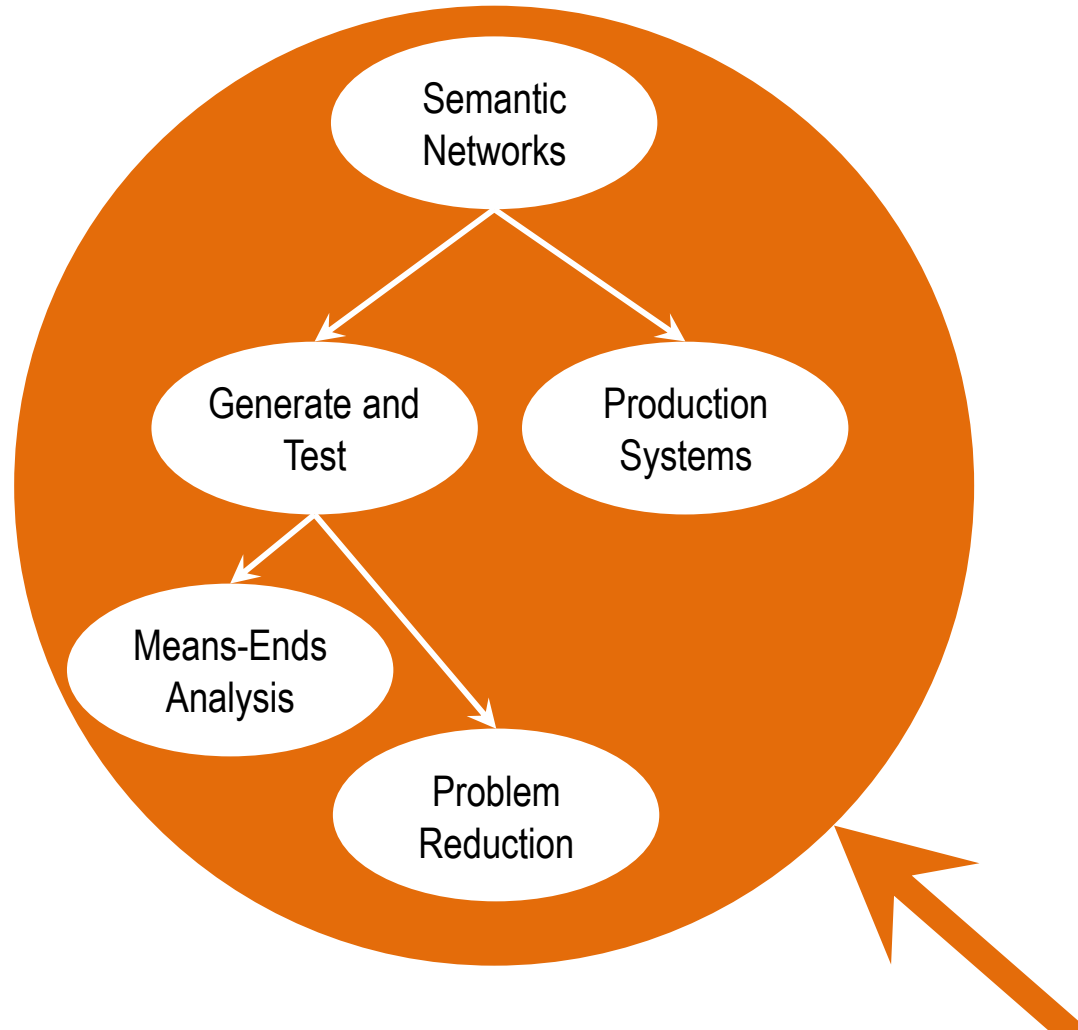


A large, solid orange circle is centered on a white background. Inside the circle, the words "Semantic Networks" are written in white, sans-serif font, stacked vertically.

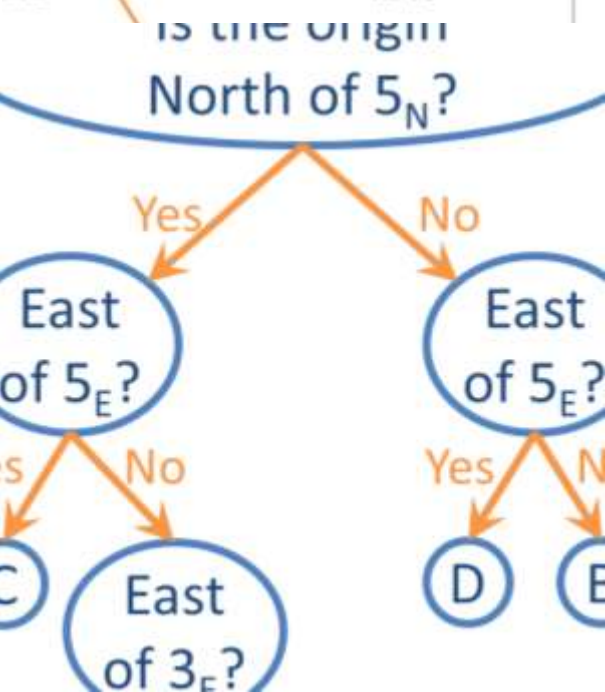
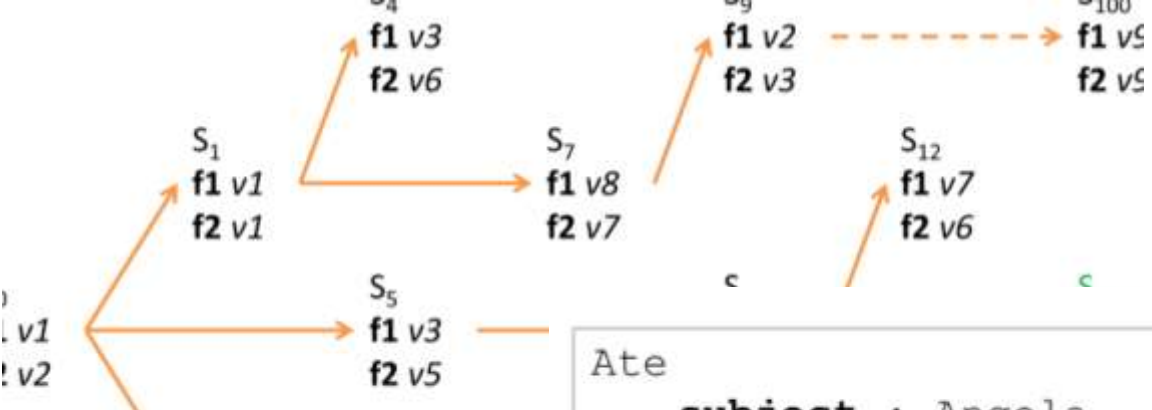
Semantic Networks

Fundamentals



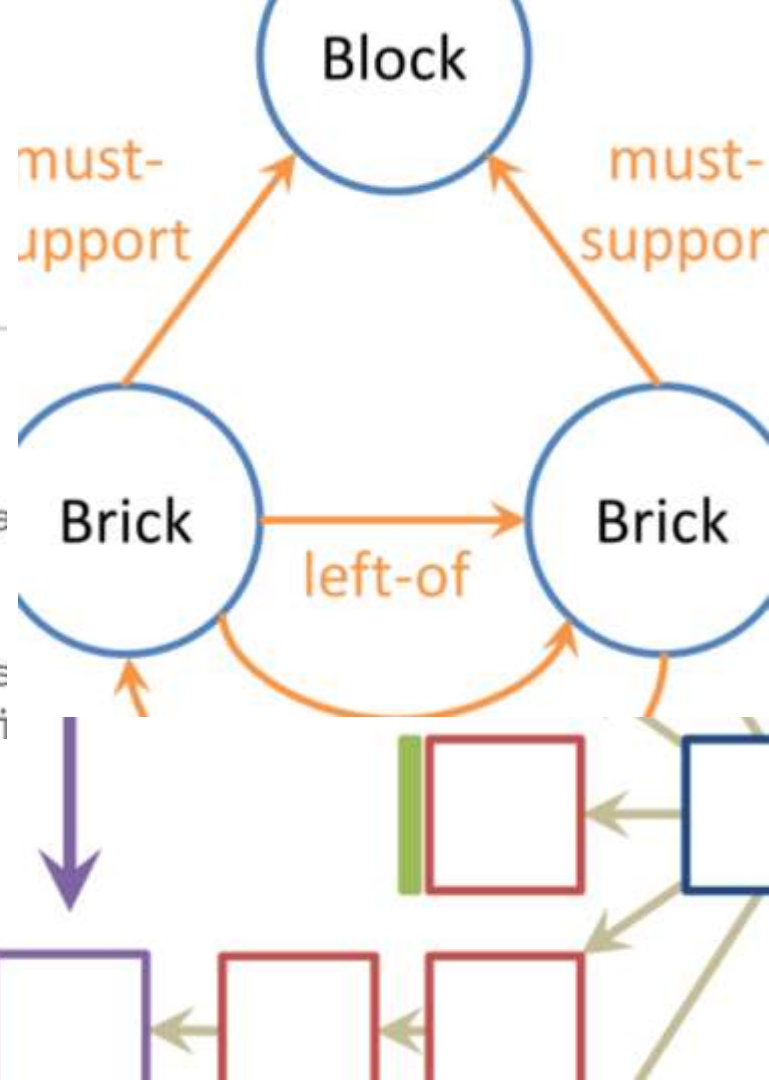
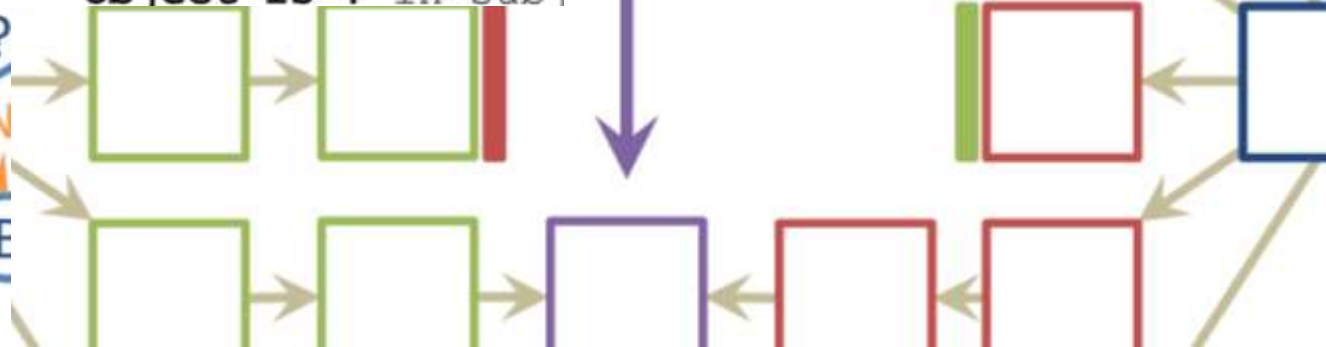
Lesson Preview

- Knowledge representations
- Semantic networks
- Problem-solving with semantic networks
- Represent & Reason

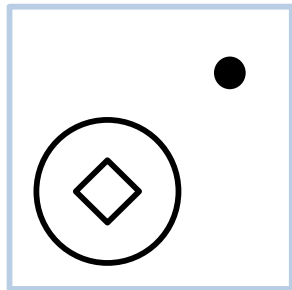


Ate

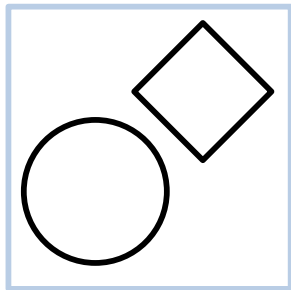
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object : lasagna
location : Olive Ga
time : night
utensils :
object-alive : false
object-is : in-subj



