



Eurobot and Eurobot Junior 2027 Rules

34rd edition of the robotic contest - Eurobot
BETA 0.4 version



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A. NOTICE

The rules have been split up in several documents. Most parts remain the same for the Eurobot^{Open} and Eurobot^{Open} Junior contests, but to avoid confusion, each contest has its own rules as a single document.

Thus the particular cases specific to one of the competitions appears only in the document concerning it.

You will find the Eurobot^{Open} and the Eurobot^{Open} Junior rules and other information on the Eurobot^{Open} website (www.eurobot.org/)

Please note that the version of this release is noted down at the end of this page. For any inquiry, only an OFFICIAL version should be considered. The current document is the BETA version. No complaints arising from this document will be taken into account during official meetings.

Changes or clarifications of the rules may be made during the year. We therefore strongly encourage all participants to check our website regularly (www.eurobot.org/) as well as your NOC's own website for news. You can also follow discussions, ask questions or get further assistance on our faq (www.eurobot.org/faq/).

Any changes to the specifications will, if necessary, be set out in a supplementary document which will be available on the website of your national organising committee¹ and Eurobot (<https://www.eurobot.org/>).

The FAQ responses from a referee are official responses taken into account for match refereeing and homologation stages.

In case of doubt regarding any point of the rules or the homologation of robots, the referee committee may also be contacted at referee@planete-sciences.org.

Have a good reading!

As is the case every year, a number of parameters in these rules have been modified. As a result, please reread in detail all the parts of these rules, even those that seem familiar to you.

ATTENTION : all images and example in this document are provided as a guide to illustrate the various paragraphs. In no case can they serve as an exhaustive reference.. Only writed rules and the dimensions, colors and materials indicated in the appendix shall be taken into consideration.

¹For example: for France <https://www.coupederobotique.fr/>, for Belgium <https://sparkoh.be/projet-robotix/>, for Switzerland <https://swisseurobot.ch/>

B. CONTEST PRESENTATION

Eurobot^{Open} and Eurobot^{Open} Junior are two international amateur robotics competitions for young people organised in clubs, groups of friends or schools. Their common aim is to enable young people to take charge of their own learning and put their knowledge, technical and social skills into practice, by taking part in a fun and friendly event. The technical challenge involves building one or more robots.

Eurobot^{Open} and Eurobot^{Open} Junior have for only ambitions those described above. As an actor of the popular education movement and as a youth movement, inclusiveness is a strong value for Planète Sciences and its European partners. The organizers do not (and will never) impose a team model; whether you participate to discover robotics, to practice your skills, as part of teaching or for competition, you are (and always will be) welcome.

The Eurobot^{Open} and Eurobot^{Open} Junior meetings are prepared passionately throughout the year by volunteers of all nationalities who believe in the educational values of this experience and are themselves, often, former participants.

The rules for both contest, Eurobot^{Open} and Eurobot^{Open} Junior, are based on the same concept. As organisers, we intend to provide a common platform for the Eurobot^{Open} event. This platform is dedicated to autonomous robots for Eurobot^{Open} while for Eurobot^{Open} Junior, the robots are remote controlled. In this way, the Eurobot^{Open} organiser can easily set up the Eurobot Junior contest and vice versa.

You're currently reading version

Eurobot^{Open} and Eurobot^{Open} Junior BETA 0.4 of 2027 rules.

This document is supplemented by the general Eurobot and Eurobot Junior rules in version 1 (latest sub-version)

C. THEME PRESENTATION

Hear ye, hear ye, good people, ladies and gentlemen! Let me tell you the story of the great King Arthur, the quest for the Grail, and the legendary Camelot.

Once upon a time, in the land of robots who fancied themselves knights, there lived a robot named Arthur who set off on a quest for the Holy Grail. This wasn't as difficult as all that, according to an old robot he met in a tavern, who had over-recharged his batteries and was carrying a bag full of Grails.

But the king also learned that another robot was claiming to be King Arthur and wanted to steal his precious Grail, so there was no time to lose; he had to be safely secured behind the walls of Camelot!

Your feats of arms will be:

- **Build the glorious Camelot.**
- **I have the real one!**
- **The return of the king.**
- **To the attack!**

Please note: All actions are independent from one another and no specific sequence is imposed whatsoever. No single action is mandatory. Give careful thoughts to your strategy. It is strongly recommended to design simple and reliable systems with a limited number of actions.

