



GE105

Introduction to Engineering Design

College of Engineering

King Saud University

## Lecture 8.

# *Creativity: Thinking Outside the Box*

FALL 2016

# Before We Start

“The best way to have a good idea is to have **a lot of ideas.**”

Linus Pauling (Nobel Laureate)



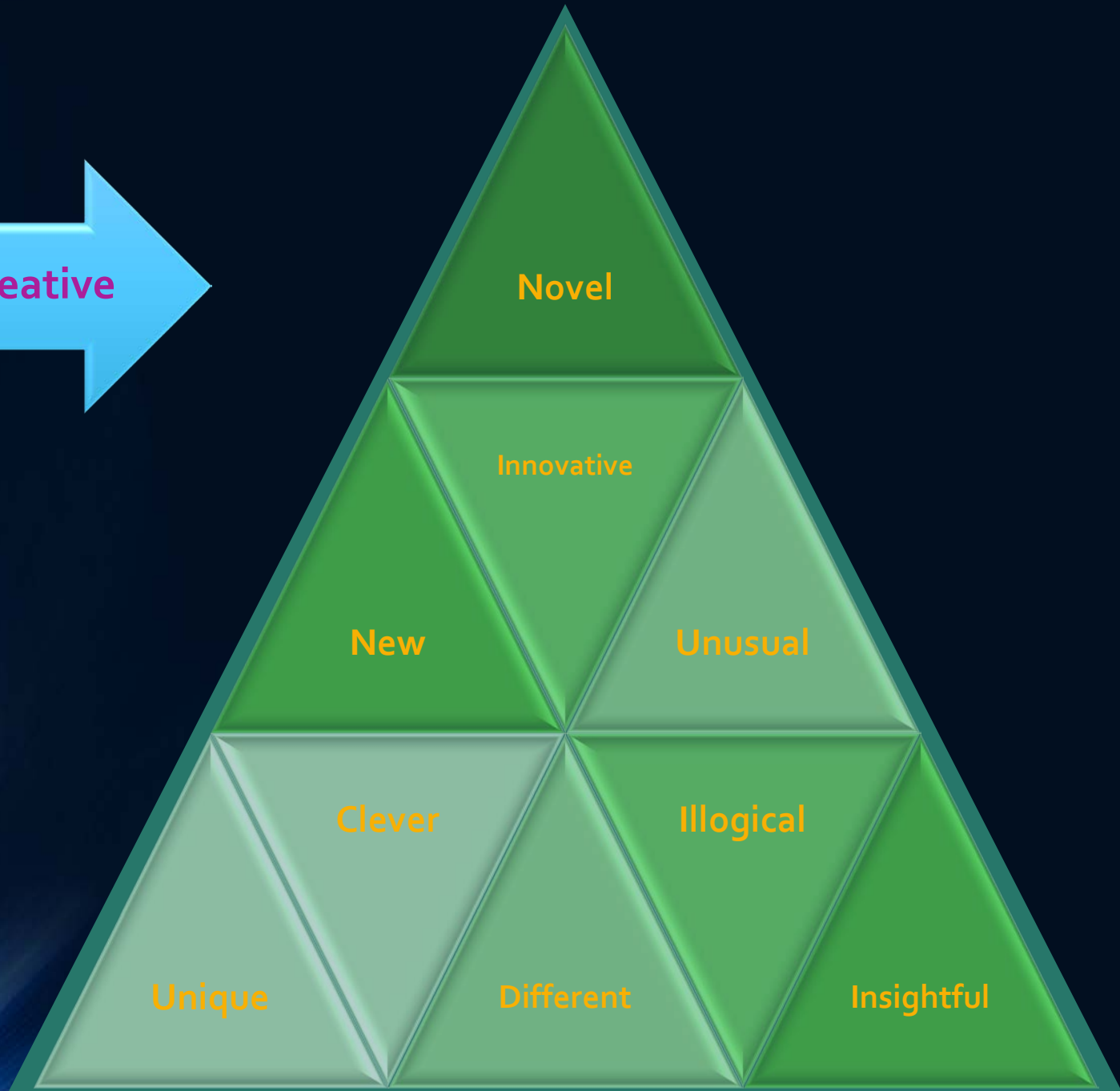
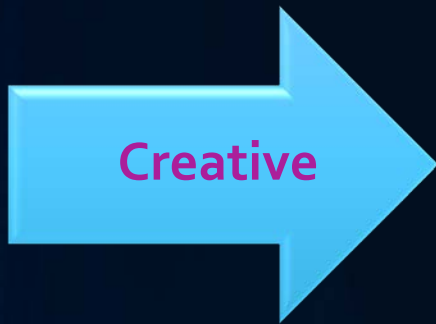
“Nothing is more dangerous than an idea when it is the **only one** you have.”