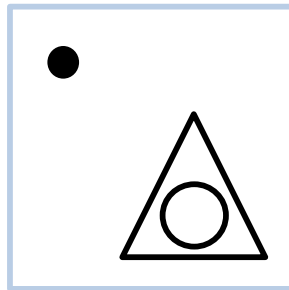
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B



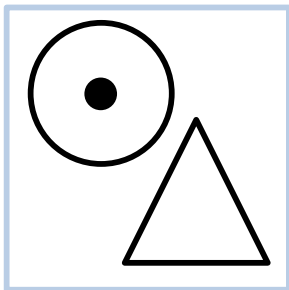
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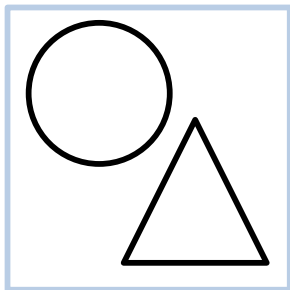
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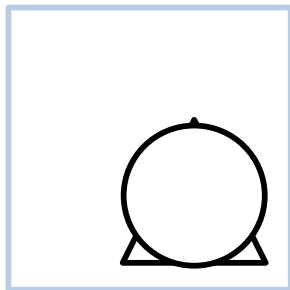
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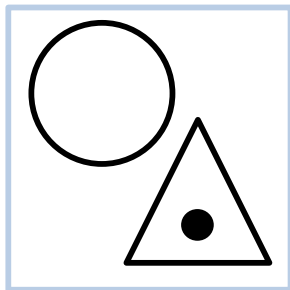
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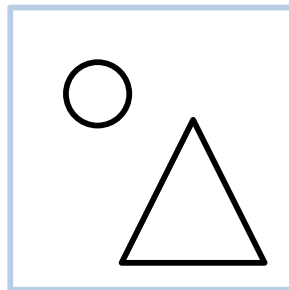
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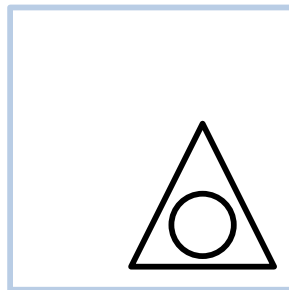
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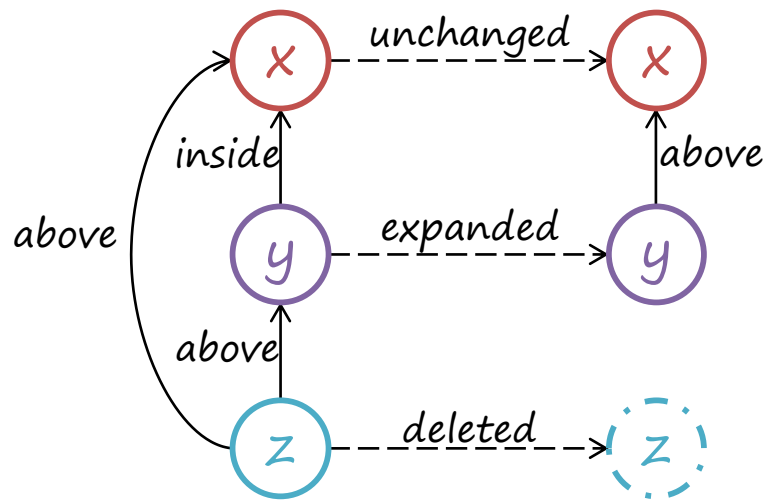
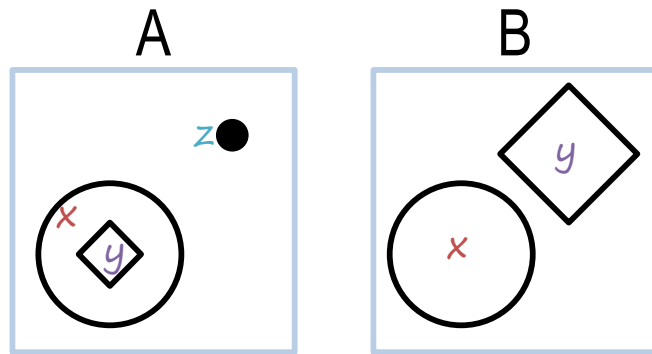


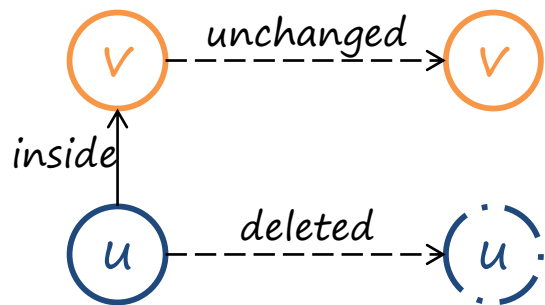
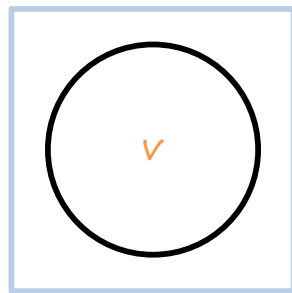
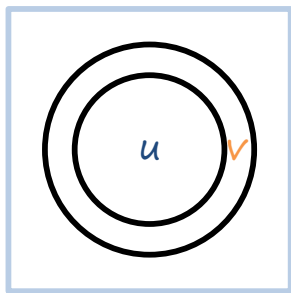
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6

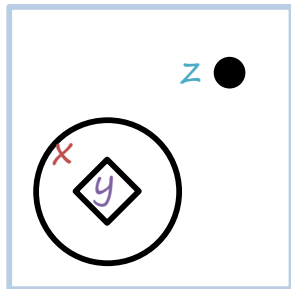




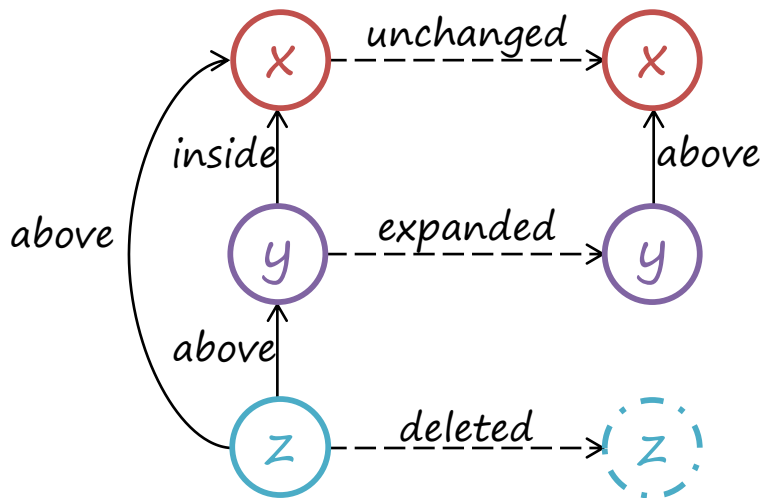
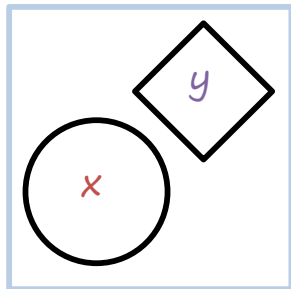


The relationships between the pieces and the transformations between the frames.

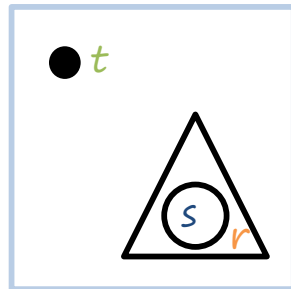
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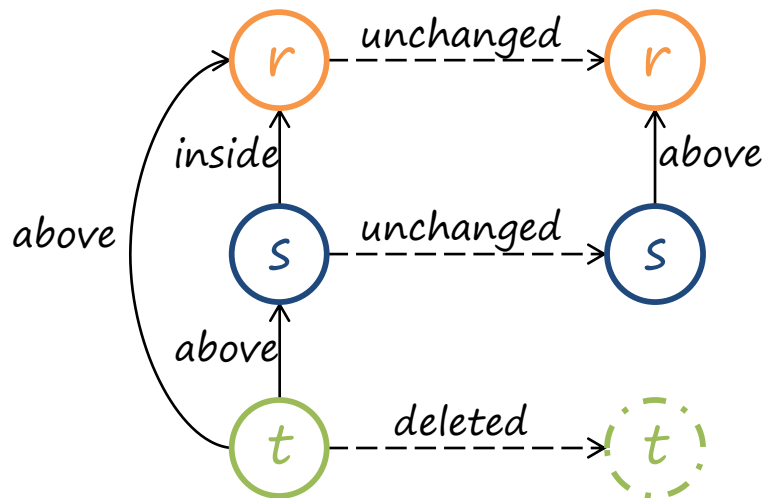
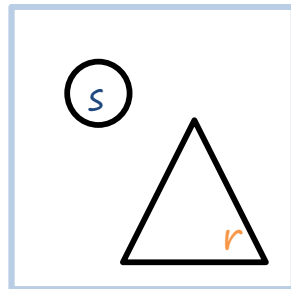
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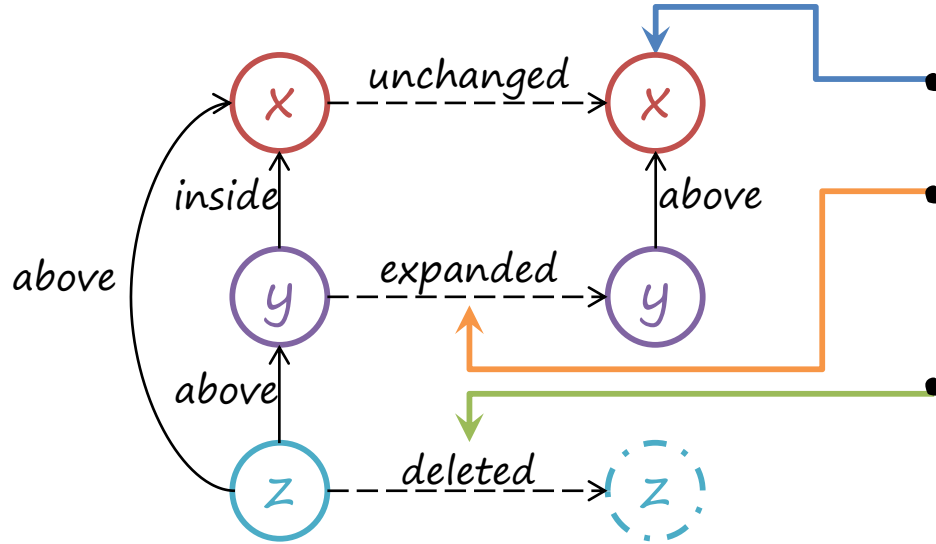
C



