoboCupJunior OnStage Rules 2016

RoboCupJunior OnStage Technical Committee 2016:

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RoboCupJunior OnStage (formerly Dance) invites teams to develop a creative stage performance using autonomous robots that they have designed, built and programmed. The objective is to create a robotic performance of 1 to 2 minutes that uses technology to engage an audience. The challenge is intended to be open-ended. This includes a whole range of possible performances, for example dance, storytelling, theatre or an art installation. The performance may involve music but this is optional. Teams are encouraged to be as creative, innovative and entertaining, in both the design of the robots and in the design of the overall performance.

These are the official rules for RoboCupJunior OnStage event 2016. These rules have priority over any translations. **The rules, score sheets, and all forms of documentation can be downloaded from the official RoboCupJunior website (<http://robocupjunior.org/>).** Teams are encouraged to study these **in detail**. All teams must comply with the rules for competing in RoboCupJunior 2016, including the age categories and team sizes stated.

Changes from RoboCupJunior Dance 2015 rules

Changes from previous Dance rules are highlighted in red. The rules have changed significantly for 2016 so all **teams should make sure they study the new rules**. The rules have been changed to deepen and broaden the educational benefits of competing in RoboCupJunior.

Specifically, please pay attention to the following:

- Performances that are innovative and creative in their use of technologies are desired for the competition where the emphasis is on the robotic performance
- Open technical demonstration (see Section 3), which is a new addition to team's tasks.
- A maximum of two human performers are allowed on the stage at any one time
- New score sheets have been produced and are available at robocupjunior.org)
- Performances which use line following are discouraged and are not allowed for secondary teams.
- All team members are encouraged to have a technical role in the team
- Props and/or scenery are no longer rewarded. The focus of the performance should be on the robots!
- Secondary teams are allowed to use up to 8 coloured markers (4 orange and 4 green, see Appendix for more information) on the stage to aid navigation if they wish.

Overview:

Teams are judged in three areas; OnStage performance, Open technical demonstration, and technical interview.

OnStage performance: 1-2 minute stage performance in which a performance routine is judged according to creative, innovative and entertainment criteria. Teams must show originality, **creativity** and innovation throughout their performance routine. It is expected that all participating teams perform their performance at their best. **See the Performance Score Sheet.**

Open technical demonstration: 5 minute stage demonstration to showcase the capabilities of their robots. Teams should demonstrate and describe the capabilities of their robots such as interaction with humans or with each other, using colored markers for navigation, or a particular mechanism, sensor system or algorithm that has been developed. Teams need to present a technical description of how the capabilities have been developed, the challenges overcome and the technologies involved. This is assessed on the demonstrations, description of robot(s) capabilities, and the quality of the presentation. **See the Open Technical Demonstration Score Sheet.**

Technical interview: 15 minute face-to-face interview between the team and the judges in which all robots and programming are judged against technical criteria. Creative and innovative technical aspects are rewarded with higher scores. Judges are interested in determining students' understanding of the robotic technologies they have used. Teams must show authenticity and originality with regard to their robots and performance in this interview.

Each team members must be prepared to answer questions about the technical aspects of their involvement in the robot design. **See the Technical Interview Score Sheet.**

At the international RoboCupJunior OnStage competition, teams will also take part in a SuperTeam Performance.

- **SuperTeam Technical challenge:** a robotic performance created by a group of cooperating teams. SuperTeams comprise of two or more participating teams. The SuperTeams are given a short period of time for collaboration at the competition venue. During this time, each SuperTeam must create a new performance that incorporates the work of each participating team. SuperTeams are encouraged to create an exciting and entertaining robotic performance, expressing their friendship and cooperation and demonstrating what they have learnt from each other.

The SuperTeam Challenge is a special program for the international event and is not obligatory for regional events. The rules of the SuperTeam challenge are provided in a separate document, teams who participate in the international event are strongly encouraged to carefully read the SuperTeam 2016 rules in advance of the international finals.

1. Robots

1.1. Robot technology

1.1.1. Teams are encouraged to use technologies creatively. Innovative or unusual use of technology (including sensors) is encouraged and will be rewarded. For example, laptops, notebooks, mobile phones, tablets, Raspberry Pi and other similar devices **can be used** as robotic controllers, on stage as part of the performance. **Under no circumstances will mains electricity be allowed to use on the stage.**

Teams are encouraged to use technology in unusual, innovative or inspired ways to create an engaging performance. If you are unsure whether the technology you are using is appropriate please contact the **Technical Committee Chair** before the competition.

