Math
Released Item 2019

Grade 8

Gallons in Pool
VH024103
Anchor Set
A1 – A8

With Annotations
Prompt

The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A

Lap Pool B

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

Enter your answer and your explanation in the space provided.
## VH024103 Rubric

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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| 3     | Student response includes the following 3 elements.  
  - **Computation component** = 1 point  
    - The student correctly expresses the final result, $9.9 \times 10^4$ in scientific notation.  
  - **Reasoning component** = 1 point  
    - The student uses an appropriate strategy to calculate the number of gallons of water in Lap Pool A based on the number of gallons of water in Lap Pool B.  
  - **Reasoning component** = 1 point  
    - The student provides a response that indicates that the capacity of Lap Pool B is approximately 6 to 7 times the capacity of Lap Pool A, or that the capacity of Lap Pool A is approximately 1/6 to 1/7 the capacity of Lap Pool B.  

Sample Student Response:  
Lap Pool A looks to be about ½ the length of Lap Pool B. And Lap Pool A looks to be 3/10 the width of Lap Pool B because it has only 3 lanes compared to the 10 lanes in Lap Pool B. Since $\frac{1}{2} \times \frac{3}{10} = \frac{3}{20}$, Lap Pool A is about 3/20 the capacity of Lap Pool B. Multiplying it out, I get $(6.6 \times 10^5) \times \frac{3}{20} = (19.8 \times 10^5)/20 = 0.99 \times 10^5$. To change $0.99 \times 10^5$ to scientific notation, I need to move the decimal one place to the right and decrease the exponent on the 10 by 1. So the estimated number of gallons of water in Lap Pool A is $9.9 \times 10^4$.  
Or other valid response.  

Notes:  
- The values calculated in the Computation and Reasoning Components may differ from the examples shown. As long as the amounts provided follow from student provided Reasoned Estimates, credit should be awarded for the Computation and first Reasoning Component.  
- The method used to get the final answer in scientific notation may differ. Students may set the problem up differently and not need to shift the decimal point. For example, a student may set up the expression as $(6.6 \times 10^5) \times (1/2)(3/10)$ and evaluate it as follows: $(6.6 \times 10^5) \times \frac{1}{2} \times (3/10) = (3.3 \times 3 \times 10^5)/10 = 9.9 \times 10^4$. In this case, the student would receive the computation point for performing operations with numbers in scientific notation.
- The student may receive a combined total of 2 points if the reasoning processes are correct, but the student makes one or more computational errors.

- The student may receive a total of 1 point if they compute the correct answer but show no work or insufficient work to indicate a correct reasoning process.

- The student cannot receive more than 2 points if the explanations, while sufficient to indicate that the student had correct reasoning, contain nonsense statements.

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<thead>
<tr>
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<tbody>
<tr>
<td>2</td>
<td>Student response includes 2 of the 3 elements.</td>
</tr>
<tr>
<td>1</td>
<td>Student response includes 1 of the 3 elements.</td>
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<tr>
<td>0</td>
<td>Student response is incorrect or irrelevant.</td>
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</table>
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^3$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

Since pool B has 10 lanes while pool A has 3, I made a fraction $\frac{3}{10}$, after turning it into a decimal, .3, I divided it by 2 since pool B has about twice the length of pool A, getting .15. Then I multiplied 660000, the standard form of the amount of water there is in pool B, by .15, and got 990000 gallons in pool A. In scientific notation it is $9.9 \times 10^4$. 
Anchor Paper 1
Score Point 3

This response receives full credit. It includes each of the three required elements:

- The response provides a reasoned estimate of the capacity of Pool A (99000 gallons).

The response must indicate that the capacity of Pool B is approximately 6 to 7 times as large as Pool A, or the capacity of Pool A is $\frac{1}{6}$ to $\frac{1}{7}$ the capacity of Pool B.

- The response provides a correct final result expressed in scientific notation (9.9×10^4).

- The response shows or explains a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B (Since pool b has 10 lanes while pool a has 3, i made a fraction $\frac{3}{10}$, after turning it into a decimal, .3, i divided it by 2 since pool b has about twice the length of pool a, getting .15. Then i multiplied 660000 . . . by .15).
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$1.1 \times 10^5$ gallons of water. I got this because Lap Pool B is twice as long and 3 times as wide so divide 6.6 by 2 and then divide by 3 which equals 1.1.
### Anchor Paper 2
**Score Point 3**

This response receives full credit. It includes each of the three required elements:

- The response provides a reasoned estimate of the capacity of Pool A (Lap Pool be is twice as long and 3 times as wide). \[3 \times 2 = 6 \text{ times as large}\]

The response must indicate that the capacity of Pool B is approximately 6 to 7 times as large as Pool A, or the capacity of Pool A is \(\frac{1}{6}\) to \(\frac{1}{7}\) the capacity of Pool B.

- The response shows or explains a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B (divide 6.6 by 2 and then divide by 3).

