

Eggsactly

We have 12 chicken eggs in our classroom incubator. If the 1st egg hatches today at 11:00, and the next one hatches at 11:20, and then next one at 11:40, and this rate continues, what time will it be when all 12 eggs hatch? Show how you figured this out.

Grade Levels Pre-K-2

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Context

We have been studying egg development of chickens. When we did this problem, we had been observing 12 eggs in a classroom incubator. We had also studied time for several weeks during the early spring, and each student made a clock out of a paper plate, construction paper and a brad.

What This Task Accomplishes

This task assesses how well students understand time and the use of the minute and hour hands. The task reveals if students understand the concept of a rate or pattern that has developed and will continue. It also shows how well students are using their counting skills (fives, 10s or 20s) and organization skills to show the hatch times.

What the Student Will Do

Some students will recognize the pattern/rate of 20 minutes, but they will occasionally switch to 10-minute intervals. Some will count to 20 by fives starting at the last hatching time, which leads to a solution of only 15 minutes later. Some students will only be able to get to 11:40 before they go in an unrelated direction. Some students will record times as if there were 100 minutes in an hour (11:20, 11:40, 11:60, 11:80, 12:00, etc.). Some students will never move the hour hand and come up with a solution that is the same as the third hatch time (11:40). Some students will successfully get up to the fifth or sixth hatching and give up. Some students will not even need the clock because they have the problem so well organized in their minds. Some students will use military time (after the times for the hour after 12:00, they will use 13:00, 13:20, 13:40, etc.) Some students will want to use a diagram to show a strategy so they will record unrelated pictures to represent the numbers involved in the problem (11 dots for 11:00, 20 dots for 11:20 and 40 dots for 11:40).

Interdisciplinary Links

This task can be used during a science unit. It directly connects to a study of egg development.

Teaching Tips

It is helpful for each child to have a clock. In our case, the students had clocks which they had

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made themselves. Most kids referred to the clocks they made. The task as stated required finding the hatching time of 12 eggs because that is how many eggs we had in our incubator. I think that was too many for some kids. Six would have been a good number to help some of the students feel successful and less overwhelmed. For younger students, it would probably be less intimidating if the times did not have to go past 12:00; maybe the first hatching could be at 1:00. Fifteen minute or 30 minute intervals would also be less confusing for students who are just beginning to learn about time.

Suggested Materials

Clocks made by students or clocks made for practice.

Possible Solutions

If 12 eggs were going to hatch every 20 minutes beginning at 11:20, the 12th egg would hatch at 2:40.

Benchmark Descriptors

Novice

A Novice solution may have no relationship to the task because the student applied inappropriate concepts. A Novice may have so many errors in mathematical procedures that the problem could not be solved. The explanation may not be understood because it is unrelated to the problem.

Apprentice

An Apprentice may use a strategy that is partially useful, leading toward a solution. An Apprentice may not completely carry out the procedure because parts of the problem are misunderstood. The student may also count by 20s up to 80 as if there are 100 minutes in an hour. There is some use of appropriate mathematical notation; s/he may instinctively use military time, which is an appropriate strategy to make it easier to record times through 12:00.

Practitioner

A Practitioner's solution may show that the student has a broad understanding of the problem and the concepts necessary for its solution. After recording the times 11:00, 11:20, 11:40, 11:60, 11:80, 12:00, etc., this student may recognize that s/he had used inaccurate mathematical notation. S/he may change the times to the right times. The Practitioner will use a strategy that leads to the correct solution.

Expert

An Expert will immediately be able to identify the appropriate mathematical concepts necessary for a solution. S/he may not need to use the clock, because s/he is able to mentally apply procedures accurately to correctly solve the problem and verify the results. Mathematical representations and notation will be actively used as a means of communicating ideas related to the solution of the problem. The Expert may make mathematically relevant observations about the solution, such as "three eggs hatch every hour."

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Novice

This student was eager to develop a strategy, but s/he was unable to demonstrate its use.

Student lacks use of correct mathematical language and reasoning.

~~11:40 + 30 = 12:10~~
~~20 + 30 = 0 =~~

12:40

if it's 11:40 then it will be 12:40 because it matches.

put 11 dots (for 11:00) 11:20

20 dots (for 11:20)

40 dots 11:40 (for 11:40)

Student is unable to continue the pattern.

There is no evidence the student understood that s/he was solving for twelve chickens.

The student does not understand the connection between the times and the clock.

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Apprentice

This student uses some proper notation.

Student attempts to follow a pattern.