1.1.2. Robots must perform **autonomously**.

1.2. Size & number

Robots may be of any size. Any robot(s) taller than **1.5 meters** from the stage floor must be discussed with the judges and permission sought. There may be any number of robots on a team. However, using multiple robots does not necessarily result in obtaining higher points.

1.3. Communication

1.3.1. Robots may communicate with each other on stage. There must be no communication with off-stage devices. The only allowed communication protocols are infrared (IR), Bluetooth (LE and classic) and ZigBee. It is the team's responsibility to make sure that their communication does not interfere with other teams' robots when practicing or performing. No team is permitted to use other radio frequency (RF) signals (like Wi-Fi or Z waves) this may interfere with robots in other leagues. If you are unsure please check with the **Technical Committee Chair** before your performance.

1.4. Lines and markers for sensing

1.4.1. The primary league may use mats on the stage floor. Line following will not receive higher points.

1.4.2. The secondary league must not use any mats or tape on the floor.

1.4.3. The secondary league may place up to 8 coloured cylinder markers anywhere on the stage to assist robotic navigation. Four of the markers are coloured orange and four are green. The markers are 210mm in height and 40mm in diameter. Details of how to construct the markers are given in the Appendix. Teams may bring their own cylinders if these satisfy the rules, or markers will be supplied by the organisers.

1.5. Additional advice for designing and constructing robots

1.5.1. While floor joints will be taped to make them as smooth as possible, robots must be prepared for irregularities of up to **5 mm** in the floor surface. Whilst every effort will be made to make the stage flat this may not be possible, teams should be prepared to cope with this uncertainty.

1.5.2. Although the RoboCupJunior organizers endeavor to make variable lighting including spotlights available, there is no guarantee that direct or intense spotlights will be available. Teams should come prepared to calibrate their robots based on the lighting conditions at the venue. Teams using compass sensors should be aware that metal components of the staging may affect the compass sensor readings. Teams should come prepared to calibrate such sensors.

2. OnStage performance (40% of total score)

2.1. Overview

The OnStage performance is an opportunity to demonstrate the technical aspects of the robot(s), design and construction through a stage show. This could be, for example, a magic show, theatre performance, storytelling, comedy show, dance or art installation. Teams are encouraged to be creative, innovative and take risks in their use of technology and materials when creating their performances. Refer to the Performance Score Sheet for more details.

2.2. OnStage performance judging

2.2.1. All teams will be given 2 opportunities to perform before the judges. The highest scoring performance will be used.

2.2.2. The stage performance will be judged by a panel of at least three officials. At least one of these judges are RoboCupJunior officials who have judged the Technical Interview as well.

2.3. Stage performance

2.3.1. The duration of the performance routine must be no less than 1 minute and no more than 2 minutes.

2.3.2. Each team will have a total of 5 minutes for their performance. A judge starts a stopwatch when a team member steps a foot on the stage. This time includes stage set-up, introduction and performance routine, including any re-starts due to factors under the team's control. It does not include time needed for packing up and clearing the stage. If the time limit is exceeded due to circumstances outside the team's control (for example problems with starting the music by the technicians) there will be no penalty. The judges have the final say on any time penalties.

2.3.3. Following each performance, a team must fully tidy up the stage, pack up and remove any objects related to their performance. The performing team has a maximum of **one minute** to clear the stage after the end of their performance. **The maximum total time onstage is therefore six minutes.**

2.3.4. A technician designated by RoboCupJunior official will start the music and the audio visual/multimedia presentation for the performance routine.

2.3.5. **Teams are strongly encouraged to use the time while they are setting up on the stage to introduce to the audience the performance and the features of their robots.**

2.4. Restarts

Teams are allowed to restart their routine if necessary, at the discretion of the judges. There is no limit on the number of restarts allowed within their 5 minute-performance time. Penalty marks will be deducted from the score. The team will be asked to leave the stage after 5 minutes.

2.5. Music & video

2.5.1. Team may use music to complement their performance. Teams may find it useful to include a "beep" at the beginning of their music as a start signal.

