LESSON MAKER PRO

Count the Crop

Use propagation data to predict food production.

HIGH SCHOOL · BOT.3

BOT.3 "Students will characterize the reproductive strategies of plants. Describe the various processes of asexual reproduction and vegetative propagation used by plants..."

NAME _____ DATE _____

FROM STARTS TO HARVEST

Asexual reproduction makes new plants without fertilization. Vegetative propagation is asexual reproduction that uses a plant part to make a new plant. To predict a harvest, multiply the number of starts by the fraction that survives, then multiply by the food produced per surviving plant.

WORKED EXAMPLE

A grower plants all the cloves from 11 garlic bulbs. Each bulb has 5 cloves, and 4/5 of the planted cloves sprout. How many new plants grow?

1. Find the number of planted cloves: 11 × 5 = 55.
2. Find the number that sprout: 55 × 4/5 = 44.

Answer: 44 new garlic plants

PRACTICE 6 problems

1 Use the table. Each runner can grow into one new strawberry plant. How many new plants establish?

STRAWBERRY RUNNER TRIAL

Parent plants	Runners per parent	Fraction that establish
6	8	3/4

ANSWER _____

2 A grower cuts each of 7 ginger rhizomes into 6 pieces with buds. If 2/3 of the pieces sprout, how many new plants grow?

ANSWER _____

3 A farm plants 20 pineapple crowns. If 70% establish, how many new plants grow?

ANSWER _____

4 In a trial, 1/2 of 36 tomato seeds germinate, and 3/4 of 24 tomato stem cuttings root. Calculate both totals. Which method produces more plants in this trial?

ANSWER _____

5 A grower needs 30 new potato plants. Each planted tuber piece has a bud, and 3/4 of the pieces sprout. At that rate, how many pieces should the grower plant?

ANSWER _____

6 A garden has 48 new plants. Of these, 12 grew from seeds and the rest grew from runners. What percent grew from runners?

ANSWER _____

APPLY IT Show your work

1 A neighborhood food pantry plans to grow sweet potatoes. Volunteers plant 80 slips, which are shoots used to start new plants. They expect 3/4 of the slips to establish and each established plant to produce 2 edible storage roots. How many storage roots can they expect?

WORK SPACE

ANSWER _____

2 A school farm tests strawberry plants grown from runners and strawberry plants grown from seeds. Use the table to find how many more runner-grown plants were harmed by a pathogen. Then state one possible risk of growing many genetically similar plants.

SCHOOL FARM TRIAL

Plant group	Plants tested	Fraction harmed
Grown from runners	96	1/4
Grown from seeds	96	1/8

ANSWER _____

CHALLENGE One step up

A farm compares two groups of edible fruit plants. Each vegetatively propagated plant grows from a piece of a parent plant; each seed-grown plant grows from a seed produced by sexual reproduction. Use the trial data to predict the total fruits from each group and find the difference. Then explain one reason a farmer might still choose vegetative propagation, even if this trial predicts fewer fruits.

FRUIT PRODUCTION TRIAL

Plant group	Starts	Fraction that survive	Fruits per survivor
Vegetatively propagated	72	3/4	2
Seed-grown	60	2/3	3

WORK SPACE AND ANSWER

Count the Crop

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Use the table. Each runner can grow into one new strawberry plant. How many new plants establish?	**36 new plants**
2	A grower cuts each of 7 ginger rhizomes into 6 pieces with buds. If 2/3 of the pieces sprout, how many new plants grow?	**28 new plants**
3	A farm plants 20 pineapple crowns. If 70% establish, how many new plants grow?	**14 new plants**
4	In a trial, 1/2 of 36 tomato seeds germinate, and 3/4 of 24 tomato stem cuttings root. Calculate both totals. Which method produces more plants in this trial?	**18 seed-grown plants and 18 cutting-grown plants; neither method produces more.**
5	A grower needs 30 new potato plants. Each planted tuber piece has a bud, and 3/4 of the pieces sprout. At that rate, how many pieces should the grower plant?	**40 tuber pieces**
6	A garden has 48 new plants. Of these, 12 grew from seeds and the rest grew from runners. What percent grew from runners?	**75%**

PART 2 · APPLY IT

1. **120 edible storage roots** 80 × 3/4 = 60 established plants. At 2 storage roots per plant, the expected harvest is 60 × 2 = 120 roots.
2. **12 more runner-grown plants were harmed. Genetically similar plants may share susceptibility to a pathogen.** The pathogen harmed 96 × 1/4 = 24 runner-grown plants and 96 × 1/8 = 12 seed-grown plants, a difference of 12. Shared susceptibility is a possible risk, but this trial does not show that genetics caused the difference.

CHALLENGE

Vegetatively propagated plants: 108 fruits. Seed-grown plants: 120 fruits, or 12 more. A farmer might choose vegetative propagation to keep a desirable trait of the parent plant in new plants.

Accept equivalent calculations and any accurate benefit of vegetative propagation in the challenge, such as preserving a desirable trait. Do not treat the pathogen trial as proof that genetic similarity caused the observed difference.