

NCSM Great Tasks for Mathematics

*Engaging Activities for
Effective Instruction and Assessment that Integrate
the Content and Practices of the
Common Core State Standards for Mathematics*

A Resource from the
National Council of Supervisors of Mathematics

SAMPLE TASKS

SPRING 2012

LEADERSHIP IN MATHEMATICS EDUCATION
NCSM NETWORK
COMMUNICATE
SUPPORT
MOTIVATE

Task Title: The Missing Words

Grade Level: 6th

Task Overview:

Students should be able to explain a reasonable strategy for determining the number of missing words. They should accurately compute the mean and range, and select an appropriate graph for displaying the data. Students will explore the concepts of variability and distribution of a data set.

Prerequisite Understandings:

Students need some experience with estimation so that they are comfortable with the first part of the task. They need to have experience with multiple ways to represent data so that they will have a variety of choices when asked to create a graph.

CCSSM Content Standards:

6.SP.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.

6.SP.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.

6.SP. 4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

CCSSM Mathematical Practices:

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

Teaching Notes:

Launch activity:

Make sure that students have computed measures of central tendency and range. Provide a format for students to report and defend their actions.

Core task:

Assure students that this is an actual page from the book, *Little House on the Prairie*. In providing lines to write a letter, students find it much easier to actually write words versus simply show mathematics. Student thinking is more transparent. Students will have a number of strategies for determining the number of missing words, and there will likely be a large range for the data.

Extension(s):

Locate a copy of *Little House on the Prairie* and share page 332 with students. Students can analyze the strength of their reasoning in estimating the number of missing words.

Launch

The Missing Words

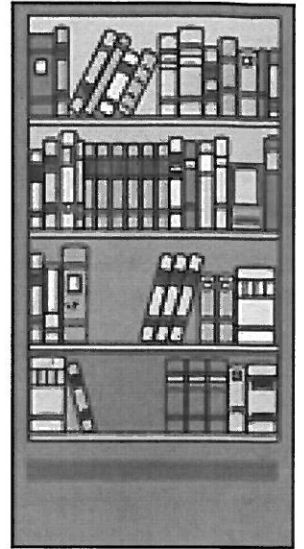
For each condition below, ask students to create a set of five data points that satisfy that condition. Reveal, or read, one condition at a time and ask several students to share their data and justify their answers before moving on to the next condition. Emphasize that there are many correct answers to each condition.

<u>Condition to Satisfy</u>	<u>Five Data Points</u>	Proof
Mean = 80	_____	
Mean = 80, Range = 10	_____	
Mean = 80, Range = 50	_____	
Mean = 80, Median = 80	_____	
Mean = 80, Median = 100	_____	
Mean = 80, Median = 50	_____	
Mean = 80, Mode = 75	_____	
Mean = 80, Mode = 50, Range = 70	_____	

The Missing Words

Hitoshi began reading *Little House on the Prairie* after he bought the book at the Reading Times Bookstore. When he got to page 332, he noticed that there was something wrong. He went to the bookstore to complain, but the store manager would not give Hitoshi a refund or a new book. However, the manager finally agreed to give him a new book if Hitoshi could provide both:

a **reasonable estimate** of how many words were missing, and
a **clear explanation of how he had figured it out.**



GOING OUT

lifted out the food-box. The fire burned beautifully, and Ma quickly got supper.

Everything was just as it used to be before

they		ere
on th		the
wage		hot
from		ny
mund		for
Jack,		as
soon		
Th		the
west,		for
nigh		
Pa		the
end o		side.
And		nen

he sat by the fire and smoked his pipe, while Ma tucked Mary and Laura into bed and laid Baby Carrie beside them.

She sat down beside Pa at the fire, and Pa took his fiddle out of its box and began to play.

"Oh, Susanna, don't you cry for me," the

Part 1

Your Job

Write the letter that tells Hitoshi what he can write to the manager. Be sure to tell:

1. about how many words you think are missing, and
2. how you figured out how many words are missing.

SHOW YOUR LETTER ON THIS PAGE.

Don't worry too much about spelling – just do your best. Hitoshi is your age and will understand that this is just your “first draft.”

Dear Hitoshi,

I think there are about _____ words in the missing section of the page. Here's how I figured it out.