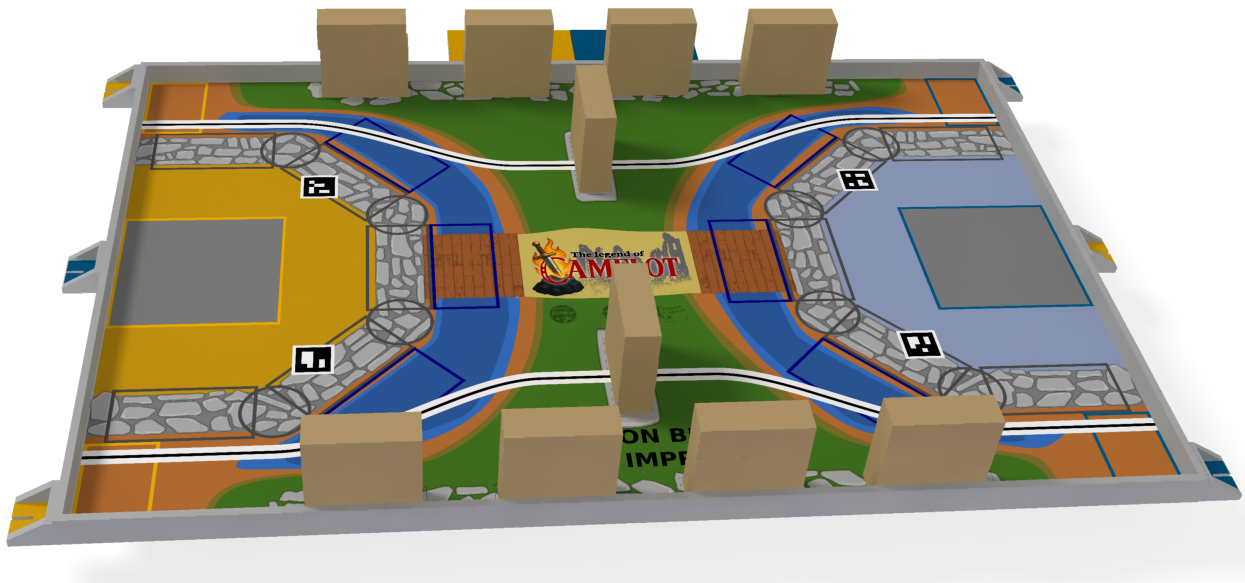


Figure 1: Overview of the playing area

D. PLAYING AREA

D.1. IMPORTANT INFORMATION

The organizers are committed to build the playing area with as much accuracy as possible. Nevertheless, minor tolerances may be observed depending on manufacturing constraints.

No complaints regarding dimensional deviations will be taken into account.

Teams are warned that the surface condition may differ from one playing area to another and may also degrade over time.

Graphics displayed in this document represent the Eurobot^{Open} playing area and not the Eurobot^{Open} Junior one. Thus figures show elements not useful in this version of the rules such as fixed beacon supports and remote computing device.

BETA 0.4 VERSION

D.2. PLAYING AREA

The playing area is a horizontal rectangular plane of 3000 mm by 2000 mm with 70 mm height, 22 mm thick borders on each outer side. Depending on the construction process, it may consist of one or several parts (eg 3 parts of 1000 mm per 2000 mm). Please note that the joints may have imperfections, and it will not be possible to contest these imperfections during the competition.



Figure 2: Detailed view of the playing area, audience point of view

- | | |
|---|-----------------|
| 1. The throne room (Robot starting areas) | 4. Ramparts |
| 2. Castle courtyard | 5. Moat |
| 3. Stables (SIMA Starting Areas) | 6. Stone quarry |

Full specifications of the playing area and game elements (dimensions, positions at the beginning of the match, colors and other references) are listed in the appendix.

In the remainder of this document, horizontal and vertical directions are stated relative to the playing area. Notions of “left”, “right”, “front” and “back” are stated with respect to the spectator’s point of view.

D.3. STARTING AREAS

D.3.a. DESCRIPTION

Each team has one starting and finishing area.

The "throne rooms" are the team's starting and finishing areas. They are the surfaces of 50 cm by 50 cm delimited by a line on the table, which is itself included in this area and of the team's color; they are placed in the side of the table.

