LESSON MAKER PRO

Plants by the Numbers

Use quadrat data to compare plant communities.

HIGH SCHOOL · BOT.6.1

BOT.6.1 "Conduct transects/plot studies to determine species, biodiversity, or health of a plant community. (Plots may be linear or a quadrat (square or circular) depending on the habitat. (Typically, relative density, relative dominance..."

NAME _____ DATE _____

THREE WAYS TO COMPARE

Relative density = a species' stems / all stems * 100. Relative dominance = its cover area / all species' cover area * 100, and relative frequency = quadrats containing it / the total quadrat appearances of all species * 100. Add these three percentages to find its importance value (IV); more than one species can appear in the same quadrat.

WORKED EXAMPLE

A survey used 6 quadrats. Find poplar's importance value.

QUADRAT SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Poplar	8	16	2
Maple	24	48	6

1. Relative density: 8 / (8 + 24) * 100 = 25%.
2. Relative dominance: 16 / (16 + 48) * 100 = 25%.
3. Relative frequency: 2 / (2 + 6) * 100 = 25%.

Answer: Poplar's IV = 25 + 25 + 25 = 75.

PRACTICE 6 problems

1 Use the stem counts to find sedge's relative density.

MEADOW STEMS

Species	Stems
Aster	9
Sedge	18
Clover	9

ANSWER _____

2 Find goldenrod's relative dominance.

PLANT COVER

Species	Cover area (m^2)
Fern	20
Goldenrod	60
Violet	20

ANSWER _____

3 A survey used 5 quadrats. Find clover's relative frequency.

QUADRAT APPEARANCES

Species	Quadrats present
Yarrow	2
Aster	3
Clover	5

ANSWER _____

4 Find dune grass's relative density and relative dominance.

DUNE SURVEY

Species	Stems	Cover area (m^2)
Dune grass	20	60
Beach pea	20	40

ANSWER _____

5 A survey used 3 quadrats. Find rush's importance value.

WETLAND SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Rush	6	40	2
Sedge	9	60	3

ANSWER _____

6 A survey used 3 quadrats. Which species has the higher importance value, and by how many points?

POND-EDGE SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Cattail	12	70	3
Bulrush	18	30	2

ANSWER _____

APPLY IT Show your work

1 Students survey 6 quadrats in a school garden before planning new paths. Which plant has the higher importance value, and by how many points?

SCHOOL GARDEN SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Coneflower	18	40	4
Milkweed	12	60	6

ANSWER _____

2 A bike-trail group surveys 5 quadrats beside a path it wants to restore. Do bluestem or wild rye have a higher importance value? Show the two totals.

BIKE-TRAIL SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Sunflower	10	20	2
Bluestem	20	50	3
Wild rye	20	30	5

ANSWER _____

CHALLENGE One step up

A survey used 5 quadrats. In two sentences, name the species with the highest importance value, state its value, and explain why stem counts alone give a different leader.

PRAIRIE SURVEY

Species	Stems	Cover area (m^2)	Quadrats present
Little bluestem	24	20	2
Switchgrass	12	30	3
Blue grama	4	50	5

WORK SPACE AND ANSWER

Plants by the Numbers

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the stem counts to find sedge's relative density.	**50%**
2	Find goldenrod's relative dominance.	**60%**
3	A survey used 5 quadrats. Find clover's relative frequency.	**50%**
4	Find dune grass's relative density and relative dominance.	**Relative density: 50%; relative dominance: 60%.**
5	A survey used 3 quadrats. Find rush's importance value.	**120**
6	A survey used 3 quadrats. Which species has the higher importance value, and by how many points?	**Cattail, by 40 points (170 versus 130).**

PART 2 · APPLY IT

1. **Milkweed, by 20 points (160 versus 140).** Coneflower's relative values are 60%, 40%, and 40%, for an IV of 140. Milkweed's are 40%, 60%, and 60%, for an IV of 160.
2. **Neither; both have an IV of 120.** Bluestem's IV is 40 + 50 + 30 = 120. Wild rye's IV is 40 + 30 + 50 = 120.

CHALLENGE

Blue grama has the highest importance value at 110 (10 + 50 + 50). Stem counts alone favor little bluestem, but blue grama has more cover and appears in more quadrats.

Accept percentages or equivalent fractions for individual relative measures when the value is exact. Importance values are sums of percentages, not percentages themselves.