

Activity 1



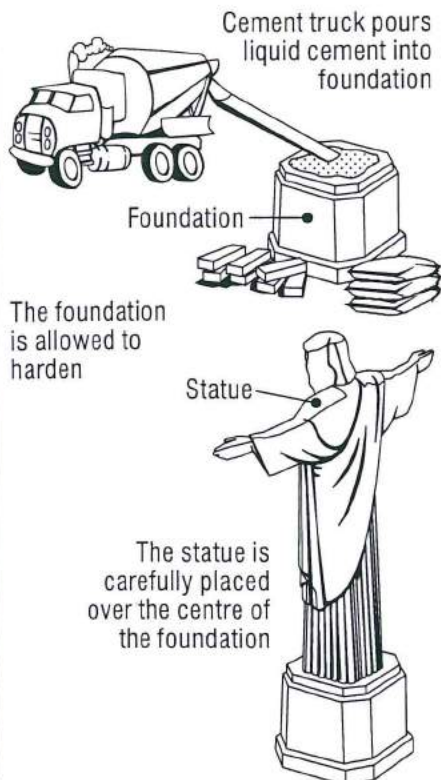
Grade 7 Science and Technology Structural Strength and Stability

Types of Structures (page 2)

Solid (or Mass) Structures

- solid structures are usually composed of only one part;
- solid structures contain no hollow spaces;
- solid structures may be solid like a hockey puck;
- one of the main uses of solid structures is for foundations (see example below);
- solid structures, like poured concrete foundations, are very good at resisting forces of compression, but are poor at resisting forces of tension;
- poured concrete that is reinforced with steel wires is able to resist the forces of compression and tension;
- solid structures are very heavy.

Example: Poured Concrete Foundation for a heavy statue



Frame Structures

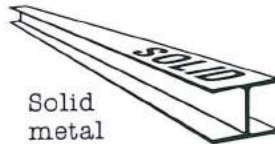
- frame structures are usually composed of many parts that form a skeleton;
- the skeleton is fastened together to support the load;
- the supports in the skeleton are very strong ~ the supports may be hollow or solid;
- a bicycle frame is a frame structure with hollow supports;



Hollow metal tube



- the Eiffel Tower is an example of a frame structure with solid supports;



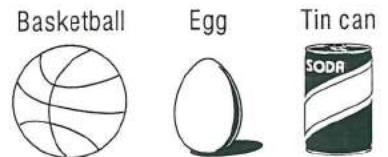
Solid metal I-Beam



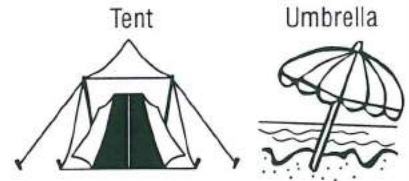
- one of the main uses of frame structures is in the construction industry (e.g., houses, schools, high rise buildings);
- frame structures are very good at resisting forces of tension and torsion;
- frame structures are usually lighter than solid structures.

Shell Structures

- shell structures are usually composed of only one part; a thin, carefully shaped outer layer or skin;
- shell structures usually have a hollow interior;
- examples of shell structures composed of only one part:



- examples of frame-shell structures composed of more than one part:



- the shape of the outer layer gives the structure strength;
- rounded shell structures (egg) are usually stronger than flat shell structures (box);
- the main use of shell structures is for protection (e.g., cardboard carton protects eggs from breaking) and as containers [e.g. cans];
- shell structures are good at resisting gradual, not sudden forces of compression;
- shell structures are usually lighter than frame structures.

Activity 1

Applying
the
Facts



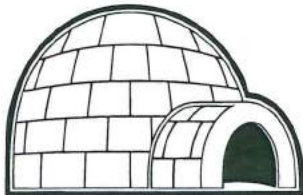
Grade 7 Science and Technology

Structural Strength & Stability

Classification Activity (page 3)

Instructions: Use page 2 to identify each type of structure in the diagrams below.

