PDST
Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

An Roinn Oideachais agus Scileanna
Department of Education and Skills

National Workshop 2

LEAVING CERTIFICATE
COMPUTER SCIENCE

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Session 2 CT Examples

Learning Outcomes / Intentions

Outcomes:

-To develop an understanding of the centrality of Computational Thinking in CS.

- To understand and apply the concepts / pillars of Computational Thinking.

Intentions:

- To analyse and develop solutions to problems of various types using Abstraction, Decomposition, Pattern Recognition, Algorithm formation.

Computational Thinking – Rationale for Examples

- Different Pillars
- Licence / Help for students
- Computer?
- Why choose ‘logic’ problems: Monty Hall / Sisters and not Skiing Holidays
- 4 pillars ……. 6 pillars …… 7 pillars
- Pillars …….Concepts

Examples

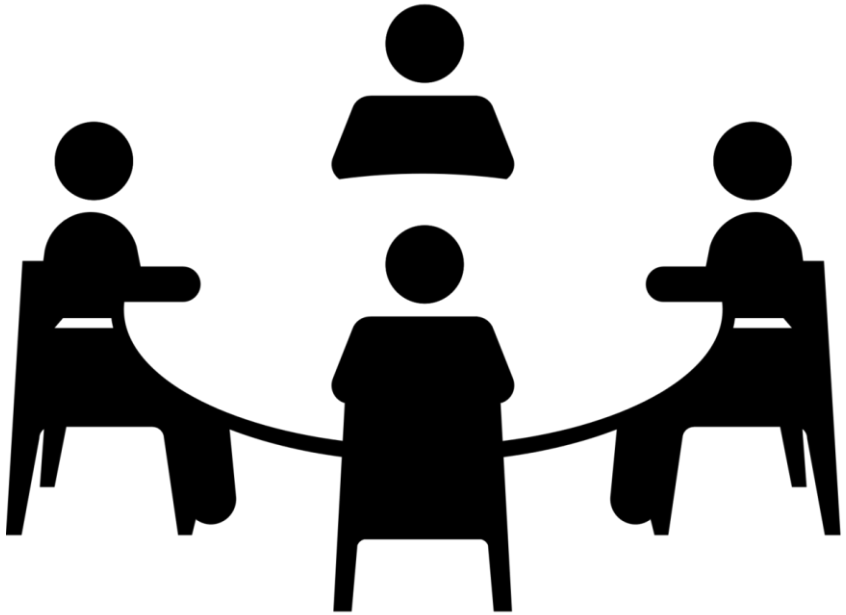
Chinese Babies

The basis of this problem in the One-Child policy introduced by the Chinese government in 1979. Many Chinese families wanted a boy.

Let's abstract a model of families where if a boy is born, they have no more children, and if a girl is born, they have another child and keep going until they have a boy. We ignore other biological, geographical or sociological factors.

If this model was run, would the population trend towards more boys, more girls or the same?

Group Activity

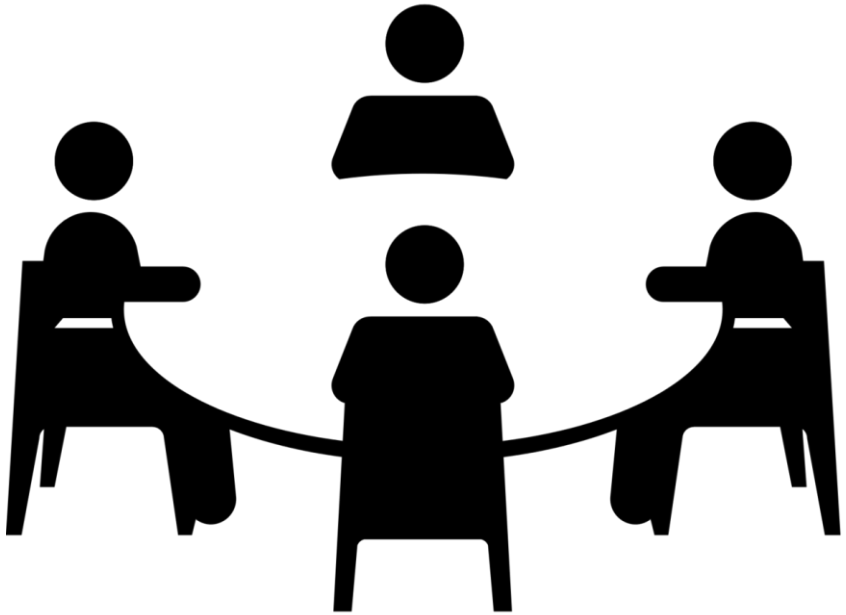


Farmer's Problem

A farmer wants to cross a river and take with him a wolf, a goat, and a cabbage. There is a boat that can fit himself plus either the wolf, the goat, or the cabbage. If the wolf and the goat are alone on one shore, the wolf will eat the goat. If the goat and the cabbage are alone on the shore, the goat will eat the cabbage.

How can the farmer bring the wolf, the goat, and the cabbage across the river?

