



2019 Jousting Challenge

This challenge concludes in a **single elimination tournament** **Top 8 teams** from each division, based on scores, will compete for awards

Goal

To design, build, and program a line following robot that can carry a knight (lightly held by 3 magnets to a steel plate) that will knock off your opponent's knight by using it's lance only.

Who Can Play

Teams in this challenge compete in **separate divisions**, typically:

- Elementary School
- Middle School

Requirements

Autonomous robot, any platform, costing \$1,500 USD or less, and meets the following design constraints, which will be **verified during Check-In**:

- Robot can demonstrate it is running a line following program by negotiating the jousting track from the start point and around the curve up to the 100 point line.
- Knights connecting structure (canning jar lid) can be attached using whatever material is practical, method of attachment cannot provide any support to the knight, and cannot provide any additional magnetic gripping force to aid the knight in staying attached to the structure.
- Knight's connecting structure is no more than *10cm* in front of the robot, and no more than *10cm* above the track.
- Knight's body is completely unsupported while on the required metal lid, therefore NO surrounding support systems allowed around the metal lid.
- Knight is attached to the metal plate using only three *2cm* round "button" magnets.
- No extra magnets are allowed inside or outside the Knight's body or attached to the plate.
- A line following sensor(s) and programming guiding the robot is required.
- During practice and/or competition, any of the official RoboRAVE knights are allowed:

o 2013 Red & Green	o 2017 Red
o 2014 Yellow	o 2018 Pink
o 2015 Blue	o 2019 (TBA)
o 2016 White	

However, during qualifying or tournament competition you must use the official Jousting Knight provided at the track for both teams.

- Volume of the robot must **not** exceed 65030cm^3 .

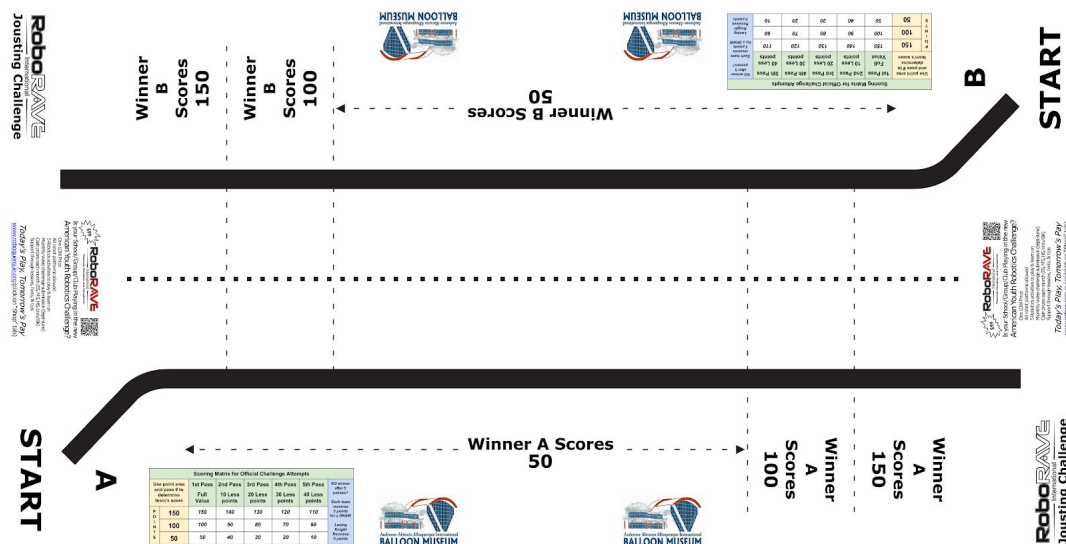
General Rules of Play

- A line following program must control your robot's motion.
- During the scoring period there is no seeding, simply go to any track to find an opponent.
- Up to 5 passes may be made during a match, a pass is defined as an **attempt** is made by both robots to knock each other off.
- If all passes are used and no knight is knocked off, the joust will be considered a **draw**. Both teams relinquish the track to the teams waiting to joust.
- If both knights fall, the **last** knight to hit the floor, as determined by the track official, will be awarded the win.
- **Only the lance** can knock the knight off; if the knight is knocked off by something other than the lance then **that pass is up and a new pass is attempted** (except on the 5th pass)
- **Only** the lance may cross the midline of the track (*13cm* from either of the 2 parallel lines).
- Scores decrease by 10% for each pass after the 1st run. Maximum number of attempts: 5
For example: You win on your 3rd pass, landing your opponent in the 150, or 100, or 50 points zone: Your score possibilities would be: $150 \times 0.8 = 120$; $100 \times 0.8 = 80$; $50 \times 0.8 = 40$
- You will get **10 official scored runs** during the challenge scoring period.
- The **total of your 5 highest official scores** are used to determine tournament selection.

Challenge Specifications

The Track

- Two parallel, *2.5cm* wide black lines on a white PVC vinyl track.
- Each line has a slight curve at the start.
- A meter stick **may** be inserted under the track **along** the midline to create a "wall".



Scoring Zones

- 150 points - *0cm* to *15cm* from start
- 100 points - *15cm* to *30cm* from start
- 50 points - *30cm* to *90cm* from start

All Challenge Dimensions are Approximate

Scoring

- Full score is awarded **only** if you knock your opponent off during the **1st** of 5 attempts. Each successive attempt used decreases the point value by 10%. **See matrix below.**
- Higher scores are earned by knocking your opponent off closer to their START position.
- If the knight (**not the lance**) is lying within two point areas, the higher point value is awarded.

Scoring Matrix

IF a knight is knocked off, IF and ONLY IF, by the opponent's lance, THEN, circle the winner's score Definition: Pass - an attempt is made by both robots to knock each other off, but NO ONE does Each team has 5 Passes to knock their opponent OFF.							
Points per pass		1st Pass (100%)	2nd Pass (90%)	3rd Pass (80%)	4th Pass (70%)	5th Pass (60%)	5 Passes, No Winner? <i>Draw: Each Team gets 5 points</i>
P O I N T S	Lands in the "150 point" zone	150	135	120	105	90	
	Lands in the "100 point" zone	100	90	80	70	60	
	Lands in the "50 point" zone	50	45	40	35	30	
Loser gets 0 Points							

Tournament Scoring

- The top eight teams from each division will compete in the final tournament.
- Advancing teams will be seeded into the tournament bracket according to their aggregate score (see bracket below).



- Runner Up is used to determine 3rd place based on outcome of semi-finals.