The Early Bird Catches the Worm

This year at many parent conferences, parents have discussed with me the time their children should go to bed and how much sleep children should typically be getting a night in order to be at their best at school the next day.

With parent-teacher conferences coming up, I would like to be able to answer parents' questions about fourth and fifth graders' sleeping habits.

Please conduct a survey to help me become more informed about this topic.

I want you to keep track of the work that you are doing as you do it! Tell me how you decided on a question, how you decided the way you were going to collect your data, what changes you make along the way, and represent your data so that the class can analyze it too. Then I will need you to write a formal analysis of your data, including what is important about the data and what it means to you. You should also make recommendations to parents who are having a hard time deciding when their children need to go to bed.

Thanks for your help!
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Suggested Grade Span

3-5

Task

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Thanks for your help!

Alternate Versions of Task

More Accessible Version:

Determine the typical time students your age go to bed. Create and conduct a survey. Organize your results in a graph. Analyze your results. Draw conclusions about the typical time students your age go to bed.

More Challenging Version:

This year at many parent conferences, parents have discussed with me the time their children should go to bed, and how much sleep children should typically be getting a night in order to be at their best at school the next day. Help us! Is there a relationship between the numbers of hours of sleep students get and how well they do in school?

Conduct an investigation to reach a mathematically supported conclusion.

Thanks for your help!
Context

Our "Math Words of the Week" that we were studying included mode, mean and median. After studying these words and understanding their differences and similarities, I provided students with the following task to assess their ability to use these words appropriately in a real-life context.

What This Task Accomplishes

This task enabled me to assess where students stand in their understanding of mode, mean and median so I could plan future instruction. It also showed students that they could structure an investigation to find answers to every-day questions. This activity can lead to a great discussion of how data can be manipulated to prove different points of views and perspectives.

What the Student Will Do

Most students chose to create a formal survey, collect and organize their data and make conclusions. This was an authentic learning experience for students in creating meaningful and useful surveys. Some students became quite frustrated when the results of their survey did not fit the format they expected. For instance, some students responded that their bedtime was a range between 8:00-10:00, while others stated 8:30. Students then had to figure out how they were going to deal with these discrepancies. Some students were obviously "untruthful" about their bedtimes and that added another dimension to the data analysis. Obtaining the typical bedtime was not the only investigation students performed. They also investigated whether or not students agreed with their bedtimes and whether bedtimes varied from weekends to weeknights.

Time Required for Task

2-3 hours

Interdisciplinary Links

This study would be interesting to accompany a study of other topics students feel are "not fair". For instance allowances, time spent on chores, time spent on homework, etc.

Teaching Tips

Definitions:

Mean or Average - adding all the information together and dividing by the number of pieces of data.

Median - arranging all of the data in order and determining the middle piece of each data.
Mode - the most common.

When grading my students, I used the following format:

Understanding of the problem and evidence of approach and strategy: tally, scratch work, narration describing what was done and why. (10 pts)

Representation (50 pts)

Use of math language (20 pts)

Conclusion, recommendation, I noticed statements (20 pts)

**Suggested Materials**

- Ditto masters
- Graph paper
- Markers
- Stencils
- Calculators

**Possible Solutions**

Solutions will vary depending upon what students decide to research.

**More Accessible Version Solution:**

As with the original version, solutions will vary depending upon the data collected. Look for well documented work, correctness of mathematics used, and logic and reasoning.

**More Challenging Version Solution:**

As with the original version, solutions will vary depending upon the data collected. Look for well documented work, correctness of mathematics used and logical reasoning. With this version of the task, the student needs to have data to support a conclusion. They must show whether or not a relationship exists between the numbers of hours of sleep students get and how well they do in school.

**Task Specific Assessment Notes**

**Novice**

Student has limited awareness of the problem: S/he does not understand the goal is to collect and analyze data about which to draw a conclusion. Student has not organized data in a way that would lead to a mathematically relevant conclusion.
**Apprentice**  
Student shows some understanding of the problem, but has a random or weak strategy. Student collects relevant data, but makes an incorrect or incomplete mathematically relevant conclusion.

**Practitioner**  
Student understands the problem and obtains a correct solution. Student collects relevant data and makes a correct and complete mathematically relevant conclusion.

**Expert**  
Student creates multiple solutions, looks at the problem in a more complex manner, makes a correct and complete mathematically relevant conclusion and considers more than one dimension (time and day or bedtime and wake-up time).
The task was to find the average bedtime for our student. Most people go to bed at 8:00 and 10:00, so the range of bed times is 8-11:00.

I think parents should make kids go to bed at 9:00 because I get a good sleep, and that's what time I go to bed on school days.