2.5.2. **If music is used teams must provide their own audio music source.** The preferred transport method is to place the sound file on a memory stick as a MP3 file. The memory stick should be clearly labelled with the team name and category (primary or secondary) and should hold only the MP3 file. It is essential that the music should be given to a sound technician or a RoboCupJunior official before the team's practice period. Teams are encouraged to bring multiple copies of the audio source file.

2.5.3. The music should start at the beginning of the audio music source with a few seconds of silent lead-time.

2.5.4. Teams are encouraged to provide a visual or multimedia presentation as part of their performance. This can take the form of a video, animation, slideshow etc. A projector and screen will be provided. **The organisers cannot guarantee the height of the projection screen above the stage.**

2.5.5. **Interaction between the robots and the visual display is allowed and encouraged. A VGA and HDMI cable will be available on stage to which a laptop or other device can be connected to the projector. The length of the cable cannot be guaranteed.**

2.6. Stage

2.6.1. The size of the performance stage area will be marked in a rectangular area of 4 x 3 meters (m) for robots with the 4m side facing the judges. This rectangular area is within a stage with a minimum size of 5 x 4 meters.

2.6.2. The boundary of the performance stage area will be marked with a 50 millimetre (mm) black tape-line. Teams are allowed to use the black boundary to identify the performance stage area. The floor provided shall be made of flat (non-glossy) white painted MDF (compressed wood fibre).

2.7. Scenery

2.7.1. **Static props which do not form an integral part of the performance are discouraged since the focus of the performance should be on robots. The kind of props that are considered "interactive" are:**

- **Props interact with robots via sensors**
- **Props interact with robots via communication (bluetooth or ZigBee, for example).**

If a team decides to use static props, they should be placed on the periphery of the defined stage performance area. Robots can sense static props to perform a certain task or trigger a performance as long as they are placed on the periphery of the defined stage performance area

2.8. Human-robot and robot-robot interaction

2.8.1. Robots may be started manually by human contact, sensor interaction or with remote control (see 1.3) at the beginning of the performance. This is the only physical contact humans may have with their robots. **Any clarifications regarding this ruling should be directed to the judges before the competition to ensure the interaction is permitted.**

2.8.2. Human-robot interaction is encouraged; humans cannot physically touch the robot, just interact with the robot's sensors. Interaction which is used to alter the robot's behaviour directly, e.g. to keep it inside the black lines, will be rewarded far less in comparison to more intelligent interaction (e.g. a robot following human using a camera).

2.8.3. Interaction between robots is highly encouraged. Robots are allowed to physically touch one another, and can interact through sensors and also wired/wireless communication (refer to 1.3 for allowed wireless communication).

2.9. Humans on stage

2.9.1. **A maximum of two human team members may perform with their robots on the stage at any one time during the performance. There is no penalty for humans not performing with their robots. Human performers may be inside and/or outside the marked area but should keep to the 5 x 4 meter area.**

2.10. Penalties

- 2.10.1. If a team exceeds the time limit explained in 2.3, the team will be penalized by the loss of points (see performance score sheet).
- 2.10.2. If **all of the robot's contact points (e.g. wheels)** move outside the marked boundary of the performance area the team will receive a penalty score. **A contact point is considered to be the point at which a robot touches the stage.** If in doubt please consult with the **Technical Committee Chair** for clarification of "contact point" in relation to your robot design.
- 2.10.3. Unless a problem is not the fault of the team, any restart will result in a score penalty.
- 2.10.4. **Teams who, in the opinion of the judges, have knowingly produced duplicate robots, costumes or performance movement (duplicate music is allowed) of another team or reused previous years' robots (with or without modifications), costumes or performances will be subject to penalties. This applies to any previous RoboCupJunior Dance or Dance performances.**

2.11. Preparation for the stage performance

- 2.11.1. It is the responsibility of the team to ensure that the music and video/presentation is playing correctly before their first performance by liaising with the RoboCupJunior officials.
- 2.11.2. Depending on the configuration of the stage and the sound system at the venue, it is possible that the human starting the robot will not be able to see the RoboCupJunior official starting the audio source; and vice versa. Teams should come prepared for these conditions.