Emile Chartier (French Philosopher)

# Creativity

- A mental process involving the generation of new ideas or concepts, or new relations between existing ideas or concepts
- It is both: an art and a science
- It is doing things in a “non-normal” way





**Creativity**

**Innovation**

**Invention**

**Creativity** is the capability or act of conceiving something original or unusual.

**Innovation** is the implementation of something new.

**Invention** is the creation of something that has never been made before and is recognized as the product of some unique insight.

Creativity is a skill; innovation is a process

# Thinking Outside the Box

A “box” confines and **restricts thinking**.  
A creative person is not confined to a box,  
but sees opportunities outside the box.



## Creative thinking (Lateral)

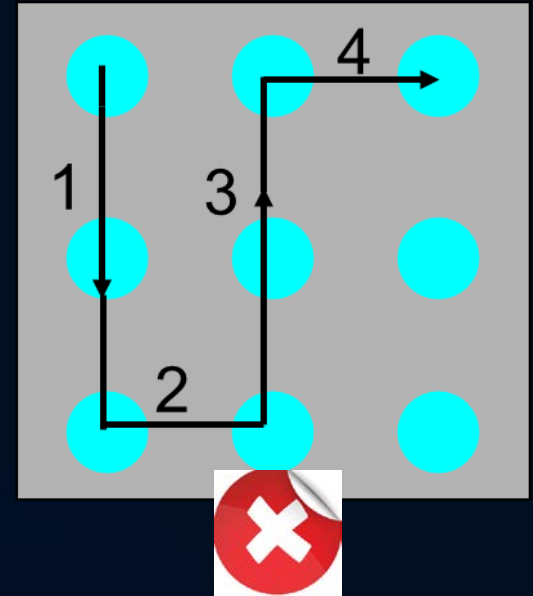
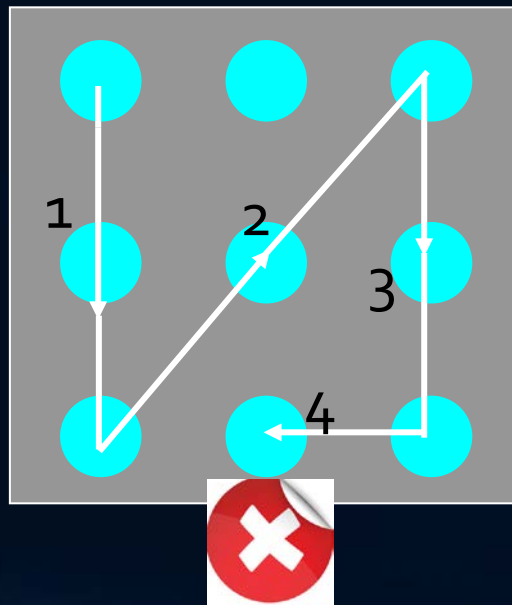
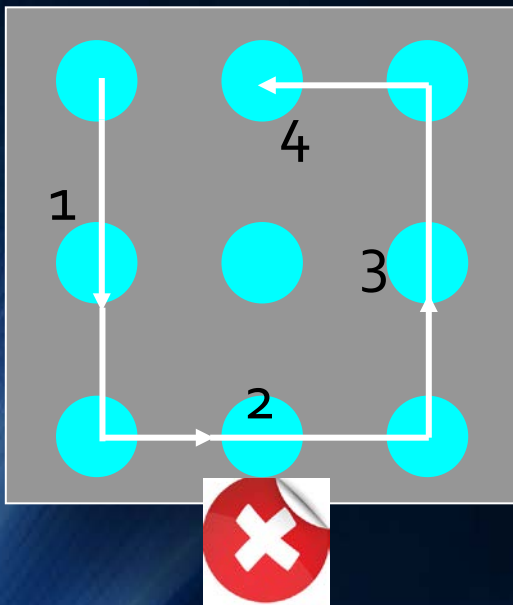
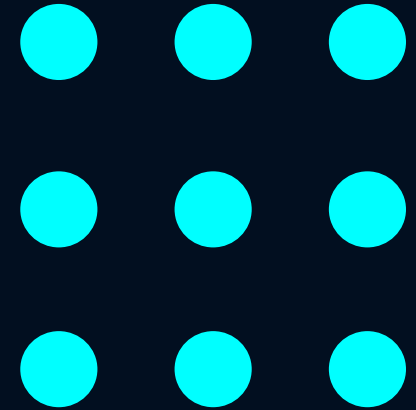
- Divergent\*
- Right brain (global, parallel, emotional, subjective)
- Synthesis