5



Structure of Semantic Networks



Lexically: nodes

Structurally: directional links

Semantically: application-specific labels

Characteristics of Good Representations

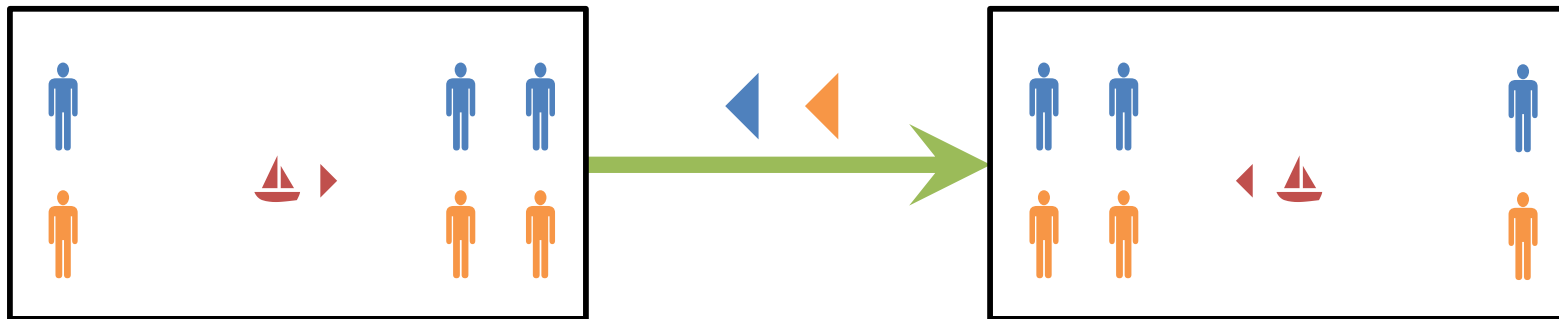
- Make relationships explicit
- Expose natural constraints
- Bring objects and relations together
- Exclude extraneous details
- Transparent, concise, complete, fast, computable

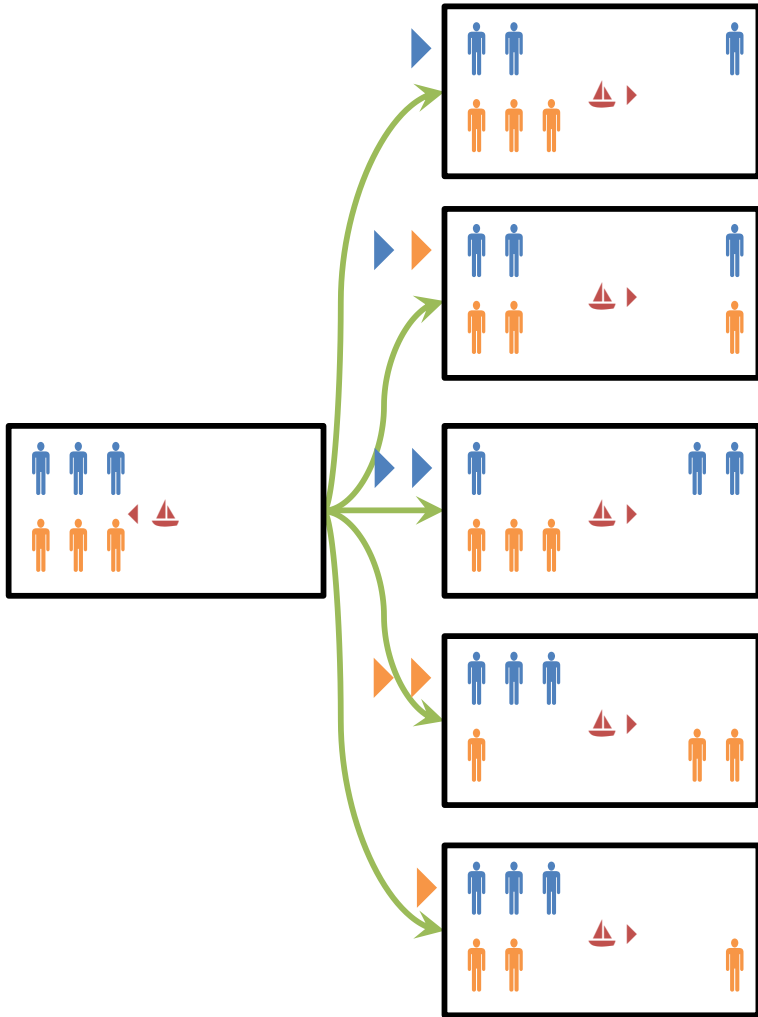
Guards & Prisoners Problem

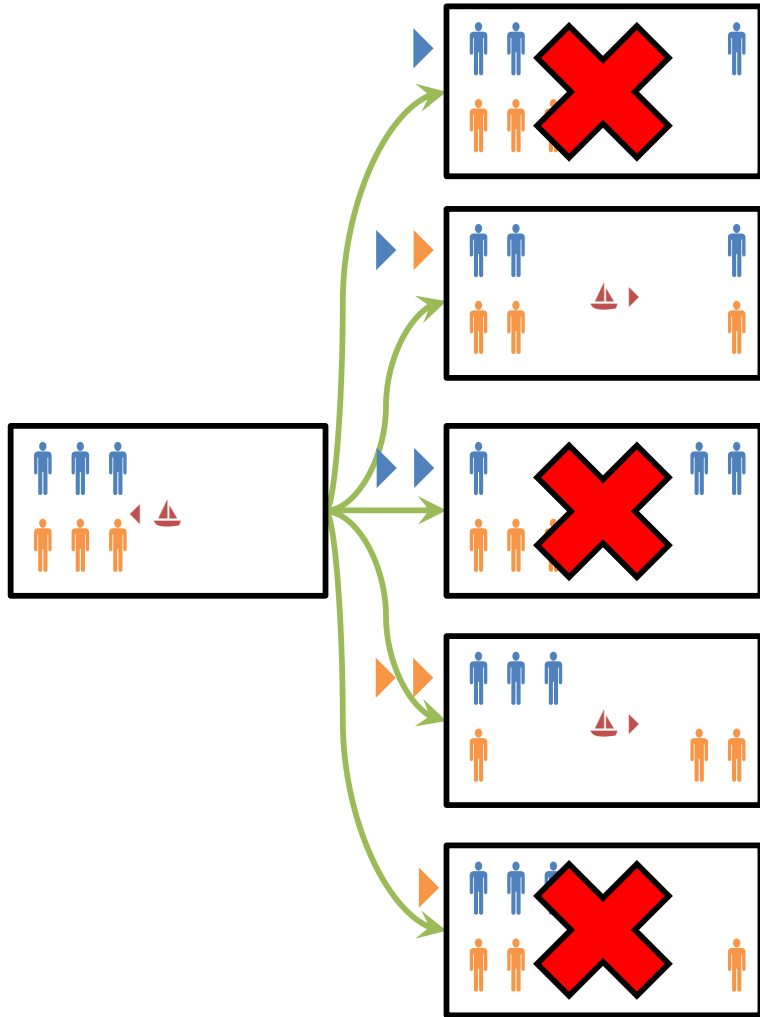
- Also known by other names (cannibals and missionaries, jealous husbands, brothers and sisters).
- Originally appeared in the 1200-year-old text Propositiones ad Acuendos Juvenes.
- Used by throughout AI for problem representation.

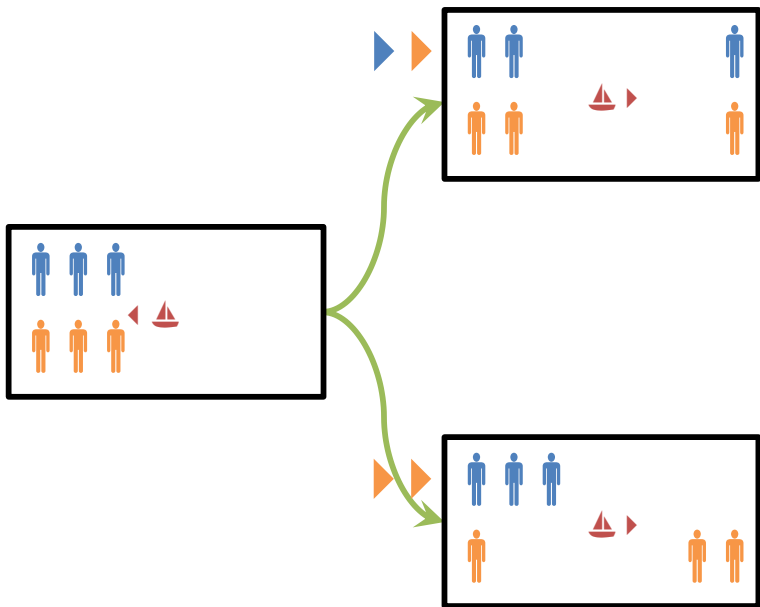
Guards & Prisoners Problem

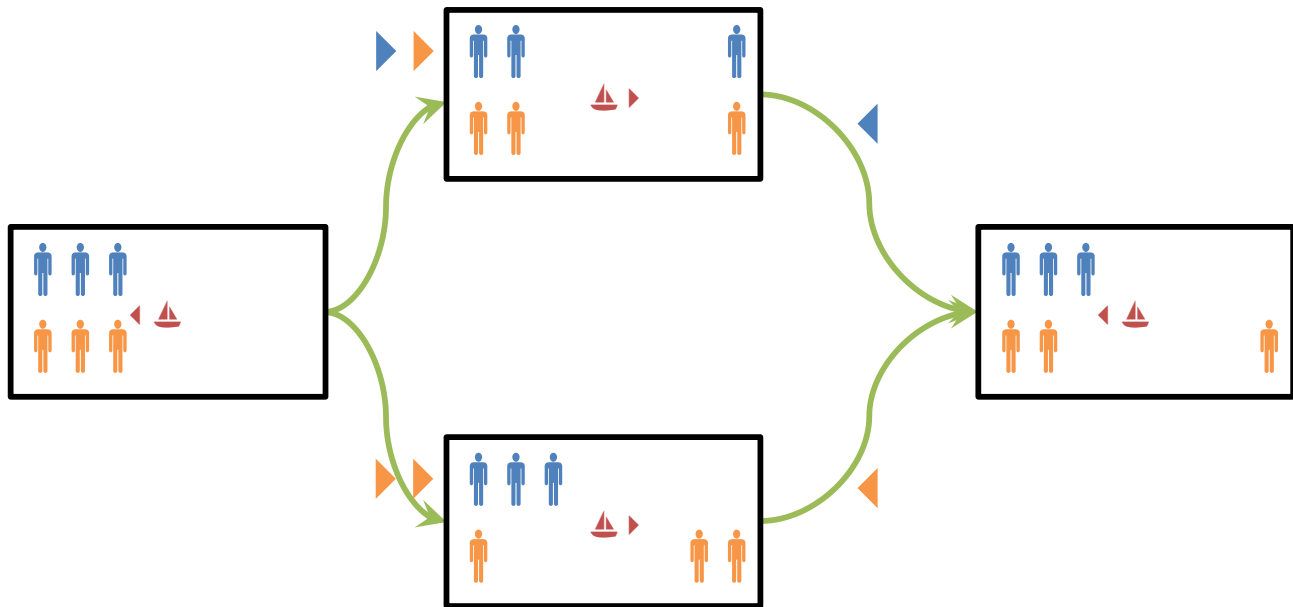
- Three guards and three prisoners must cross river.
- Boat may take only one or two people at a time.
- Prisoners may never outnumber guards on either coast, though prisoners may be alone on either coast).

