## Forces and structures: Build a structure.

NAME: $\qquad$ BLOCK: $\qquad$
You have been hired to build a structure that can carry an increasing number of SciencePower 7 textbooks without changing shape for over a minute at a time. It needs to be a light structure and it will be weighed on a scale. It must be portable and sturdy so it can be used in the classroom. The higher the structure, the better, and the company wants the books lifted as high as possible. They want the books lifted at least three inches from the base of the structure.

At its base, it can be no larger than 30 cm by 30 cm . You are permitted to use anything you wish for its base, as long as you can bring it with you to school on the day that it is due.

There's a catch: you cannot spend more than $\$ 1500$ on your structure.
You will be judged during a competition on March 27 (7A) and 26 (7B).

## Your materials and their prices:

| Structural material | Used for |  |
| :--- | :--- | :--- |
| Drinking Straw | Frame | \$100 each |
| Toothpick | Frame | \$10 each |
| Small Marshmallow | Adhesive | $\$ 10$ each |
| White slow-setting glue | Adhesive | $\$ 5 /$ connection (dots only) |
| Hot glue-gun glue | Adhesive | $\$ 100 /$ connection (dots only) |
| Card paper | Shell | $\$ 10 / \mathrm{sq} \mathrm{cm}$ |
| Corrugated cardboard | Composite | $\$ 40 / \mathrm{sq} \mathrm{cm}$ |
| White School Eraser | Mass | $\$ 100$ each |
| Tongue depressor or popsicle stick | Frame or shell | $\$ 50$ each |
| Knitting yarn | Frame | $\$ 10 / 30 \mathrm{~cm}$ |
| Plastic, clear tape | Adhesive | $\$ 10 / \mathrm{cm}$ |
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What will you use in your structure? (use pencil)

| Structural material | Amount/length/sq cm |  |
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|  |  | Total for your structure |
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## Your Structural design:

What do you want your structure to look like?

| Top view: | Side view |
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| Front view: | Angled view |
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## Building your structure: shapes and forms

If you want to build the structure cheaply and safely, you will need to do it a few days ahead. You will want to build your frames and test them before you put the structure together as a whole. You will want to give time for your adhesives to set, paints to dry, and structure to settle.

Please draw each of the necessary shapes/forms for your structure. See pages 426, 398, and 392-393 in SciencePower 7 to see examples of how to draw different parts of a structure. Be sure to label the materials you plan to use, the direction of the load you want each part to carry, and the size/length of each part in centimetres (cm).

Shapes, forms, and frames in my structure:

After you build your structure

1. What was the greatest challenge in building your structure?
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2. What didn't work out the way you expected it to?
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3. What would have made your structure better, or more efficient?
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4. What hard choices did you have to make?
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5. Why do you think your structure succeeded, or failed?
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