JBC Challenge 1 *Tag You're It*

Setup: Use Surface-A. Place a 12oz. empty soda can in circle 9.

Level: Beginner

Skill: Learning to drive the robot forward and reverse a set distance. Learning to drive straight and to align the robot the same way every time.

Goal: The robot will drive to the can in circle 9, touch it, and return to the starting area.

Completion: Participants will receive a completion award when the robot touches the can and returns behind the starting line.

General Rules:

1. All robot's must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
9. The judge must be able to tell that the can was touched by the robot, either visually (the can moved) or audibly (the robot touching the can made a noise).
10. The can must not tip over and some part of the can must remain in the circle for the team to achieve completion.

JBC Challenge 2 *Ring Around the Can*

Setup: Use Surface-A. Place a 12oz empty soda can in circle 6.

Level: Beginner

Skill: Learning to turn.

Goal: The robot will drive out and around the can in circle 6, and return to the starting area.

Completion: Participants will receive a completion award when the robot drives around the can and returns behind the starting line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The entire robot must go around the far side of the can.
9. The can must not tip over and some part of the can must remain in the circle for the team to achieve completion.

JBC Challenge 2B *Ring Around the Cans Sr.*

Setup: Use Surface-A. Place a 12oz empty soda can in circles 12, 11, and 10.

Level: Beginner

Skill: Learning to turn.

Goal: The robot will drive out and around the cans in circles 12, 11, 10, and return to the starting area.

Completion: Participants will receive a completion award when the robot drives around the cans and returns behind the starting line.

General Rules:

10. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
11. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
12. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
13. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
14. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
15. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

16. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
17. The entire robot must go around the far side of the can.
18. The cans must not tip over and some part of the can must remain in the circle for the team to achieve completion.

JBC Challenge 3 *Precision Parking*

Setup: Use Surface-A.

Level: Beginner

Skill: Making precision turns and movements.

Goal: The robot will successfully park in at least two of the garages. .

Completion: Participants will receive a completion award when the robot successfully parks in at least two of the garages.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The team must declare which garage they intend to park in before starting a run, only attempting one color of garage per run. If they attempt to park in both garages in one run they go back to the start line and then continue to the second garage.
9. The robot may not touch the solid lines marking the 3 sides of the garage the team intends to enter. A robot may pass over (but not touch) the vertical projection of the solid lines of the selected garage. A robot may drive over the dotted line of the selected garage. All lines from undeclared garages will be ignored.

JBC Challenge 3B *Parallel Parking*

Setup: Use Surface-A.

Level: Beginner

Skill: Making precision turns and movements.

Goal: The robot will successfully parallel park on the side of at least two of the garages. .

Completion: Participants will receive a completion award when the robot successfully parallel parks on the side of at least two of the garages. **A successful parallel park occurs when the robot moves past the garage (all parts of the robot must go past the end) and then backs into the "space" with less than 2" between the line of the garage (wall) and the entire length of the chassis without touching any part of the solid line of the garage.**

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
2. The team **must declare** which garage they intend to parallel park by before starting a run, **only** attempting one color of garage per run.
3. The robot may **not touch** the solid lines marking the 3 sides of the garage the team intends to parallel park by. All lines from undeclared garages will be ignored.
4. **A successful parallel park occurs when the robot moves past the garage (all parts of the robot must go past the end) and then backs into the "space" with less than 2" between the line of the garage (wall) and the entire length of the chassis without touching any part of the solid line of the garage.**

JBC Challenge 4 *Figure Eight*

Setup: Use Surface-A. Place 2 empty 12oz soda cans in circles 4 and 9.

Level: Beginner

Skill: Precision robot driving, recognizing repeated actions.

Goal: The robot will weave in and out of the cans in the pattern of a figure 8 going out AND coming back and end back behind the starting line.

Completion: Participants will receive a completion award when the robot completes the figure 8 as specified and returns behind the starting line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The entire robot must weave around the cans in a figure 8 pattern going out AND coming back and end back behind the starting line. The cans are placed on circles 4 and 9.
9. The cans must not tip over and some part of each can must remain in the circle, or that team does not complete that run.
10.

JBC Challenge 4B Barrel Racing

Setup: Use Surface-A. Place 3 empty 12oz soda cans in circles 8, 9 and 5.