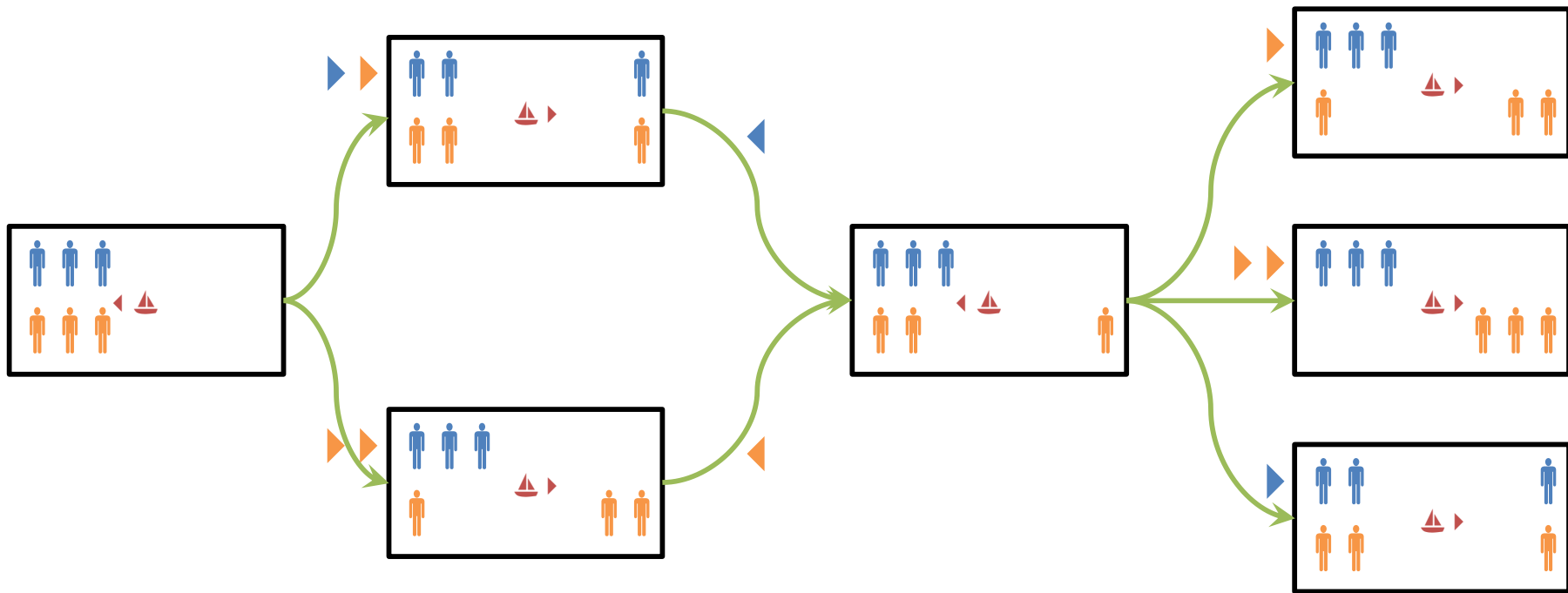


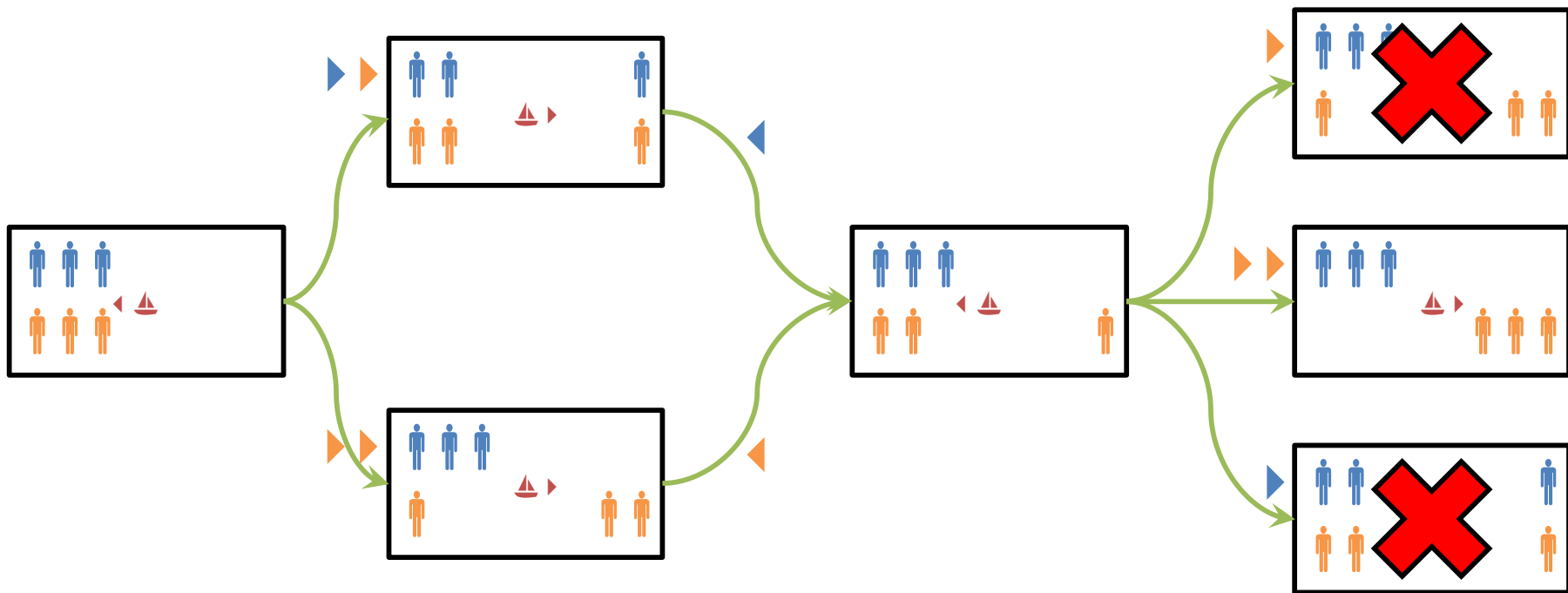


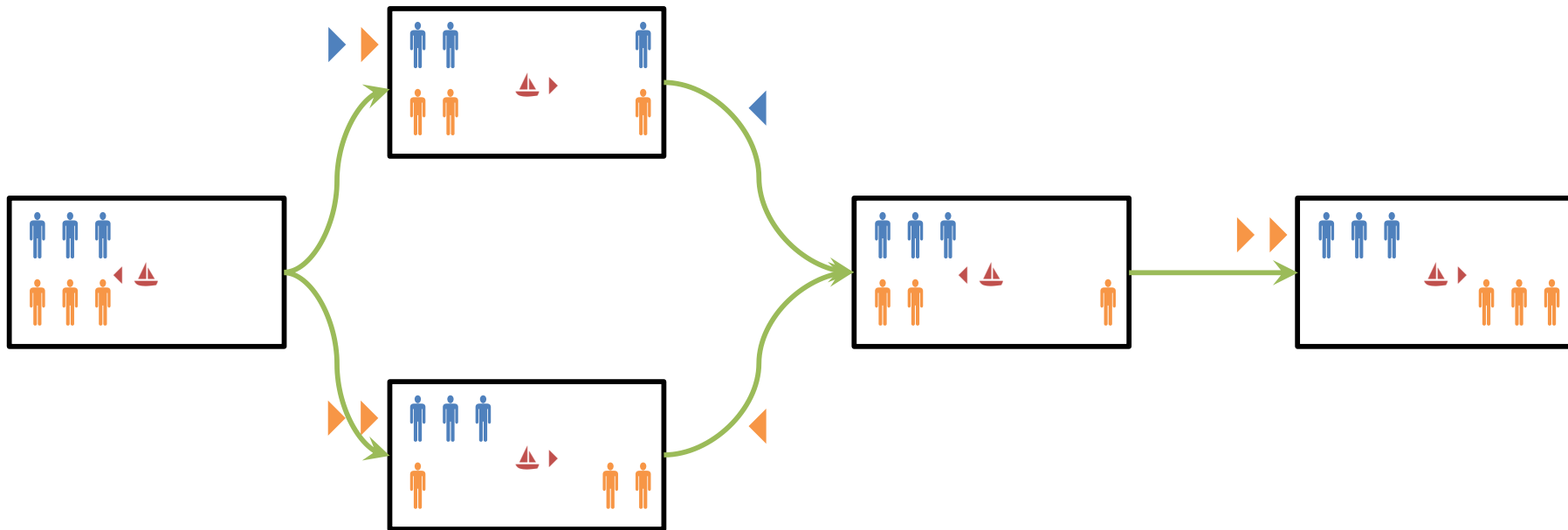




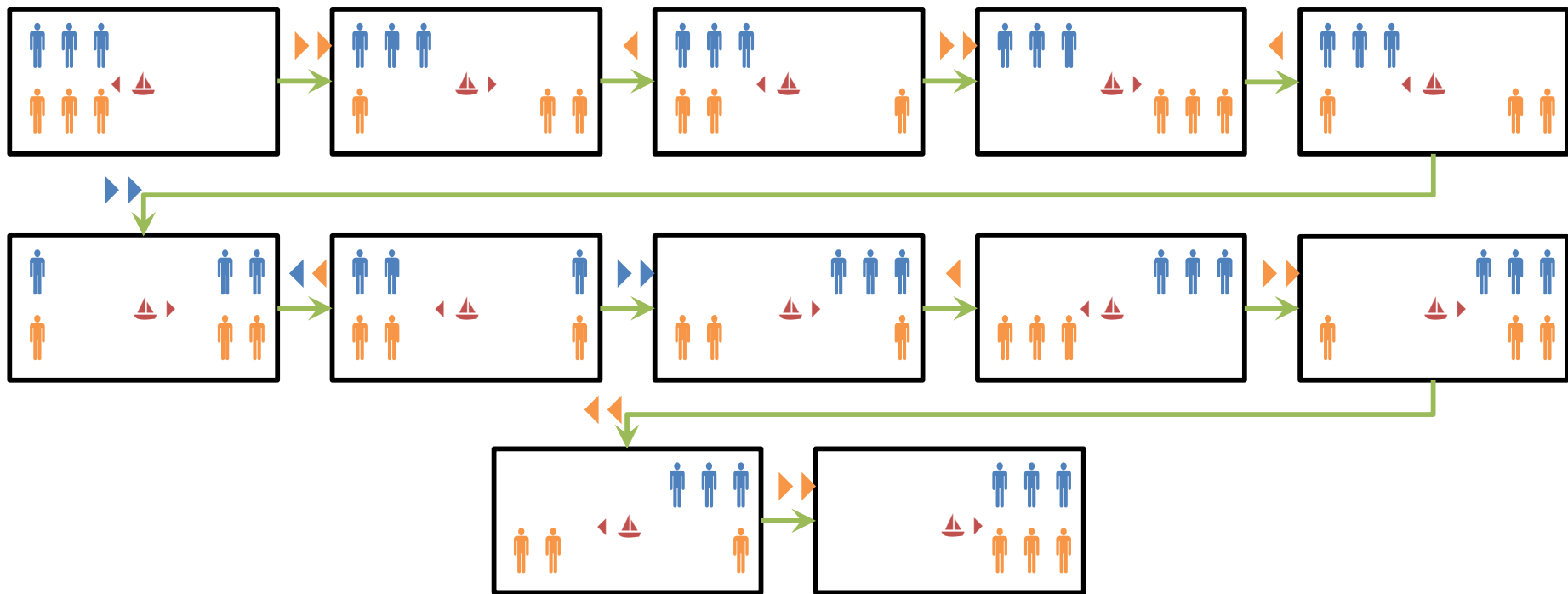




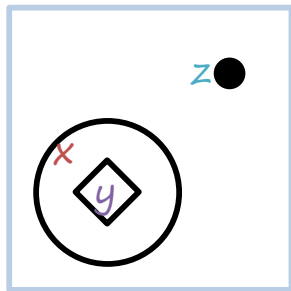




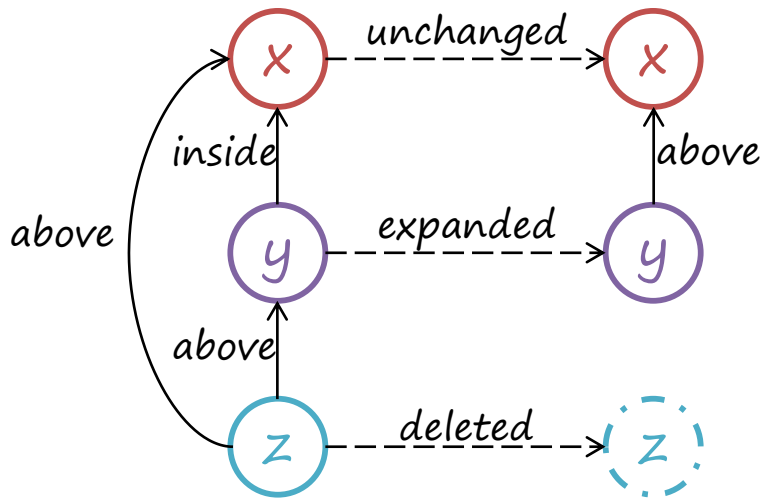
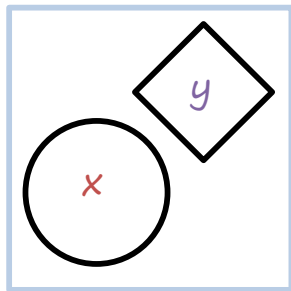
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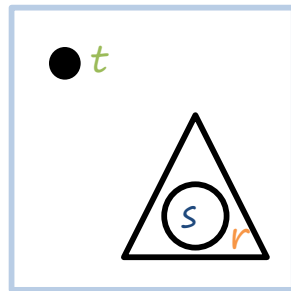
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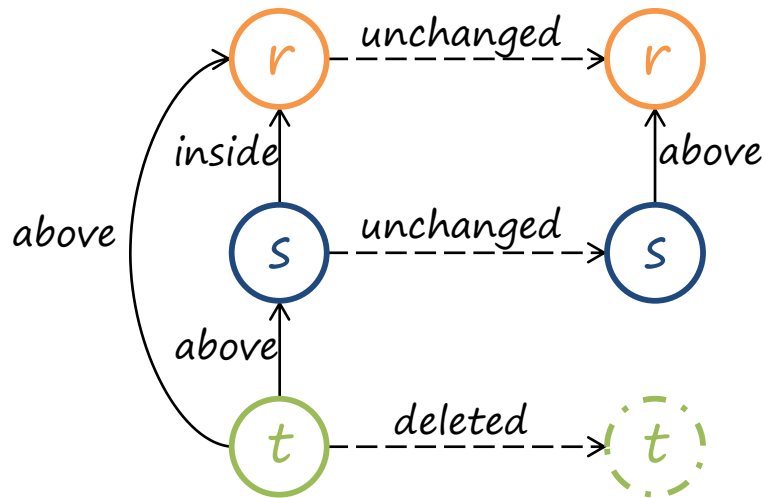
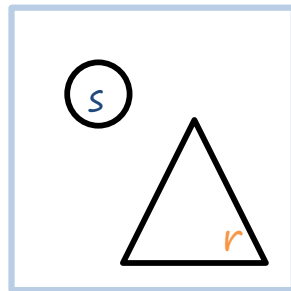
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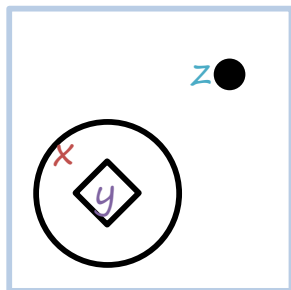
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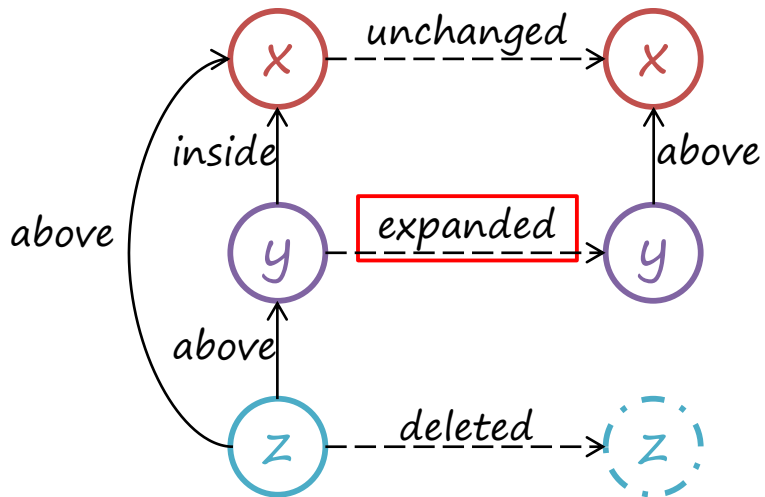
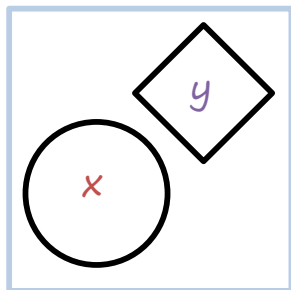
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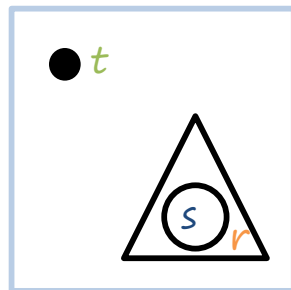
