Raptor Migration Modeling Prompts

Learning Task for Grades 10th - 12th
Subject Areas: Physics

Prepared by Russell K. Columbus

OVERVIEW & PURPOSE

As part of an energy unit, these prompts are designed for students with a good understanding of scientific modeling.

This prompt is used about ⅔ of the way through the semester, so students already have plenty of practice with their skills and a solid foundation to build on. By introducing the concepts of migration at this point, students are challenged to demonstrate deep understandings and make multiple connections.

STANDARDS ALIGNMENT

1. Next Generation Science Standards (NGSS)
    a. HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.

ADDITIONAL RESOURCES & REFERENCES:

Michigan Modeling Instruction: https://www.mimodelinginstruction.org/

Lesson plan Russell K. Columbus, template by Richard Bacolor
Michigan Raptor Migration Teaching Network, Learning Community 2024
For more information and additional resources, visit
https://www.hmana.org/mrmtn/

Live raptor program in the classroom! https://www.miavianexperience.org/

ACTIVITY:

Energy Modeling Prompt
Almost all energy on Earth comes from the Sun and returns to outer space as heat. One way that this can be easily demonstrated is by a simple trophic level diagram (sometimes called a “food pyramid”)

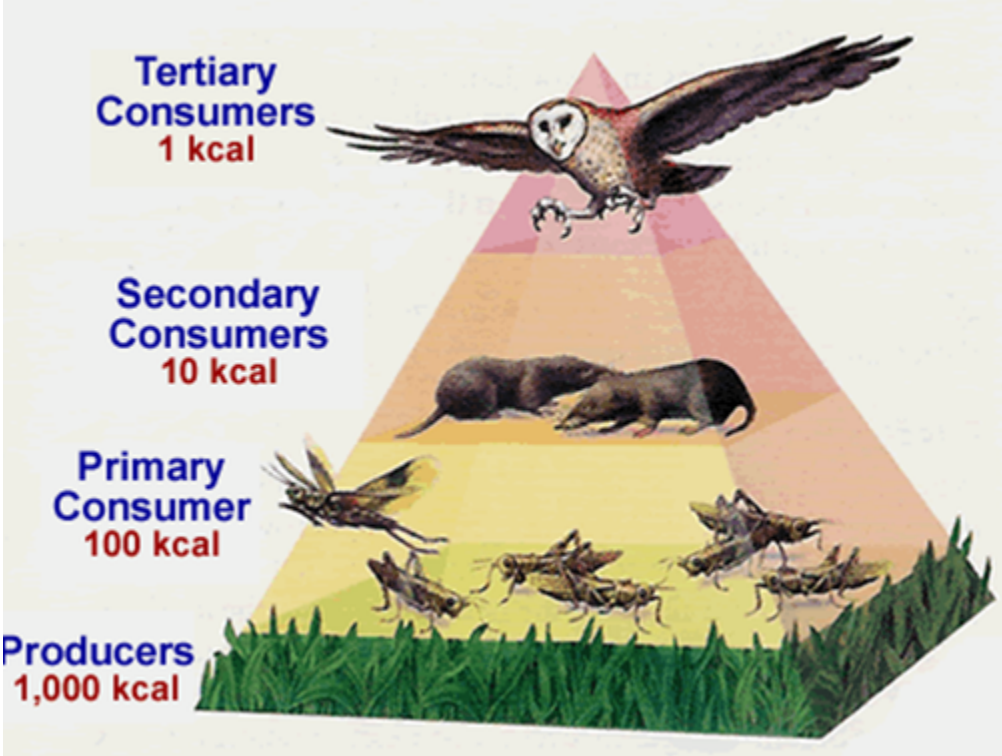
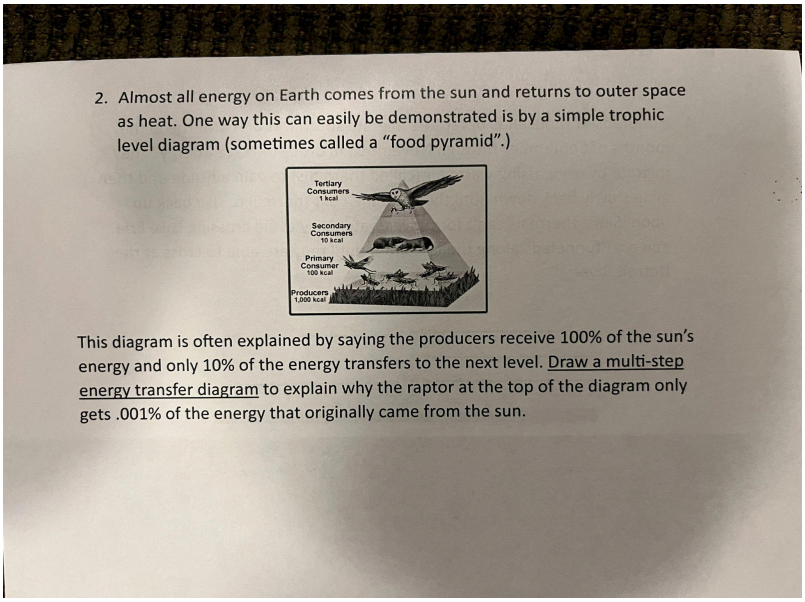