- The response provides a correct final result expressed in scientific notation \((1.1 \times 10^5)\).
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

Lap pool A has about $1.98 \times 10^5$ gallons in it because I calculated $6.6 \times 10^5$ to equal 660000, and A is $\frac{3}{10}$ the size of the big pool. I multiplied the 660000 by $\frac{3}{10}$ and got 198000, which is $1.98 \times 10^5$ in scientific notation.
This response receives partial credit. It includes two of the three required elements:

- The response shows or explains a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B, using the incorrect estimate provided (I multiplied the 660000 by $\frac{3}{10}$).

- The response provides a correct final result of the capacity of Pool A, based on the incorrect estimate, expressed in scientific notation ($1.98 \times 10^5$).

The response provides an incorrect estimate (A is $\frac{3}{10}$ the size of the big pool, 198000).
Lap pool A will probably have \(1.1 \times 10^5\) gallons of water in it if it is only the size of B.
This response receives partial credit. It includes two of the three required elements:

- The response provides a reasoned estimate of the capacity of Pool A (b/c A, is 6th the size of B).
- The response provides a correct final result expressed in scientific notation (1.1 \times 10^5).

The work or explanation of a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B is missing.
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $5.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$16.5 \times 10^4$

Lap Pool A is 4 times smaller than Lap Pool B, so Lap Pool B’s gallons of water is going to be divided by four.
This response receives partial credit. It includes one of the three required elements:

- The response shows or explains a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B, using the incorrect estimate provided (Lap Pool B’s gallons of water is going to be divided by four).

The response provides an incorrect estimate (Lap Pool A is 4 times smaller than Lap Pool B).

The response provides an incorrect value of the capacity of Pool A, based on the estimate provided, expressed in scientific notation \((16.5 \times 10^4)\). The correct value expressed in scientific notation for the estimate provided would be \(1.65 \times 10^5\).
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

In 10 lanes there is 660,000 gallons of water. If you divide by 10 you know how many gallons would be in one lane, 66,000 gallons. Multiply by 3 for pool a. 198,000 gallons are in pool a.
This response receives partial credit. It includes one of the three required elements:

- The response shows or explains a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B, using the incorrect estimate provided (If you divide by 10 you know how many gallons would be in one lane. 66,000 gallons. Multiply by 3 for pool a).

The response provides an incorrect estimate (198,000).

The final result expressed in scientific notation is missing.
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately \(6.6 \times 10^5\) gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

Lap pool A probably contains about 22000 gallons of water because when I solved the equation needed to find the amount of water lap pool B is, I estimated that it was about 3 times the amount of water lap pool A has in it.
This response receives no credit. It includes none of the three required elements:

The estimate provided is incorrect (I estimated that it was about 3 times the amount of water lap pool A has in it).

The response does not show or explain a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B, using the incorrect estimate provided. (I solved the equation) is overly general and not a strategy.

The final result expressed in scientific notation is missing.
Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^6$ gallons of water.

The diagrams shown are the top views of two pools used for swimming laps.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$3.3 \times 10^9$ because the pool is half the other pool and so then you could just take half the answers
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| **Anchor Paper 8**  
**Score Point 0**  
This response receives no credit. It includes none of the three required elements:  
The estimate provided is incorrect (because the pool is half the other pool).  
The response does not show or explain a strategy to calculate the number of gallons in Pool A based on the number of gallons in Pool B, using the incorrect estimate provided. (so then you couls just take half the answers) is overly general and not a strategy.  
The final result expressed in scientific notation \( (3.3 \times 10^2) \) is incorrect. It does not match the estimate provided. The value that would match the estimate provided would be \( 3.3 \times 10^5 \). |
Practice Set
P1 - P5
No Annotations Included
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$6.6 \times 10^5 \div 10$ to get the water per lane. $6.6 \times 10^4$ Lap Pool A’s lanes are around twice as small so $6.6 \times 10^4 \div 2 = 3.3 \times 10^4$ However there are 3 lanes so $3.3 \times 10^4 \times 3 = 9.9 \times 10^4$ ∎

I estimate that there are $9.9 \times 10^4$ gallons in Lap Pool A.
$10^5 = 100,000$

6. $6 \cdot 100,000 = 660,000$ gallons of water

6 a pools inside b pool

$\frac{660,000}{6} = 110,000$

There would be 110,000 gallons of water inside lap Pool A. I determined my estimate by figuring out how many A pools would fit inside of pool B. I did the math for the water inside pool B. Then I put the math together, as you can see, and I came up with my answer.
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^3$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$1.1 \times 10^5$
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$1.98 \times 10^5$
The diagrams shown are the top views of two pools used for swimming laps.

Lap Pool A has lanes for 3 swimmers and Lap Pool B has lanes for 10 swimmers. The lap pools have the same uniform depth. Lap Pool B contains approximately $6.6 \times 10^5$ gallons of water.

Estimate the number of gallons of water in Lap Pool A. Express your answer in scientific notation. Explain how you determined your estimate.

$6.6 \times 100000 = 660000$
$660000 \times .30 = 198000$
$\frac{198000}{2} = 99000$

Lap pool A contains 99000 gallons of water.
## Practice Set

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