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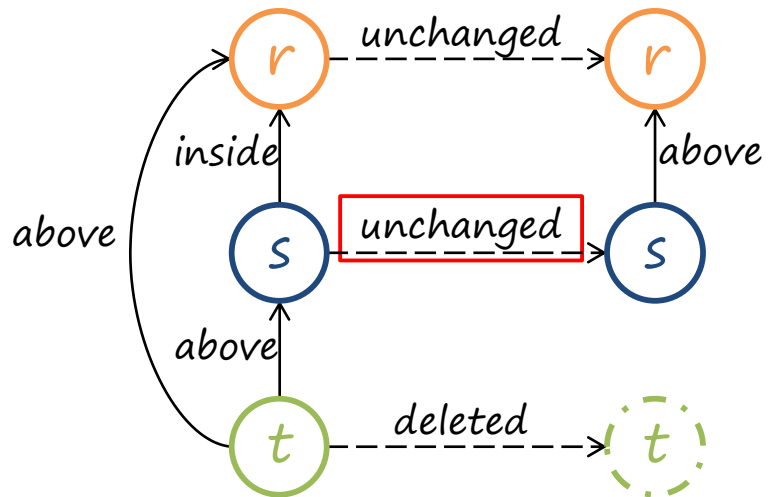
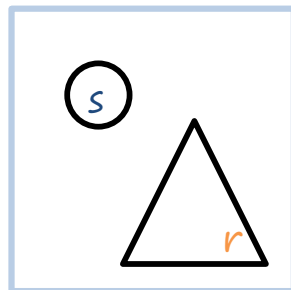
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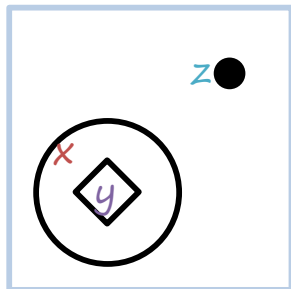
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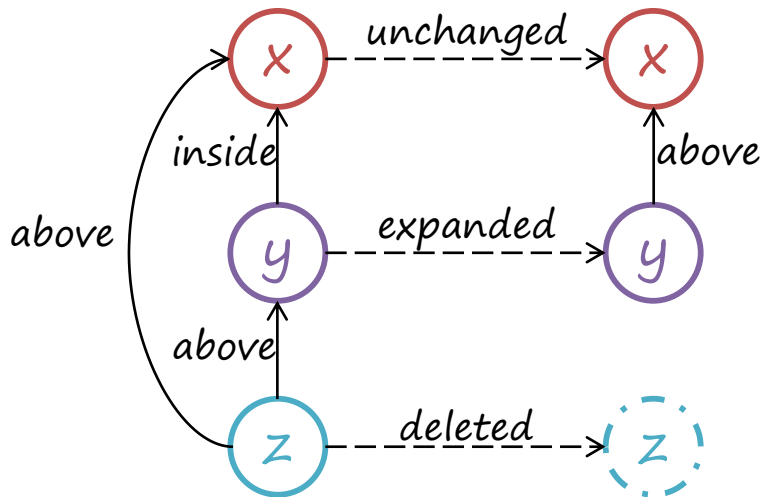
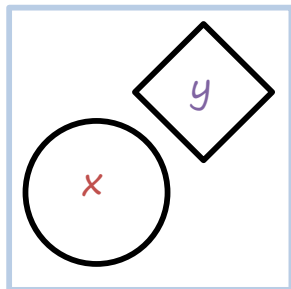
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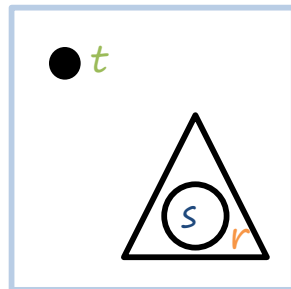
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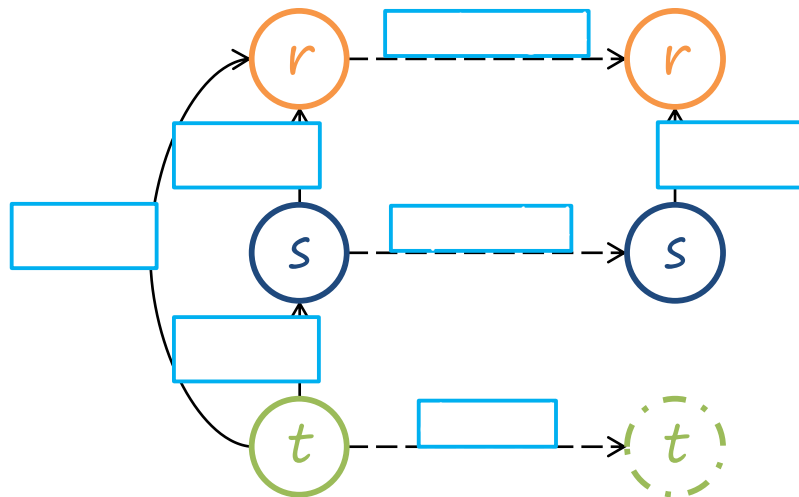
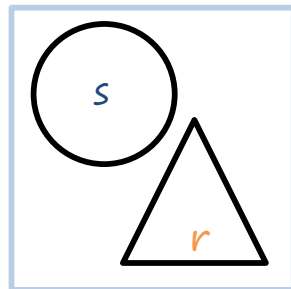
B



C

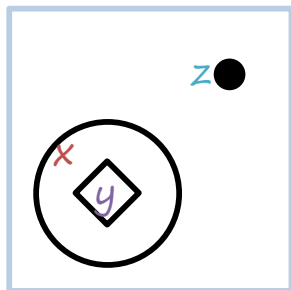


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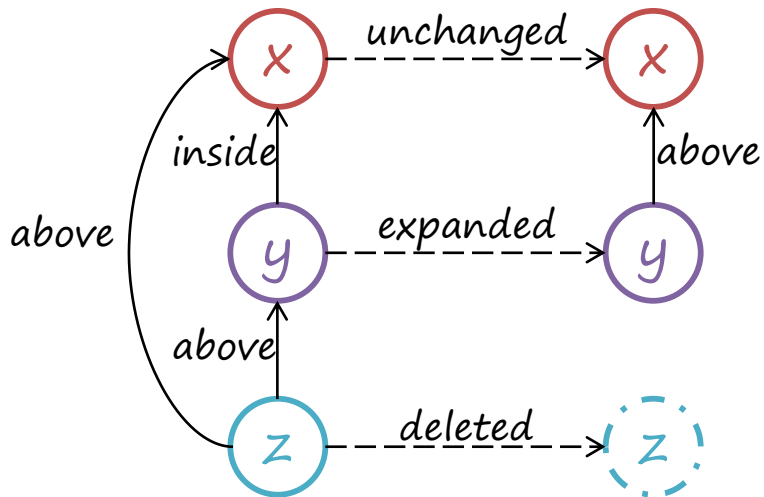
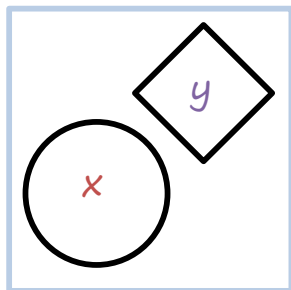