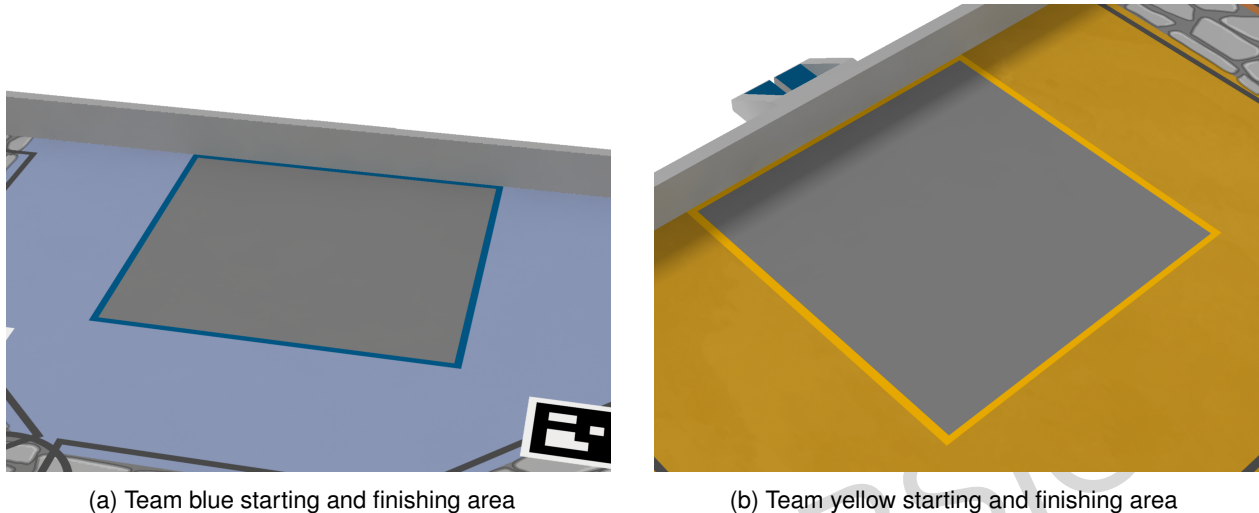


Figure 3: Detailed view of the blue and yellow teams areas

D.3.b. CONSTRAINTS

At the end of the setup time, the vertical projection of the robots must not exceed the limits of their starting area.

Make sure your robot can fully enter its starting area.

The colored lines and the border of the table next to the area are also included in the starting area.

D.4. DESCRIPTION AND LAYOUT OF THE PLAYING ELEMENTS

The stone: The stones are cardboard boxes measuring 320 mm x 110 mm x 110 mm. There are 30 of them, and they are placed in the stone quarries. An Aruco tag with a value of 13 is present on each of the 4 large faces of the stone.

Stone quarries: Zones distributed across the table. They contain 3 stones arranged vertically (see distribution on the table plan).

Rampart: Construction zones are distributed on each side of the table and reserved for each team (see distribution on the table plan), delimited by a line which is itself included within these zones. There are 2 types of rampart: walls with a rectangular surface of 150 mm by 400 mm, and towers with a circular surface and a diameter of 200 mm.

Castle courtyard: Areas placed on the sides of the table and surrounded by ramparts, it's included the throne room.

Moat: Areas spread across the table and surrounding the ramparts, delimited by a line which is itself included within these areas.

The knights: Built by the team, the knights is a small independent mobile actuator (SIMA) activated during the match. It will initially be placed in the SIMA starting areas (stable). For ease of identification, a harmonization of design and colors between the SIMA and the robot is desired.

The Grail: Made by the team, the Grail is an element placed on the throne room of the team before the match.

The cannonballs: Each team has 10 lightweight foam balls, each ball being 45mm in diameter and are compressible.