Level: Beginner

Goal: The robot will start behind the take a path to go;

- around the can in circle 8 (clockwise)
- around the can in circle 5 (counter clockwise)
- around the can in circle 9 (counter clockwise)
- go back across the start/finish line.

Completion: Participants will receive a completion award when the robot completes the barrel race as specified and returns behind the starting line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
6. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
7. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8’ enclosure as long as it is behind the actual and virtual start line.
2. The robot will go around cans on circles 5 ,8, and 9 and then return across the start/finish line. The robot will start behind the take a path to go around the can in circle 8 (clockwise), around the can in circle 5 (counter clockwise), around the can in circle 9 (counter clockwise) and back across the start/finish line.
3. The cans **must not tip over** and some part of each can must remain in the circle, or that team does not complete that run.

JBC Challenge 5 *Dance Party*

Setup: Use Surface-A. No game pieces required.

Level: Beginner

Skill: Motor and servo control and movement.

Goal: The robot must "dance" along with the music.

Completion: Participants will receive a completion award when the robot "dances" to the music provided by the students and completes all of the performance standards listed in the challenge rules below.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The students must provide their own music clip that plays loud enough for the judges to hear. Music clips can be played from a cell phone or the students can provide live music (singing).
9. The robot must leave the starting box before completing the dance moves and must complete all of the following moves:
    a. Must complete at least one 360 degree clockwise turn
    b. Must complete at least one 360 degree counter clockwise turn
    c. Must move forward
    d. Must move backward
    e. Must wave the servo (up and down at least once)

JBC Challenge 5B *Line Dance*

Setup: Use Surface-A. No game pieces required.

Level: Beginner

Skill: Motor and servo control and movement.

Goal: The students and the robot will line dance.

Completion: Participants will receive a completion award when the student and the robot "line dances" and completes all of the performance standards listed in the challenge rules below.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
2. The student's verbally call and do the line dance with the robot.
3. The robot must leave the starting box before completing the dance moves and must complete all of the following moves:
    f. Must complete at least one 360 degree clockwise turn
    g. Must complete at least one 360 degree counter clockwise turn
    h. Must move forward multiple times (more than 5
    i. Must move backward multiple times (more than 5)
    j. Must turn to the right multiple times (more than 5)
    k. Must turn to the left multiple times (more than 5)
    l. Must wave the servo (up and down at least three times)
    m. Be creative and have fun.

JBC Challenge 6 *Load 'Em Up*

Setup: Use Surface-A. Place 3 empty 12oz soda cans in circles 2, 9, and 10.

Level: Intermediate

Skill: Precision robot driving, engineering an effector to push cans.

Goal: The robot will manipulate the can in front of each garage into the garage. Put the can from circle 2 into the green garage, can 9 into the blue garage, and can 10 into the yellow garage. You will attempt all cans in a single run.

Completion: Participants will receive a completion award when the robot successfully manipulates two of the cans into two of the garages in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The team must declare which garages they intend to put cans in before starting a run.
9. The cans must not tip over and some part of each can must remain in the inside edge of the solid and dotted lines denoting the garage touching the surface, or that can does not count towards completion.
10. The robot may be touching cans at the end of the round.

JBC Challenge 6B *Pick 'Em Up*

Setup: Use Surface-A. Place 3 empty 12oz soda cans in circles 2, 9, and 10.

Level: Intermediate

Skill: Precision robot driving, engineering an effector to pick up cans.

Goal: The robot will pick up the can in front of each garage and then place them into the a garage. Pick up the can from circle 2 place it into the green garage, can 9 into the blue garage, and can 10 into the yellow garage. You will attempt all cans in a single run. The cans must be upright (vertical) after placement.

Completion: Participants will receive a completion award when the robot successfully **picks up** two of the cans and place them into two of the garages in one run.

General Rules:

11. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
12. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
13. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
14. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set-up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
15. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
16. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
2. **The team must declare which garages** they intend to put cans in before starting a run.
3. The cans must not tip over and some part of each can must remain in the inside edge of the solid and dotted lines denoting the garage touching the surface, or that can does not count towards completion.
4. The robot may be touching cans at the end of the round.

JBC Challenge 7 *Bulldozer Mania*

Setup: Use Surface-A. Place 1 empty 12oz soda can in each numbered circle (12 cans total).

Level: Intermediate

Skill: Precision robot driving, engineering effectors (blades, claws etc.).