Image: https://images.app.goo.gl/qExTGisRpxd2tPfC8

This diagram is often explained by saying the producers receive 100% of the sun’s energy and only 10% of the energy transfers to the next level. Draw a multi-step energy transfer diagram to explain why the raptor at the top of the diagram only gets .001% of the energy that originally came from

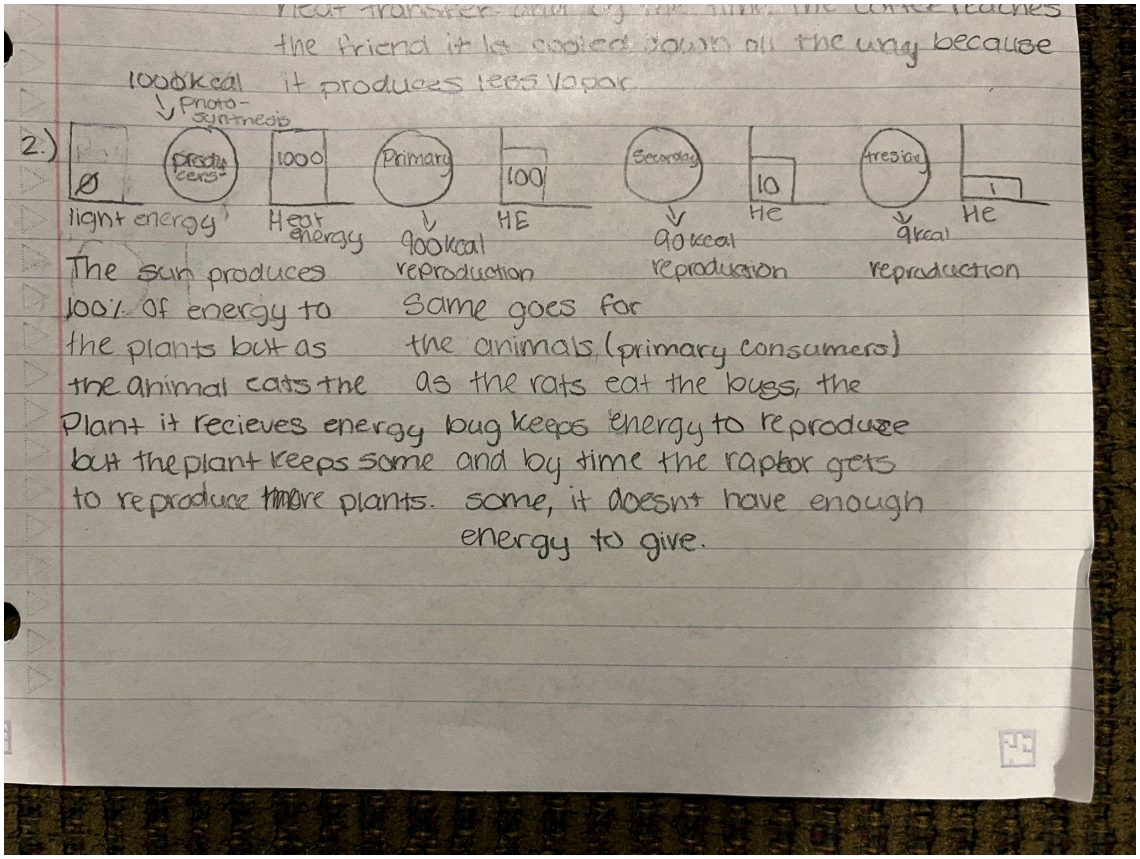
Example:



2. Almost all energy on Earth comes from the sun and returns to outer space as heat. One way this can easily be demonstrated is by a simple trophic level diagram (sometimes called a "food pyramid".)

This diagram is often explained by saying the producers receive 100% of the sun's energy and only 10% of the energy transfers to the next level. Draw a multi-step energy transfer diagram to explain why the raptor at the top of the diagram only gets .001% of the energy that originally came from the sun.

Student Work Sample:



Assessment or Rubric

Energy Modeling Rubric

CATEGORY	Exceeds Expectations 4 (A/B)	Meets Expectations 3 (B/C)	Approaching Expectations 2 (D)	Below Expectations 1 (F)
System	Student can identify all the parts of the system present in complex energy transfers.	Student can identify all the parts of the system present in simple energy transfers.	Student can identify most of the parts of the system present in simple energy transfers.	Student cannot identify many of the parts of the system present in simple energy transfers.
Energy Transfers	Student can identify each type of energy present in each step and correctly quantify the amount of energy present in complex energy transfers.	Student can identify each type of energy present in each step and correctly quantify the amount of energy present in simple energy transfers.	Student can identify each type of energy present in each step and but cannot correctly quantify the amount of energy present in simple energy transfers.	Student cannot correctly identify each type of energy present in each step and nor correctly quantify the amount of energy present in simple energy transfers.
Points_____ Grade_____				