Transforming pre-service teachers' dispositions towards mathematics through reflection *in*-activity and *post*-activity

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Goals of N102

- Role of the Teacher
  - Transmit his or her knowledge to a group of passive students
- Teacher as Facilitator
  - Orchestrates instruction and organizes the learning environment so:
    - students are actively engaging in ‘doing’ mathematics
    - students are creating, exploring, testing and verifying
    - students develop confidence in their mathematical ability and believe they can make sense of mathematics

Problem Solving Activities

- Course begins with a set of problem solving activities aimed at:
  - Helping pre-service teachers develop their abilities to think and reason about problems
  - To independently develop problem solving strategies that are portable

- Through a series of activities students identify strategies that aid in solving non-routine problems. They include:
  - Organizing information
  - Working backwards
  - Identifying similarities between problems
  - Making representations and selecting the most appropriate given the problem
    - Tables, diagrams, drawings etc.
  - Looking for patterns
  - Making generalizations that represent different aspects of the problem

Poison

- Begin with the game of Poison
  - Form two teams in your group. One team will play against the other team in the group. Your instructor will give you 10 color tiles. Place the 10 tiles between the two teams and follow these rules:
    - Decide which team will go first.
    - When it is your team's turn, you must take one or two tiles from the table.
    - Alternate turns until there are no tiles remaining on the table.
    - The team who takes the last tile, the "poison" one, is the loser

Students' Initial Responses

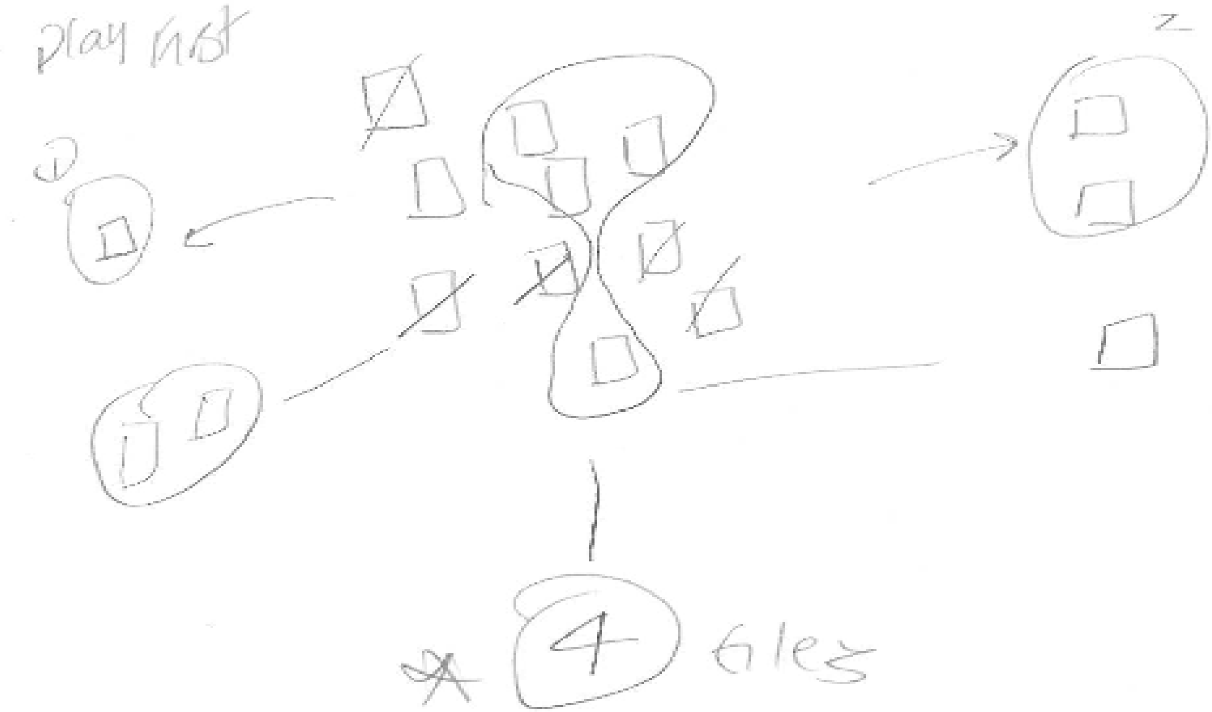

Table Tennis Problem

- *Eight children are entered in a table tennis tournament. If each child plays one game with each of the other children in the tournament, how many games will be played altogether?*