Is this the right answer to the problem? ☐ Yes ☐ No

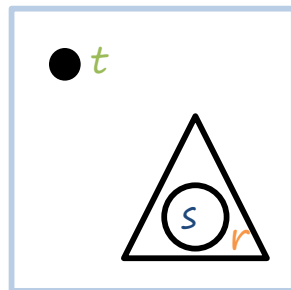
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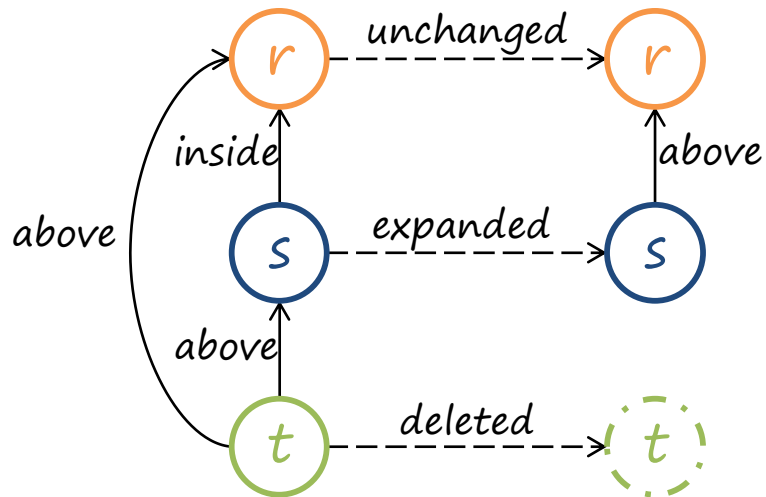
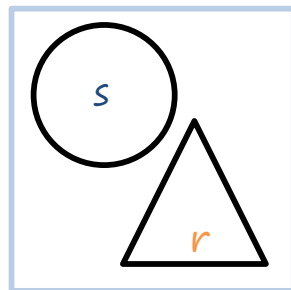
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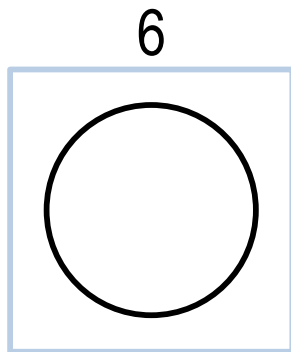
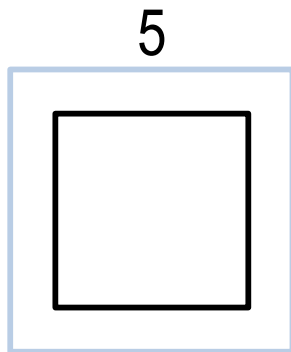
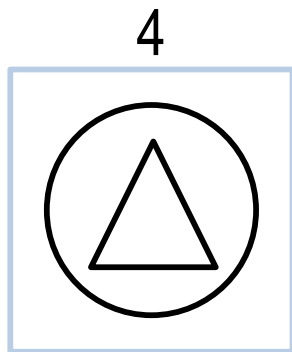
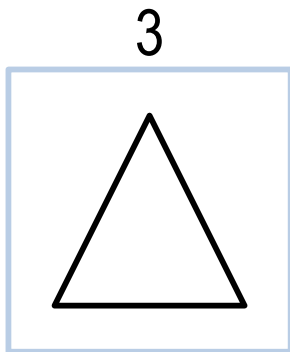
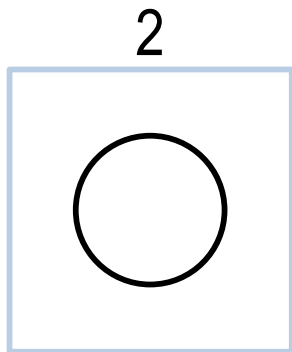
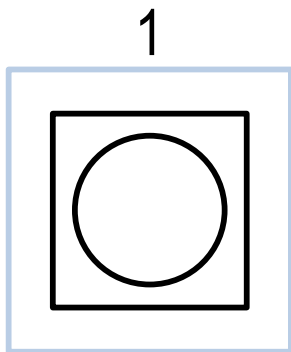
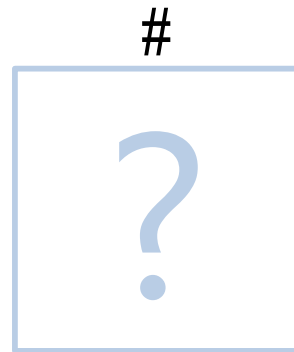
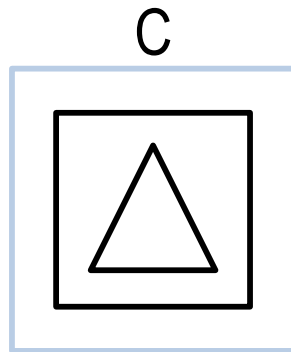
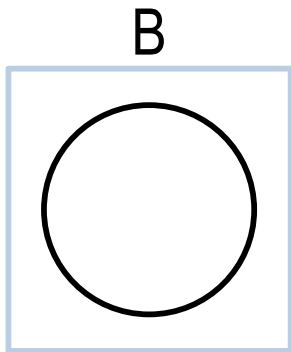
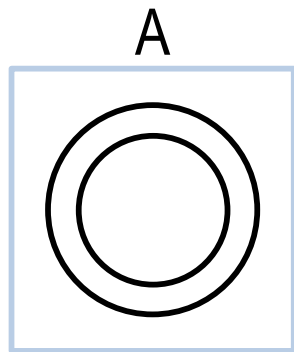
C



2



Is this the right answer to the problem? ☒ Yes ☐ No



0

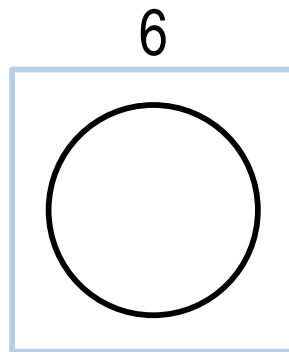
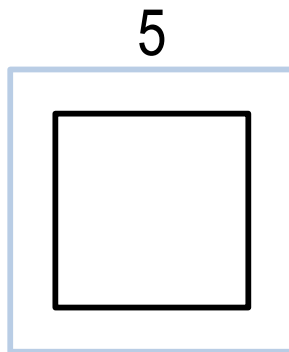
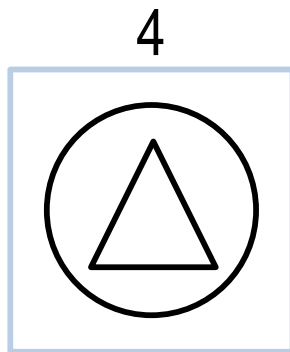
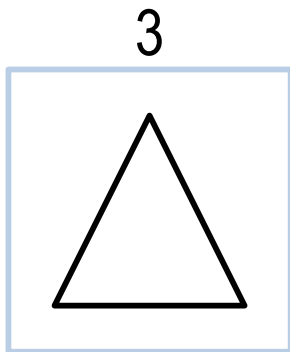
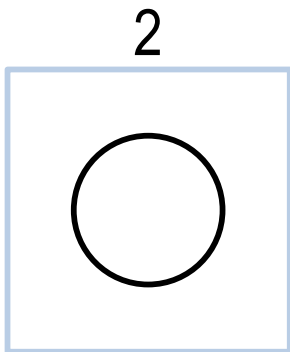
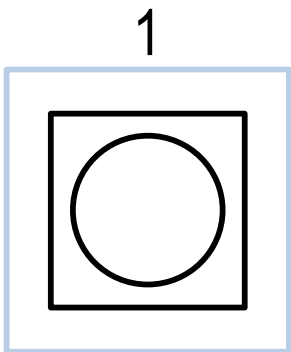
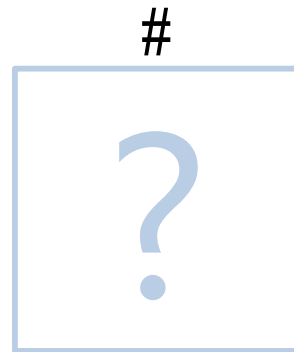
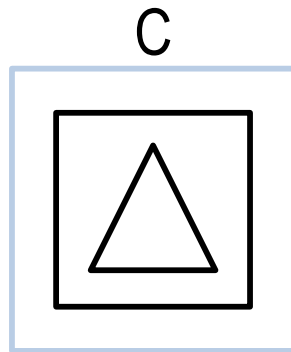
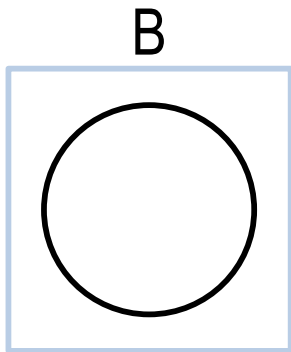
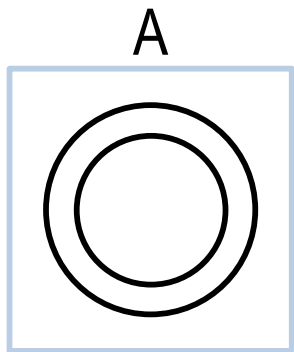
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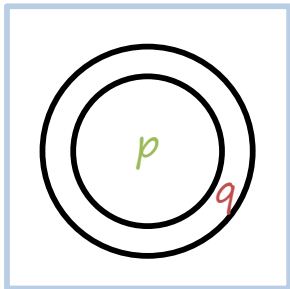
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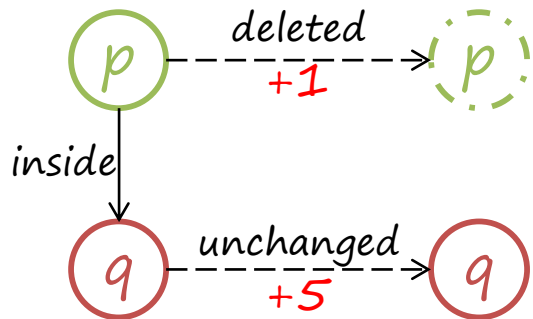
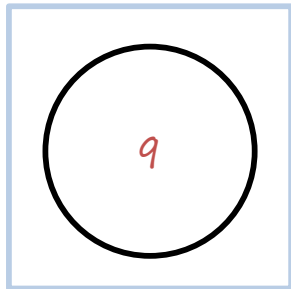
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Transformation #1

