

CITYSHAPERSM

BLUEPRINTS

Worksheets for the 2019-20 Season



FIRST® LEGO® League
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Learn the Missions

Instructions:

1. Cut out each each set
 2. Place them on your challenge table next to each mission so that students can learn the mission names, the rules and the point values for each mission

Elevated Places	<p>If the Robot is Supported by the Bridge: 20 → If one or more Flags are clearly raised any distance, only by the Robot: 15 Each Flag <i>You can only get Flag points if you get Bridge points. Rule 31 allowance: It is okay and expected for Robots to collide while trying to earn Flag points.</i></p>
Crane	<p>If the Hooked Blue Unit is → clearly lowered any distance from the Guide Hole: 20 → Independent and Supported by another Blue Unit: 15 and Level 1 is Completely in the Blue Circle: 15</p>
Inspection Drone	<p>If the Inspection Drone is Supported by axle (A) on the Bridge: 10</p>

If the number of Precision Tokens left on the Field is 6: **60 / 5: 45 / 4: 30 / 3: 20 / 2: 10 / 1: 5**

Precision

Design for Wildlife	If the Bat is Supported by branch (B) on the Tree: 10	
Treehouse	If a Unit is Independent and Supported by the Tree's → Large Branches: 10 Each Unit → Small Branches: 15 Each Unit	
Traffic Jam	If the Traffic Jam is lifted, its moving part is Independent, and it is Supported only by its hinges as shown: 10	LOCATION - If there are any Circles with at least one color-matching Unit Completely In, and Flat Down on the Mat: 10 Each Circle HEIGHT - If there are Independent Stacks at least partly in any Circles, add all of their heights together: 5 Each Level
Swing	If the Swing is released: 20	Design & Build

Elevator	If the Elevator's moving parts are Independent, and Supported only by its hinges as shown, in the following position → Blue Car Down: 15 → Balanced: 20	
Safety Factor	If the Test Building is Independent and Supported only by the blue beams, and some beams have been knocked out at least half way: 10 Each Beam	If an Upgrade (solar panels, roof garden, insulation) is Supported only by a Stack which is at least partly in any Circle: 10 Each Upgrade
Steel Construction	If the Steel Structure is standing, and is Independent, and Supported only by its hinges as shown: 20	
Innovative Architecture	If there is a team-designed Structure clearly bigger than a Blue Building Unit, built only from your white LEGO bricks → Completely In any Circle: 15 → partly in any Circle: 10	Sustainability Upgrades

Mission Evaluation Worksheet

Name:

Instructions:

1. For each mission, fill in the information after reading the Missions in the Engineering Notebook. Is it far the Launch area? Are there lines to get there, making it easier to navigate? Are there many missions in the vicinity you might be able to do together? Is the activation of the model hard?
2. Based on the information, select the missions your team should work on
3. Compare with other teammates and come to a consensus as to which missions you would like to try this season
4. Use this information to help you with the Mission Strategy Worksheet.

Mission	Location from Launch Near/Far	Navigation Easy/Hard	Combine with Mission	Activation Method	Other Factors	Points
1 Elevated Places						
2 Crane						
3 Inspection Drone						
4 Design for Wildlife						

Mission Evaluation Worksheet**Name:**

Mission	Location from Launch Near/Far	Navigation Easy/Hard	Combine with Mission	Activation Method	Other Factors	Points
5 Treehouse						
6 Traffic Jam						
7 Swing						
8 Elevator						
9 Safety Factor						

Mission Evaluation Worksheet

Name:

Mission	Location from Launch Near/Far	Navigation Easy/Hard	Combine with Mission	Activation Method	Other Factors	Points
10 Steel Construction						
11 Innovative Architecture						
12 Design & Build						
13 Sustainability Upgrades						

Strategy Planning Worksheet

Name:

Instructions:

1. Take a pen and trace out the path the robot will take each time it leaves the Launch Area (a new pen color for each path)
2. Decide which missions the robot might complete along that part and mark them with a circle
3. Determine the order in which the robot will go on the paths
4. Compare your strategy with others on the team.
5. Come to a consensus