## Critical thinking (Logical)

- Convergent
- Left brain  
(analytic, serial, logical, objective)
- Evaluation

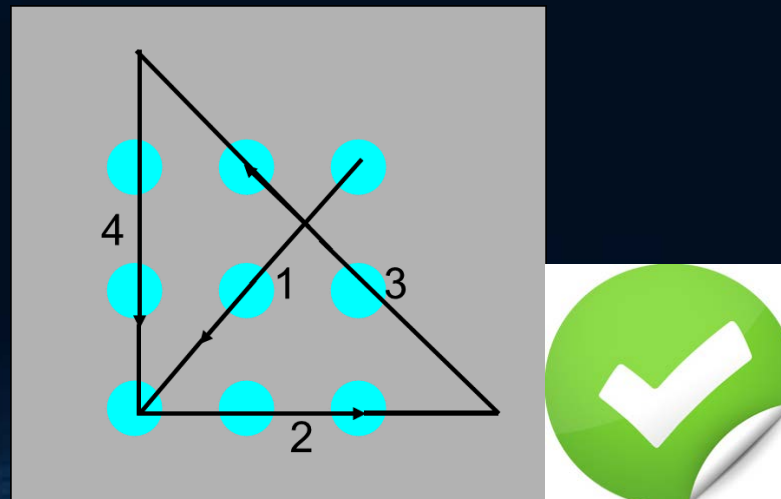
# Lateral Thinking Example

- Without lifting your pencil from the paper, draw four and only four straight lines that connect all nine dots



If you did not get the correct answer that is because:

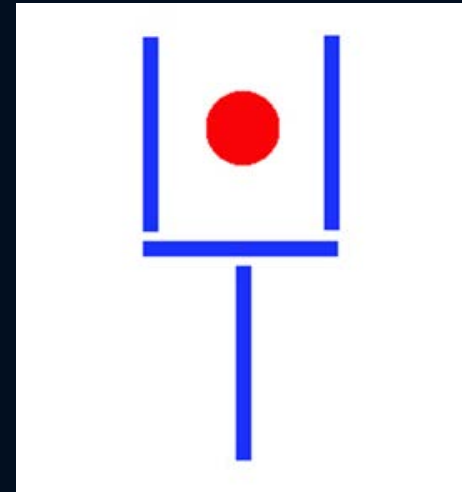
- You used logic ; you did not think outside the box
- You may have assumed that you needed to stay within the boundaries
- You made false assumptions in order to fit the problem to your previous experience



