## Choice Board: Centres Preparation

### Materials
- Sticky notes
- Individual or partner copies of Appendices B, C, D, and E
- Blank paper, graph paper, isometric paper
- Fasteners: masking tape, brass fasteners and hole punches, Plasticine, mini marshmallows, glue and/or glue guns
- Newspaper, corrugated cardboard
- Cylindrical materials such as paper towel rolls, empty soft drink cans, straws, rolled newspaper
- Deck of cards, Popsicle sticks, long pasta such as linguine, toothpicks
- String, yarn
- K’Nex®, Lego®
- Fan to generate wind

### Optional Materials
- Jinks wood, coloured sticks
- Hot glue sticks
- Gussets

### Optional Equipment
- Glue guns
- Power bars
- Coping saw
- Mitre box
- Spring scale to measure tension forces in newtons

### Notes:
- Remind students that the structure has to endure a number of forces and that it should not be pushed to failure early in the investigation. Students should be encouraged to test each type of force. Should a structure fail, coach students to rebuild and refine their structure to continue testing.
- Store materials in small labeled baskets or boxes in order to simplify the material selection process.
- Be prepared to coach students on choosing materials that complement each other (e.g., mini marshmallows are not suitable fasteners for Popsicle sticks).
- The Internet can be a source of videos and other information that illustrates the effects of natural forces on structures. The following is provided as an example: Galloping Gertie—Tacoma Narrows Bridge, http://en.wikipedia.org/wiki/Tacoma_Narrows_Bridge
- Recommended next step: Specific Expectation 3.6 (Science and Technology Curriculum Policy—Grade 7): Identify and describe factors that can cause a structure to fail (e.g., bad design, faulty construction, foundation failure, extraordinary loads).
SAMPLE ASSESSMENT CHECKLIST: INVESTIGATING THE EFFECTS OF FORCES ON STRUCTURES

Name: _____________________________________________

<table>
<thead>
<tr>
<th>Category/Criteria</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Knowledge and Understanding</strong></td>
<td></td>
</tr>
<tr>
<td>The student:</td>
<td></td>
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<tr>
<td>Accurately identifies six forces</td>
<td></td>
</tr>
<tr>
<td>Accurately describes the effects of various forces on structures</td>
<td></td>
</tr>
<tr>
<td><strong>Thinking and Investigation</strong></td>
<td></td>
</tr>
<tr>
<td>The student:</td>
<td></td>
</tr>
<tr>
<td>Designs a “testable” structure</td>
<td></td>
</tr>
<tr>
<td>Sketches the structure so that:</td>
<td></td>
</tr>
<tr>
<td>• Parts are accurately labeled</td>
<td></td>
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<tr>
<td>• Approximate measurements are given</td>
<td></td>
</tr>
<tr>
<td>• Materials are listed accurately</td>
<td></td>
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<tr>
<td>• Materials are justified</td>
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<tr>
<td>Pre-tests the structure and modifies as necessary</td>
<td></td>
</tr>
<tr>
<td>Tests the structure and records relevant observations</td>
<td></td>
</tr>
<tr>
<td><strong>Communication</strong></td>
<td></td>
</tr>
<tr>
<td>The student:</td>
<td></td>
</tr>
<tr>
<td>Records observations clearly and accurately during testing</td>
<td></td>
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<tr>
<td>Shares understanding through discussion and product development using appropriate scientific terminology</td>
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</table>
CHOICE BOARD: INVESTIGATING THE EFFECTS OF FORCES ON STRUCTURES

A

Chair
- Rolled newspaper
- Popsicle sticks
- K’nex® and/or Lego®

Tower
- Toothpicks and marshmallows/Plasticine
- Pasta or paper towel rolls
- K’nex® and/or Lego®

House
- Deck of cards
- Cardboard and glue
- K’nex® and/or Lego®

Bridge
- Straws and Plasticine
- Popsicle sticks or pasta
- K’nex® and/or Lego®

B

Statue
- Materials of your choice

Bed
- Materials of your choice

Bicycle
- Materials of your choice

Your Idea
- Materials of your choice (Check with the teacher)
INSTRUCTIONS: INVESTIGATING THE EFFECTS OF FORCES ON STRUCTURES

You will be testing six forces.

Build your structure.
Pre-test a few of the forces.
Modify the design of your structure so that it will withstand all six of the forces during your test.

To simulate:

Wind: Use a fan
Earthquake: Shake the desk (earthquakes destabilize a structure and can change the way the force of gravity affects it)
Compression: Place weights, such as books, on the structure
Tension: Support the base of the structure and pull on the other end
Shear: Support the base of the structure and push on the upper side
Torsion: Support the base of the structure and twist the other end

Record your observations on the Observation Chart (Appendix E).
**OBSERVATION CHART: INVESTIGATING THE EFFECTS OF FORCES ON STRUCTURES**

Record all observations below. Choose any of the following forms of note taking:

1. Outline—point form text
2. Images and point form text
3. Web
4. Other—check with your teacher

<table>
<thead>
<tr>
<th>Tension</th>
<th>Compression</th>
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<tbody>
<tr>
<td></td>
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</table>
## Observation Chart: Investigating the Effects of Forces on Structures

**Name:**

<table>
<thead>
<tr>
<th>Shear</th>
<th>Torision (Torsion)</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wind</th>
<th>Earthquake/Gravity</th>
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<tbody>
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</table>