2.12. Practice on the main stage

- 2.12.1. The main performance stage will be made available for teams to practice on. In fairness to all teams who may wish to practice, a booking sheet will be used to reserve the stage for a short practice time. Please be respectful of the allocated time.
- 2.12.2. The last team to practice on the main stage before performance time starts must fully clean up the stage and clear the stage area at least 3 minutes before the performance start time.

2.13. Content

Any performance that includes violent, military, threatening or criminal elements will be excluded. Any team using an inappropriate name or logo will also be excluded.

Participants are asked to carefully consider the wording and messages communicated in any aspect of their performance. What seems acceptable to one group may be offensive to friends from a different country or culture.

2.14. Security and safety

- 2.14.1. In order to protect participants **and comply with occupational health and safety regulations of the host country**, RoboCupJunior officials and bystanders, routines may not include explosions, smoke or flame, use of water, or any other hazardous substances.
- 2.14.2. A team whose routine includes any situation that could be deemed hazardous, including the possibility of damaging the stage, must submit a report outlining the content of their performance to the **Technical Committee Chair one month** before arriving at the competition. The **Technical Committee Chair may also request further explanation** and also a demonstration of the activity before the stage performance. Teams not conforming to this rule may not be allowed to present their routine.

2.15. Authenticity and originality

The performance is to be unique and have never been used in any other RoboCupJunior International competitions. Teams are encouraged to carefully check that all robots and costumes conform to this rule.

3. Open technical demonstration (30% of total score)

The description of the robots' capabilities should explain to the audience how the robot's capabilities have been achieved. Teams for whom English is not their first language will be provided with a RoboCup official to present their written words if so required. Teams may use a video or other recorded aids to present the description.

3.1. Demonstration procedure

- 3.1.1. Teams will have 5 minutes on stage to give their demonstration. They will additionally have 1 minute to enter and set-up on stage and an additional 1 minute to clear the stage.
- 3.1.2. The technical capabilities of their robot(s) should be demonstrated by both describing what has been developed and demonstrating this capability. This could cover any aspect of the performance or technical capabilities of the robot(s), such as interaction with humans, interactions with other robots or the use of a particular sensor.
- 3.1.3. The technical demonstration will be judged by at least two judges.
- 3.1.4. The Open Technical Demonstration Score Sheet is used in the judging. It is strongly suggested for teams to read the Score Sheet before the demonstration to make good use of the demonstration. This assesses both the content and presentation of the demonstration.

3.2. Stage

The same stage will be used for performance and the technical demonstration, with the same restrictions as given section 2.6 applying.

3.3. Demonstration presentation

Two microphones will be available for teams to use. Teams are encouraged to produce presentations, videos or use music or a pre-recorded commentary to accompany and assist with their technical demonstration. There is no limitation on the number of team members allowed on the stage.

4. Technical interview (30% of total score)

4.1. Interview procedure

- 4.1.1. All teams will have a 15 minutes technical interview judging during the competition.
- 4.1.2. Interviews will be judged by at least two RoboCupJunior officials.
- 4.1.3. The Interview Score Sheet is used in the interview judging. It is strongly suggested for teams to read the Technical Interview Score Sheet **before** the interview to make good use of the interview.
- 4.1.4. Teams should ensure that they bring all their robots, and copies of all their programs in a format that can be easily viewed
- 4.1.5. Each team member must be prepared to answer questions about the technical aspects of their involvement in the robot design.

4.2. Translator

Interviews will take place in English. If teams require a translator they should inform the RoboCupJunior officials or local organizing committee by e-mail prior to the event to allow translators to be organized.

4.3. Second technical interview

If the judges consider it necessary, teams may be asked to complete a second technical interview. If this occurs, the score from the second interview will be used to calculate the total score.

5. Documentation required for the event

5.1. Documents

- 5.1.1. A technical information form will be send to teams prior to the international event. This allows teams to provide a summary of the robots and technology used prior to their interview. Teams should ensure that they submit this form.
- 5.1.2. The Technical Sheet must be submitted to the judges prior to judging.

