**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ # \_\_\_\_\_\_\_ Biology Exploration Guide**: Cell Metabolism #4

 Thermoregulation and Energy Budgets



**Key Concepts**:

* Feedback control maintains the internal environment in many animals
* Energy requirements are related to animal size, activity, and environment
* Feedback circuits regulate digestion, energy allocation, and appetite

**Read:**

* Chapter 40.2- 40.4

**Key Terms**: Here is a list of key terms and concepts you will hear about and see during the chapter readings. Get to know them!

|  |  |  |  |
| --- | --- | --- | --- |
| *Thermoregulation* | *Countercurrent exchange* | *Metabolic rate* | *Energy budgets* |
| *Endothermic* | *Circadian rhythms* | *Basal metabolic rate (BMR)* | *Homeostasis* |
| *Ectothermic* | *Bioenergetics* | *Standard metabolic rate (SMR)* | *Feedback Control* |
|  |  |  |  |

**Questions:**

**Feedback Control (40.2)**

1. Distinguish between positive and negative feedback.
2. What are circadian rhythms?
3. Make a claim and provide evidence using Fig 40.9 in your book

**Thermoregulation (40.3)**

1. What is ***thermoregulation***?
2. Describe the difference between ***endothermy*** and ***ectothermy. G***ive an animal that exhibits each.
3. What are the four processes by which heat is exchanged with the environment? Use Figure #1 (next page) to name and explain each process. (Cut out Figure #1, LABEL it, and place it in your notebook)
4. Discuss how each of the following are involved in thermoregulation:
	1. fur/feathers adipose tissue
	2. goose bumps
	3. vasodilation/vasoconstriction
	4. panting/sweating
	5. burrowing/sunning
5. Heat loss in extremities is reduced by countercurrent exchange (text- p. 884). Use Figure #2 (next page) to explain how countercurrent exchange works. (Cut out Figure #2, LABEL it, and place it in your notebook)
6. What is the role of the hypothalamus in temperature regulation?

**Energy Requirements (CH 40.4)**

1. Define ***metabolic rate*** and identify what units it is measured in.
2. Distinguish between ***basal metabolic rate*** (BMR) and ***standard metabolic rate*** (SMR). Identify the broad categories of animals to which each term applies.
3. What is the relationship between BMR and body mass? (See Fig 40.21)
4. The energy required to maintain each gram of body mass is much greater for a mouse than for an elephant. What can you conclude about the metabolic rates from the mouse and the elephant?

**FIGURE #1**



**FIGURE #2**