Good luck,

Part 2

In order to answer the following questions, you will need to have the estimates of the missing numbers of words from all of your classmates.

1. Collect the data from your classmates and list them in the space below.
2. Find the mean number of the estimates of the missing words.
3. What is the range of estimates? Why do you think this number is as large as it is?
4. Create a graph representing the information. Explain why you made the graph you selected.
5. Decide how to identify the mean on your graph. Does your graph tell you any additional information about the set of data (classmates' answers)? Explain.

Results from the Classroom The Missing Words

Rebecca's work:

Dear Hitoshi,

I think there are about 100 words in the missing section of the page. Here's how I figured it out.

I took all of the words that were there and I estimated how many words would be under there so I imagined there were 10 words in each sentence and there were 10 sentences so I multiplied them 10×10 and I got 100 words missing.

Rebecca took a very basic approach to her estimate and was able to easily explain it.

Sari's work:

Dear Hitoshi,

I think there are about 130 words in the missing section of the page. Here's how I figured it out.

Because the sentence above it was 9 & right below it was eleven, & the average is 10 so I used the number of sentences that is missing & multiplied it & got 130.

Sari explained where she got her estimate of 10 for the number of words and then estimated more lines missing than Rebecca did.

Chase's work:

Dear Hitoshi,

I think there are about 169 words in the missing section of the page. Here's how I figured it out.

I counted the amount of words there was and I just times 13 by 13 and got 169 words.

CF

Chase has the largest estimate for the missing words by a larger estimate for the length of the line and the number of missing lines.

Adriana's work:

Dear Hitoshi,

I think there are about 75 words in the missing section of the page. Here's how I figured it out.

I counted how many words were in the sections you can see. I added them together & got 75. ~~The~~ The two numbers I added together were 52 & 23. I did it this way because, I think the missing section is about the same size as the other two sections put together.

This is a different approach to the estimate and provides one of the smallest estimates. It is good when students can share a different strategy for producing the estimate.

The second part of the task involved collecting the data and the interpretation of the data. It is more important as it related to the practices, and the student answers are missing some of the depth that we would like to see.

3. What is the range of estimates? Why do you think this number is as large as it is?

$$\begin{array}{r} 169 \\ -75 \\ \hline 94 \end{array} \text{ -Range}$$

Because there was so many words,

3. What is the range of estimates? Why do you think this number is as large as it is?

That's what they feel it is.

$$\begin{array}{r} 169 \\ -75 \\ \hline 94 \end{array}$$

3. What is the range of estimates? Why do you think this number is as large as it is?

I think it is this large because we did the math.

$$\begin{array}{r} 169 \\ -75 \\ \hline 94 \end{array}$$

$$\begin{array}{r} 169 \\ -75 \\ \hline 94 \end{array}$$

When asked to make a graph and explain why they selected the one they did, it was again clear