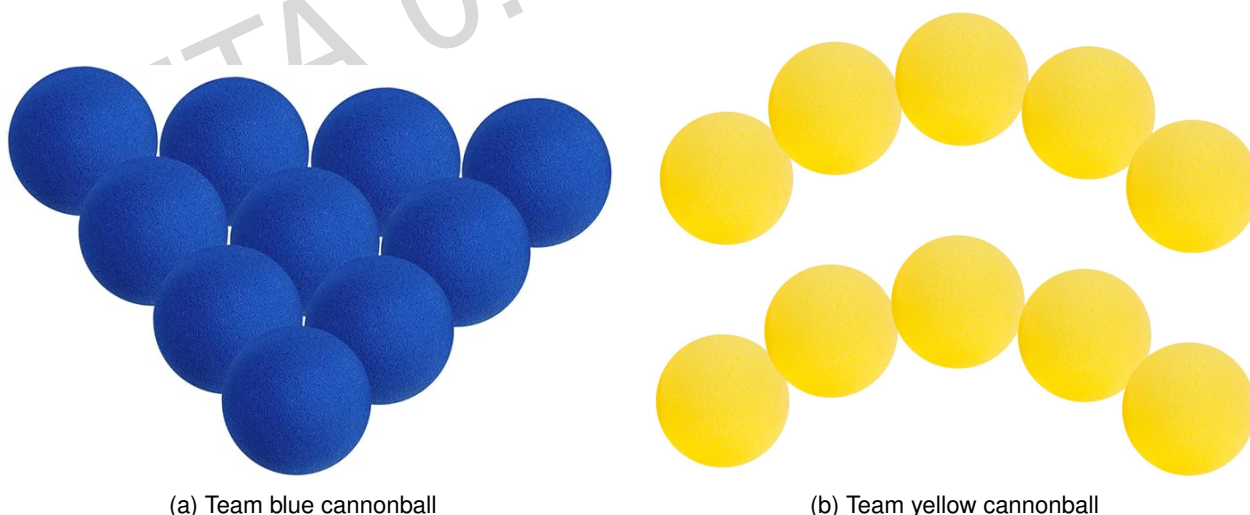


Figure 4: Detailed view of the blue and yellow teams areas



Figure 5: Stones

BETA 0.4 VERSION

E. ACTIONS

E.1. CONSTRUCTION OF THE GLORIOUS CAMELOT!

To keep the Grail safe, we must build an impregnable castle, the legendary Camelot. But be warned, for the building to withstand the test of time, we must strictly adhere to the plans of the chief architect.

E.1.a. DESCRIPTION AND LAYOUT OF THE PLAYING ELEMENTS

This action involves the stones and the ramparts.

E.1.b. ACTIONS AND CONSTRAINTS

Actions:

- The goal is to collect the stones and place them within the ramparts, carefully following the castle's layout, between the walls, towers, and castle gate.

Constraints:

- A stone is considered placed in a zone if all or part of its vertical projection is in this zone, or on top of a stone already valid for that zone.
- A wall is made up of 3 stones arranged horizontally and stacked one on top of the other. A wall must be built within a rectangular wall area.
- A tower is composed of 1 stone placed vertically. A tower must be built within a circular area.
- A gate consists of two stones placed vertically and topped with a third stone placed horizontally. A gate must be built within a rectangular area of the wall. Game elements are permitted to exceed the allowed height limit by up to 430 mm, but only within construction zones and the castle boundaries.
- Each zone can only contain one building of the type permitted for that zone, and a castle can only have one gate. A bonus will be awarded per zone if the building conforms to the zone's plan.
- An element still under control by a robot at the end of the match will not be counted.
- During the match, it will be possible to store up to 3 stones in the castle courtyard.
- During the match, it will be possible to steal stones from the opposing castle to build your castle, but only if all the stone quarries are empty, and without only crash the opposing castle. A 50-point penalty for unfair play will be applied where appropriate.

E.1.c. POINTS

- **p1 points** per stone placed in a construction zone.
- **p2 points** per wall built.
- **p3 points** per tower built
- **p4 points** per built door

