Forces, Loads, Materials, Shapes
Student Activity Handout

Name: _____
Date: _____

LINK: http://www.pbs.org/wgbh/buildingbig/lab/forces.html

_____
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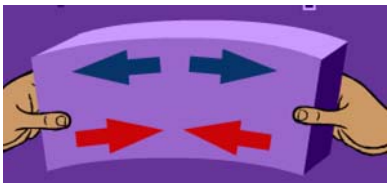
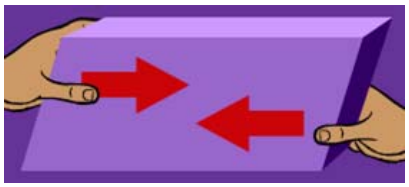
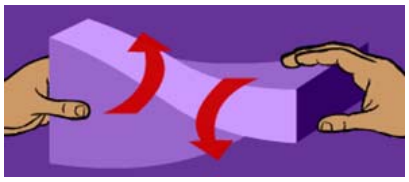
FORCES [12 marks]

Use the FORCES section to complete the table below by filling in the empty boxes.
Important: For the last column (the examples) look at the examples in each section by choosing SEE IT IN REAL LIFE
Then think of an example of the force in everyday life and write it down.

Action	Name of Force	What does the force do?	What does it look like? (Draw the force in action!)	Example of the force in action!
Squeezing	Compression	Squeezes material together.		
Stretching		Stretches material apart.		
Bending		When a straight material becomes curved, one side squeezes together and the other side stretches apart.		
Sliding		Sliding two materials past one another in opposite direction.		
Twisting				

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LOADS [15 marks]

1. **What are loads? [1 mark]**

_____

2. **What is the dead load? Give an example of what a dead load would include. [2 marks]**

_____

_____

3. **What is the live load? Give an example of what a live load would include. [2 marks]**

_____

_____

4. **A library is built from concrete walls and will hold a collection of children's books. Identify the dead load and live load in this example. [2 marks]**

_____

5. **Complete the table below. [8 marks]**

What is the load called?	Force acting on the structure	Description of the load	Preventing the load from occurring
Settlement load			**Deep piles** (heavy concrete pillars) to support the structure
	Temperature	Shrinking or expanding due to changes in temperature	**Roller joints** (inserts into building material to allow it to expand or contract)
Earthquake load		Push and pull in a horizontal direction	**Shear walls** (walls of concrete reinforced with steel beams)
Wind load	Wind		
	Vibration	A load that changes over time	

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MATERIALS [9 marks]

1. **Why is it important to take into account the direction of the fibers when building with wood? [1 mark]**

_____

_____

2. **Why are circus tents made from plastic? [2 marks]**

_____

_____

3. **Aluminum is a building material that when combined with magnesium and copper (both metals) is almost as strong as steel. What do we call materials that are a combination of metals? [1 mark]**

_____

4. **Why is brick not used in building modern structures (excluding houses)? [1 mark]**

_____

5. **What is the difference between concrete and reinforced concrete? [1 mark]**

_____

6. **Which force is significantly improved by using reinforced concrete versus concrete? [1 mark]**

_____

7. **Cast iron can be molded to any shape but is not used as a modern day building material, why? [1 mark]**

_____

8. **Which material is stronger than any other in <u>both</u> compression and tension? [1 mark]**

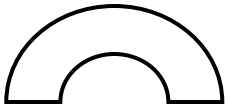
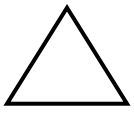
_____

SHAPES [6 marks]

1. **Compare the structural strength of the three shapes by using the slider on the right side to add and remove weight. Draw the shapes below in the order of greatest structural strength to least structural strength. [3 marks]** *<u>Note:</u> Move to slider to the very bottom to return to the introductory screen*

Greatest amount of strength	**Moderate amount of strength**	**Least amount of strength**

2. **Select each of the shapes to learn more about them. Complete the table below. [3 marks]**

		
Add a brace for support	**Add buttresses for support**	**Circle the strongest point**