



Efectul designului unui pod asupra capacității de susținere a greutății

STEM4inclusive schools
WP2 – Toolbox

Școala Gimnazială Nr. 7, Galați

-1-



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Structura activității

A Introducere

despre subiect

Determinarea modului în care diferite modele de poduri afectează capacitatea acestora de a susține greutatea.

B Faza de instruire

despre instruire

Proiectarea și construirea unui pod stabil și estetic.

-2-



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A: Despre subiect

Diferite modele de poduri

-3-



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Definiție!



Un **pod** este o structură construită pentru a traversa un obstacol fizic (cum ar fi o apă, vale, drum sau cale ferată) fără a bloca calea de dedesubt. Este construit pentru a permite **trecerea peste obstacol**, care altfel ar fi dificil sau imposibil de traversat.

Există multe **modele de poduri**, fiecare servind unui scop specific și fiind adaptat la diferite situații. Modelele de poduri variază în funcție de: **funcția** podului, **natura terenului** unde este construit și ancorat, **materialele** folosite, **fondurile** disponibile pentru construcție.



Tipuri de poduri

Definiție!



Podul grindă: O structură simplă cu o grindă orizontală susținută la fiecare capăt.



<https://deepai.org/>

Image created by AI

-5-



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Podul cu zăbrele: Utilizează o structură triunghiulară pentru a distribui greutatea.

Tip Pratt

Tip Warren



Images created by AI
<https://deepai.org/>



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Podul arcuit: Are o structură curbă care transferă greutatea pe suporturile de la capete.



<https://deepai.org/>
Image created by AI



Podul suspendat: Utilizează cabluri suspendate între turnuri pentru a susține platforma podului.



<https://deepai.org/>
Image created by AI

-7-



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Știați că?



De-a lungul istoriei, podurile arcuite s-au dovedit a fi printre cele mai durabile pentru distanțe scurte. Unele au rezistat secolelor – iată câteva exemple notabile:

1. **Pons Fabricius** leagă Insula Tiberina de centrul Romei din anul 62 î.Hr. Este cel mai vechi pod din oraș, construit din rocă vulcanică, cărămidă și marmură.



https://en.wikipedia.org/wiki/Pons_Fabricius#/media/File:Ponte_Quattro_Capi.jpg

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Știați că?



2. **Podul Caravan** din Turcia, datând din 850 î.Hr., este cel mai vechi pod din lume cu datare sigură..



<https://time.graphics/es/event/2704321>

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Știați că?



3. **Podul Arkadiko** din Grecia, din Epoca Bronzului, este încă în uz.



https://en.wikipedia.org/wiki/Arkadiko_Bridge

-10-



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Știați că?



4. **Podul Anji** din China (695 d.Hr.) este renumit pentru stabilitatea sa.



https://en.wikipedia.org/wiki/Anji_Bridge

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-11-



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Podul pietonal Langkawi Sky din Malaezia

Știați că?



- Are o lungime de 125 de metri și o lățime de 1,8 metri.
- Design curbat – oferă o perspectivă panoramică excepțională.
- Structură: Panouri din oțel și beton montate pe o zăbrele triunghiulară inversată.
- Suspensie: 8 cabluri legate de un pilon unic de 81,5 m, menținând pasarela la ~100 m înălțime.
- Rezistență: Suportă până la 250 de persoane simultan.

https://en.wikipedia.org/wiki/Anji_Bridge



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Știați că?



Prăbușirea podului Tretten din Norvegia



Podul avea o lungime de 148 de metri, cu o deschidere principală de 70 de metri și o lățime de 10 metri.

Cauzele prăbușirii:

- Perioadă scurtă de construcție, dimensiunea deschiderilor și refolosirea unei fundații existente;
- Alegerea materialelor și o accentuată preocupare pentru estetică au contribuit la o structură mai puțin robustă.

