ANSWER KEY.

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Biodiversity and Ecosystem Services

Biology | ANSWER KEY

Answer in complete sentences where asked. Show your work for calculations and use the data as evidence.

1. Name the level of biodiversity described by each observation. Choose from: genetic, species, or ecosystem diversity.

Observation	Level of biodiversity
(a) A seed bank stores 40 different varieties of one kind of rice.	**Genetic diversity**
(b) A coastal region has salt marsh, sand dunes, and forest.	**Ecosystem diversity**
(c) A rainforest survey finds 150 species of beetles.	**Species diversity**

Genetic diversity is variety within one species. Species diversity is the number of different species. Ecosystem diversity is variety of ecosystems.

2. The table shows tree counts in two plots of the same size.

Tree species	Plot A: mixed forest	Plot B: pine plantation
Oak	12	2
Maple	9	0
Hickory	4	0
Beech	5	0
Pine	0	28
Total trees	30	30

(a) Find the species richness of each plot.

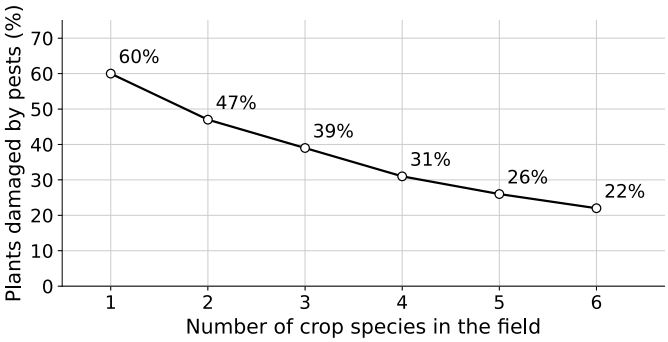
(b) Plot B has what percent fewer species than Plot A? Show your work.

(a) **Plot A: 4 species (oak, maple, hickory, beech). Plot B: 2 species (oak, pine).** Both plots have 30 trees, so richness depends on the number of species, not the number of trees.

(b) $(4 - 2) \div 4 \times 100 =$ **50% fewer species**

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3. Fields with different numbers of crop species were checked for pest damage (sample data).



(a) How many percentage points lower is the damage in the 6-crop field than in the 1-crop field?

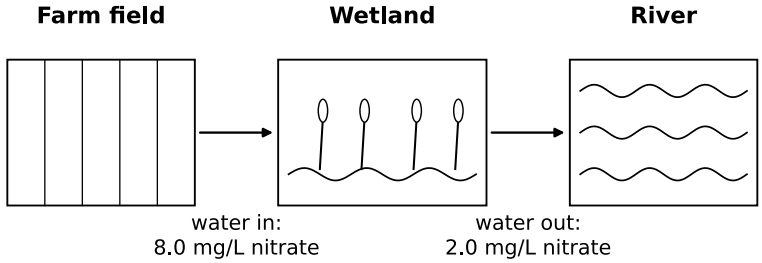
(b) Write a claim about crop diversity and pest damage. Support it with data from the graph, and give one possible reason.

(a) 60% − 22% = **38 percentage points**

(b) **Model answer: Fields with more crop species had less pest damage. Damage fell from 60% of plants with 1 crop to 22% with 6 crops. A more diverse field may support more natural enemies of pests, and pests that feed on one crop find fewer host plants.**

A correct answer must include: a claim that more crop species goes with less pest damage; data from the graph with units (for example, 60% and 22%); one reason, such as more natural enemies or fewer host plants. Use of *may* or *tends to* is fine, since this shows a pattern, not proof of cause.

4. A wetland lies between a farm field and a river. The drawing shows nitrate in the water going in and coming out (sample data).



(a) What percent of the nitrate is removed by the wetland? Show your setup.

(b) Is this a provisioning, regulating, supporting, or cultural service?

(c) A town drains the wetland to build a parking lot. Predict what happens to the nitrate in the river, and name one way the town might have to make up for the lost service.

(a) (8.0 mg/L − 2.0 mg/L) ÷ 8.0 mg/L × 100 = **75%**

(b) **Regulating** (it cleans the water).

(c) **The river would likely carry more nitrate, up to about 8.0 mg/L if the wetland removed none, which can feed algal blooms downstream. The town might have to build a water treatment system, or restore a wetland elsewhere.**

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