

BIRDEE Unit 1 Lesson Plans

1.5.4. Conceptual Design 3: Morpho Matrix for the Design Challenge

Students will use the morphological matrix to ideate design ideas for the design challenge. They will then combine an idea from each function into a conceptual design and evaluate that idea in terms of their product requirements. Students will create their third conceptual design.

Engage: 5 min

View: [1.5.4. BID Ideation](#)

- You are designing and creating a new drone. This drone must be able to carry packages as big as a box of crayons, but small enough to be sneaky. What in nature could you draw inspiration from for your new drone?
- List three organisms that could inspire your drone. Sketch the structure of these organisms that allows them to fly and be sneaky. How are these structures different from each other?
- **Class Discussion** on what students brainstormed

Now, we are going to ideate and create a conceptual design. Remember, if you use biology to follow the BID steps, do your biological concept selection and biological design integration.

View: [BIDI Graphic](#)

Explore: 20 min (*Individual worksheet but work in Group*)

Morphological Matrix

Use the first page of your [1.5.4 Morphological Matrix](#) worksheet and begin filling in functions your solutions needs to be able to achieve. Functions can be taken from EDPL requirements, [1.5.1. Identify the Client's Problem Part II](#), or [1.3.1. Identify and Define the Client's Problem](#) (all these worksheets have functions your solution should have on them).

Then, begin brainstorming a range of different ways each function could be achieved. Include a description and a sketch for each idea. Remember to look at existing thermal regulation and thermoregulation solutions. Also, what animals in nature could inspire ways to achieve each function?

Explain: 5 min

Now that you have different structure ideas for each function, combine a structure idea from each row into a conceptual design. Then, you will evaluate that design and create another design from your matrix based on your evaluation. Even if your ideas seem like they are crazy or like

Student Handouts:

[1.5.4. Morphological Matrix](#)

Student Materials:

N/A

Instructional PPT's & Materials:

[1.5.4. BID Ideation](#)

Teacher Resources:

N/A

Web Resources:

[BIDI Graphic](#)

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they won't go together well, you should still try it because you never know, some of the best ideas happen by accident!

Explore: 20 min

Combination of morpho matrix: *(Individual)*
Creation of third conceptual design: *(Group)*

Work on pages 2 and 3 of your worksheet. Your first combination of ideas from the morpho matrix will be chosen randomly (**Teacher Note:** *teacher can provide dice for the students to use to make sure they choose their structures randomly, if desired*). The second combination you will choose the structures while considering how the structures will interact in the final design. Consider how both combinations address the problem requirements and the strengths and weaknesses of each combination. Lastly, share your design ideas and its strengths and weaknesses with your group and create your third conceptual design.

Teacher Note: *The teacher can also have each group share their design with another group or with the class, if there is time.*

Extend: 10 min *(Group)*

EDPL: Log your third conceptual design in the EDPL Ideate section.