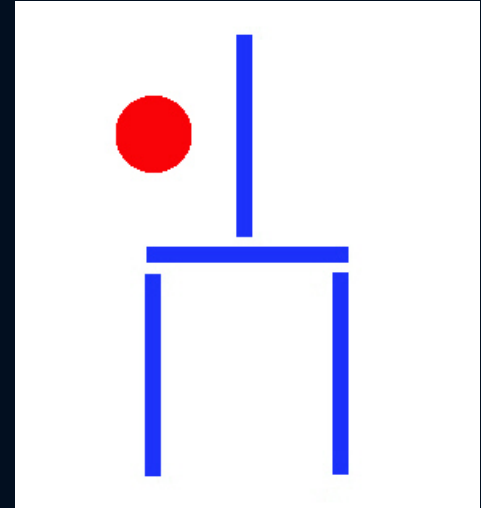
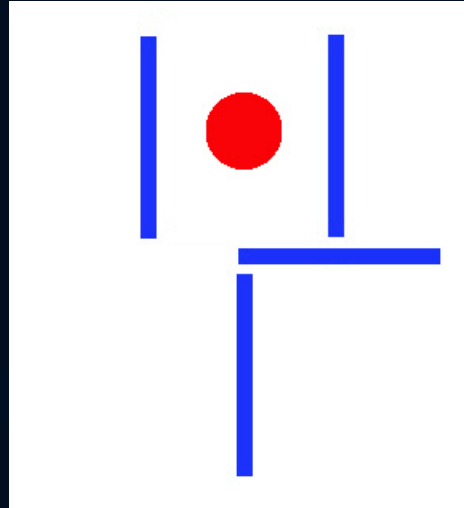
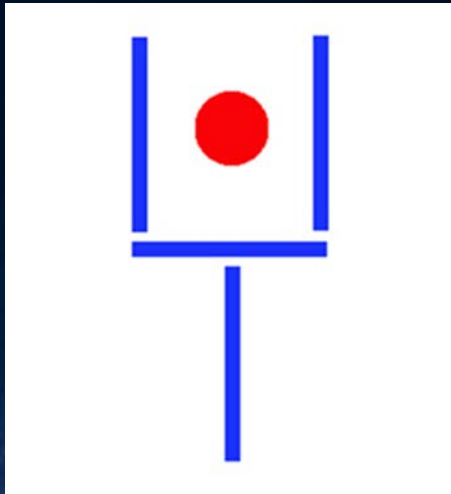


# Another Example

Think of this as a shovel  
with a coin inside. Move just  
two sticks so that the coin is  
no longer inside, but there is  
still a shovel.

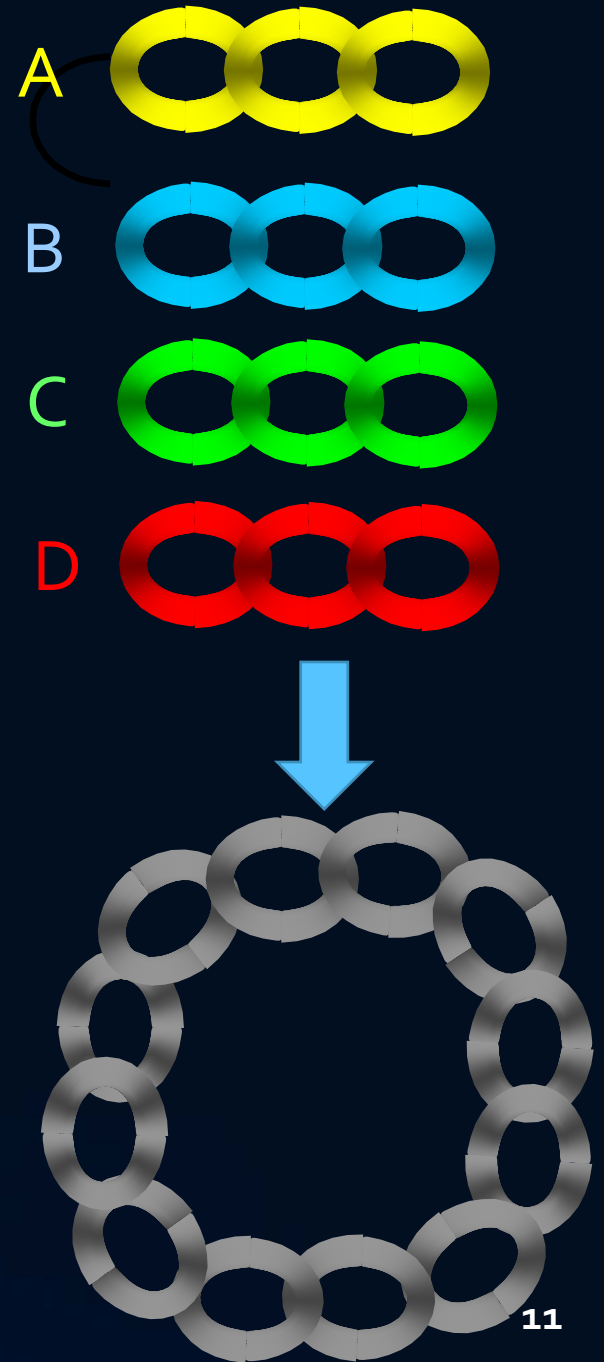


Using **lateral thinking** and thinking **outside the box**, you should get:



