

# BENEATH THE SURFACE



## Missions and Rules

Make sure to spend some time exploring caves. There is a lot of history of how the caves have been used by humans. The importance for shelter. The search of minerals. Or the habitat of creatures that live in the dark. While it may be hard to use a robot in a cave. I know your team can imagine ways to make the robot work.

*This document is meant to be used in conjunction with other videos and documents for the Beneath the Surface Challenge. Go to the RCX Program website, click on the Beneath the Surface tab for a list of videos and documents. Review the videos and documents before you start. Review the videos and documents for the correct construction and placement of the Mission Objects on the mat: at the start of the Match and at the end of the Match. The videos and documents will show the correct location for how to score each Mission Object.*

## Rule Changes

General Rule changes for this year.

### **Rule 6-2 Robot interaction with Mission Objects on the Mat.**

The robot MAY interact with Mission Objects while the robot is in the Safe Zone.

### **Rule 6-8b Assessing Touch Penalties**

The Referees will take Touch Penalties from WEST to EAST.

### **Board & Mat, Rule 4-2**

“...the Mat should be placed on the Board against the North and ~~East~~ WEST walls first, then fit to the South and ~~West~~ EAST walls, cut if necessary. If the Board is too big for the Mat, leave extra space on the South and ~~West~~ EAST walls. With the Quad Platform in the Northwest corner, the Mat must touch both the North and West walls.

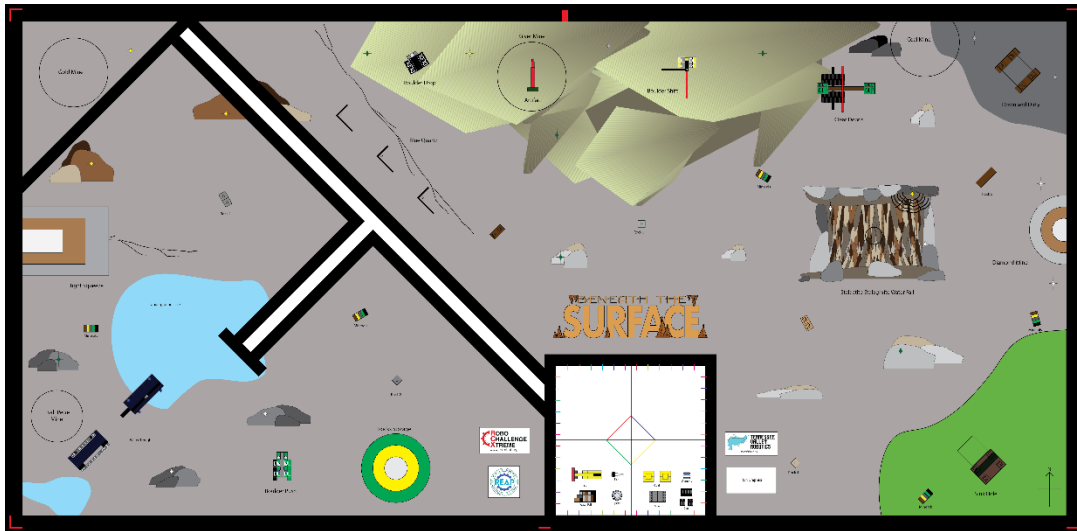




## General Rules Most Often Overlooked

**Rule 7-6** ONLY the robot, attachments, and other devices constructed of LEGOs may be used at Board during the Match. No electronics devices like a phone or tablet. **No paper notes.**

**Rule 7-8** Don't bring a practice mat to the tournament



## Before you start

When discussing with your team how to accomplish the missions make sure to follow the instructions of the missions, individually &/or collectively to achieve the best results for your team. Look for key words in each mission, like: “In”, “On”, “Touch”, “Unite”, and so on. Teach your team to consider these phrases: “Haste makes waste”, “Risk/Reward”, and “Time has value” as they program and handle the robot.

Also, notice how the Mission Objects are constructed. Many of them are constructed “Upside Down” to allow them to move easier.

Practice with your team to make sure all Mission Objects will be placed on the Mat by the Referee. Team members should review the Mat before the Match starts and notify the Referee if any object is not placed on the Mat correctly. ONLY the robot may remove Mission Objects from the Mat.