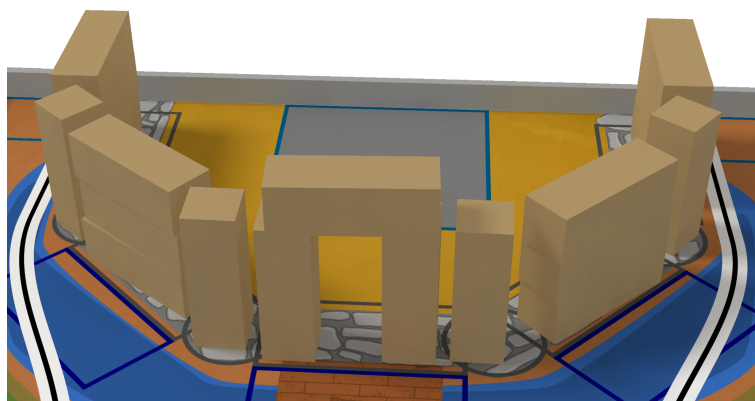


Figure 6: Detailed of the castle layout, view from the center of the table

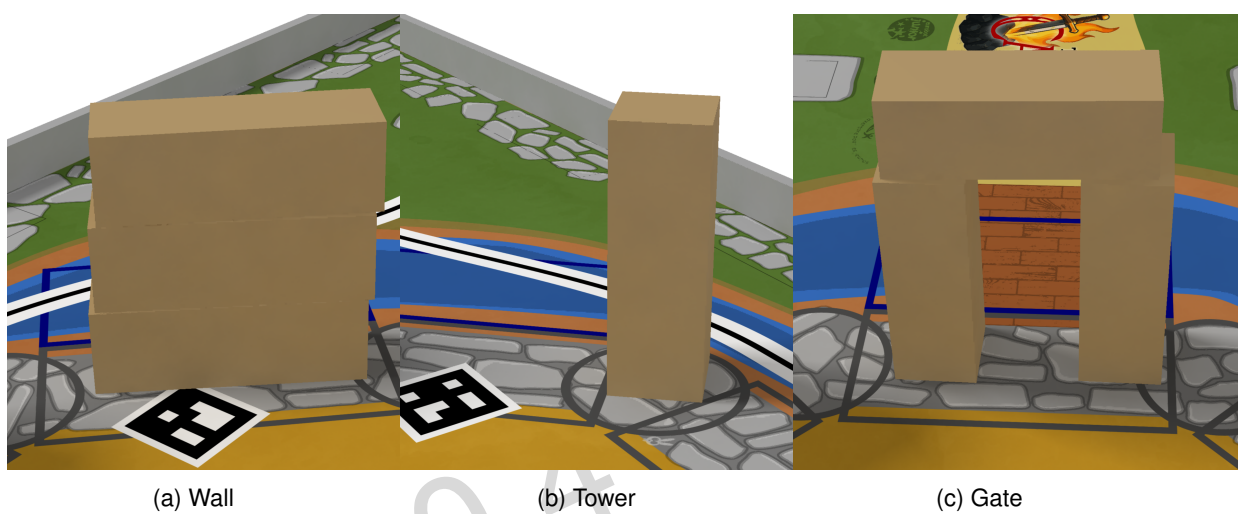


Figure 7: Different types of construction

E.2. I HAVE THE REAL ONE!

We have the Grail! And to show that we have the real one, we're going to show it to the whole world, so that everyone can see that it shines brightly!

E.2.a. DESCRIPTION AND LAYOUT OF THE PLAYING ELEMENTS

This action involves the Grail and the castle.

E.2.b. ACTIONS AND CONSTRAINTS

Actions:

- The team has to put its Grail on its throne some during the preparation time.
- During the match, the team must raise their Grail as high as possible so that everyone can see it.

Constraints:

- During the preparation, the Grail must be placed in the throne room floor, remaining entirely within the designated area and without being under the robot's control.
- The Grail must comply with the same construction constraints as a SIMA.
- During the match, the robot must pick up the Grail and place it on a support (stone, construction or robot). The number of points awarded depends on the altitude of the lowest point of the Grail at the end of the match. The Grail is allowed to exceed the permitted height limit of up to 430mm, but only in construction zones and the castle courtyard, and without blocking any opposing beacons (for seniors).
 - Level 1 corresponds to one stone horizontally (10cm)
 - Level 2 to two stones horizontally (20cm)
 - Level 3 to three stones horizontally or one vertically (30cm)
 - Level 4 to the robot's roof, but free of any actuators and any fixing system (>30cm)
- During all the match, the Grail must stay fully inside the castle area. It will be removed from the table the opposite case.
- A Grail that is still controlled by an actuator at the end of the match will not be counted.

E.2.c. POINTS

- **p5 points** if the Grail is present in the castle.
- **p6 points** per Grail elevation level.

E.3. THE RETURN OF THE KING

Once the construction of his castle was finished, the king returned to court to feast with his valiant knights.

E.3.a. DESCRIPTION AND LAYOUT OF THE PLAYING ELEMENTS

This action involves the robots and the castle courtyard (SIMA are excluded from this action).

E.3.b. ACTIONS AND CONSTRAINTS

Actions:

- At the end of the match the robots must be stopped in their throne room.

Constraints:

- To be considered partially in the zone, the main robot must have a part of its vertical projection in the arrival area.
- To be considered completely in the zone, the main robot must have all of its vertical projection in the arrival area.

