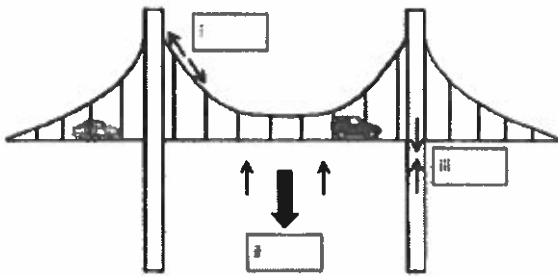


1. When manufacturing a technical object, it is often necessary to define the mechanical properties of different materials in order to make the most suitable choice. Which **mechanical property** is sought in each of the following examples? (4)

Hardness Elasticity Resilience Ductility Malleability Stiffness

- A) a material that bends easily, without breaking, to make a car bumper malleability
- B) wooden flooring that resists indentation by pointed objects, such as shoe heels hardness
- C) a horizontal rod resists deflection when a heavy object hangs from one end stiffness
- D) a boat hull that resists shocks caused by running into shoals resilience

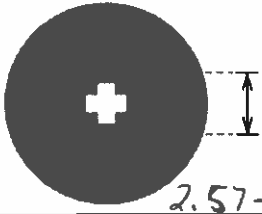
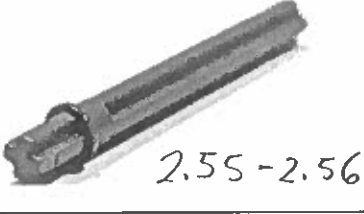
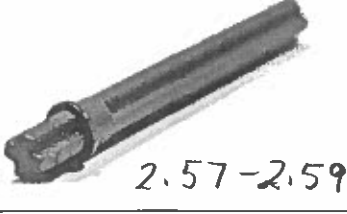
2. Indicate the constraint that the bridge is being subjected to at the indicated points. (3)



- i: tension
- ii: deflection
- iii: compression

3. This wheel fits onto an axle in the shape of a **+**. Determine which axle **will always fit** into this wheel. (2)

Please note. The wheel will still fit if it is a little loose, BUT it will not if the axel is too large!

Wheel	Axle A	Axle B
$\text{Ø } 2.58 \text{ mm } \pm 0.01$	$\text{Ø } 2.56 \text{ mm } \begin{smallmatrix} 0 \\ 0.01 \end{smallmatrix}$	$\text{Ø } 2.57 \text{ mm } \begin{smallmatrix} 0.02 \\ 0 \end{smallmatrix}$
		

Check the appropriate box.

- Axle A: will always fit will NOT always fit.
- Axle B: will always fit will NOT always fit.

4. Matching. Which category of material meets the following needs? (5)

- a) A shiny material that conducts electricity 2 1. Wood & modified wood
- b) A light material made of fossil fuels 3 2. Metals & alloys
- c) A durable material with low electrical conductivity & high degree of heat resistance & hardness 4 3. Plastics
- d) One of Canada's natural resources 1 4. Ceramics
- e) A material that combines several categories 5 5. Composites

3. Below is an isometric projection of a technical object. The dimensions indicated are in millimeters. Using the graph paper below, draw the multiview projection of this object. Use a 1:1 scale. **Do not include dimensions.** Note that the hole on the right side is drilled all the way through the object and that the diameter of the hole is 20 mm. (4)