Goal: The robot will manipulate at least three upright cans behind the starting line in one run..

Completion: Participants will receive a completion award when the robot manipulates at **least three** upright cans behind the starting line in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set-up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8’ enclosure as long as it is behind the actual and virtual start line.
8. The robot’s drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
9. The cans must not tip over and some part of each can must touch the surface and be behind the start line (actual or virtual within the 8’ enclosure), or that can does not count towards completion.
10. The robot may be touching cans at the end of the round.

JBC Challenge 8 *Serpentine*

Setup: Use Surface-A.

Level: Intermediate

Skill: Make precision turns <90° and >90°.

Goal: The robot will drive on the surface touching each of the numbered red circles with at least one of the robot's wheels in sequential order (1, 2, 3, etc.) through 8.

Completion: Participants will receive a completion award when the robot drives through (touches with at least one drive wheel) circles 1-8 in the correct order in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set-up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The robot must touch each circle with at least one drive wheel in the correct order through 8 for completion.

JBC Challenge 8B Serpentine Jr.

Setup: Use Surface-A.

Level: Intermediate

Skill: Make precision turns

Goal: The robot will drive on the surface touching or straddling each of the numbered red circles with at least one of the robot's wheels(or straddling it) in sequential order (1, 2, 3, etc.) through 5.

Completion: Participants will receive a completion award when the robot drives through (touches or straddles the circles with at least one drive wheel) circles 1-5 in the correct order in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
2. The robot must touch or straddle each circle with at least one drive wheel (or straddle, a wheel on each side of the circle) in the correct order through 5 for completion.

JBC Challenge 9 *Add it Up*

Setup: Use Surface-A.

Level: Intermediate

Skill: Precision robot driving and using a servo.

Goal: Drive the robot to the numbered circles on the mat (doesn't have to be sequential), and then use a servo to touch the circles.

Completion: Participants will receive a completion award when they have **accrued 20** or more touch points in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set-up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. Robots must use a servo to lower an effector to touch the circle (it cannot be something that is always dragging or always touching the surface) and **accrue 20** or more points.
9. To count as touching a circle part of the robot must be lowered by a servo and touch either inside the red circle or on any part of the red circle line itself.
10. You can only touch one circle at a time. Any robot that touches two or more circles at the same time will not get points for the touch.

JBC Challenge 9B *Balancing Act*

Setup: Use Surface-A.

Level: Intermediate

Skill: Precision robot driving and using a servo.

Goal: Drive the robot to the numbered circles on the mat and then use a servo to touch the circles to create a balanced equation.

Completion: Participants will receive a completion award when they have:

1. **Touched the multipliers (factors) and product of 2 numbers (multiply) and/or factors, addend and product (multiply and add) of 3 numbers to create an equation.**
2. Must use order of operations.
3. Must multiply.
4. Must make at least one equation by touching the circles in one run. Example: The robot touches circle 7, 3, 10, 11 (7 x 3 = 10 + 11) and touches 5,2,10 (5x2=10).
5. Student must write the equations on the provided white board.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
2. Robots must use a servo to lower an effector to touch the circle (it <u>cannot</u> be something that is always dragging or always touching the surface).
3. To count as touching a circle part of the robot must be lowered by a servo and touch either inside the red circle, or on any part of the red circle line itself.
4. You can only touch one circle at a time. Any robot that touches two or more circles at the same time will not get points for the touch.
5. You can not repeat circles.

JBC Challenge 10 *Solo Joust*

Setup: Use Surface-B. Place one empty 12oz soda can on the black line between the text “Line B” and the B in “Botball”.

Level: Intermediate

Skill: Driving the robot in a straight line, and manipulating a can.

Goal: The robot will drive without touching the Line B (blue line) with either wheel and knock over a can on the other side of the blue line.

Completion: Participants will receive a completion award when the robot knocks over the can without the drive wheels crossing the blue dotted line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start with the wheels on the green line side of the blue dotted line (Line B) and be completely behind the vertical projection of the inside of the green “Start” line and the blue dotted line. The arm may not project over the solid line until after the entire robot has crossed the start line.
8. The robot must drive to the end of the mat (indicated as past the black line) and tip over the can without any drive wheels touching Line B (blue line).

JBC Challenge 10B *Solo Joust Jr.*

Setup: Use Surface-B. Place empty 12oz soda cans on the interception of the colored lines (purple, yellow, red, green) with the Black lines on the B mat.

