



GET Term 2 Take Home Package

Technology

Grade 7

Take Home Resource Pack: Technology: Grade 7 Term 2

Structures

Anything that **holds** something (coffee in a cup), **protects** something (eggs in an egg box), **supports** something (you seated on a chair), or **spans** a space between two objects (bridge across a railway line) is known as a structure

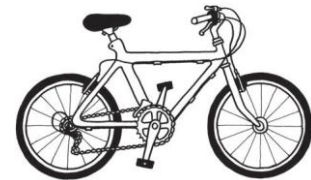
1. **Made structures** are made by people: a house, a tower, a chair etc.
2. **Natural structures** are found in nature: a bird's nests, seashells, rocks etc

Three types of structures:

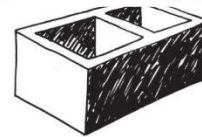
- a. **Shell structures:** Contain or hold and protect things. The strength of a shell structure is in the outside shell
EXAMPLES: Balls, mugs, eggs, pots, shopping bags



- b. **Frame structures:** A frame structure consists of different parts that are combined to make the structure strong.
EXAMPLES: ladder, bicycle, spiderwebs



- c. **Solid structures:** Made of solid material. They do not consist of different parts with open spaces between them.
EXAMPLES: bricks, stones, erasers



- d. **Combined structures:** A house is a good example of a structure that is a combination of shell, frame and solid structures. The bricks, roof tiles or roof sheets are all **solid** structures. The different rooms of the house is a **shell** structure. The framework on which the roof tiles or sheets rest are called roof trusses and are **frame** structures

Strengthening Frame Structures

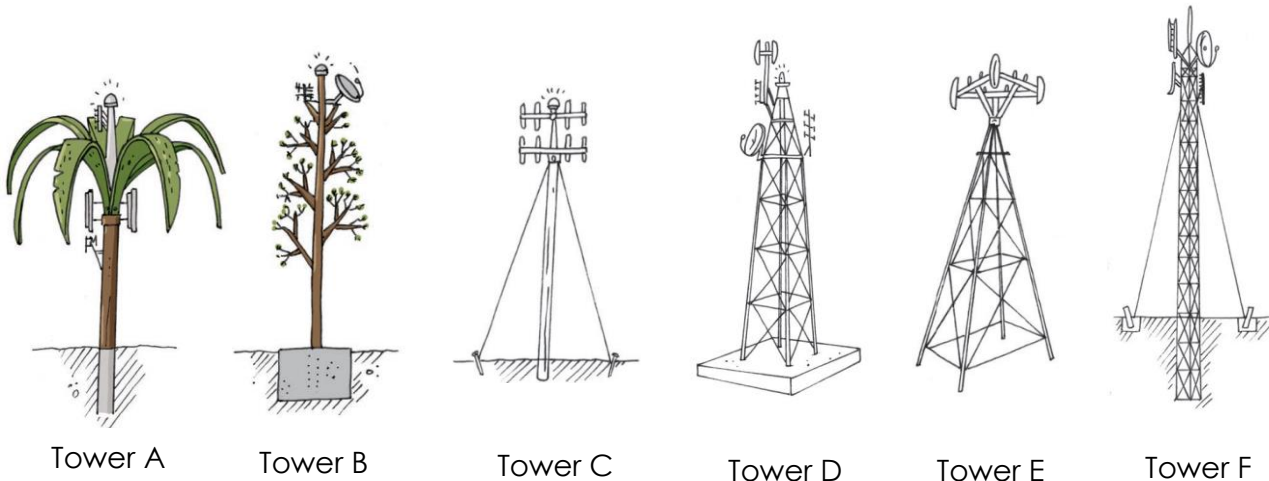
One of the methods used to strengthen frame structures is **triangulation**. A triangle is a very strong shape. When a force or pressure is exerted on a triangle, two of the sides stretch the third side. This side then pulls the other two sides towards itself. All of this stretching and pulling means two things:

- a. The structure stays **rigid**.
- b. The force is spread among all three sides of the triangles.

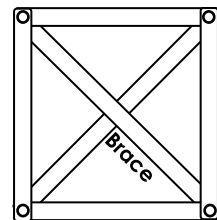


The spreading of the force makes the shape very **stable**.