-13-

https://en.wikipedia.org/wiki/Tretten_Bridge



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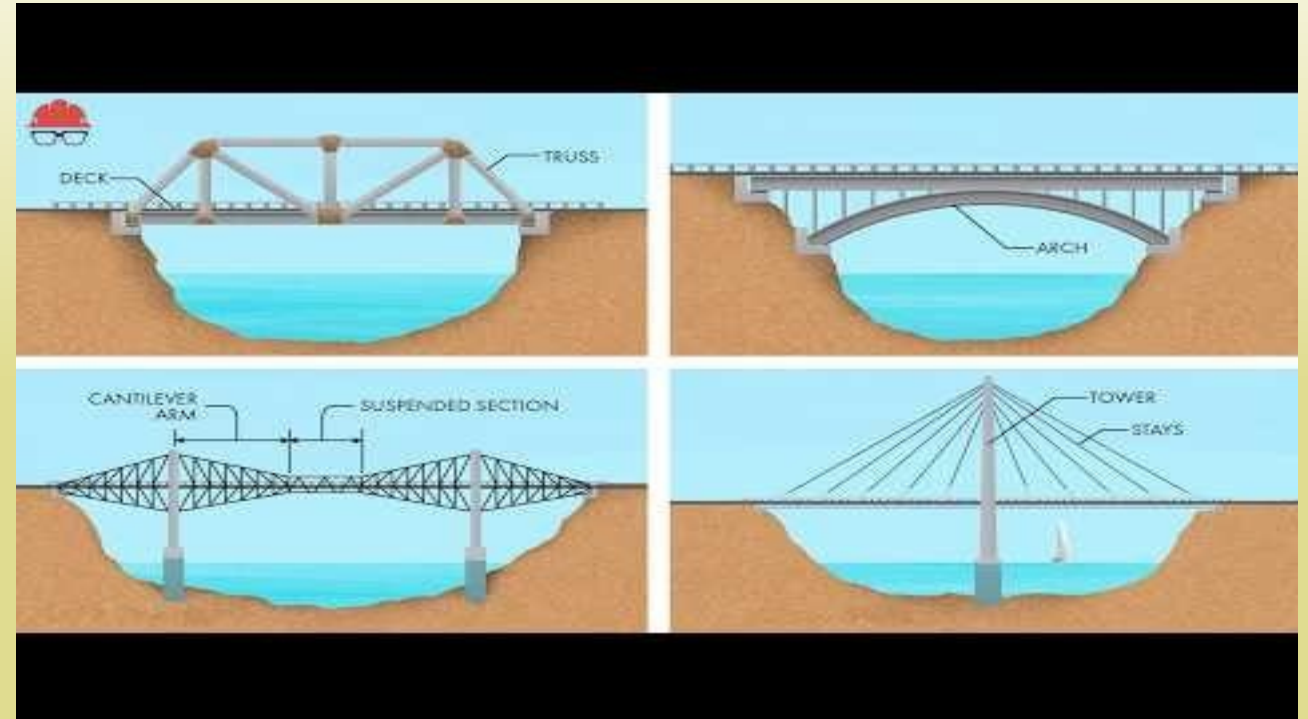


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Să ne uităm la acest videoclip!



Diferite modele de poduri- videoclip



Youtube channel name: **Practical Engineering**
Name of video: **Every Kind of Bridge Explained in 15 Minutes**
Link: https://www.youtube.com/watch?v=DX_zkaK5Pal
Accesed: 9.12.2024

-14-



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Materiale necesare:

- **Bețe de înghețată sau lemn balsa** (pentru construirea podurilor)
- **Lipici** (lipici de lemn sau pistol de lipit)
- **Greutăți** (greutăți mici sau punguțe cu nisip)
- **Cântar** (pentru măsurarea greutăților)
- **Riglă sau bandă de măsurare**
- **Caiet** (pentru înregistrarea datelor)

-15-



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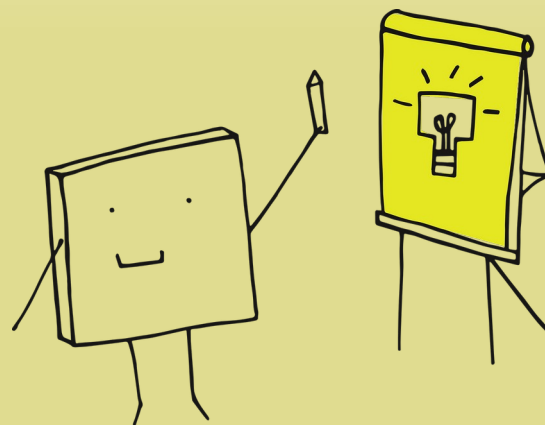


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B: Faza de instruire

Construiește-ți podul



-16-



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Sarcina 1:



Sunteți o echipă de ingineri care trebuie să proiecteze un pod folosind lipici și maximum **200 de bețe de înghețată**.

Instrucțiuni:

Lucrați în echipe de **3 persoane**, inclusiv cu elevii care nu pot desena singuri, integrându-le comentariile și ideile.

Timp alocat: **30 de minute** (40 de minute dacă în echipă sunt elevi cu nevoi speciale).

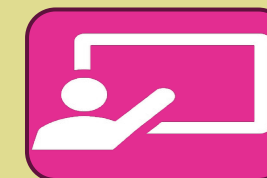
Cerințe pod:

Să susțină aproximativ **10 kg** greutate.

Să aibă o deschidere minimă de **35 cm**.

Colaborare:

- 17- Asigurați-vă că toți membrii echipei contribuie, inclusiv cei cu deficiențe vizuale sau motorii.
- Folosiți metode inclusive (ex.: descrieri verbale, adaptări fizice) pentru a integra fiecare idee



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Sarcina 2:

- Să urmărim acest videoclip:



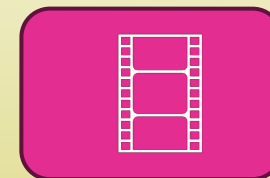
Youtube channel name: **Physics Burns (Raymond Burns)**

Name of video: **Easy Popsicle Stick Bridge**

Link: https://www.youtube.com/watch?v=s3HZievz_3Y

Accessed: 9.12.2024

Urmăriți videoclipul "Easy Popsicle Stick Bridge" de la Physics Burns și discutați în grup sau înregistrați un audio cu ideile voastre.