Level: Intermediate

Skill: Driving the robot in a straight line.

Goal: The robot will drive straddling line B (blue line) without either wheel touching the line and knock over at least 2 cans (2 of the 4) on the colored A-D lines.

Completion: Participants will receive a completion award when the robot knocks over at least 2 of the cans without the drive wheels touching the blue dotted line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot will start off the mat. It will straddle the blue line without touching it.

2. Cans will be placed on the interception the black and colored lines.
3. The robot must straddle the blue line without the blue line until it

reaches the far end of the mat.

JBC Challenge 11 *Be Happy*

Setup: Use a 2’ x 4’ sheet of butcher paper. Attach a marker to the robot.

Level: Intermediate

Skill: Driving and operating a servo.

Goal: The robot will drive on the butcher paper while manipulating the marker to draw a smiley face ☺

Completion: Participants will receive a completion award when the robot successfully makes three marks on the paper that can be construed as a smiley face.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must make at least 3 separate marks that could be construed as a smiley face – two eyes and a mouth.

JBC Challenge 11B *Tis the Season*

Setup: Use a 2' x 4' sheet of butcher paper. Attach a marker to the robot.

Level: Intermediate

Skill: Driving and operating a servo.

Goal: The robot will drive on the butcher paper while manipulating the marker to draw a seasonal object (Ghosts, jack-o-lantern, leaf, pumpkin, umbrella). This will be determined and posted before the Challenge day. Rules will be provided to say what makes the object that object (constraints of the drawing).

Completion: Participants will receive a completion award when the robot successfully makes the marks on the paper that can be recognized as the seasonal objects.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must make the marks that represents the desired seasonal object.
2. **Teams must provide their own marker and effector** to hold it.
3. Additional Rules will be given when posted as a Challenge Day.

JBC Challenge 12 *Unload 'Em*

Setup: Use Surface-A. Place one empty 12oz soda can in each of the three garages.

Level: Intermediate

Skill: Precision robot driving, engineering and effector to push cans.

Goal: The robot will manipulate the can in each garage into the circle outside each garage. Put the can from the green garage into circle 2, can from the blue garage into circle 9, and the can from the yellow garage into circle 10. You will attempt all cans in a single run.

Completion: Participants will receive a completion award when the robot successfully manipulates at least two of the cans into the correct circles in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The cans must be placed in each garage before starting a run.
9. The cans must not tip over and some part of each can must remain in the inside edge of the circle and be touching the surface, or that can does not score in that run.
10. The robot may be touching cans at the end of the round.

JBC Challenge 13 *Clean the Mat*

Setup: Use Surface-A. Place 5 empty 12oz soda cans in circles 2, 5, 8, 10, and 11.

Level: Intermediate

Skill: Precision robot driving, engineering effectors (blades, claws etc.).

Goal: The robot will find cans and push them into a single colored garage.

Completion: Participants will receive a completion award when they have pushed at least 4 cans into the declared garage in one run.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The team must declare which garage (green, blue or orange) they are going for before starting the program.
9. Cans count as being in the garage when they are upright and inside or touching the colored lines (including the dashed line) of the declared garage

JBC Challenge 14 *Recycle & Make Friends*

Setup: Use Surface-A. Green, blue and yellow paper of any size on the robot

Level: Intermediate

Skill: Precision navigation and fine manipulation.

Goal: The robot will drive to each colored garage and deposit a matching colored piece of paper inside the garage.

Completion: Participants will receive a completion award when the robot correctly matches the paper in all three garages.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The robot can drive over the garages.
9. Each paper should be labeled or colored to indicate the color of garage it matches.
10. The paper can be any size, but the robot can only start with one of each color.
11. The robot does not have to deposit all three colored papers in one run.

JBC Challenge 15 *Tag and Bring Home*

Setup: Use Surface-A. One empty 12oz soda can randomly placed in circle 2, 6, or 11.

Level: Intermediate

Skill: Precision robot driving, using a sensor.

Goal: The robot will go out, sense the can, and then return it to the starting box.