3. What is the range of estimates? Why do you think this number is as large as it is?

94

$$\begin{array}{r} 0 \\ - 169 \\ - 75 \\ \hline 064 \end{array}$$

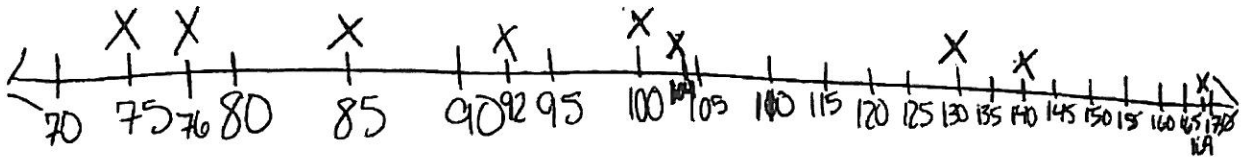


Because the space is bigger than the other spaces,

4. Create a graph representing the information. Explain why you made the graph you selected.

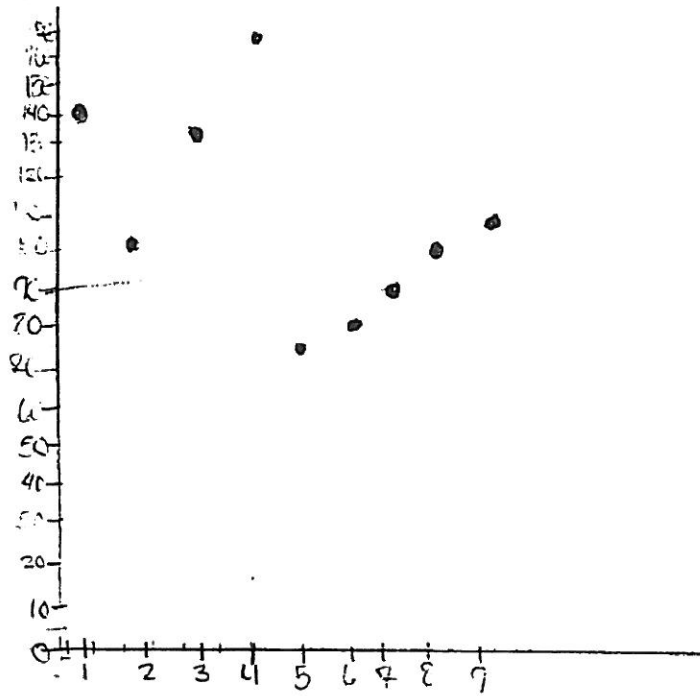
So the number should be bigger than the other spaces

that more work is needed to help students at this level of development justify their selection. Many different types of graphs were created, and the students demonstrated the ability to create the graphs.

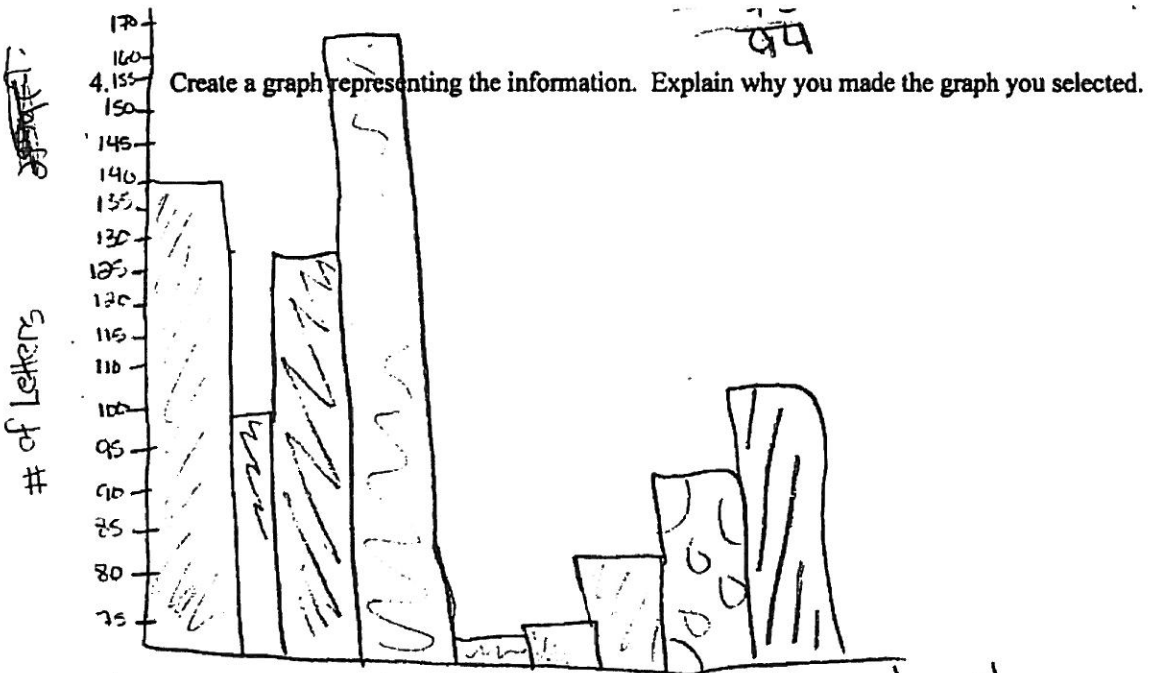


A line plot is a good graph because it shows all the numbers & it's easy to see the numbers placed on the line.

4. Create a graph representing the information. Explain why you made the graph you selected.



I think this graph is good because i fee like its more accur



Create a graph representing the information. Explain why you made the graph you selected.

of letters

i thinks its better cuz it shows much more and easier to read