# The Missions

## Mission Letters

At the end of each Mission you may see these letters listed below. To receive a score for the Mission you will need to place the Mission Object in the manor listed. This is what they mean:

- P: Partially In
- C: Completely In

## Touch Penalties/ Minerals

Each Touch Penalty Mission Object is constructed of a different color. They may be placed on any “Minerals” location on the Mat.

- Minerals located anywhere across the mat **5 Points each**
- Minerals located in the Safe Zone **15 Points each**
- Maximum 75 Points Total**

*Missions are listed in clockwise order, starting from the Safe Zone.*

**Mission 1      Rocks Storage**    Position as many Rocks in the Rock Storage target area. (P,C) **15 Points each**  
**All 5, 90 Total Points**

**Mission 2      Move the Boulders**

- Boulder Push    Push the arm to lower the Blue/Yellow Flap. **30 Points**
- Boulder Drop    Push the arm to drop the Green Flag. **25 Points**
- Boulder Shift    Rotate the arm so that the Green Flag is to the right of the Red Line. **40 Points**

**All 3 Boulders activated 110 Points**

**Mission 3      Water Trough**    Slide the Water Trough Section so that the black arm is under the Water Trough Base.(P,C) **35 Points**

**Mission 4      Heavy Load**    Position the Yellow Cart in the Black Ring at the Salt Petre Mine. (P,C) **30 Points**

**Mission 5      Go Fishing**      Many creatures live in caves. Place the Fish in the Underground Lake. (P,C) **20 Points**

**Mission 6      Tight Squeeze**    Position up to 2 Minifigs in the target area. Each minifig scores separately.

- Partially **Grey 15 Points, Brown 25 Points, White 35 Points**
- Completely **Grey 25 Points, Brown 35 Points, White 45 Points**

**90 Maximum Points**

**Mission 7      Deliver Gold**    Deliver the Gold to the Gold Mine. (P,C)

- Under the Quad, Must TOUCH Mat **25 Points each**
- On top of the Quad, Must TOUCH Platform **40 Points each**
- Robot On top of Quad **90 Points**

**Maximum 170 Points**





**Mission 8 Find the Blue Quartz** The panels will be randomly positioned. Move ONLY the Blue Panel to score. **50 Points**

**Mission 9 Silver Mine** Place the Silver in the ring at the Silver Mine(P,C) **25 Points**

**Mission 10 What's That** Recover the Artifact to the Safe Zone **30 Points**

**Mission 11 Clear Debris** Reposition the roller such that the axle is to the right of the Red Line. Do NOT destroy the Base. **40 Points**

**Mission 12 Coal Mine** Place the Coal in the ring at the Coal Mine. The Large Coal Mission Object may NOT touch the mat. (P,C) **20 Points each**  
**All 3 Coal Pieces 70 Points**

**Mission 13 Down & Dirty** Have a minifig crawl under the platform. (P,C) **25 Points**  
Have a minifig climb the platform by placing the it on top of the platform. (P,C) **40 Points**  
**Maximum 65 Points**

**Mission 14 Is that a Water Fall?** The formation of Stalactites & Stalagmites looks like a waterfall. Position the Water Fall over the Black Ring. (P,C) **20 Points**

**Mission 15 Look on the Ceiling** Many insects live in a cave. Position the Spider on the Spider Web. (P,C) **20 Points**

**Mission 16 Shiny Rock** Place the Diamond in the Target Area. (P,C) **Grey 15 Points, Brown 20 Points, White 30 Points**

**Mission 17 Be careful** Make sure not to fall in the hole. Lower the Sink Hole base arm, so that the flowers touch the mat. **30 Points**



**Total Challenge Points**

**1000 Points**



*Remember, the Referee will score the Match when the clock goes to "0:00" or the Team calls "Time". Actions of the robot may place a Mission Object in a "Scoring Position" while the clock is running. Subsequent action of the robot may change the Mission Object's location, causing the Mission Object to be moved to a "Non-Scoring Position". The Referee will score the Mission Objects in their position at the end of the Match. Touch Penalties are the only action the Referee will take during the Match.*