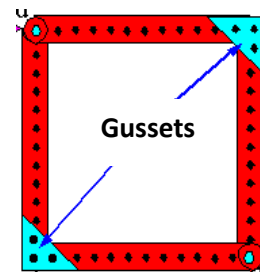
Reinforcing techniques



a. **Cross-bracing** increases the stability of cell phone tower. (Tower D, E, F). A **brace** is a structural element used to reinforce and strengthen a structure. It stops the structure from being pushed out of shape. Cross-bracing is a form of **triangulation**.



b. **Gusset plates:** Gussets are made from strong materials and are used to reinforce and connect different parts of a frame structure.






Making Towers Stable


Ways of making towers STABLE (prevent them from collapsing)

- Make the centre of gravity low. One way of doing this is to connect the tower to a heavy object at its bottom (a foundation).
- Fasten the tower to the ground with cables (guys).
- Plant the tower deep in the ground
- Give the tower a wide base

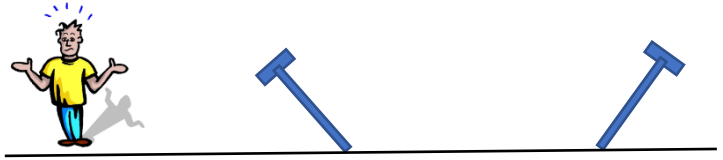
QUESTIONS

1. Identify the types of structures (some structures are a combination of different types)

Structure	Shell structure	Frame structure	Solid structure	Natural	Man-made
Garden chair 					
Tortoise shell 					
Cellphone tower 					

Brick						
House						

2. Mikey is trying to make a washing line. He unfortunately has no idea how to stabilize the washing poles. They keep on falling over. Provide Mikey with three ideas of how he can stabilize the poles so that they do not fall over.

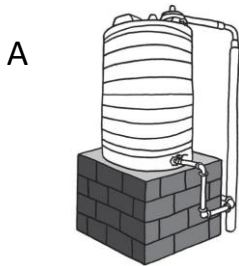


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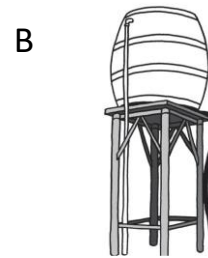
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3. Consolidation / Informal assessment: Support for water tanks



A water tank on a solid brick



A water tank on a metal-frame stand

a. Which stand do you think is the stronger of the two? Explain why you think so.

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b. Use the words *triangulation* and *gusset* to say how you would reinforce B

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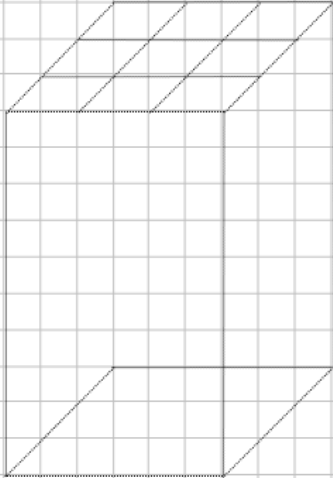
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GRAPHIC COMMUNICATION

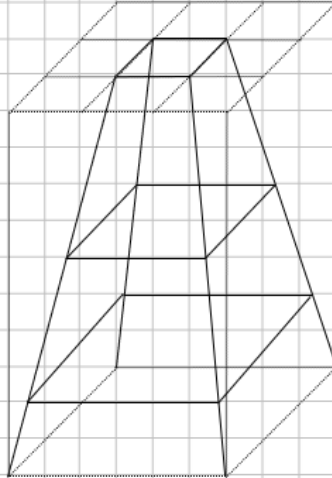
To help you develop your ideas you are going to draw an example of a tower in **oblique projection** and then in **single vanishing point perspective**.

Oblique drawing: Follow the steps and complete the drawing below.

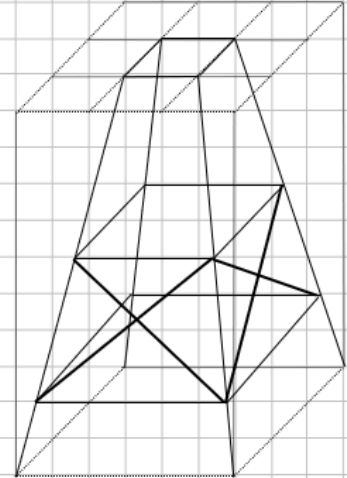
Step 1: Use construction lines to draw the box (thin lines).



Step 2: Use construction lines to draw the tower (thin lines).

