



## FlinnPREP™ for Practice Exam 2

### Untimed Free Response

1. The Anderson family is looking to go green and conserve energy. Their house currently uses ten 60-watt incandescent light bulbs that each are on an average of 8 hours per day. They decide to change these incandescent bulbs to new LED light bulbs that emit an equivalent amount of light while only using 10 watts of electricity. Each new bulb costs one dollar. The rate for a kilowatt hour of electricity is 10 cents.

(A) Calculate how much the family spends per day on electricity to light their home with the incandescent bulbs. (2 Points)

(B) Calculate how much it will cost per day to light their home after the family changes the bulbs to LEDs. (2 Points)

(C) Calculate how many days it will take to recover the cost of replacing the light bulbs. (2 Points)

(D) Explain two small changes besides light bulbs that this family can make to reduce their usage of electricity. (2 Points)

(E) Describe two actions or incentives the government could use to encourage people to make energy-efficient upgrades to their homes or increase the use of small-scale renewable energy-generating systems. (2 Points)

2.



#### DAILY TRAVELER

January 23, 2018

Engaged in a daring solo voyage around the world, Dora Exploradora was navigating the Pacific Ocean from Chile to New Zealand and found herself approaching the Pitcairn Islands' idyllic Henderson Island, known as one of the most remote islands in the world. She knew from her extensive research that it was a United Nations World Heritage site and one of the world's largest marine reserves and was described by UNESCO as "one of the world's best remaining examples of a coral atoll" that is "practically untouched by human presence" aside from an occasional scientist or wayfaring tourist. Dora was excited to explore the island and see its only four kinds of land birds, 10 kinds of plants and colony of seabirds.

Expecting to find a beautiful paradise of pristine white sandy beaches, to her shock, Dora found immense piles of garbage (mostly plastic) all along the shore. Using her superb observation and deduction skills, she estimated around 38 million pieces of trash that had come from Russia, the United States, Europe, South America, Japan and China. After further exploration, she found that only one-third of the trash was actually visible on the surface. In dismay, she realized that nearly 18 tons of plastic had piled up on the island, giving Henderson the highest density of plastic debris recorded anywhere in the world.

(A) In the absence of humans, explain how the trash ended up on Henderson Island. (1 Point)

(B) Describe two ways this trash could negatively affect the wildlife native to this island. (2 Points)

(C) Describe 2 ways to prevent this trash from entering the ocean in the first place. (2 Points)

(D) The majority of the garbage produced in the United States ends up in a landfill. Identify and describe the functions of 2 components of a sanitary landfill. (4 Points)

(E) Many landfills capture the methane gas released by landfills. Describe the process by which methane is formed in a landfill. (1 Point)

3. The American Bison (*Bison bison*) once roamed in massive herds across the grand prairie of North America, occupying a historic range of 1,300,000 km<sup>2</sup>. It is considered one of the most numerous large land mammals of all time. Bison typically wander in large herds of females and calves, along with males during the breeding season, and graze mostly on the grasses of the prairie. Males can weigh as much as 2,000 lbs and run at speeds of 35 mph. The size and roaming behavior of the bison resulted in the clearing of a space for many plant species to grow. In addition, the random depositing of nutrients through defecation ensured nutrient cycling in the ecosystem.

The following data table documents the changes in American Bison population over time.

Year	Estimated Population Size
1800	60,000,000
1830	40,000,000
1840	35,650,000
1870	5,500,000
1880	395,000
1890	541
1900	300
1930	5,000
1951	23,340
2000	360,000

(A) Identify and describe how an increase in the human population may have resulted in a decrease in the Bison population. (2 points)

(B) Identify and explain how the American Bison alter two biogeochemical cycle. (4 points)

(C) Explain how the American Bison functioned as a keystone species in the Grand Prairie. (2 point)

(D) Keystone species are typically thought of as animals, but plants also can be keystone species. Identify a plant that acts as a keystone species, and explain how that plant influences the ecosystem. (2 points)

Finished

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## FLINNPREP™

📍 P.O. Box 219  
Batavia, IL 60510

📞 800-452-1261

📠 866-452-1436

✉️ flinn@flinnsci.com

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