Worms at Work

Design experiments and weigh evidence for human uses of worms.

ZOO.4.7 "Enrichment: Design, conduct, and communicate results of an experiment demonstrating the importance of flatworms, roundworms, and annelids for human use (e.g., the earthworm in agriculture and the leech in medicine)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the condition that differs between groups in each worm experiment, and circle what the researchers measure. Number one sentence that limits a claim about human use.

What Can Worms Do for Us?

1. At a school garden, students tested whether earthworms, a type of annelid, change how quickly water moves through soil. They filled twelve identical pots with equal amounts of the same soil. Six pots received two earthworms each; six received none. Every pot got the same amount of water and stood in the same location for four weeks. The students poured 200 milliliters of water into each pot and timed how long 100 milliliters took to drain. They repeated the test twice per pot. Pots without worms served as a comparison, so any difference would be less likely to reflect soil or watering conditions.

2. The pots with earthworms drained 100 milliliters in an average of 42 seconds; the pots without worms took 69 seconds. The students reported averages rather than selecting the fastest pot. They concluded that earthworm activity increased drainage under their test conditions, which could matter in farming where waterlogged soil can harm some crops. Drainage alone, however, cannot show that crop harvests would improve. A stronger follow-up would grow the same crop in both groups and measure harvest mass. To make the findings trustworthy, the class would also report the number of pots, its procedure, and results that did not fit the pattern.

3. Other worm groups could be studied through different human uses. Some roundworms, or nematodes, infect insect pests; growers can apply certain species to help protect crops. Students could compare equal groups of pest larvae exposed to a purchased beneficial nematode product or plain water, then count surviving larvae after a set time. Flatworms called planarians are studied for their ability to regrow body parts, helping researchers investigate tissue repair, but this does not mean planarians can treat human injuries. Medical leeches are annelids used under clinical supervision to relieve blood buildup after some surgeries. Students should examine published clinical data rather than experiment on patients.

2 ANSWER WITH EVIDENCE

Use the passage

1. In the earthworm experiment, what condition did the students change, and why did they use pots without worms?

2. Use both averages to state what the earthworm experiment showed under its test conditions.

3. Why would the class need a follow-up experiment before claiming that earthworms improve crop harvests?

4. In the proposed nematode test, what would differ between groups, and what result would support using nematodes to control pests?

3 YOUR TURN

Your own words

Design a new experiment to test whether a beneficial nematode product reduces damage to bean plants, not just larval survival. State your prediction, groups, one condition you would keep equal, what you would measure, and how you would report a result without claiming more than the evidence shows.

Worms at Work

PART 1 · READ AND MARK

Underline the condition that differs between groups in each worm experiment, and circle what the researchers measure. Number one sentence that limits a claim about human use. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	In the earthworm experiment, what condition did the students change, and why did they use pots without worms?	**They changed whether pots contained earthworms. Pots without worms provided a comparison for judging the worms' effect on drainage.**
2	Use both averages to state what the earthworm experiment showed under its test conditions.	**Water drained in an average of 42 seconds with earthworms and 69 seconds without them. Drainage was faster in the pots with worms.**
3	Why would the class need a follow-up experiment before claiming that earthworms improve crop harvests?	**The class measured drainage, not harvests. It would need to grow the same crop in both groups and compare harvest mass.**
4	In the proposed nematode test, what would differ between groups, and what result would support using nematodes to control pests?	**One group would receive a beneficial nematode product and the other plain water. Fewer surviving larvae in the nematode group would support its use for pest control.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I predict that bean plants treated with beneficial nematodes will have fewer leaves damaged by pest larvae. I would place the same number of larvae on each of twelve similar plants. Six plants would receive the nematode product, and six would receive plain water. I would give all plants the same amount of light and count damaged leaves after one week. I would report the average number of damaged leaves in each group. If the treated plants had fewer, I could say the product reduced leaf damage under these conditions, not that it works on every crop.

Accept designs with comparable groups, a measurable plant-damage outcome, and a conclusion limited to the test conditions. Students may measure damaged leaf area instead of counting damaged leaves.