Hydro Dynamics
Robot Game
What’s Allowed

• 1 EV3, RCX or Controller

• 4 Motors
What’s Allowed

As many of the following external sensors as you like:

- EV3 TOUCH
- EV3 COLOR
- EV3 ULTRASONIC
- EV3 GYRO/ANGLE
- NXT TOUCH
- NXT LIGHT
- NXT COLOR
- NXT ULTRASONIC
- RCX TOUCH
- RCX LIGHT
- RCX ROTATION
What’s Allowed

• Regular LEGO Elements (non-electric)

MINDSTORMS® /TECHNIC/DUPLO®/BIONICLE™/STAR WARS™/ HARRY POTTER™/etc
What’s not allowed

• Modified parts

• Purchased pull-back and go motors

• Purchased wind-up motors

• Power-functions

• Glue, tape, oil, paint, etc.

• 5\textsuperscript{th} motor (In the Competition Area)
A Few Exceptions

• **Exception 1:** You may reference a paper list to keep track of robot programs.

• **Exception 2:** LEGO string and tubing may be cut to length.

• **Exception 3:** Marker may be used only in hidden areas, for ownership identification.

• **Exception 4:** Carts, trays, and boxes may be used for carrying and storing your equipment, off the table only.
Software and Awards

• Software – The robot may only be programmed using LEGO MINDSTORMS, RoboLab, NXT-G or EV3 software (any release)

• No other software is allowed

• If your team is in violation, they will not be allowed to compete.
Changes for 2017

- The word “objects” has been replaced with the word “things” for parallelism with the term “anything.”

- If you interrupt the Robot while it’s transporting a Mission Model that came from Base during the most recent Launch, you may keep that model.

- Maximum Equipment height UPON LAUNCH is now limited (12 inches).
Missions
Pipe Removal

Move the Broken Pipe so it is completely in Base.

Points

20
Completely in Base
Flow

Move a Big Water (one time maximum) to the other team’s field only by turning the Pump System’s valve(s).

Points

15
Pump Addition

Move the Pump Addition so it has contact with the mat and that contact is completely in the Pump Addition target.

20 Points
Rain

Make at least one Rain come out of the Rain Cloud.

Points

20
Filter

Move the Filter north until the lock latch drops.

Points

30
Water Treatment

Make the Water Treatment model eject its Big Water and sludge

- Only by moving the Toilet’s lever

Points

20
Fountain

Make the Fountain’s middle layer rise some obvious height and stay there, due only to a Big Water in the gray tub.
Manhole Covers

Flip Manhole cover(s) over, obviously past vertical
*without it/them ever reaching Base

**Points**
- 15 each
  - Flip manhole covers

**Points**
- 30 added
  - WITH BOTH covers completely in separate Tripod targets

**FOR BONUS:** Score 30 Manhole Cover points as described above. WITH both covers completely in separate Tripod targets. 30 Points Added

**Bonus Added**

**No Bonus**
Tripod

Move the inspection camera Tripod so it is

- **FOR PARTIAL SCORE:** partly in either Tripod target, with all of its feet touching the mat.
- **FOR FULL SCORE:** completely in either Tripod target, with all of its feet touching the mat.

**Points**

**PARTIAL**

15
Partial

**FULL**

20
Full
Pipe Replacement

(Install the Optional Loop first, in Base, if you wish.)
Move a New Pipe so it is where the broken one started, in full/flat contact with the mat.
Pipe Construction

(Install the Optional Loop first, in Base, if you wish.) Move a New Pipe so it is

- **FOR PARTIAL SCORE**: partly in its target, in full/flat contact with the mat.
- **FOR FULL SCORE**: completely in its target, in full/flat contact with the mat.

**Points**

- Partial: 15 Points
- Full: 20 Points
Sludge

Move the Sludge so it is touching the visible wood of any of the six drawn garden boxes.

Points

30

Score

Score

No Score
Make the Flower raise some obvious height and stay there, due only to a Big Water in the brown pot.

- **FOR BONUS:** Score Flower Points as described above WITH at least one Rain in the purple part, touching nothing but the Flower model.
Water Well

Move the Water Well so it has contact with the mat and that contact is

- **FOR PARTIAL SCORE:** partly in the Water Well target.
- **FOR FULL SCORE:** completely in the Water Well target.
Fire

Make the fire drop *only by making the Firetruck apply direct force to the House’s lever.

Points
25
Water Collection (part 1)

Move or catch Big Water and/or Rain water (one Rain maximum; no Dirty Water) so it is touching the mat in the Water Target, *without the target ever reaching the white Off-Limits Line shown below. Water may be touching the target, and/or other water, but not be touching nor guided by anything else. Each water model is scored as an individual. At least one Rain:

- Off-limits line extends all the way North/South including under ramps: No Score
- Score: Two Big Water and at Least one Rain
- No Score
Water Collection (part 2)

Score: Two Big Water

Score: One Big Water

Score: At least one Rain

Score: Two Big Water

Points: 10 At least one Rain

Points: 10 EACH Big Water
FOR BONUS: Score at least one Big Water in its target as described above WITH one on top, which is touching nothing but other water.
Slingshot (Part 1)

Move the SlingShot so it is completely in its target.

Points

20

Score

Score

No Score
FOR BONUS: Score SlingShot points as described above WITH the Dirty Water and a Rain completely in the SlingShot target.

15 Points
Faucet

Make the water level obviously more blue than white as seen from above the cup, *only by turning the Faucet handle.

Score

Score

No Score

No Score

Points

25
Penalties

**Interruption Penalty** – Caused by you interrupting the Robot while it is not completely in Safety

Before the match starts, the Ref removes the six red Penalty discs from the Field, and holds on to them. If you Interrupt the Robot, the Ref places one of the removed Samples in the white triangle, in the southeast, as a permanent untouchable Interruption Penalty. You can get up to six such penalties, worth 5 Points EACH
Questions???