

Plankton test MARKSCHEME – October 2019

1. Define *plankton*. [1]

organisms that drift / are at the mercy of tides and currents

2. Describe AND evaluate (= advantages & disadvantages) two methods used to collect plankton. [6 max]

plankton net – drag the plankton net through the water along a dock or behind a boat, remove the cod end to retrieve sample;

advantage: can filter a lot of water at a time

disadvantage: gelatinous species may be damaged

(niskin) **bottle** – send the open bottle down to a particular depth, send the messenger down to close the bottle then bring the bottle up to retrieve sample;

advantage: can sample at a very specific depth

disadvantage: only a very small volume of water is sampled

3. Compare (= similarities and differences) the morphology (= shape / physical structure) of planktonic diatoms, dinoflagellates and coccolithophores. [4 max]

Make direct comparisons!

all three are unicellular;

diatoms have frustules of silica, dinoflagellates have cellulose cell walls and coccolithophores have calcium carbonate disks;

diatoms and dinoflagellates are in the same size range while

coccolithophores are much smaller;

diatoms have no flagella, dinoflagellates and coccolithophores have 2 flagella;

any other reasonable response

4. Define *phytoplankton bloom* and explain the conditions necessary to produce a bloom. [3 max]

definition: a rapid increase or accumulation in the population or number of photosynthetic plankton which can colour the water;

conditions necessary: high nutrient levels which may occur after rainfall or larger than usual river / stream / freshwater input;

lots of light for photosynthesis;

ideal temperature – not too low, not too high;

minimal losses from grazing and vertical mixing;

5. Explain adaptations that phytoplankton possess to survive in marine ecosystems. [3 max]

oil droplets in centric diatoms which provide positive buoyancy;

chain formation which increases surface area and reduces sinking rates;

spines which increase surface area and reduce sinking rates;

flagella which allow for some swimming / directional movement;

pigments in addition to chlorophyll to absorb more light;
fingers in *Ceratium* to absorb more light;

6. Compare the distribution (= where they live) of phytoplankton and zooplankton in the ocean. [2 max]

phytoplankton must live at the surface (of the water);
zooplankton may live at the surface or at depth;
phytoplankton usually live in coastal areas (for nutrients);
zooplankton usually live near their food / phytoplankton / also coastal;

7. Describe the reproduction of diatoms. [3 max]

asexual reproduction by mitosis / cell division / binary fission;
followed by new hypotheca formation;
once the offspring cells get too small, diatoms undergo sexual reproduction;
sperm & egg fuse to form a new diatom which has the original frustule size;

8. Distinguish between **holoplankton** and **meroplankton** and give a named example of each. [4 max]

holoplankton spend their whole life in the plankton;
e.g. jellyfish, larvacean;
meroplankton only spend part of their life as plankton then metamorphose into a benthic or nektonic stage;
e.g. crab larva, sea star larva

9. a) Explain how 'iron fertilization' might help with the problem of global warming. [3 max]

iron is a limiting nutrient for phytoplankton;
a phytoplankton bloom / population explosion will result from adding iron;
phytoplankton are photosynthetic;
and will fix carbon dioxide from the atmosphere;
thereby reducing the amount of carbon dioxide in the atmosphere;
carbon dioxide is one greenhouse gas which contributes to global warming

- b) Evaluate 'iron fertilization' as a solution to global warming. Give both pros and cons. [4 max]

pros:

CO₂ removal from the atmosphere and pumping into the deep ocean;
potential of restoring phytoplankton populations in areas where they have declined;
potential to restore whale / salmon populations;

cons:

may create toxic algal blooms;
dead zones may result due to lack of oxygen;
increased nitrous oxide, a more powerful greenhouse gas than CO₂;
small scale only / would need to continuously add iron for desired effect;
we don't know the effects of adding iron to the ocean;

10. Describe your favourite example of zooplankton. [2 max]

copepods
moon jelly
jellyfish
larvaceans
red eye jellyfish

11. Write one question about plankton that you wish had been on this test and answer your question. [2 max]

The white cliffs of Dover are made of which plankton?
What is the formula for photosynthesis?
How can we use diatomaceous in our daily life?
Name and explain two adaptations of (deep sea) zooplankton.
Why is the precautionary principle important?
What does phytoplankton taste like?
What are some important services provided by plankton?
What is your favourite example of phytoplankton?
What is sea foam?
Draw a food web for a marine ecosystem that contains plankton.