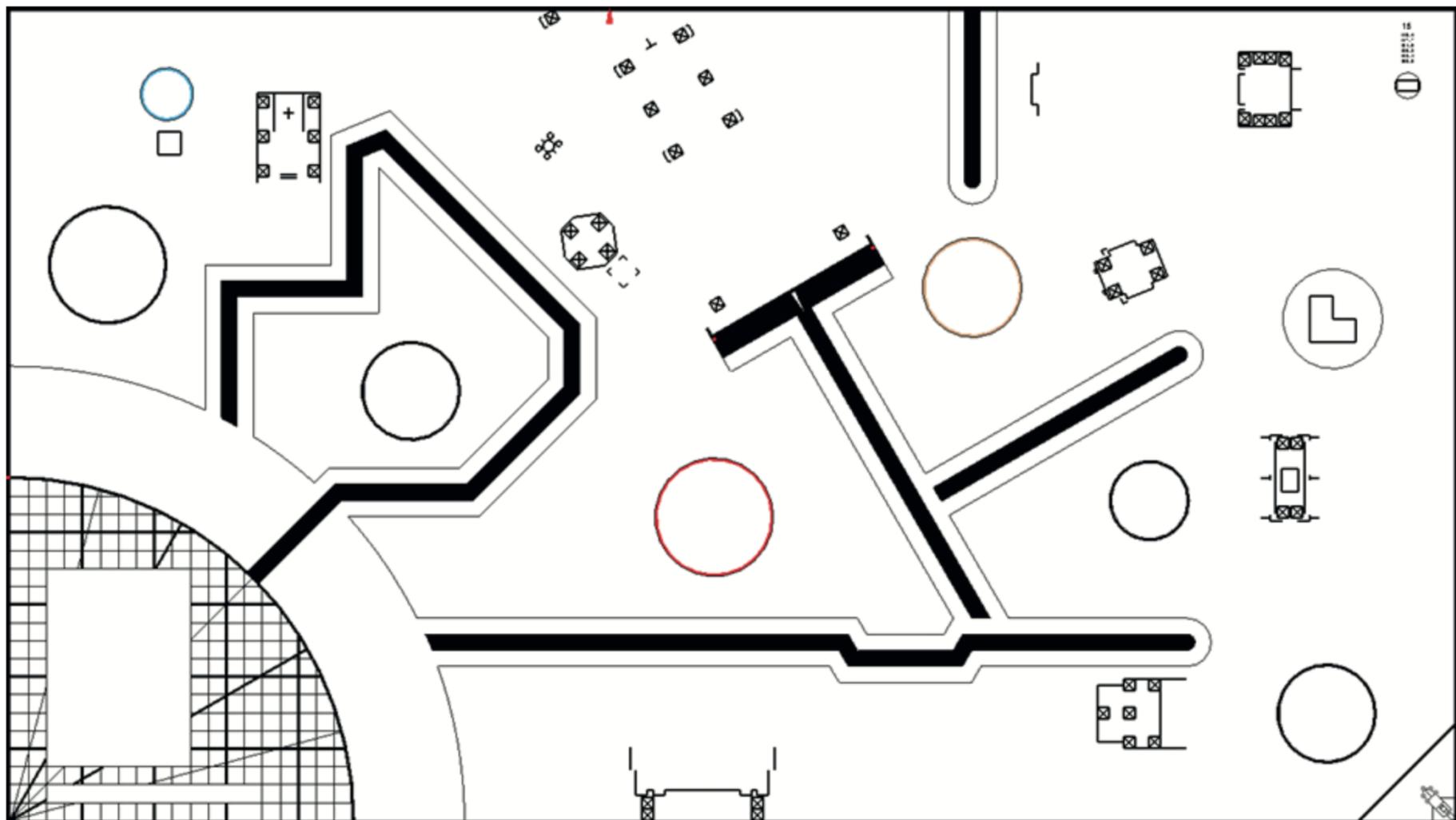


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Robot Design Worksheet

Name:

Instructions:

1. Review the rules for the robot game. Are there any rules that will restrict your design? Is there a size limit? Method of activation that is required?
2. Think about all the missions your team decided to do. Will it need to go over something or reach high up?
3. Think about the paths your team decided to go on. Will it need to line follow? Where will it align?
4. Discuss with the rest of your team and then build a base robot to match the features you want and need.

**What features should
the robot have?**

**What sensors do we
need?**

**What are some
mechanisms that can
solve the mission?**

Robot Testing Worksheet

Name:

Instructions:

1. If you design more than one robot, use this chart to compare them. At the top of each column, describe your robot
2. Come up with some basic tests to compare the robot designs. Can this robot move straight accurately? Can it turn consistently? Can it line follow? Can it detect a line? Did the robot move as intended?
3. Discuss which robot performed the best to help you pick the best design for your team.

	Robot 1: Wheels: Size: Sensors: Motors:	Robot 2: Wheels: Size: Sensors: Motors:	Robot 3: Wheels: Size: Sensors: Motors:
Move Straight 50cm			
Overall: Speed? Balance?			