Completion: Participants will receive a completion award when they have returned at least two cans and brought them back to the starting box.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The students must have their robot lined up and ready to go before the judge places the can on the mat. **The students must be using a sensor to detect the cans. They may not change the program once they set down the robot.**
9. Once the can is placed, the team starts the robot **(team cannot reposition, change program, etc.).**
10. If the robot brings the can back to the starting box (can must break the vertical projection of the inside boundary of the starting line) the team can remove the can and reposition their robot for another run.
11. The judge will take the can and place it again at random in circle 2, 6, or 11 (except not in the same circle as any previous successful runs).

JBC Challenge 16 *Proximity*

Setup: Use Surface-A. One ream (500 sheets) of standard copy paper.

Level: Intermediate

Skill: Students will learn how to use the rangefinder (ET) sensor to sense an object and stop before hitting the object

Goal: On two separate runs, the robot has to sense the wall (ream of paper) that has been randomly placed on the mat and drive out to it, stopping within approximately 4 1/4" (the width of a piece of paper folded in half lengthwise) of the wall without touching it.

Completion: Participants will receive a completion award when the robot goes out, senses the wall and stops within approximately 4 1/4"" of the wall without touching it on two different runs.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
8. Once the robot is in starting position, a ream of paper is placed on edge (long side down and parallel to the starting line) at either circles 4, 6, 9 or 11.
9. Once the ream of paper is set, students can push "run" on their robot.
10. Robot must come to a complete stop within approximately 4 1/4" (the width of a piece of paper folded in half lengthwise) without touching the wall with any part of the robot.

JBC Challenge 16B *Blind Corner*

Setup: Use Surface-A. One ream (500 sheets) of standard copy paper.

Level: Intermediate

Skill: Students will learn how to use the rangefinder (ET) sensor to sense a wall and stop before hitting the object, then make a left or right turn and move forward for 1 second.

Goal: On two separate runs, the robot has to sense the wall (ream of paper) that has been randomly placed on the mat and drive out to it, stopping within approximately 4 1/4" (the width of a piece of paper folded in half lengthwise) of the wall without touching it and then turn around and go back to the starting box.

Completion: Participants will receive a completion award when the robot goes out, senses the wall and stops within approximately 4 1/4"" of the wall without touching it, turns around and goes back to the starting box.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all setup time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

1. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual starting line.
2. Once the robot is in starting position, a wall (ream of paper) is placed on edge (long side down and parallel to the starting line) at either circles 4, 6, 9 or 11.
3. **Once the ream of paper is set, students can push "run" on their robot.**
4. Robot must come to a complete stop within approximately 4 1/4" (the width of a piece of paper folded in half lengthwise) without touching the wall with any part of the robot, turns around and goes back to the starting box.

JBC Challenge 17 *Walk the Line*

Setup: Use Surface-B.

Level: Intermediate

Skill: Using a reflectance sensor.

Goal: The robot will follow the black line from start to finish.

Completion: Participants will receive a completion award when the robot's drive wheels touch or cross the blue line.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time. At least one team member must remain with the judge for 5 minutes. Other team members may leave the area to make changes within the 5 minutes.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line.
8. The robot must be following the line. Dead reckoning will not be allowed and will result in a disqualification. If the judge believes dead reckoning is occurring, he will immediately check the code running on the robot.
9. Lines are only counted as touched if all the driving wheels touch the colored line.

JBC Challenge 18 Movin' on Up

Setup: Use Surface-A. Place one empty 12oz soda can in circle 10.

Level: Advanced

Skill: Precision robot driving, engineering an effector utilizing two servos

Goal: The robot will manipulate a can outside of the orange garage into the green garage without driving over the solid lines of the orange or green garage.

Completion: Participants will receive a completion award when the robot starts in the orange garage and successfully manipulates the can into the green garage in one run without driving over the solid orange or green lines.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The entire robot must start completely inside the orange garage.
8. The robot cannot touch the can until after the run starts.
9. The robot cannot touch the solid orange or green lines at any point during the run. It can drive over the blue lines.
10. The can must not tip over and some part of the can must finish in the inside of the green garage and be touching the surface.
11. The robot may not be touching the can at the end of the round.

JBC Challenge 19 *Mountain Rescue*

Setup: Use Surface-A. Place a full ream (500 sheets) of standard 8.5" x 11" copy paper inside the blue garage so that it is touching the solid side and back lines of the garage and extends over the dashed line. Place 3 empty 12oz soda cans on top of the ream of paper.

Level: Advanced

Skill: Precision robot driving, engineering effectors utilizing two servos.