A



B



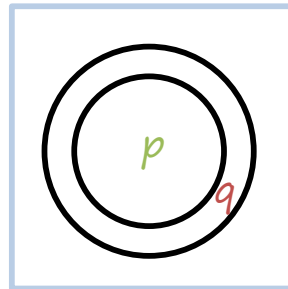
Similarity:
6 points

Similarity Weights

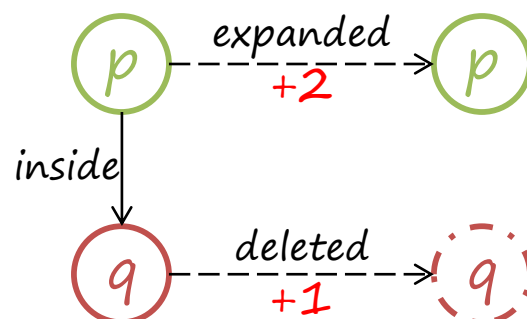
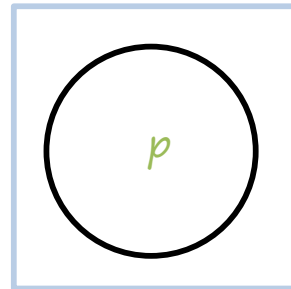
5 points	Unchanged
4 points	Reflected
3 points	Rotated
2 points	Scaled
1 points	Deleted
0 points	Shape Changed

Transformation #2

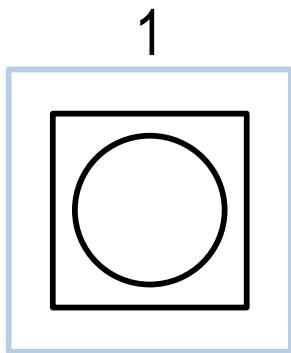
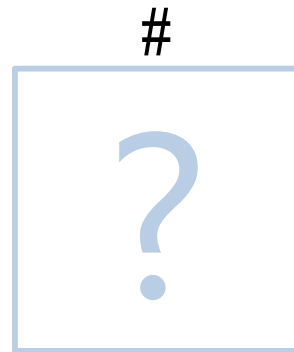
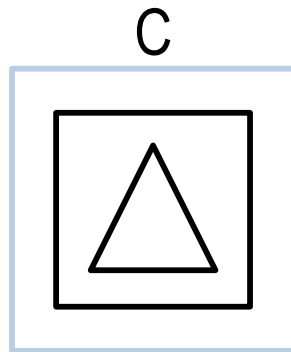
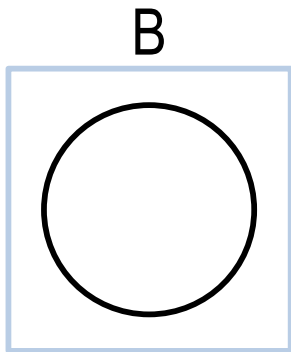
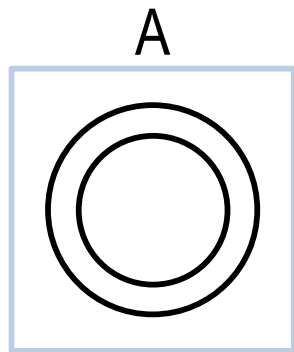
A



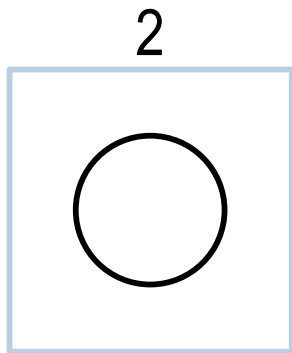
B



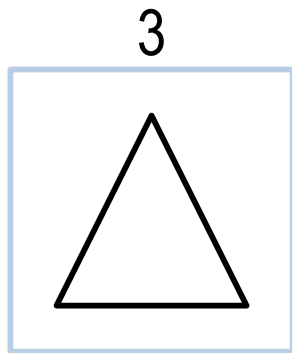
Similarity:
3 points



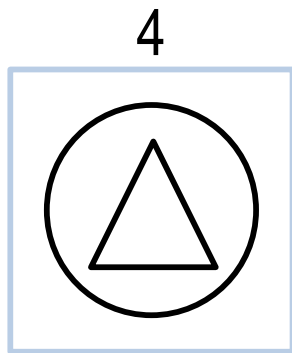
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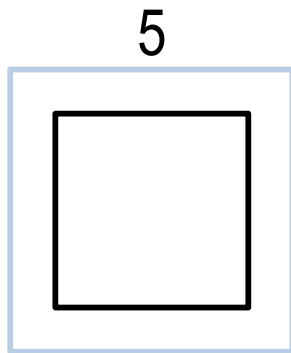
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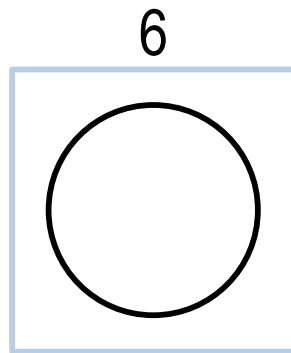
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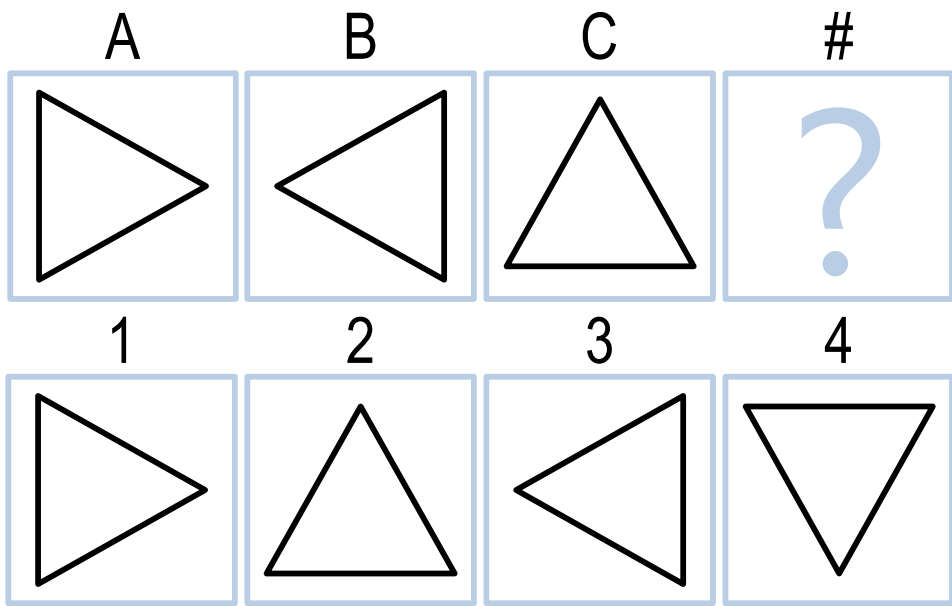
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0



0



Similarity Weights

5 points	Unchanged
4 points	Reflected
3 points	Rotated
2 points	Scaled
1 points	Deleted
0 points	Shape Changed

Assignment

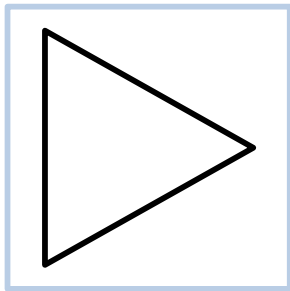
How would you use semantic networks to design an agent that can answer Raven's Progressive Matrices?

To recap...

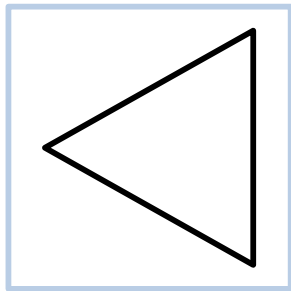
- Representations
- Semantic networks
- Represent & Reason
- Weights with Represent & Reason

What is the answer to this problem?

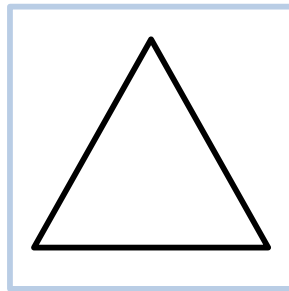
A



B



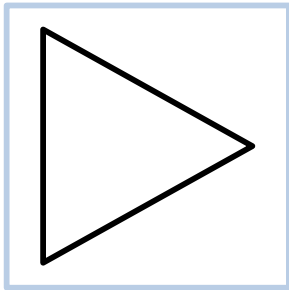
C



#

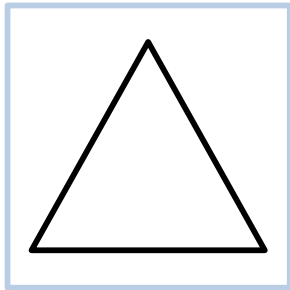


1



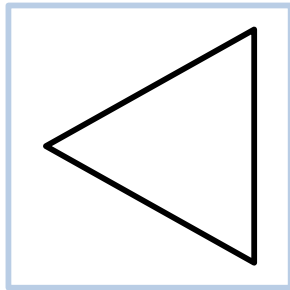
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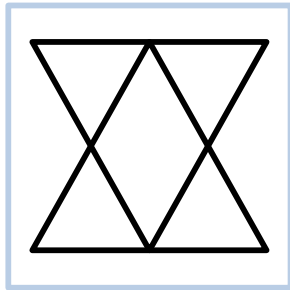
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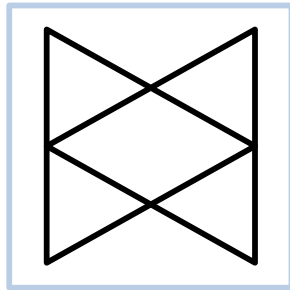
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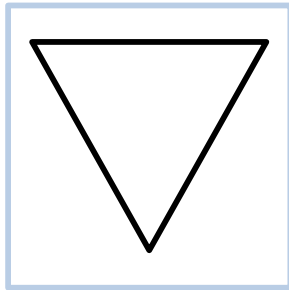
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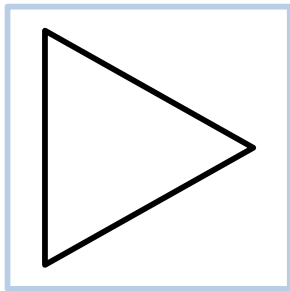
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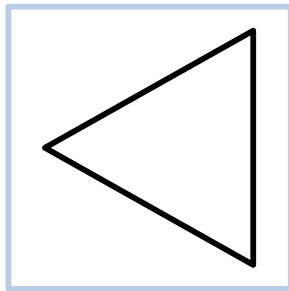
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What is the answer to this problem?