<table>
<thead>
<tr>
<th>8:00</th>
<th>8:30</th>
<th>9:00</th>
<th>9:30</th>
<th>10:00</th>
<th>11:00</th>
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<tr>
<td>x</td>
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</tbody>
</table>

Range:
- 8:00-10:30
- 8:30-9:00

The student makes a conclusion without a mathematical basis.
The problem my friend and I had to solve was called “The Early Bird Catches the Worm, But What Time does the Bird go to Bed?” It was about a question that a teacher kept getting asked at many parent conferences. The question was “What time should their children go to bed, in order to be their best at school the next day.”

The way we figured out this problem was we made a paper with two columns. One for what you go to bed and one for what time do you wake up. Then we had it copied, and handed out to a class of 20 kids. After everybody had filled the survey out we made a data sheet and recorded all the different times kids go to bed. Then we found the time that was the most popular, and made that our model. The time was 8:30. Next we made our representation, showing the kids names, the time they went to bed, and the time they woke up. Our mode for what time they woke up was 6:00.
The # of hours people get of sleep

From our results we recommend having your child go to bed at 8:30, and waking up at 6:00 or 7:00, unless they have to go to school earlier. I noticed that there is a 1 and a half hour difference between the time kids should go to bed, and the time kids wake up. Overall I think I learned a lot from this math problem, and I think it was fun.
<table>
<thead>
<tr>
<th>The Names of The Kids</th>
<th>The Time They Go To Bed</th>
<th>The Time They Wake Up</th>
<th>Hours of Sleep Each Person Gets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elyse</td>
<td>8:30</td>
<td>6:00</td>
<td>9 and a half</td>
</tr>
<tr>
<td>Jamie</td>
<td>8:00-8:30</td>
<td>6:00</td>
<td>9 and a half</td>
</tr>
<tr>
<td>Cortney</td>
<td>8:30</td>
<td>6:00</td>
<td>9 and a half</td>
</tr>
<tr>
<td>Jeremy</td>
<td>9:00-10:00</td>
<td>7:30</td>
<td>10 and 15 minute</td>
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<tr>
<td>Desiree</td>
<td>9:00</td>
<td>7:30</td>
<td>8 hours</td>
</tr>
<tr>
<td>Milly</td>
<td>8:00</td>
<td>6:30</td>
<td>10 hours</td>
</tr>
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<td>Eric</td>
<td>8:30-9:00</td>
<td>7:00</td>
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<td>Marcus</td>
<td>8:00-9:30</td>
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<td>Courtney</td>
<td>8:00-8:30</td>
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<td>Kelly</td>
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<td>Chris</td>
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<td>Lewy</td>
<td>7:00-8:00</td>
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<td>Patrick</td>
<td>8:00</td>
<td>6:30</td>
<td>10 and a half</td>
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<td>Everett</td>
<td>8:00-9:00</td>
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<td>9 hours</td>
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<tr>
<td>Kristen</td>
<td>10:00</td>
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<td>Emma</td>
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<td>Michelle</td>
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<td>Sam</td>
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<td>Scott</td>
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The first thing that I did was I decided to ask people in my class when they went to bed on Saturday. I picked Saturday because it was in the middle of the weekend. I made a survey and gave it to kids in the class when I got my survey back. I made a tally of the times people went to bed. I took my information and put it on a piece of graph paper. I figured out that more people go to bed at ten o'clock.

My range for a weekend bed times was 7:00 pm to 2:00 Am. From looking at my graph I noticed that the times were clustered between 7:00 pm to 11:00 pm. I also noticed that 2:00 Am was a outlier because it was not the same as the others. I found out the average was and

The student uses accurate and appropriate language of statistics.
Saturday night bed times of 4th and 5th graders

The student displays survey results in an accurate graph.

Student justifies his/her solution.

Saturday night bed times of students in Mrs. Hasson's class

5th graders go to Bed at 10:00 on Saturdays because 10:00 is the mode.
Draft

The most popular bed times of kids.

goes to bed
My task was to figure out what times kids go to bed. The way I figured this out was by making a survey and giving it to all of the people in my class (showed on page 3). Once I got all of the data back I made a tally to help me make my line graph. When I was handing out the surveys I told the people that they could have ranges of times. I knew that it would only be a sample of kids’ bed times but at least you could get an idea of what times kids get to bed on all of the different days. The results I got back weren't really clustered and they went out liers either.

For figuring out kids’ bed times, I found the most frequent or mode of the bed times. When I told the people they could have ranges and when they handed the surveys back with ranges on them, I figured what time they went to bed by using the first bed time that they put down. I noticed that the average kid goes to bed (out of my sample) at 8:00 on Mondays, 8:30 on Tuesdays, in between...
8:00 and 8:30 on Wednesday's, 8:30 on Thursdays, 10:00 on Fridays, 10:00 on Saturdays, and 8:00 on Sunday nights.

I recommend that you look at this graph I made and maybe make a reasonable time according to these results.

All that Don't have AM Are pm.

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The student reaches a supported conclusion.
The most popular bedtime times of kids.

The student summarizes results in a graph.

The graph is labeled and accurate.