## 2020 SeaPerch Challenge Competition Classes and Design Rules

### Rules

<table>
<thead>
<tr>
<th>Rules</th>
<th>Middle School Stock Class</th>
<th>High School Stock Class</th>
<th>Open Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PVC Division</td>
<td>Other Materials Division</td>
<td>PVC Division</td>
</tr>
</tbody>
</table>

### BUDGET*

The total cost of modifications to the final ROV must be $25 or less

- Middle School Stock Class: X
- High School Stock Class: X
- Open Class: X

The cost of modifications may exceed $25

- Middle School Stock Class: X
- High School Stock Class: X
- Open Class: X

### MATERIALS

- Frame built using only PVC, CPVC, PEX pipe and fittings.
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- Attachments and non-frame parts made from various materials but may not include 3D printed or additive manufactured parts.
  - Middle School Stock Class: X
  - High School Stock Class: X

- Frame and other parts may include 3D printed or additive manufactured parts as well as other materials.
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- Parts may be made using CNC machinery.
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

### POWER SUPPLY

- Must design for and utilize a 12-volt power source
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- May utilize a second power source (no more than 12-volts) to power auxiliary equipment
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

### MOTORS

- Must include waterproofed motors
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- Must use ONLY stock SeaPerch motors (Jameco Electronics 232022) for propulsion**
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- Additional non-stock motors may be used for non-propulsion uses
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X

- May include more than 3 thrusters (i.e. Motor and propeller assembly)
  - Middle School Stock Class: X
  - High School Stock Class: X
  - Open Class: X
## 2020 SeaPerch Challenge Competition Classes and Design Rules

<table>
<thead>
<tr>
<th>CONTROLLERS</th>
<th>X</th>
<th>X</th>
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</tr>
</thead>
<tbody>
<tr>
<td>May only use simple on/off switches for thruster controls</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>May use power conditioning or pulse-width modulation (PWM) controls for thruster controls</td>
<td>X</td>
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<tr>
<td>May use microcontrollers such as Arduino or Raspberry Pi for thruster controls</td>
<td>X</td>
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<tr>
<td>May use PWM, microcontrollers, or other devices for non-thruster controls</td>
<td>X</td>
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<tr>
<td>May use a fixed or variable resistor to reduce voltage</td>
<td>X</td>
<td>X</td>
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</table>

<table>
<thead>
<tr>
<th>STRUCTURE/SIZE</th>
<th>X</th>
<th>X</th>
<th>X</th>
<th>X</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Must fit through 18” diameter hoop</td>
<td>X</td>
<td>X</td>
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</table>

<table>
<thead>
<tr>
<th>COMPETITION CRITERIA</th>
<th>X</th>
<th>X</th>
<th>X</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ROV must not be modified after compliance check (with the exception of buoyancy)</td>
<td>X</td>
<td>X</td>
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<tr>
<td>The same ROV must be used for both pool events</td>
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<td>X</td>
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<tr>
<td>Team includes a student in 9th grade or above</td>
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<td>X</td>
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</tbody>
</table>

*Budget Guidelines include:

- Donated material will be assessed at what the cost would be to procure the material.
- Spare parts and tools are not included in this budget.
- Materials used on earlier prototypes are not included in this budget. Only materials and supplies used on the competition ROV and controllers that are not part of the standard SeaPerch ROV kit should be included.
- Proof of budget compliance should be made available to the judges upon request.
- 3D printed parts will be costed out at $0.05 per gram.

** Thrusters used for propulsion are thrusters that directly exert force against the water causing the ROV to move in any direction.