1. 11:00 | 2. 11:20 | 3. 11:40
4. 11:60 | 5. 11:80 | 6. 12:00
7. 12:20 | 8. 12:40
9. 12:60 | 10. 12:80

The student would probably be more comfortable learning military time before standard.

Student work shows some organization.

1. 13:00 | 12. 13:20 |

The student confused ten minutes and twenty minutes, and thought each hour is made up of one hundred minutes-this led him/her to the wrong solution.

There is evidence the student understood s/he was solving for twelve.

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Practitioner

Student obtained a correct solution.

There is evidence that the student knew s/he was solving for twelve.

① 11:00 ② 11:20 ③ 11:40 ④ 12:00 ⑤ 12:20 ⑥ 12:40 ⑦ 12:00 ⑧ 12:20 ⑨ 11:40 ⑩

⑪ 2:00 ⑫ 2:20

When s/he was translating to "real time" s/he skipped hatching. Organization and planning contributed to his/her mistake.

At first J. said 2
11:60 for 12 o'clock and then 11:80 then
he translated it back to "right time" ← J's words.

Student verifies solution and makes adjustments.

Student's work is organized. Correct notation is used.

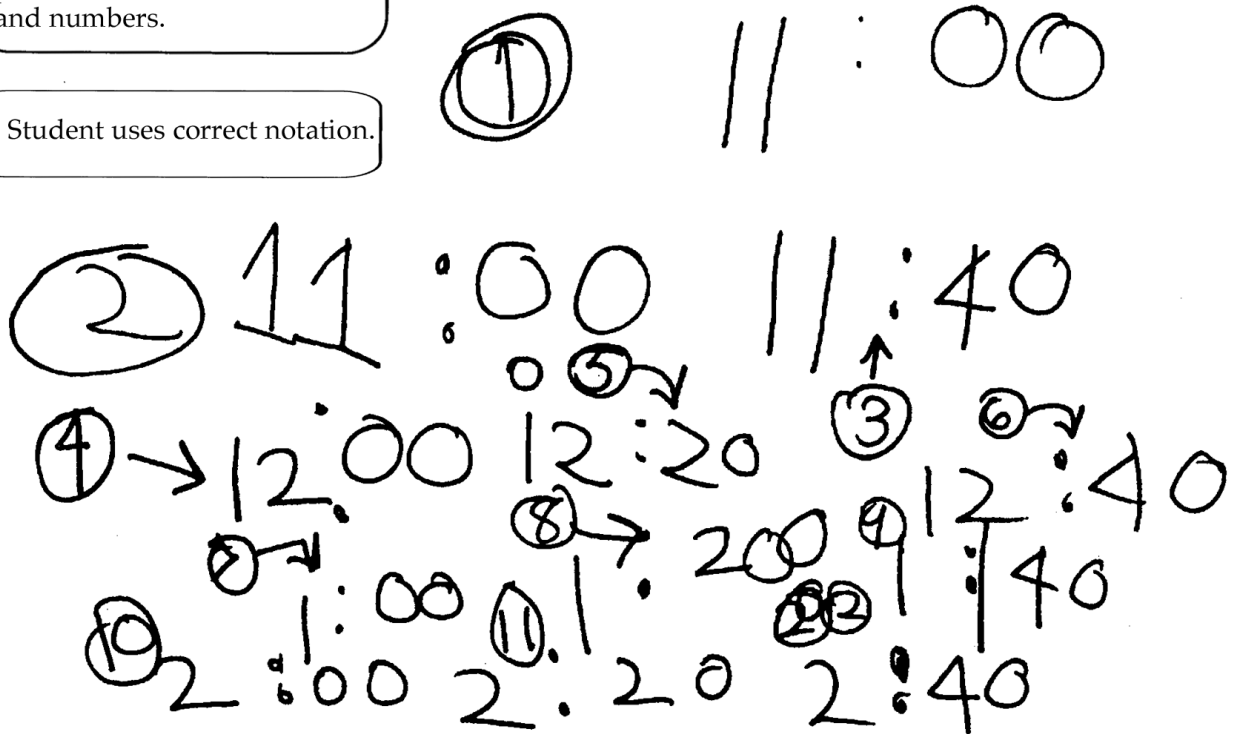
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Expert

The student was able to figure out the times without a clock. S/he quickly recognized the pattern and recorded times and numbers.

Student's work is correct, labeled and organized.

Student uses correct notation.



This student said 11:20 for the number two, but wrote 11:00. This did not confuse the student because the answers were immediately clear in his/her mind.

A stronger expert solution would have included a mathematically relevant comment such as "3 eggs hatch per hour".