ATTACHMENT EVOLUTION

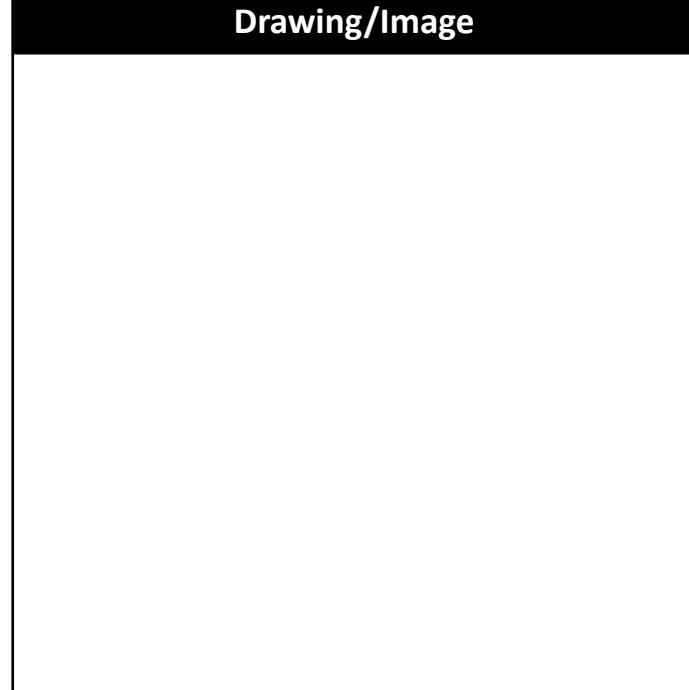
Name:

Date:

Mission Name:

Essential Features of This Version

Drawing/Image



Important Changes Made and Why

Other Notes

Instructions:

1. Time to plan. For each path your team picked to go on, write out the pseudocode for the robot. Once the robot launches, how will it travel to the mission model and activate it? E.g. Move forward 30cm, turn 90 degrees left, etc
2. Write down each step the robot would take in plain English. Later, programmers can convert this into code
3. Add as many rows as needed

Step	Instruction
1	
2	
3	
4	
5	
6	
7	
8	

Pseudocode Worksheet

Name:

Instructions: Read the text below and highlight and key words you think are important to this year's project

CITY SHAPER Project Description:

Architects design and construct buildings. They combine science and art to make buildings and structures for their clients. Sometimes they make new buildings and sometimes they redesign old ones.

They work as part of a larger team, just like yours. Structural, civil and environmental engineers make sure a project suits its site. Construction workers like electricians, plumbers and carpenters, and project managers make sure the job stays on time and within budget. Every role is important to get the job done.

Our cities and towns face big issues, like transportation, accessibility and even natural disasters. How can we shape a better future for everyone? It will take teamwork and imagination. Are you ready to build a better tomorrow together?



**CITY
SHAPER**

In the Innovation Project, your team will:

- Identify a problem with a building or public space in your community.**

Design a solution.
Share your solution with others and then refine it.

Project Selection Worksheet

Name:

Instructions:

1. Read the challenge and project description carefully
2. What problems do you know about related to the topic?
3. What experts can you talk to? What fieldtrips can you go on?
4. Share your ideas with your team members

Project Ideas/Problems

Field Trips

Experts

Project Solution Worksheet

Name:

Instructions:

1. Once your team has picked a problem, think about how to solve it
2. What solutions exist already? How will your solution be different?
3. Can you make a prototype? Can you test the idea?

**What solutions exist
for this problem?**

**Can we solve the
problem in a new or
better way
(easier/cheaper)?**

**How can we test the
idea?**

Innovation Worksheet

Name:

Instructions:

1. Find as many similar products/solutions as you can find and compare them to your team's solution
2. The goal is to gather enough information to be able to explain how the team's solution is innovative (different or an improvement on something that exists). You can share all this information with your judges.

Product/Link	Costs	Implementation Process	Pros	Cons	Other
Our Solution					

Learn the Core Values

Name:

Instructions: Have each student fill in the form

Core Value	Definition	How will our team use this Core Value?
Discovery	<i>We explore new skills and ideas.</i>	1. 2.
Innovation	<i>We use creativity and persistence to solve problems.</i>	1. 2.
Impact	<i>We apply what we learn to improve our world.</i>	1. 2.
Inclusion	<i>We respect each other and embrace our differences.</i>	1. 2.
Teamwork	<i>We are stronger when we work together.</i>	1. 2.
Fun	<i>We enjoy and celebrate what we do!</i>	1. 2.

Other Core Values-Related Concepts

Name:

Instructions: Have each student fill in the form

Core Value	Definition	How will our team use this Concept?
Coopertition	<i>Learning is more important than winning; Team learns from, teaches, and cooperates with each other and competing teams</i>	1. 2.
Gracious Professionalism	<i>Encourage high-quality work, value each other, and respect individuals and the community</i>	1. 2.
Kids Do the Work	<i>Appropriate balance between team responsibility and coach guidance</i>	1. 2.