Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

point: from one identifiable place, e.g. a factory outlet pipe; non-point: from many spread-out places, e.g. fertilizer runoff from farmland

2.2

below the outlet, organic matter is decomposed by bacteria, so BOD is high; bacteria use up oxygen, so dissolved oxygen falls; further downstream the organic matter is used up and oxygen dissolves from the air, so oxygen recovers

2.3

stoneflies need clean, oxygen-rich water, so upstream water is clean; bloodworms tolerate low oxygen, so downstream water is polluted, probably with organic matter or nutrients from the farm; indicator species show conditions over a long period, while a chemical test shows only one moment

3.1

(a) nitrate and phosphate cause rapid growth of algae; algae block light, so plants die; dead matter is decomposed by bacteria; bacteria use up oxygen, so fish and other animals die

(b) the dead animals add more organic matter, so decomposition and oxygen loss increase further

3.2

award up to [5]: change the activity: use less fertilizer, apply it at the right time, phosphate-free detergents: cheapest in the long term but needs farmer cooperation; control the release: buffer strips and sewage treatment that removes nutrients: effective but costly to build; clean-up: dredge nutrient-rich sediment, aerate water, remove algae: fast effect but expensive and only treats the symptoms; conclusion: prevention at the source is most sustainable, with clean-up for quick relief

3.3

(a) animals become entangled, or swallow plastic and starve; microplastics enter food chains and carry toxic chemicals

(b) bans can sharply cut bag use and are easy to understand; but bags are only a small part of ocean plastic, much of which comes from fishing gear and poor waste collection, so other measures are needed