E.3.c. POINTS

- **p7 points** if the team's main robot is partially in its own valid area.
- **p8 points** if the team's main robot is completely in its own valid area.

E.4. TO THE ATTACK!

You've learned that another robot claims to be King Arthur, and worse still, it claims to possess the "real" Grail, they're surely French! You can't let this go on; it's time to teach it a lesson... but be careful, you mustn't use anything meaner than a grown rabbit!

E.4.a. DESCRIPTION AND LAYOUT OF THE PLAYING ELEMENTS

This action involves the robot, the SIMAs, the cannonballs, and the opposing castle.

E.4.b. ACTIONS AND CONSTRAINTS

Actions:

- The team can release one or more SIMAs, and ensure that they reach the moat of the opposing castle during the attack phase.
- SIMAs can also attack opposing SIMAs during the attack phase.
- The team can also bombard the opposing castle during the attack phase.

Constraints:

- During preparation, the SIMAs will be placed in the starting area on the table (the stable) and must remain within the boundaries of the area. The colored lines on the vinyl and the edge of the table (on its 22mm thickness) adjacent to the area are part of the starting area.
- During preparation, the cannonballs will be loaded into the robot and the SIMA with a limit of 1 cannonball per SIMA.
- The attack phase is active between the 85th second and the end of the match; any subsequent actions performed outside of this phase will not be counted.
- If a SIMA moves out of the starting zone before the attack phase, it will be removed from the table and will no longer be considered to be in the match.
- A SIMA is validated as being in the zone if all or part of its vertical projection is within a moat of the opposing castle at the end of the match.
- A SIMA is considered to be attacking an opposing SIMA if one of its actuators touches an opposing SIMA at the end of the match. Caution! This actuator must have a distinct color from the rest of the SIMA, must not damage the opposing SIMA, and only this actuator is allowed to touch the opposing SIMA.
- The robot and the SIMA can launch the cannonballs into the opposing castle. A cannonball is considered to be in the zone if all or part of its vertical projection is within the opposing castle's courtyard at the end of the match. It is forbidden to intentionally influence the position or trajectory of the opposing cannonballs.

E.4.c. POINTS

- **p9 points** by moat occupied by the team
- **p10 points** if at least one SIMA attacks an opposing SIMA.
- **p11 points** per cannonball present in the opposing castle.

F. POINTS

ATTENTION PLEASE :

This year, point balancing is not available in the beta version of the rules. We leave it to you to propose your point balances.

The rules for point balancing are as follows:

- Start on a basis of 1, 2 or 5 points for the simplest action.
- Always have a integer number of points.
- Avoid selfish balancing where only the actions you are able to perform have points
- Think of all the teams, from the most experienced to the beginners, so that everyone can score points and not leave the cup frustrated
- As much as possible, have a balance that facilitates the counting of points.
- Only one answer per team, we will select the most recent in case of multiple answers.

You have until October 13 to answer the form, after which we will analyze your answers and weight the planned balancing according to your answers. For this you must go to the following address and complete the online form: www.eurobot.org/balancing_proposal
We will publish the balance with the final version of the rules.

CONSTRUCTION OF THE GLORIOUS CAMELOT!

- **p1 points** per stone placed in a construction zone.
- **p2 points** per wall built.
- **p3 points** per tower built
- **p4 points** per built door

I HAVE THE REAL ONE!

- **p5 points** if the Grail is present in the castle.
- **p6 points** per Grail elevation level.

THE RETURN OF THE KING

- **p7 points** if the team's main robot is partially in its own valid area.
- **p8 points** if the team's main robot is completely in its own valid area.

TO THE ATTACK!

- **p9 points** by moat occupied by the team
- **p10 points** if at least one SIMA attacks an opposing SIMA.
- **p11 points** per cannonball present in the opposing castle.

