NAME: _____ DATE:_____ CLASS:_____

From Inspiration to Application Student Notes Sample Answers

Directions

As you learn about translating biological strategies into useful design strategies, use the questions below to organize and summarize your learning in your own words.

1. What is a biological strategy?

   How an organism or living system meets a functional need.

2. What is a design strategy?

   How a designed element meets a function.

3. How can you create a bio-inspired "design strategy" out of a "biological strategy"?

   I can take the key relevant information from the biological strategy and describe it without using any biology-specific terms.

4. What are four helpful steps for creating a bio-inspired "design strategy" from a "biological strategy"?

   1. Summarize the biological strategy and/or draw a sketch of it.
   2. Identify key words and concepts that capture how the strategy meets its function in context.
   3. Translate the key words and concepts into general terms.
   4. Write a statement that describes the strategy without using biology terms.

NAME: _____ DATE:_____ CLASS:_____

From Inspiration to Application Student Notes, continued

5. Underline or highlight the key words and concepts in this summary about the jackrabbit's biological strategy for regulating its body temperature:

   The desert-dwelling jackrabbit can overheat when its body temperature exceeds the ambient temperature. The flat surface of the jackrabbit's ears is important for heat convection, but heat release isn't entirely passive. The ears are full of blood vessels that dilate, or open up, in order to dissipate heat generated by the body. This process reduces the need for evaporative cooling mechanisms (like panting or sweating), and so is an important water-conservation technique in arid climates. At air temperatures around 30°C (86°F), convection from the ears can shed the animal's excess metabolic heat. And when ambient temperatures fall below its body temperature, the jackrabbit can constrict blood flow to its ears.

6. Using the key words you underlined in #5, write the key concepts from the jackrabbit's biological strategy in the left column. Then, in the right column, restate those concepts without using any biological terminology. (Hint: Some of the words may not change.)

From Biology Concepts to Design Concepts

Biological Strategy Key Concepts	Design Strategy Key Concepts
Heat convection	Heat convection
Flat surface full of blood vessels	Thin membrane with small tubes carrying liquid
Vessels that dilate to dissipate heat	Tubes that open to dissipate heat
Vessels that constrict to conserve heat	Tubes that close to conserve heat

NAME: _____DATE:_____CLASS:_____

From Inspiration to Application Student Notes, continued

7. Use the key concepts you recorded in the design strategy column of the chart on the previous page to write a design strategy based on the jackrabbit's biological strategy.

The temperature of an object can be regulated using heat convection by having a system of small tubes that carry liquid from the object through a thin membrane. When the object is hot, the tubes allow the heat to dissipate from the liquid into the cooler air. When the object is cold, these tubes can close to prevent heat loss.