Group Activity



Farmer's Solution

1. Begin on side A
2. Take goat across to side B
3. Return with empty boat to side A
4. Take wolf across river to side B
5. Return with goat to side A
6. Take cabbage to side B
7. Return with empty boat to side A
8. Take goat to side B
9. END

A closer look …

Initial Position

FARMER	WOLF	CABBAGE	GOAT
0	0	0	0

Final Position

FARMER	WOLF	CABBAGE	GOAT
1	1	1	1

All Positions

FARMER	WOLF	CABBAGE	GOAT

FARMER	WOLF	CABBAGE	GOAT
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	1	1	1

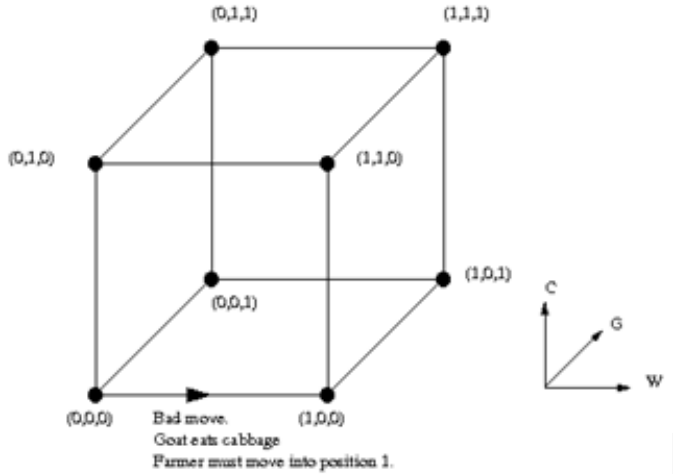
However …

Goat cannot be left alone with the cabbage: ***f=g=c V g<>c***

Goat cannot be left alone with the wolf: ***f=g=c V g<>w***

FARMER	WOLF	CABBAGE	GOAT	
0	0	0	0	✓
0	0	0	1	✓
0	0	1	0	✓
0	0	1	1	✗
0	1	0	0	✓
0	1	0	1	✗
0	1	1	0	✓
0	1	1	1	✗
1	0	0	0	✗
1	0	0	1	✓
1	0	1	0	✗
1	0	1	1	✓
1	1	0	0	✗
1	1	0	1	✓
1	1	1	0	✓
1	1	1	1	✓

10 good and 6 bad



Farmer's Problem – re-stated

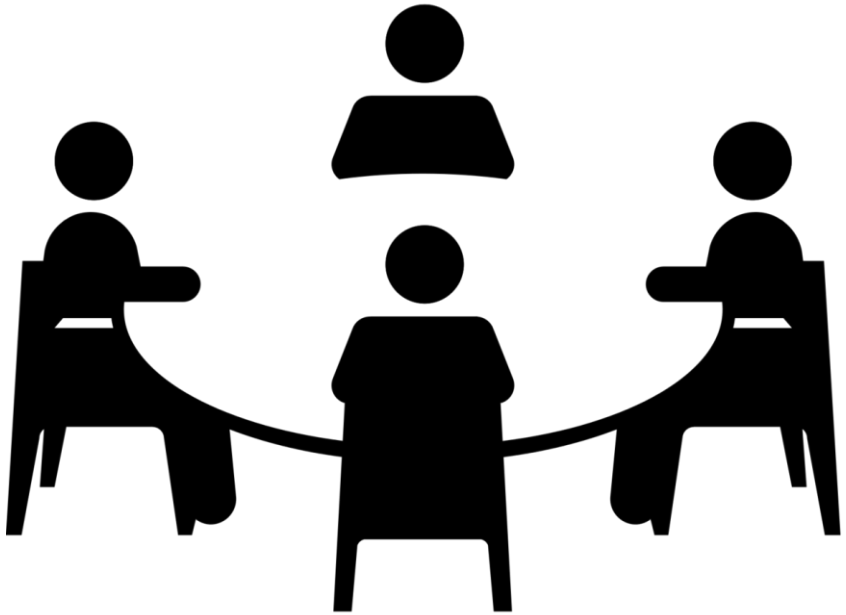
A farmer wants to ferry an alpha and two betas across a river. However his boat is large enough to only take one of them at a time, making several trips across the river necessary. Also, an alpha cannot be left alone with a beta.

How can the farmer achieve the task?

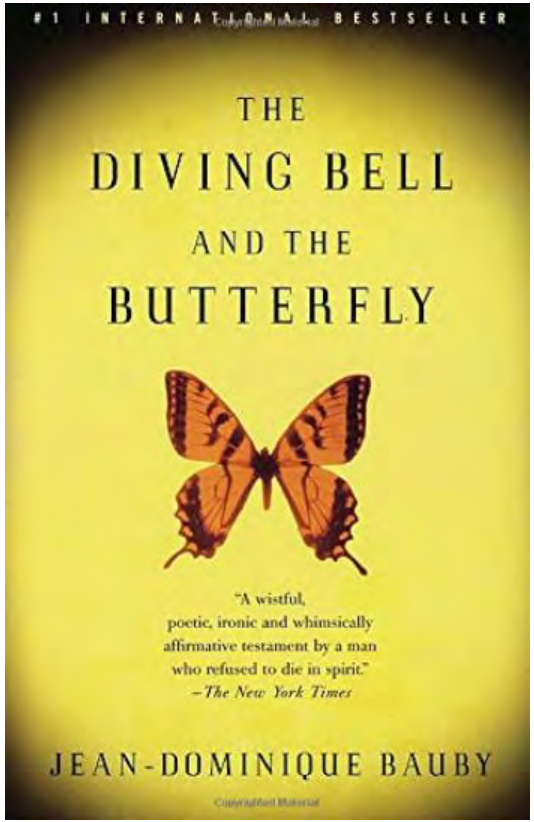
Solution: Take the alpha across, then a beta returning with the alpha. Then take the second beta across followed by the alpha

Rock Paper Scissors

Group Activity



Scenario 1



https://www.youtube.com/watch?v=t4Ek4ZBpshs

'The Diving Bell and the Butterfly' is an incredibly uplifting book. It's the autobiography of Jean-Dominique Bauby, written after he woke up in a hospital bed totally paralysed. In the book, he describes life with locked-in syndrome. He did have a way to communicate not only to write the book but also with medics, friends and family. He did it without any technology at all. How?

Pair Activity

What CT concepts are you explaining?

What pedagogy are you using?

Presentation

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