

Name: _____

Date: _____

MATERIAL PROPERTIES

There are many different materials in the world, and a lot of them can be used to build structures. However, not every material is appropriate for every job. A beautiful cottage can be made out of logs, but a sports stadium made from logs would not be as successful. High jump crash mats are made from foam and plastic. The high-jumper would not be as willing to compete if it were made from cement and steel.

Materials are chosen for each individual job based on their properties. When choosing a material, one must consider:

- Do I need something that is heavy or light?
- Do I want it to maintain its shape, or be flexible?
- Does it need to last a long time, or will it have a short life?
- How will it fit in its environment?

Explain why the object listed is made out of the material indicated.

Object	Material	Reason
Shoe Sole	Rubber	<i>flexible, cushioning</i>
Support Beams	Metal	<i>strong, rigid</i>
Mixing Spoon	Plastic	<i>light, does not conduct heat</i>
Baseball Bat	Wood	<i>strong, light</i>

What properties need to be considered when making a ...

Diving Board *Needs to be flexible, but strong. Needs to not be slippery. ...etc*

Cooler *Needs to keep heat out. Needs to be lightweight. ...etc*

Tire *Needs to have good grip, needs to resist being popped. ...etc*

Backpack *Needs to be light. Needs to be soft (comfortable). ...etc*

In Canada we have a very unique climate. As everyone knows, our winters are very cold and we get a lot of really heavy snow. However, our summers can get very hot, meaning that through the year our temperatures change by upwards of 50 degrees!

In other countries, that are hotter than Canada, they do not have the extreme colds that we do. So, even though they reach a higher temperature, the difference between winter and summer is very small. Many of these warmer countries also have to deal with extreme winds from hurricanes and tropical storms.

As temperatures rise, materials expand. As the temperature decrease, so does the size of the material. With this knowledge, and the information in the paragraphs above, explain some of the considerations that you would need to make when building the roof of a house in both Canada and a tropical country. Use the following points as a guideline for your discussion:

- What material properties would you need to think about?
- What would be different about the forces acting on the roof?
- Would the shape be the same or different?

When building a house in Canada one needs to think about the affects the weather will have on the structure. The snow will cause a lot of force on the roof supports, meaning that you must choose a material that can resist a large load. Another consideration that must be considered is that with a large temperature change, the materials will shift quite a lot due to the fact that they will expand and contract. A material that is does not expand much, or can flex to handle the stress would be necessary. A triangular roof is a common shape to help handle the forces.

A tropical roof does not have the forces (no snow), meaning they can make flat roofs with weaker materials. However the high winds could cause the materials to blow off, or become damaged. Materials that flex with the wind would be less likely to damage. The other option is to choose fasteners that hold the materials in such a way that the winds can not damage them.