5.2. Poster (optional)

- 5.2.1. Teams will be given public space to display a poster. The size of the poster should be no larger than A1 (60 x 84 cm). The interview the poster should be displayed in the designated location. Teams may bring the poster to the interview if they contain useful information, however the poster will not be judged during the interview.
Electronic posters will not be accepted.
- 5.2.2. The purpose of the poster is to introduce the team, explain the technology used to develop the robots and document the preparation work. Posters should be made in an **interesting and engaging format**. They will be viewed not only by the judges, but also by other teams and visiting members of the public.
- 5.2.3. **Areas that are useful to include are: team name, division (primary or secondary), and your country, annotated pictures of the robot under development at various stages and an explanation of the innovative robot technologies used.**

6. Judging and commending

6.1. Judging criteria

The judging criteria and allocation of marks are given in the respective score sheets.

6.2. Totaling

- 6.2.1. The total score of each team is calculated by combining the scores from the team's technical interview and the open technical demonstration, and **the highest score from two OnStage performances. There will no finals.**

6.3. Prizes and awards

- 6.3.1. The following trophies will be awarded in each age category (primary and secondary):
 - **The RCJ International OnStage Team of the Year** is awarded to the team with the highest combined overall mark.
 - **The RCJ International OnStage SuperTeam of the Year** is awarded to a SuperTeam that has gained the highest SuperTeam performance score.
- 6.3.2. Awards will also be given to individual teams in the following categories:

Best Design & Construction
Best Use of Electronic Devices
Best Use of Sensors
Best Programming
Best Robot interaction
Best Open Technical Demonstration

The awards will be awarded based on both the Technical Interview, the Open Technical Demonstration and the Performance scores at the discretion of the judges. Individual teams can receive only one award.

- 6.3.3. There may also be certificates awarded for the following categories:

Best Team Collegiality: This award goes to the team who, by popular vote, has given the greatest support to the other teams; the support can be demonstrated in a number of ways, such as providing assistance with components, developing friendships and/or giving encouragement to other teams.

Best Poster: This award goes to the team who, at the discretion of the judges, has produced the best poster that describes the team and robot technology used.

Best Creative Presentation: This award goes to the team who, at the discretion of the judges, has produced the most creative and technically interesting digital display that supports and enhances the robot performance. This could be a video, slideshow, images or any other form of digital product that is displayed during the performance.

Best Novice Team: This award goes to the primary and the secondary teams who have placed highest in the competition overall and have not received another award, and where ALL members of the team are competing at RCJ international for the first time (this does not include a team having a team member(s) who has (have) competed in other RCJI categories).

- 6.3.4. No one team shall receive more than 3 prizes, awards and/or certificates excluding the SuperTeam awards.

6.4. Feedback

RoboCupJunior is an educational project. It is important that team members learn from their experiences with RCJ, and have the opportunity to improve in later years if they so choose. The organizers will provide feedback on each team's performance at the conclusion of competition. The sheet will indicate to the team their areas of strength and also areas needing improvement. It is important to note that these sheets are not to be used to debate positions, decisions or competition scores with the judges.

- 6.4.1. Scores will be given after the first performance to allow teams to better prepare for the second performance.

7. Code of conduct

7.1. Spirit

- 7.1.1. It is expected that all participants, students and mentors, will respect the RoboCupJunior mission. In addition, participants should keep in mind the values and goals of RoboCupJunior.
- 7.1.2. It is not whether you win or lose, but how much you learn that counts. You will really miss out on a lifelong learning experience if you don't take this opportunity to collaborate with students and mentors from all over the world. Remember this is a unique moment!

7.2. Fair play

- 7.2.1. It is expected that the aim of all teams is to participate in a fair and clean competition.
- 7.2.2. Humans that may cause deliberate interference with robots or damage to the stage will be disqualified, if part of a team. If not part of a team they will be asked to leave the venue. The team is responsible for removing all debris left from their routine that may interfere with the performance of subsequent activities.
- 7.2.3. Remember, helping those in need and demonstrating friendship and cooperation are the spirit of RoboCupJunior as well as making the world a better place.

7.3. Sharing

- 7.3.1. It is understood that RCJ events with rich technological and curricular developments should be shared with other participants after the competition.

7.3.2. Any developments may be published on the RoboCupJunior web site following the event. **All winning teams should submit a one page PDF summary describing their robots for upload to the RoboCupJunior website. The technical form from the 2014 rules can be used as a guidelines.**

7.3.3. Sharing information furthers the mission of RoboCupJunior as an educational initiative.

7.4. Behaviour

7.4.1. All movement and behaviour is to be of a subdued nature within the event venue.

7.4.2. Competitors are not to enter set-up areas of other leagues or other teams, unless expressly invited to do so by other team members. Participants who misbehave may be asked to leave the building and risk being disqualified from the event.

