

Worms

On your paper plate is a handful of dirt, which contains worms.

First:

Count and record how many worms are on your plate.

Next:

Records your results along with your classmate's results on your chart.

Then:

Use the class chart to create a graph of the results.

Now:

Using the information on our class chart and the graph you made, predict how many worms will be in your next handful of dirt. Explain how you chose that amount.

Exemplars

Grade Levels Pre-K-2

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Context

Food Works has sponsored our class for the year by having us keep a worm farm. Our responsibilities include taking care of them (compost food, water and change dirt) and to do and write up weekly activities. The kids are fascinated by these creatures and are excited by any related activity.

What This Task Accomplishes

This problem provides students with an introductory experience in data analysis. The task may seem too abstract for first graders, but the structure of the task allows for safe exploration of this concept. The results obtained from the activity can provide a meaningful context for introducing students to the concepts of median and mode. Students are also given the opportunity to practice number formation, recording data on a chart, using the chart to create a graph and recognizing highest/lowest numbers in mixed data. Students will have the opportunity to make a prediction based on previous results and to explain how they determined their prediction.

What the Student Will Do

Some students will guess a number in the range of the class results because "most people had

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that number" or "five is too high and three is too low" or "because it is a number in the middle" or for a reason the student cannot explain. Other students will guess the same number of worms that were on their plate the first time. Still others will make random guesses based on numbers that have other connections for them ("That is how many kids there are." or "It is a high number."). Others will guess numbers above 50 because they think the question is asking how many are in the worm farm.

Time Required for Task

Two to three, 45-minute periods

Interdisciplinary Links

The task of studying worms has connections to science. It also promotes social skills by requiring students to know and recognize the names of their peers by creating the class chart and graph.

Teaching Tips

Before students start the problem, practice making a chart. Discuss clues about names (initial consonants) to help students identify each other. We did a practice chart by asking each student to record how many people lived in their houses. We then went through the chart to identify the highest and lowest numbers of people. I then taught students how to use information in the chart to create a graph. These activities provided students with enough prior experience to approach this task successfully.

It was obviously convenient having a worm farm in our classroom where we could easily obtain worms for this activity. If you do not have this luxury, you could purchase containers of worms from bait shops (they may even lend you some). You could also do this task by going outside and digging into a garden.

To do the same task without using real worms, you could create a mixture of crushed Oreo® Cookies (dirt) and Gummy Worms® for an edible activity!

To save time, I recommend that no matter where you get your worms, have the handfuls of dirt and worms on the plates before you begin!

See also the format I provided to students on which to record their solutions.

Suggested Materials

- Paper plates
- Worms and dirt (or Oreo Cookies® and Gummy Worms®)
- Worms Chart worksheet (see page 5)

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Possible Solutions

There is no set solution. In our experiment, reasonable guesses ranged from two to six. The next handful we pulled out of our worm farm had five worms in it. Every class will have a different result.

Benchmark Descriptors

Novice

This student had limited understanding of the task. S/he made a random guess of 13 and reasoned that this was because there are 20 kids in the class. The two numbers have no apparent connection to the problem and s/he could not explain the connection that inspired him/her to make that guess. S/he also had some difficulty recording the class data onto the graph.

Apprentice

This student had some understanding of the problem and question. His/her guess was somewhat reasonable, but based entirely on his/her own handful. His/her explanation reflected his/her inability to see beyond his/her own result. S/he guessed six worms because "that was what mostly usually what people got" even though only two out of 20 had six, (one of them being him/her). This student had some difficulty recording class results onto a graph. S/he had difficulty keeping track of the numbers and names, so when it got too confusing, s/he decided to go to the end of the list and graph and record backwards to the point of confusion.

Practitioner

This student understood the task. S/he made a reasonable guess based on what most people had for results. S/he was able to clearly explain his/her reasoning. S/he was able to record the class results accurately. S/he came up with a strategy of alternating symbols on the graph to keep track of numbers and names. S/he chose to put an "x" where students had no worms in their handfuls of dirt.

Expert

This student fully understood the task. S/he was able to generalize from previous math experience describing his/her guess as "kind of a middle number." The median of the class results was 3.5 and the average was 3.35. S/he used the class results listed on the board as well as the data recorded on his/her graph to make his/her prediction.

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Worms Chart

 Your Name Number of Worms on Your Plate