# A Final Example

- You are given 4 separate pieces of chain that are 3 links in length, each
- It costs 100 SR to open a link and 150 SR to close a link
- All links are closed at the beginning of the problem
- Your goal is to join all 12 links of chain into a single circle
- Your total budget for forming the single circle is 750SR.



# Solution (not creative/**not correct**)



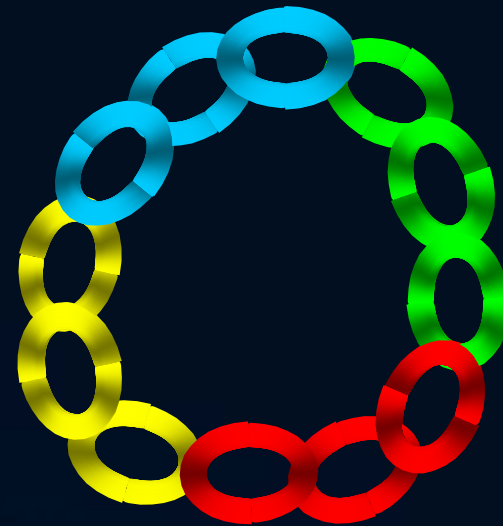
Open link of A SR100



Add B (close) (A+B) SR150



Open A + B SR100



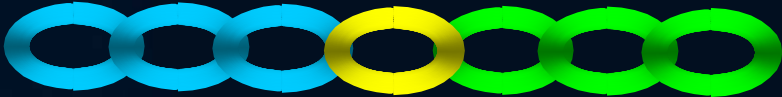
**TOTAL SR1000!**

**Not 750**

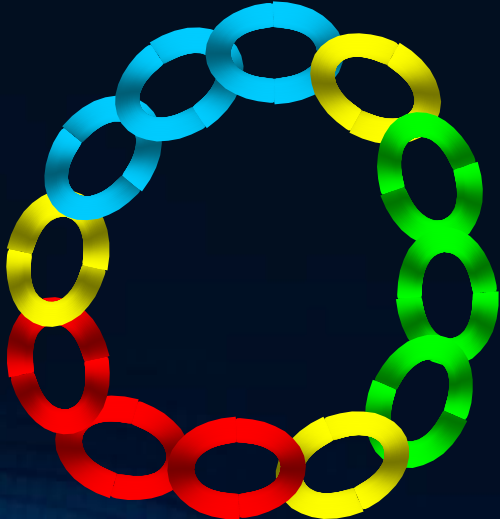
# Creative Solution

Break the assumption that when you open a link, you are limited to inserting only one link into the opening

Step 1:  Open all links in A → SR300

Step 2:  Use A to combine B+C → SR150

Step 3:  Use A to combine D → SR150

Step 4:  Use final link to combine chain SR150

Your assumption eliminated the solution



TOTAL  
\$750!!!

# Outside the Box Thinking

To be creative you need to be able to view things from different perspectives; you must have flexibility and a tolerance of ambiguity!