7.5. RoboCupJunior officials

7.5.1. The officials will act within the spirit of the event.

7.5.2. The RoboCupJunior officials shall not have close relationship with any of the teams in the age group they judge.

7.6. Mentors

7.6.1. Mentors (defined as teachers, parents, chaperones, translator or any other non team-member) are not allowed in the student work area except to assist carrying equipment in or out of the area on the arrival and departure days.

7.6.2. If a problem is encountered with a computer or other device that is clearly beyond the reasonable ability level of a student to repair, a mentor may request permission from the organizers to enter the work area for the sole purpose of advising on that repair. They must leave the work area immediately after this is completed. Rule 8.7.1 still applies at these times.

7.6.3. Mentors are not allowed to set up equipment on stage, as this should be the responsibility of team members. Organizers will assign volunteers to teams that need an assistant for stage set-up. Teams should request this assistance to the officials.

7.6.4. A mentor found in the student work area may lose his/her access to the venue and the team will be penalized.

7.6.5. A mentor found to be involved with mending, building or programming the robot(s) and/or directing choreography may lose his/her access to the venue and the team marks will be penalized. This applies to both the “individual” and “super team” competitions.

8. Additional information

8.1. Information about the event

8.1.1. Teams will be responsible for checking for updated information during the event. Teams should check the notice boards at the venue and also the RoboCup 2016 website.

8.1.2. Newsletters will be disseminated during the event to ensure teams and mentors have the latest information.

8.2. Contact

Queries regarding the rules or their interpretation may be sent to the OnStage 2016 Technical Committee Chair: Susan Bowler – Chair (Australia), susan.bowler@education.tas.gov.au

Appendix

Figure 1: Layout of the stage and the audio visual equipment supplied

Plan View of Stage Arrangement

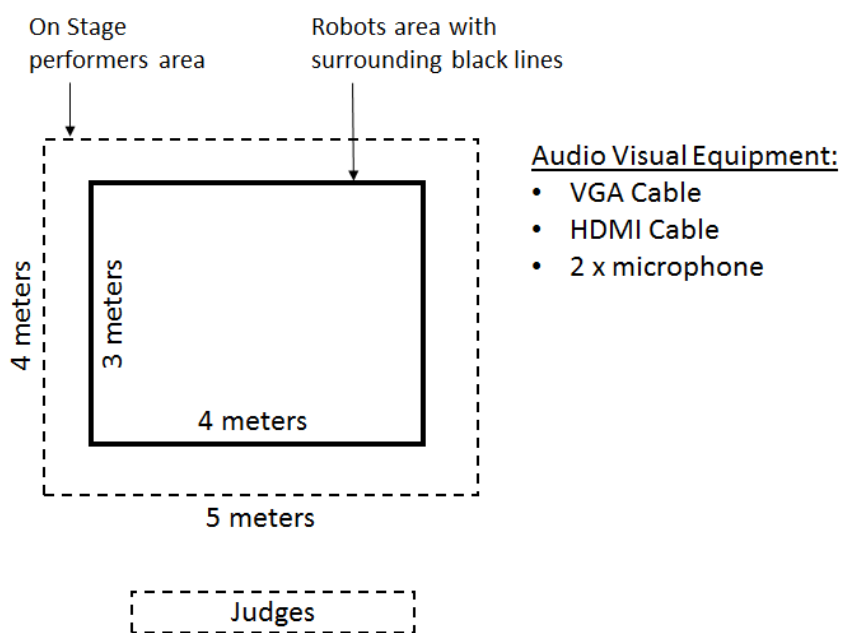
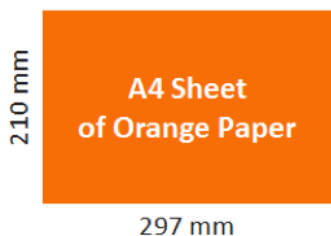


Figure 2: Suggested construction of the cylinders

The markers are 210mm in height and 40mm in diameter. Here is suggested instruction for making the cylinders.

Step 1. A4 sheet of orange/green paper



Step 2. Roll in to cylinder of 40mm diameter, add weights to the inside bottom (e.g. blue tack) to keep is upright.