Developing expressions that reflect the problem

TABLE TENNIS PROBLEM

8 players	# of games
1 2 3 4 5 6 7 8	7
2 3 4 5 6 7 8	6
⋮	⋮
	1
	28

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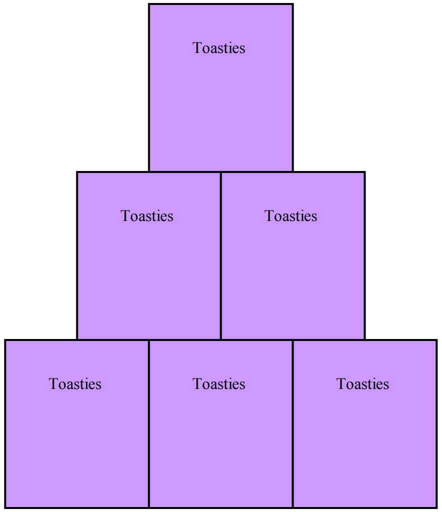
$$= \frac{(\#\text{ of players})(\#\text{ of games played})}{2} \quad - \text{ (eliminating double games)}$$

$$= \frac{n\,(n-1)}{2}$$

$\boxed{n = \#\text{ of players}}$

Cereal Boxes Problem

- A store clerk was told she had 21 cereal boxes to be stacked in the display window and all the boxes had to be used. The manager told the clerk that the boxes had to be in a triangle like the one shown below. The sales clerk wondered how many boxes needed to be placed on the bottom row to build the triangle using all the boxes.



$$T = \frac{n(n-1)}{2} + n$$

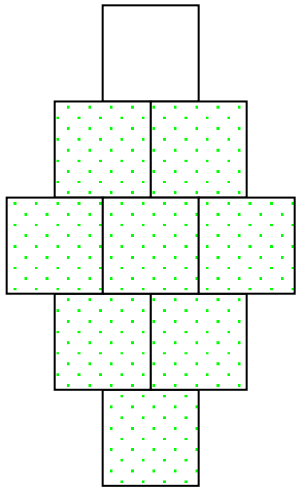
$$= \frac{6(5)}{2} + 6$$

$$= 21$$

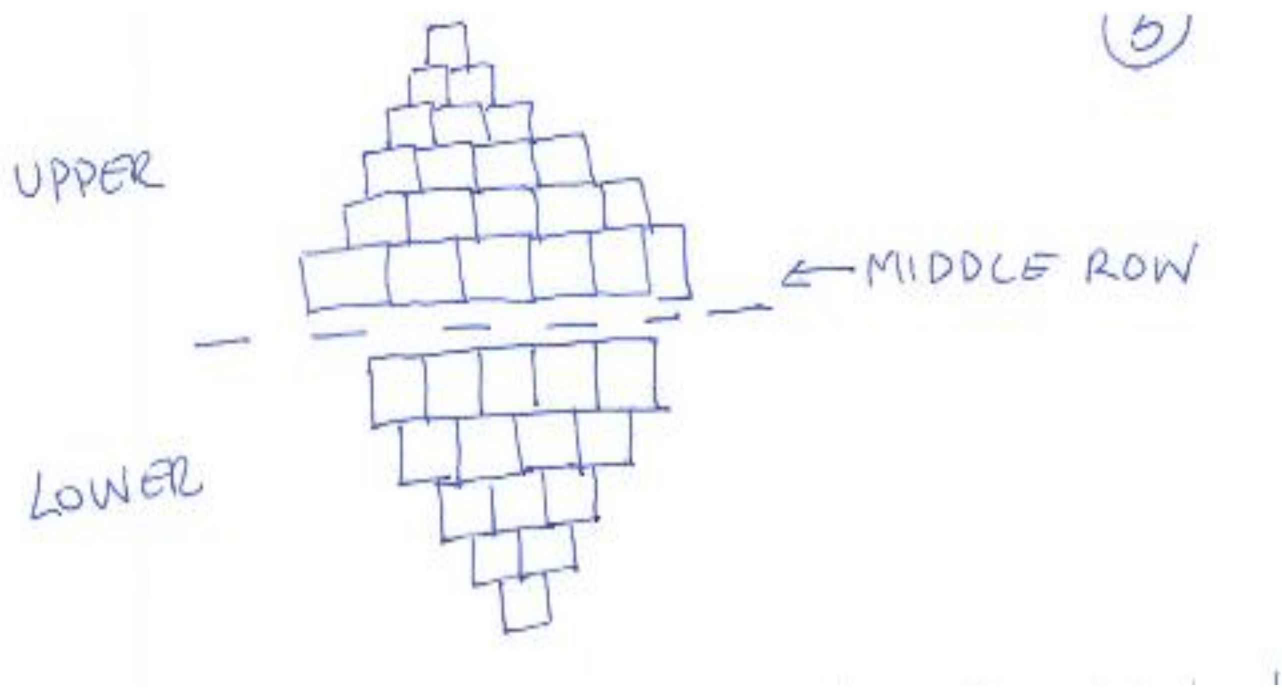
Simplified

$$T = \frac{n(n+1)}{2}$$

- A patio was to be laid in a design like the one shown. A man had 50 blocks to use. How many blocks should be placed in the middle row to use the largest number of blocks?



Identifying geometric patterns



Responses to Poison

2) Would you use the same strategy to win games with 11, 14 and 20 tiles? If so, describe the strategy and explain why it would work? If not, explain how the strategies you would use for each of these games would be different?

Yes [see 8 tiles] Works because if you play first then you can opt to select 1 tile thereby reducing the number of tiles to a multiple of 3 plus 1. This additional 1 represents the poison tile that you want your opponent to be left with. Play the complement allows you to ensure that multiples of 3 tiles are continuously being removed thereby leaving your opponent with the poison tile.

- Thank you!