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Robot Prototyping

Look at the layout of the mat and where the models are. What type of robot would be useful? How wide can the robot be? Are there lines to follow? What sensors would help with navigation (e.g. color/gyro)? Where should the sensors go on the robot? What type of wheels should you use?

Use the pre-season to build different robots and test them. It is okay to start with a basic design that you modify to suit your goals. Document your tests and results.

- [EV3 Base Robot Designs](#)
- [Spike Prime Base Robot Designs](#)
- [Additional Robot Designs](#)
- [Lessons about Wheels/Sensor Placement](#)

Robot Testing

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.

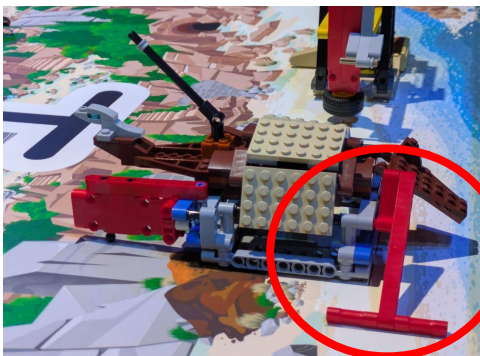
	Robot 1: Wheels: Size: Sensors: Motors:	Robot 2: Wheels: Size: Sensors: Motors:	Robot 3: Wheels: Size: Sensors: Motors:
Move Straight 50cm			
Overall: Speed Balance			

Mechanism Prototyping

Generally, *FIRST* LEGO League missions require similar actions -e.g. pull, push, lift, turn, or drop off. During the off-season, look at videos of past challenges on YouTube to see what actions were needed.

Take a close look at the UNEARTHED [teaser video](#) and watch for how the models are activated. The teaser actually reveals many of the actions that will be needed. Also look at images released. e.g. What do you think the red liftarms/connectors on the different mission models are for?

Learning to build simple mechanisms that might achieve these tasks can help you prepare for any season. A good resource for learning to building mechanisms are books by Isogawa.



- [Books by Yoshihito Isogawa](#)
- [Technic Builder's Guide](#)
- [Pre-Season Building Challenges](#)

How do these and other models move in the [teaser video](#)?



3

Programming Skills

Look at the Challenge Mat again. What skill might be worth learning? Discuss how some of these techniques can help you navigate the Challenge Mat reliably. Some techniques may be more useful than others.

Moving Straight and turning - basic movements needed for any navigation

Moving Until a Line - allows you to know exactly where you are on a mat

Line Following - allows you to traverse long distances and know where you are (there are no long lines in UNEARTHED)

Squaring on a Line - allows you to straighten out to a perpendicular line

Wall Following - allows you to be straight along a wall

Backing into a Wall - allows you to straighten out if you are crooked

You can use whatever is your favorite resource for learning these techniques. There are lessons on FLLTutorials.com, EV3Lessons.com and PrimeLesson.org depending upon what platform you use.

- [SPIKE Prime/Robot Inventor](#)
- [EV3 Lab/EV3 Classroom](#)
- [Pre-Season Navigation Challenges](#)