-18-



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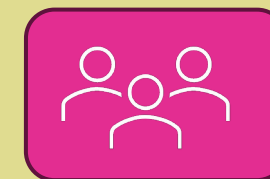


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Sarcina 3:



- **Construiți** podul proiectat folosind bețișoare de înghețată sau lemn de balsă. Asigurați-vă că fiecare pod are o lungime de aproximativ 35 cm pentru o comparație corectă.
- **Lipiți** piesele împreună și lăsați-le să se usuce complet.
- **Amenajați** o zonă de testare unde puteți plasa podurile între două suporturi.
- **Adăugați** treptat greutate în centrul fiecărui pod până când acesta cedează (se prăbușește sau se rupe).
- **Înregistrați** greutatea maximă pe care o poate susține fiecare pod înainte de a ceda.
- **Măsurați** și înregistrați greutatea suportată de fiecare pod înainte de prăbușire.
- **Comparați** capacitățile portante ale diferitelor modele de poduri.
- **Analizați** datele pentru a determina care model a fost cel mai rezistent și de ce.



-19-



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H5P- Tasks 1: What it is a bridge?

A **bridge** is a structure built to span a physical obstacle (such as a body of water, valley, road, or railway) without blocking the path underneath.

☐ True

☐ False

☒ Submit

-20-



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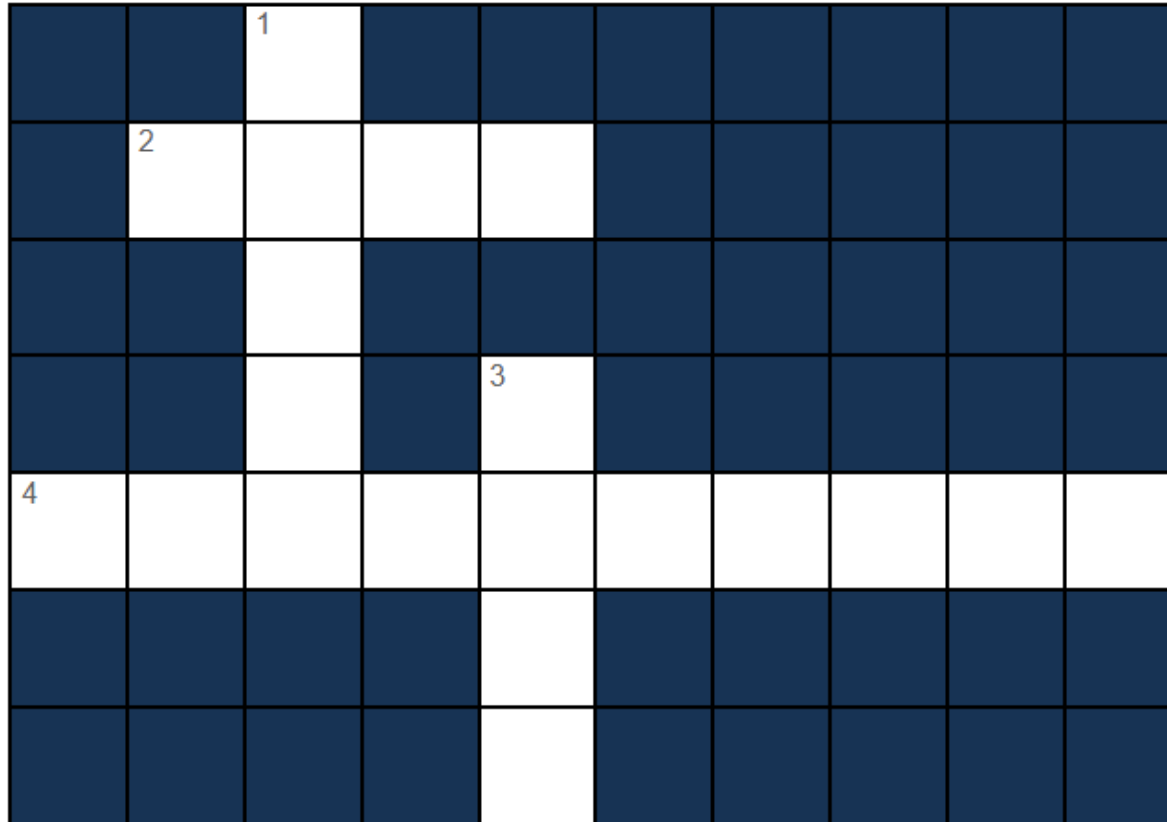


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H5P- Tasks 2: What are the different types of bridges?



Find the bridge's type.



Across

2 Has a curved structure that transfers weight to the supports at each end. (4)

4 Uses cables suspended between towers to hold up the bridge deck. (10)

Down

1 Uses a framework of triangles to distribute weight. (5)

3 A simple structure with a horizontal beam supported at each end. (4)





H5P- Tasks 3: On what a bridge design depends?

Designs of bridges vary depending on factors such as:

- ☐ the **aesthetic** factor, the **reused** materials.
- ☐ the **function** of the bridge, the **nature of the terrain**.

✓ Submit

-22-



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Felicitări!

Ai terminat activitatea despre proiectarea și construirea unui pod.

-23-



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