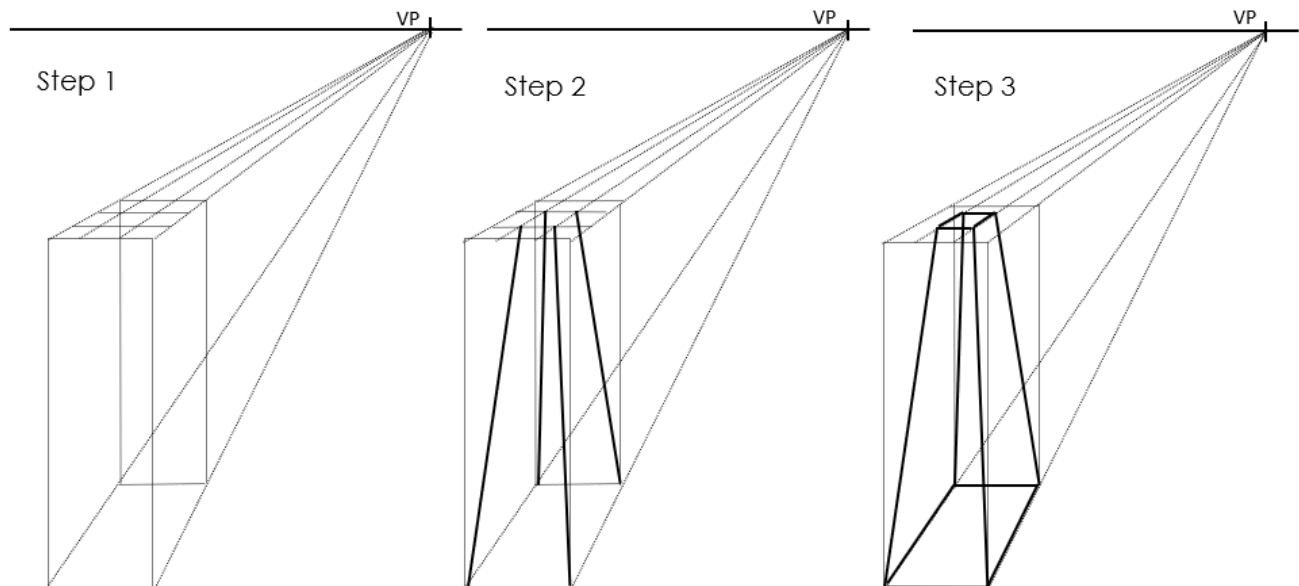


Step 3: Draw in the cross-bracing.



Single vanishing point perspective

Follow the steps below. We are going to draw a simple tower without cross-bracing.



DESIGN PROCESS:

INVESTIGATE: Did you ...	Y/N
Identify and analyse the problem, need or opportunity	
Investigate and evaluate existing products that are similar	
Investigate by doing a Case Study or practical investigation.	
DESIGN BRIEF Do you know ...	Y/N
What you are designing? What need has to be solved?	
For who you are designing?	
What is it for? (reason)	
Where will it be used?	
DESIGN SPECIFICATIONS:	Y/N
are requirements that the product must meet. Some specifications you can identify from the scenario and others you will develop.	
Have you considered safety, size, material, function, construction methods, human rights and the environment ?	
DESIGN CONSTRAINTS:	Y/N
are limitations in which the product or solution must be developed. Think about the following when developing the constraints:	
time, material, cost, tools, human resources	
DESIGNS	Y/N
Did you draw at least two freehand sketches that can solve the problem?	
Did you provide details like? <ul style="list-style-type: none"> • Dimensions • Colour • Material 	
Are the designs done according to the specifications and constraints ?	
Did you make notes about the strengths and weaknesses of each design?	
Did you choose the best design and provide reasons for choosing that one?	
MAKE	Y/N
WORKING DRAWING: This drawing is used as a template for making your product <ul style="list-style-type: none"> • Use the type of drawing required: Perspective, oblique, isometric or orthographic drawing • The drawing must have a heading. • The outline of the drawing must be darker than the dimension lines. • The dimensions (measurements) are written in millimetres. 	
LIST the steps for making the product	
List of tools and materials	
Did you make the product by considering all skills and safety precautions?	
Are you sure that you are still on track with the design brief and specifications?	
EVALUATE	Y/N
Does the product solve the problem in the scenario	
Does the product satisfy the design brief and specifications	
How can you improve on your design?	
COMMUNICATE	Y/N
Present the product and portfolio to the class and hand to your teacher	