Goal: The robot will get the cans off of the platform and bring them to the starting box.

Completion: Participants will receive a completion award when they have rescued at least one can and brought it back to the starting box.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The 3 empty cans will be placed by the students onto the top of the ream of paper prior to the start of their run.
9. Cans are considered to be on the top of the platform if the cans are upright, touch the top surface of the platform, and do not touch the surface of the mat, tape, or floor.
10. Cans are rescued and count as placed in the starting box the when they touch the surface of the starting box and are upright.
11. Once a can is rescued, students can remove the can, set it aside and reset their robot in the starting box to go after additional cans.

JBC Challenge 20 *Rescue the Cans*

Setup: Use Surface-A. Place 4 empty 12oz soda cans in circles 2, 9, 10, and 12. Place a standard 8.5" x 11" ream (500 sheets) of paper in the starting box.

Level: Advanced

Skill: Precision robot driving, engineering effectors utilizing two servos.

Goal: The robot will find the cans, pick them up and place them on top of a platform.

Completion: Participants will receive a completion award when they have at least 2 cans upright and touching only the top surface of the platform.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The students will position a full ream of standard 8.5" x 11" copy paper (500 sheets) inside the boundaries of the starting box lying flat.
9. Cans are retrieved and count as placed on the platform when they are upright and touching the top of the ream of paper but not touching the mat, tape, or floor surface.
10. Robots can hold the can(s) in place.
11. Students can reset their robot in the starting box after it has successfully placed a rescue can on the platform to go for additional cans.

JBC Challenge 21 *Foot* Tall*

Setup: Use Surface-A. Place an empty 12oz soda can in circle 9.

Level: Advanced

Skill: Grabbing and lifting objects.

Goal: The robot will drive out to the can and lift the can so that the lowest part of the can is over 11 inches above the mat.

Completion: Participants will receive a completion award when the robot successfully lifts a can (measured from the bottom of the can) to at least 11 inches above the mat.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The robot must hold the can over 11 inches for 3 seconds so that the judges have time to measure.

*A subway foot, so 11 inches.

JBC Challenge 22 *Stackerz*

Setup: Use Surface-A. Place 2 empty 12oz soda one in circle 5 and the other in circle 7.

Level: Advanced

Skill: Precision manipulating.

Goal: The robot will stack one can on top of the other.

Completion: Participants will receive a completion award when the robot places one can on top of the other can.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the chance for completion during the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. If the challenge is not completed within the 5 minute time limit, teams must leave the enclosure area, but can return and retry the challenge later as time allows.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
9. The bottom of the top can must be touching the top of the bottom can.
10. The robot may not be touching either can at the end of the round.

JBC Challenge 23 *Seeing Red*

Setup: Use Surface-A. Randomly place one empty red 12oz can and one empty green 12oz can in any circles.

Level: Advanced

Skill: Camera and decision making.

Goal: The robot will leave the starting box, find the red object and touch it.

Completion: Participants will receive a completion award when the robot leaves the starting box, and touches the red can.

General Rules:

1. All robots must be autonomous (no remote controls, wireless communication, or touching the robot after starting a run).
2. Robots may drive off the mat during a run. Non-Mat surface will be specified (size, carpet, etc.) on the local event page.
3. Only 1 robot is permitted to run at a time. Teams may change parts or robots between runs or challenges, but only 1 robot may be on the challenge surface at a time.
4. Teams will have 5 minutes to complete as many runs as they wish. Time will start after checking in with the judges and will include all set up time.
5. At any point during a run the team may forfeit the score for the run by picking up their robot. Teams are then allowed to start a new run, time permitting.
6. Only the highest scoring run from each team with in the 5-minute time limit will be counted toward the challenge and overall awards.

Challenge Rules:

7. The robot must start completely behind the vertical projection of the inside of the start line. This can be anywhere within the 8' enclosure as long as it is behind the actual and virtual start line.
8. Teams may bring their own red and green cans – which may be covered in paper, or painted to provide a uniform color.
9. The cans will be randomly placed before each attempt after the robot is set up and before starting the run. Neither the robot's placement nor code can be changed after the randomization.
10. The robot's drive wheels must completely leave the starting box (crossing over and no longer touching the black line marking the starting box).
11. The robot must touch the red can. It must not tip over and some part of the can must remain in the circle for the team to achieve completion.
12. Touching the green can stops the run.