

Past-paper walk-through

Ecological Footprints ■ 5.11

eXercise

Questions in this set

- 2018 Q1

Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- **//** separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = “or words to that effect” – the wording need not match.

Question 1

2018 ■ Q1

Read the following article from the *Fremont Daily Times* and answer the questions that follow.

[Newspaper article, masthead “Fremont Daily Times”, dated May 1, 2018, headline “GREEN IS THE NEW SCHOOL COLOR AT FREMONT HIGH SCHOOL!”]

A group of students from Fremont High School addressed the city council last night and proposed that one of the existing buildings at Fremont High School, which was built in 1970, be renovated to take advantage of recent advances in green technology. Currently the heat for the school is provided by fossil fuel combustion. The students said that the redesigned building would reduce the school’s carbon footprint, which is a measure of the amount of carbon dioxide and other carbon compounds released by various human activities. Incorporating specific features that conserve energy and utilize renewable energy sources can help reduce the carbon footprint.

Question 1

Councilperson Gail Fassler praised the idea, saying that the project could conserve local water resources, reduce the need for consuming new resources, and act as a “shining beacon” of sustainability for the greater Fremont community. Fassler suggested the project could even incorporate a living green roof as an additional sustainable feature. The council approved the initial site planning request and urged students to report back when the project was under way.

(a)(i) Define carbon footprint.

(a)(ii) Identify one way the school’s heating system is likely adding to the school’s carbon footprint.

(a)(iii) Describe one realistic way to reduce the contribution of the heating system to the school’s carbon footprint.

(b) Identify TWO environmental benefits of a living green roof, such as that suggested by Councilperson Fassler.

Question 1

- (c)** Describe TWO practices the cafeteria's food service could use to decrease the environmental impacts of Fremont High School.
- (d)** Discuss TWO benefits of using native plants for landscaping at Fremont High School.
- (e)** During the renovation, the carpeting must be replaced. Discuss one environmental benefit of using flooring made of plant material, such as cork or bamboo, instead of carpet made of synthetic fibers.

Fremont Daily Times

May 1, 2018

GREEN IS THE NEW SCHOOL COLOR AT FREMONT HIGH SCHOOL!

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renewable energy sources can help reduce the carbon footprint.

Councilperson Gail Fassler praised the idea, saying that the project could conserve local water resources, reduce the need for consuming new resources, and act as a “shining beacon” of sustainability for the greater Fremont community. Fassler suggested the project could even incorporate a living green roof as an additional sustainable feature. The council approved the initial site planning request and urged students to report back when the project was under way.

Solution 1

(a)(i)

Mark scheme

- 1 point for a correct definition of carbon footprint. Carbon footprint = the amount of carbon dioxide and/or other carbon compounds released to the environment by a product, process, or activity (a measurement of the amount of carbon released by human activities).

Solution 1

(a)(ii)

Mark scheme

- 1 point for correctly identifying a way the heating system adds to the carbon footprint. Accept: the burning/combustion of fossil fuels releases carbon dioxide; OR incomplete combustion of fossil fuels releases carbon monoxide.

Solution 1

(a)(iii)

Mark scheme

- 1 point for a correct description of a realistic way to reduce the heating system's contribution. Accept any one of: switch to renewables (solar, wind) or a more efficient fossil fuel (natural gas, propane) or a provider using nuclear energy; decrease the thermostat/program it to lower energy use at certain times; purchase carbon-offset credits through environmental agencies; increase insulation or other efficiency/design methods (green roof, double-paned glass, south-facing windows for passive solar heating, change air filters, etc.).

Solution 1

(b)

Mark scheme

- 2 points, 1 point per correct identification of an environmental benefit of a green roof (up to 2). Accept any two of: insulation/reduced fossil fuel use for heating and/or cooling; habitat for wildlife/plants, increases biodiversity; area to grow crops/local food production; reduction in urban heat islands; photosynthesis/carbon capture/CO₂ storage/oxygen release; stormwater treatment/runoff reduction; filters particulates, VOCs, O₃ from air.

Solution 1

(c) Mark scheme

- 2 points, 1 point per correct description of a practice that decreases the school's environmental impact (up to 2). Accept any two of: offer more vegetarian options/serve fewer animal products; use locally sourced food to reduce transportation; grow food at school; compost food waste; donate leftover food; use energy-friendly practices (LED lighting, more cold-cut sandwiches) to reduce energy use; purchase bulk packaged items; use recyclable containers/avoid disposable straws-trays; install a water fountain/stop selling single-serving bottled water; use reusable take-out containers/offer credit for reuse; allow students to choose appropriate portions to reduce food waste; purchase organic foods to reduce pesticide use; use gray water to irrigate landscaping.

Solution 1

(d)

Mark scheme

- 2 points, 1 point per correct discussion of a benefit of native plants (up to 2). Accept any two of: native plants need less pesticide/fertilizer/irrigation water because they are adapted to the local environment; increase biodiversity by providing native habitat; support native food webs/food production; reduce land available for invasive species to establish/spread; save the school money by needing less water/fertilizer/pesticide/upkeep.

Solution 1

(e) Mark scheme

- 1 point for a correct discussion of a benefit of plant-based flooring (e.g. cork, bamboo) over synthetic carpet. Accept any one of: plant-based material is more easily compostable/biodegradable/reusable, unlike carpet; it comes from a renewable resource, making it more sustainable than carpet; it is a carbon sink/reservoir (growing the plant material removes CO₂ from the atmosphere), unlike carpet; it requires fewer fossil fuels/toxic chemicals to produce than synthetic carpet fibers; it produces fewer indoor pollutants (off-gassed VOCs/toxins) than carpet; it harbors fewer pathogenic vectors/diseases/allergens (fleas, ticks, dust mites, mold spores) than carpet; when cultivated it provides habitat for native species.