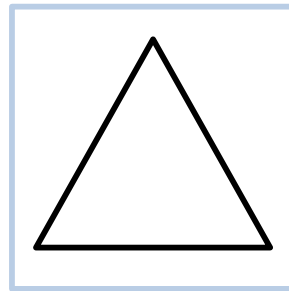
A



B



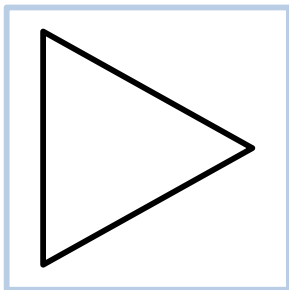
C



#

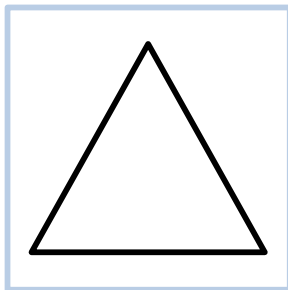


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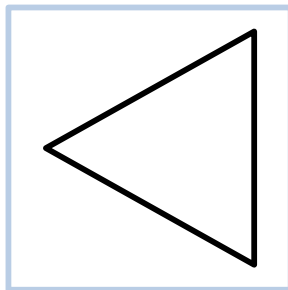


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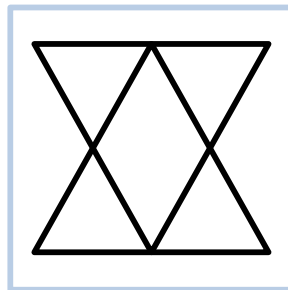


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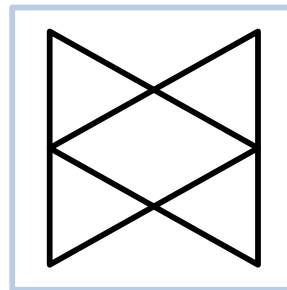
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4



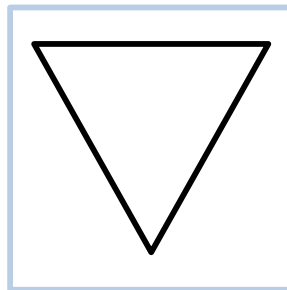
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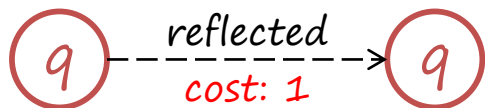
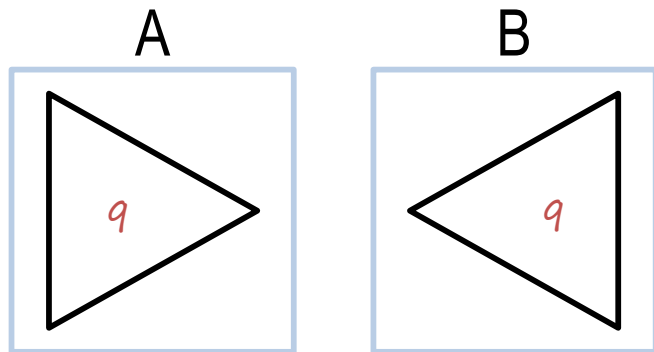


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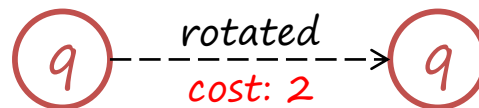
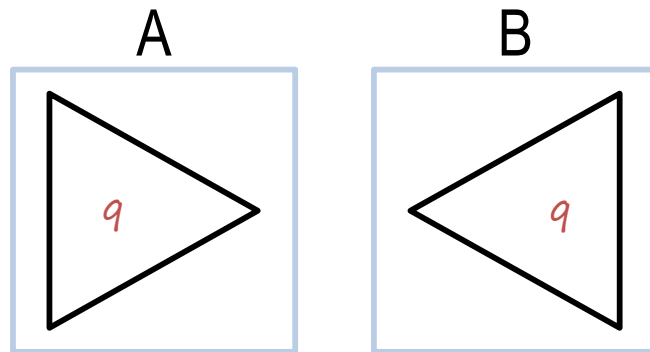
6



Horizontal Reflection

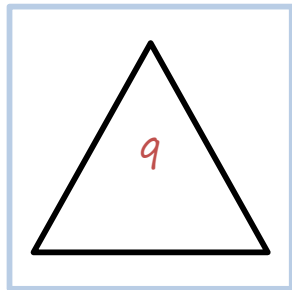


180° Rotation

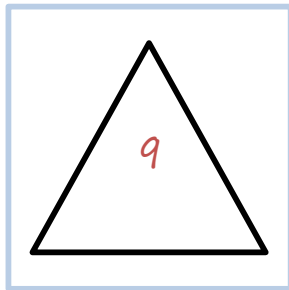


Horizontal Reflection

C

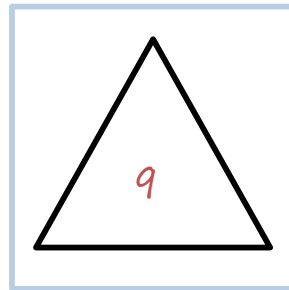


2

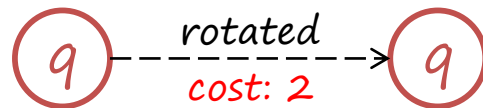
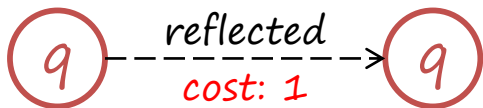
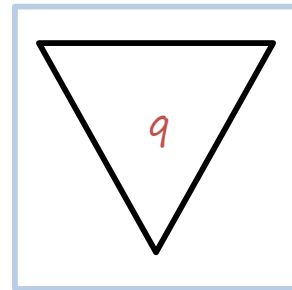


180° Rotation

C

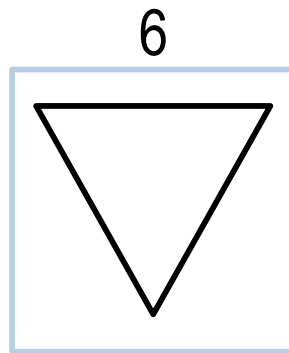
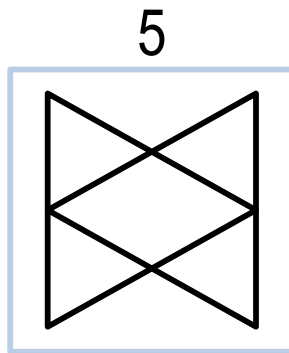
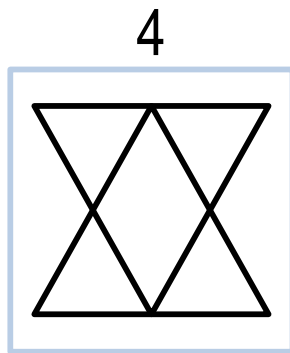
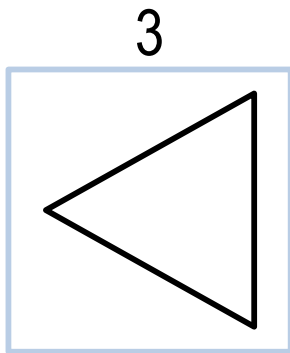
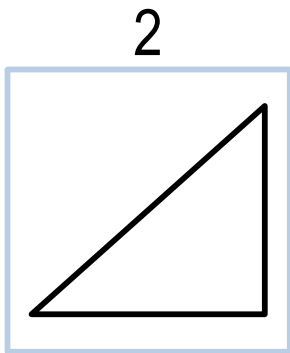
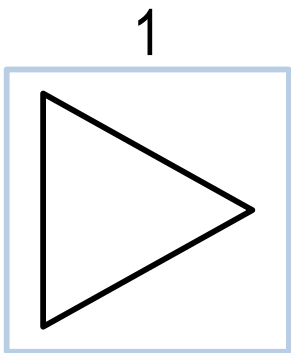
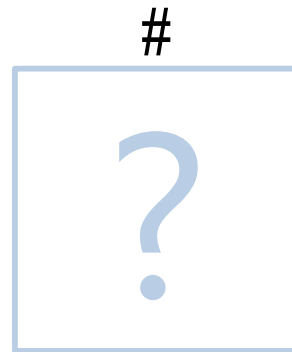
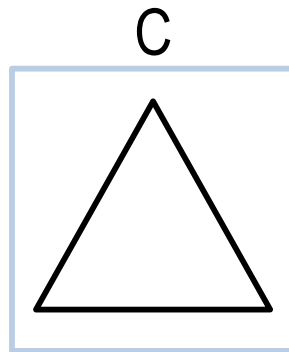
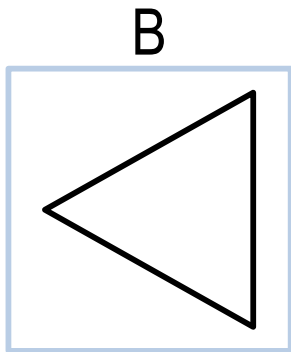
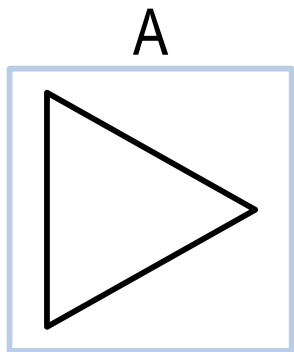


6



What would the answer be?





0

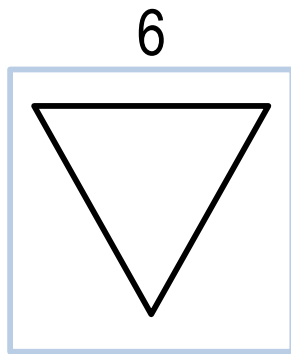
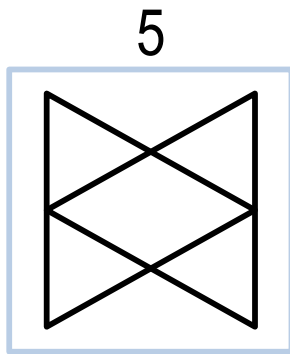
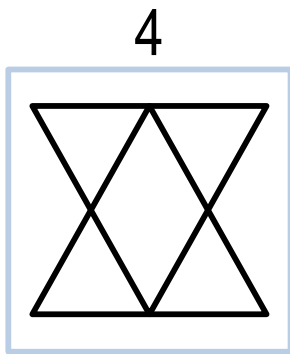
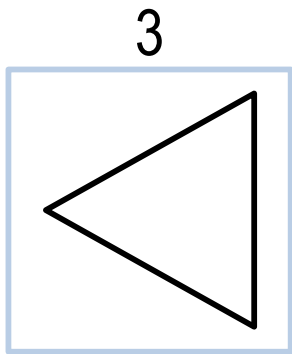
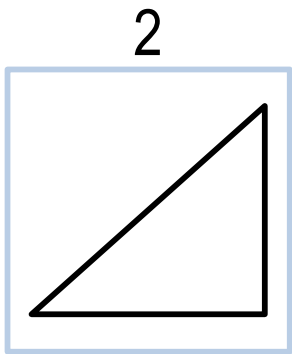
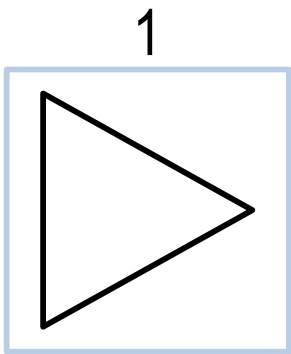
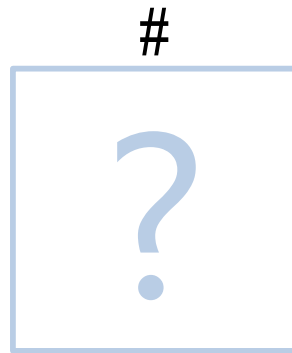
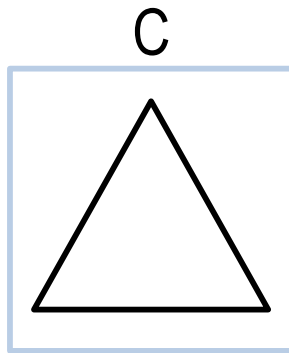
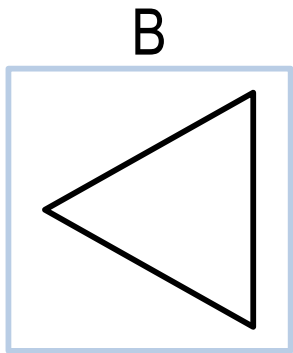
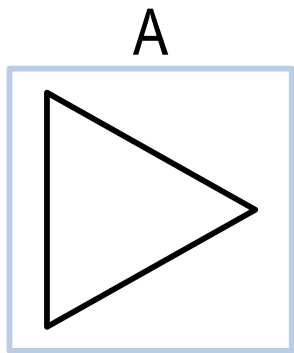
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