G. APPENDIX

G.1. GENERAL DRAWINGS

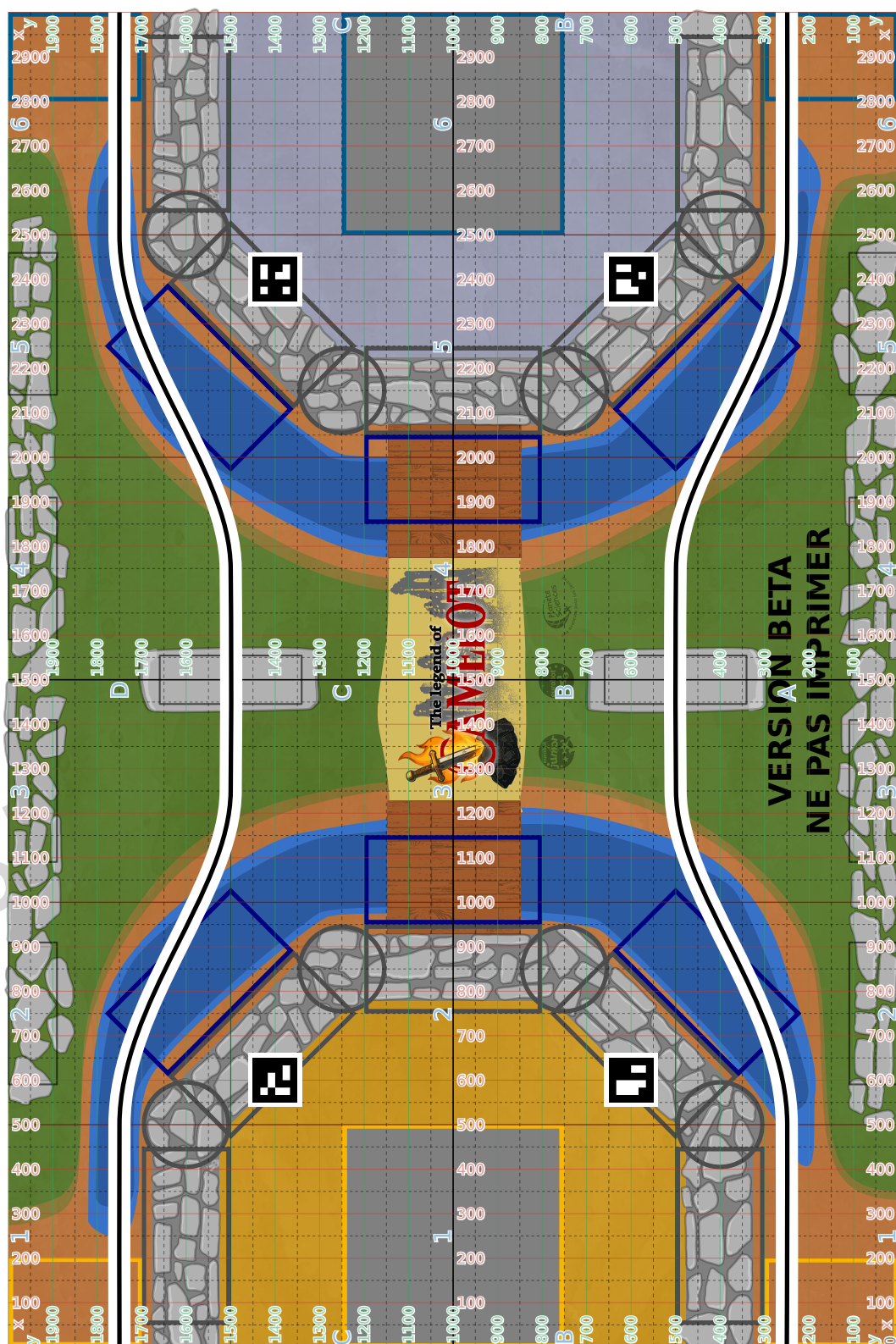


Figure 8: Top view of the playing area.

G.2. MATERIAL REFERENCES

Elements	Material or reference	Comments
Stone	Carton box, 320 mm x 110 mm x 110 mm, density 30 kg/m ³ . Their weight is approximately 90 g.	model BLFA01 of producer RAJA, or equivalent in size.
Cannonball	Foam ball, 45mm in diameter	Magician's ball, compressible
Game floor	Printed monomeric gripping vinyl	Ordering information will be provided by Planète Sciences

The material's density can change from one country to another. It is highly recommended that the teams try different types of materials since the weight may differ significantly.

G.3. COLOUR REFERENCES

Colors	References	CMYK	RGB
Team blue	RAL 5017 Mat	100% , 60% , 0% , 10%	0, 91, 140
Team yellow	RAL 1023 Mat	0% , 25% , 100% , 0%	247, 181, 0
Borders and non-colored elements	RAL 7032 Mat	15% , 10% , 25% , 20%	181, 176, 161

RAL hues can vary from a printed soil mat to another.