Horton's Clover Hunt [Problem #2839]

My children have always loved the story *Horton Hears a Who!* by Dr. Seuss. For those of you who aren't familiar with this particular tale, Horton the elephant takes on the task of protecting tiny creatures living on a dust speck that he has placed on a clover.
At one point in the story, a bird steals the clover from Horton and drops it over a very large clover field at 6:56 a.m. Ever the faithful protector and true to his promise to save them, "Because, after all, a person's a person, no matter how small," Horton begins the enormous task of searching for the lost clover.

But clover, by clover, by clover he found
That the one that he sought for was just not around.
And by noon poor old Horton, more dead than alive,
Had picked, searched, and piled up, nine thousand and five.
1. At this rate, estimate how many clovers Horton picked each minute.2. Approximately how many seconds did Horton spend on each clover?

For each of the above answers, round to the nearest whole unit.

Extra: The story continues

Then, on through the afternoon, hour after hour...
Till he found them at last! On the three millionth flower!
You need only choose **one** of these questions to answer:

1. If Horton continued at the rate you calculated above without pausing, how long would it take him to reach the three millionth flower? Be sure to answer this question in a way that makes sense (in other words, don't give an answer like 72 hours when 3 days would give us a better sense of how long this is). **or**
2. In the story it seems that Horton finds the clover later the same day. If he continued picking from noon until he found the clover at six o'clock that same evening, approximately how fast would he have to work?

Comments and Sample Solutions

Horton's problem involved using the mathematical concept of rate (or ratio) and the mentors from Drexel University enjoyed seeing the different explanations submitted. Horton's picking rate compared the total number of clovers picked over the given time period or 5 hours and 4 minutes, so the first job was correctly finding that time period in minutes. Ratio is one of the ways that we use division to answer mathematical questions.

It was also important for problem solvers to practice their rounding skills on this problem, since we requested answers to the nearest whole unit. Whenever rounding has been used in problem solving, it is then correct to say that answers are “approximately equal to” or "about" the rounded value. The mentors worked with many students to try to use accurate terminology because many of them simply rounded but used the word "equals."

Amanda S gave a nice explanation for her steps to finding both of the rate questions in the basic problem. Her work shows an interesting method for the second question. Rather than starting with her first answer (30 clovers per minute) in order to determine the number of seconds that Horton inspected each clover (as many other submitters correctly did), she looked at the situation from the perspective of total numbers. She considered the total number of clovers picked compared to the total number of seconds in his morning picking session. Either method yields the correct answer of approximately 2 seconds per clover.

Andrew Cloyd solved the questions about how much time Horton spent on each flower the way most students did. He also correctly pursued the first Extra question (Extra A). To do this, he looked first at the total time needed for 3 million (3,000,000) clovers if Horton spent 2 seconds on each. Then he systematically broke that large number of seconds into minutes, then hours, days and finally weeks.

Craig Johnsen wrote out his steps to find the initial two answers and then dove into the second Extra question (Extra B). He first considered the number of clovers remaining in order to reach the 3 millionth one, allowing that Horton had already been picking in the morning. His first rate compared those remaining clovers to the 6 hours available for picking. He then found an equivalent rate in minutes and discovered that Horton would have to move much faster in the afternoon session in order to inspect 3 million clovers!

You'll notice that these solutions have quite a bit of information. This is when formatting is especially useful. Abe W cleverly enhances his solution by setting the calculations apart with blank lines and centering. It's important to consider

how a few simple additions like this will truly improve the readability of your solution.

In order to change time units as needed in this problem, submitters were considering the concept of equivalent rates. Equivalence is one of the “big ideas” in mathematics that can be helpful in lots of different situations and problems that require a transition from one unit to another.

From: Craig J, age 10 ,

1. 30 clovers per minute. 2. 2 seconds per clover. Extra b. 8,308 clovers per minute to finish by 6:00 pm.

Problem 1:First I calculated for how long Horton picked clovers. I found that out by subtracting 6:56 from 12:00. That equalled 5:04. I converted that into minutes by mutipying 5 hours x 60 minutes per hour which equals 300 minutes. I added the extra 4 minutes to 300 because that would give me the total number of minutes horton picked, which is 304. I took the total number of clovers picked, which was 9,005, and divided it by 304 because that would give me the number of cloves Horton picked per minute. That equals 29.62171, which I rounded to 30 clovers per minute, which is the answer.

Problem 2: If Horton picks 30 clovers per minute, then an equivilent statement would be 30 clovers per 60 seconds. Then I divided 60 seconds by 30 clovers per 60 seconds to give me how many seconds he spent on each clover. The answer is 2
seconds.

Extra b: First, I found out how many clovers Horton picked between noon and 6:00 pm. To find this out I subtracted the 9,005 he picked in the morning from the 3,000,000 he picked altogether. That gave me 2,990,995 clovers picked in the
afternoon. Then I figured out how much time he spent picking in the afternoon by subtracting 6:00 pm from 12:00pm. That gave me a total of 6 hours spent picking in the afternoon. I then divided the 2,990,995 clovers picked in the afternoon by the 6
hours he spent picking because that would give me the number of clovers that needed to be picked per hour to achieve the goal. That answer was 498,499 clovers picked per hour. To convert this to the number of clovers

picked per minute, I divided
498,499 by 60 because there are 60 minutes in an hour. That gave me a picking rate of 8,308 clovers picked per minute. That means horton would have to pick 8,308 clovers per minute to finish by 6:00 pm.

I think that problems 1 and 2 were easier than the extras because the extra problems had more steps.