## Mental locks



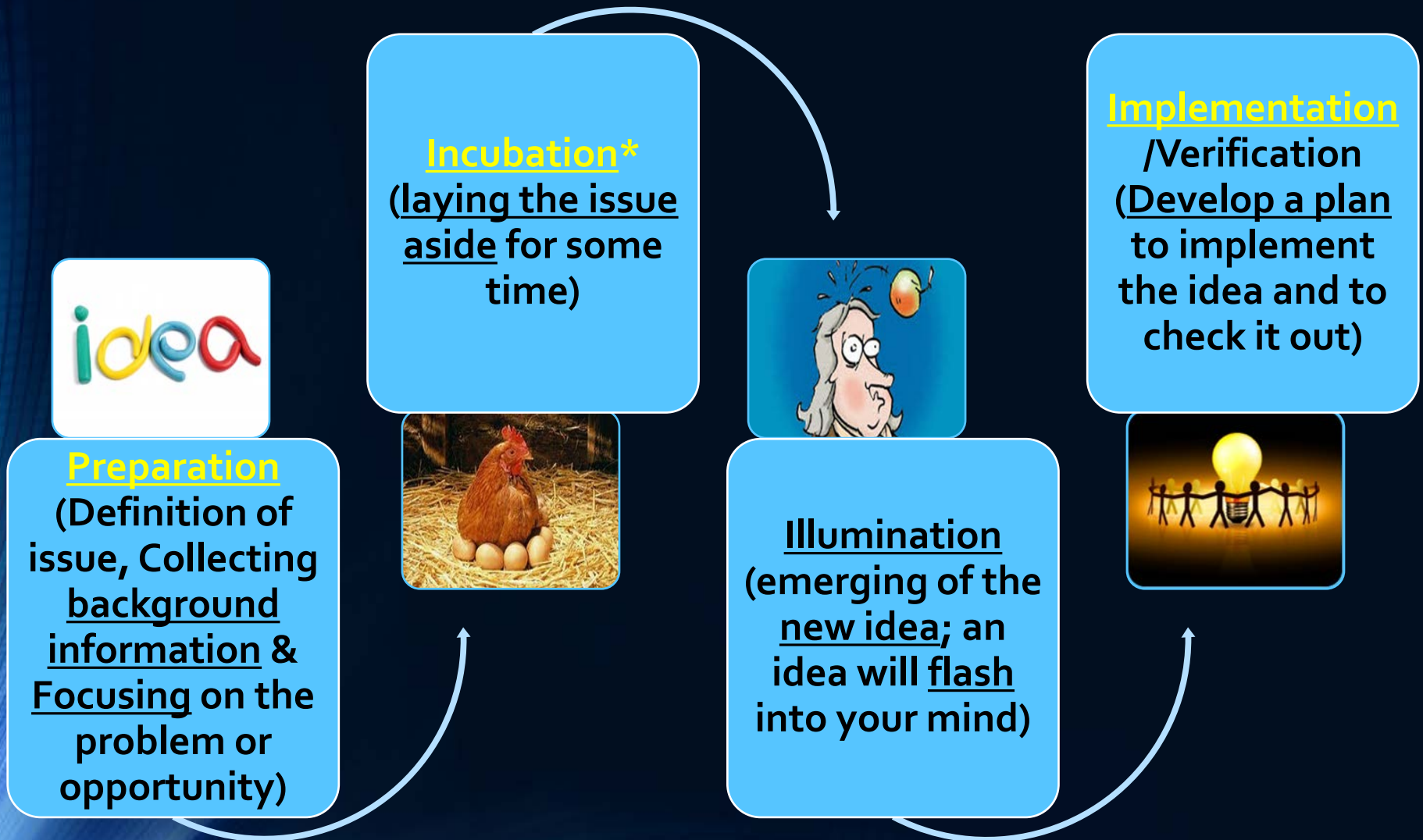
- There is one right answer
- That is not logical
- Follow the rules
- That is not my area
- Don't be foolish
- To err is wrong
- I am not creative
- Premature Judgment

## Mental Unlocks



- Think Laterally
- Don't impose assumptions
- Work when your mind is fresh
- Work fast and short periods
- Focus
- Push hard
- Have fun
- No fear

# Creativity as a Process



# Characteristics of Creative People

Achiever

Flexible

Motivated

Independent

Confident

Knowledgeable

Energetic



Skeptical

Humorous

Adaptable

Tolerant

Open-minded

Dreamer

Persistent



# Some Final Thoughts

- Creativity must be experienced, to be understood

## Hints to becoming more creative

- Hangout with creative people
- Practice mental drawing
- Keep a journal\*
- Keep an open mind
- Maintain a positive attitude
- Try new things
- “Think Outside the Box”
- Practice creativity-enhancing exercises
- Stay alert for opportunities



## Watch this video on creativity

- Only 3% of people pass this creative test, can you?

<https://youtu.be/aH2ll5bwpKw>