1 Igloo



Structure: _____

5 Seattle Kingdome



Structure: _____

9 Pyramids



Pyramids without secret inner chambers

Structure: _____

13 Aluminum can



Structure: _____

2 Hammer



Structure: _____

6 Water glass



Structure: _____

10 Deck chair



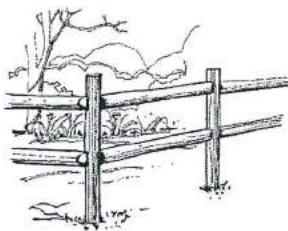
Structure: _____

14 Snow sculpture



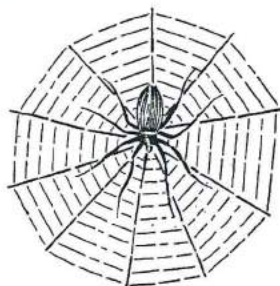
Structure: _____

3 Fence



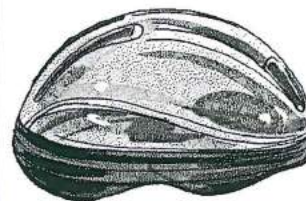
Structure: _____

7 Spider's Web



Structure: _____

11 Bicycle Helmet



Structure: _____

15 Rock Monument



Structure: _____

4 Milk carton



Structure: _____

8 Garden Trellis



Structure: _____

12 Wooden Bats



Structure: _____

16 Aluminum ladder



Structure: _____

Activity 1

Applying
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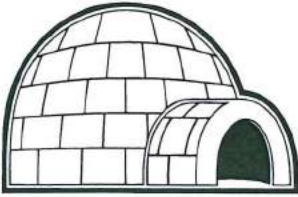


Grade 7 Science and Technology Structural Strength & Stability

Classification Activity Teacher's Answers (page 4)

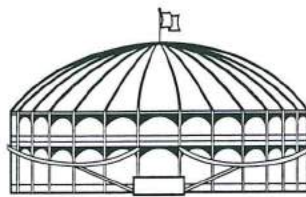
Instructions: Use page 2 to identify each type of structure in the diagrams below.

1 Igloo



Structure: **Shell**

5 Seattle Kingdome



Structure: **Frame**

9 Pyramids



Pyramids without secret inner chambers

Structure: **Solid**

13 Aluminum can



Structure: **Shell**

2 Hammer



Structure: **Solid**

6 Water glass



Structure: **Shell**

10 Deck chair



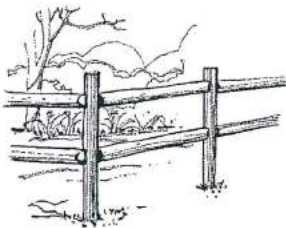
Structure: **Frame**

14 Snow sculpture



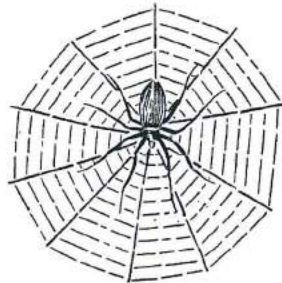
Structure: **Solid**

3 Fence



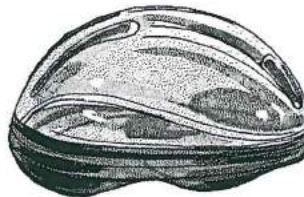
Structure: **Frame**

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Structure: **Shell**

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Structure: **Solid**

4 Milk carton



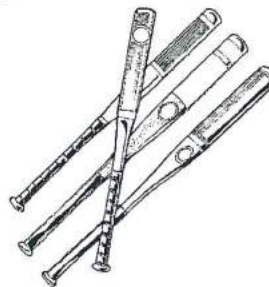
Structure: **Shell**

8 Garden Trellis



Structure: **Frame**

12 Wooden Bats



Structure: **Solid**

16 Aluminum ladder



Structure: **Frame**