EOC BIOLOGY 2010

OPERATIONAL PERFORMANCE TASK

FUELING CHANGE

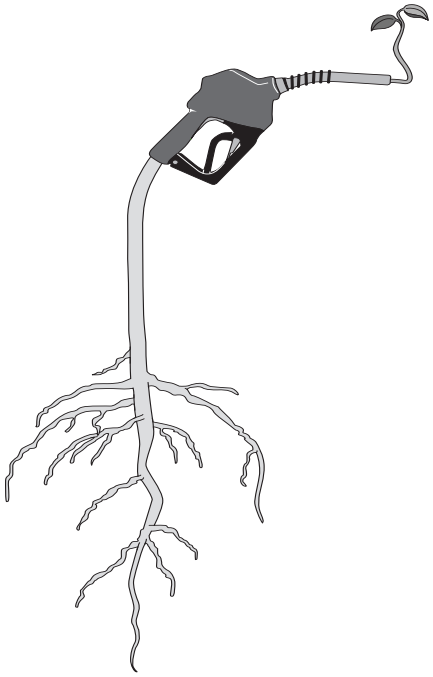
RELEASED AUGUST 30, 2010

Part 2
Fueling Change

CropCorp is a new corporation with the mission of developing new **biofuels**.[6] You have been hired as a consultant to manage its newly acquired farm. You must decide which crop will most efficiently transform sunlight into a product that can be used to make a **biofuel**. You want to choose a crop that will make the most efficient use of space and resources (land, fertilizer, money).

The farm you are planning for is located in central New Jersey, where the soil is a mix of sand, clay, and organic material with some stone and gravel. The land is flat with a 2-acre pond and 100 acres of forest that can be used for logging. One acre of land is approximately the size of a football field.

All alternative fuel decisions have environmental and economic costs that must be considered. CropCorp would like you to recommend which crop, corn or **switchgrass**,[7] should be planted on the new farm.



[6] **biofuels** – any fuels that are obtained from a renewable biological resource

[7] **switchgrass** – native prairie grass that can be grown in abundance in the United States

Figure 1
Relevant Data Regarding Corn and Switchgrass Crops

	Corn	**Switchgrass**
Approximate number of vehicles using fuel type	4 million	0 **Note: Technology still being developed**
Approximate number of working farms	300,000	100
Minimum temperature	32°F	–42°F
After-harvest regrowth rate	None	Moderate
Other uses for crop	Seed, food, starch, animal feed, sweetener	Decorative landscaping
Precipitation range	20–50 inches/year	12–60 inches/year
Soil textures	Medium	Coarse, fine, and medium
Harvest per acre (average)	3.5 tons/acre	11.5 tons/acre
Fuel per acre (in **GJ**[8])	10.15 **GJ**/acre	26.45 **GJ**/acre
Part of plant converted to biofuel	Grain	All parts
Cost per acre of production	$100–150/acre	$75–100/acre

[8] **GJ** – one billion joules, which are units of energy used to measure energy content

PART 2

Your Task:

1) Review the data about corn and switchgrass provided in Figure 1.
2) Determine which **ONE** crop you think would be the better crop for the farm, considering all factors provided in Figure 1.
3) Write a persuasive argument to the president of the corporation, detailing your decision and justifying your **ONE** crop choice using data from Figure 1. Be sure to include all of the following elements:
    - Which crop you have chosen and why.
    - Cite evidence and data from Figure 1 to support your recommendation.
    - Address potential environmental and economic consequences of your recommendation.

Please use page 8 in your answer folder for prewriting and planning.

Please write your response in paragraph form on page 9 of the answer folder.

Fueling Change
Scoring Rubric

4 POINTS	3 POINTS	2 POINTS	1 POINT
• Selects and thoroughly explains crop choice with no misconceptions.	• Selects and explains crop choice with no misconceptions.	• Selects and explains crop choice with minor misconceptions.	• Selects but does not explain crop choice.
• Uses extensive data from table to support decision.	• Uses some data from table to support decision.	• Uses data from table to support decision.	• Does not use data from table to support decision.
• Shows strong evidence of weighing multiple environmental and economic consequences.	• Shows some evidence of weighing multiple environmental and economic consequences.	• Some arguments are based on scientific evidence and/or principles.	• Few to no arguments are based on scientific evidence and/or principles.
• All arguments are strongly based on scientific evidence and/or principles.	• Most arguments are based on scientific evidence and/or principles.		

Did you remember to:

- ☐ Choose only **<u>ONE</u>** crop for the farm?
- ☐ Write a persuasive argument to the president of the corporation?
- ☐ Include all the following elements in your argument:
  - Which crop you have chosen and why?
  - Cite evidence and data from Figure 1 to support your recommendation?
  - Address potential environmental and economic consequences of your recommendation?
- ☐ Justify all of your work using biological concepts and principles?