2025 MCAS Sample Student Work and Scoring Guide

Grade 8 Mathematics
Question 6: Constructed-Response

Reporting Category: The Number System and Expressions and Equations
Standard: 8.EE.A.4 - Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.
Item Description: Convert numbers expressed in standard notation into scientific notation, and multiply and divide numbers expressed in scientific notation using a real-world context.
Calculator: Not allowed

This item can be found in the released item sets on the MCAS Resource Center.

Scoring Guide

Select a score point in the table below to view the sample student response.

Score*	Description
4A	The student response demonstrates an exemplary understanding of the Expressions and Equations concepts involved in using numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. The student estimates quantities as a single digit times a power of 10 using either positive or negative exponents, and expresses how many times greater one quantity is than the other.
4B	
3	The student response demonstrates a good understanding of the Expressions and Equations concepts involved in using numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result the response merits 3 points.
2	The student response demonstrates a fair understanding of the Expressions and Equations concepts involved in using numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Expressions and Equations concepts involved in using numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.
0	The student response contains insufficient evidence of an understanding of the Expressions and Equations concepts involved in using numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. As a result, the response does not merit any points.

*Letters are used to distinguish between sample student responses that earned the same score (e.g., 4A and 4B).

Score Point 4A

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

3×10^5

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

1×10^{-3}

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$1 \times 10^4 = 10000$

$6.25 \times 10^2 = 625$

$10000 \div 625 = 16$

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

$6.25 \times 10^2 = 625$

$625 \times 3200 = 2 \times 10^6$

Back to Scoring Guide

Score Point 4B

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

3×10^5

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

1×10^{-3}

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

it is 16 times greater. If you divide 10000 by 625 which is both of those numbers in standard form you get 16 as your answer.

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

2×10^6 if you multiply 625 by 3200 you will get 2 million which in scientific notation is 2×10^6

Back to Scoring Guide

Score Point 3

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

3×10^5

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

$1 \times .001$

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$1 \times 10^4 = 10{,}000$

$6.25 \times 10^2 = 625$

$10{,}000 \div 625 = 16$

It is 16 times heavier

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

2×10^6

$3200 \times 625 = 2{,}000{,}000$

Back to Scoring Guide

Score Point 2

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

3×10^5

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

1×10^3

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

1×10^4

6.25×10^2

$4 - 2 = 2$

About 2 times as great.

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

$3{,}200 \times 625 = 2{,}000{,}000$

2×10^6

Back to Scoring Guide

Score Point 1

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

300,000

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

.001

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

$6.25 \times 10^2 = 625$

$1 \times 10^4 = 10{,}000$

The average weight of an elephant is 16 times greater to that of a tiger. $10{,}000 \div 625 = 16$

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

32,000 Pounds is the total weight of all the tigers because if the average weight of one tiger is $6.25 \times 10^2 = 625$ then $3{,}200 \times 10^2 = 32{,}000$

Back to Scoring Guide

Score Point 0

This question has four parts.

Researchers are reviewing the weights of different animals.

Part A

A blue whale weighs $300{,}000$ pounds. What is the weight, in pounds, of the blue whale written in scientific notation?

Enter your answer in the space provided.

3×10^6

Part B

A thread snake weighs 0.001 pound. What is the weight, in pounds, of the thread snake written in scientific notation?

Enter your answer in the space provided.

-1×10^2

Part C

The researchers compare the average weights of elephants and tigers.

- The average weight of an elephant is 1×10^4 pounds.
- The average weight of a tiger is 6.25×10^2 pounds.

How many times greater is the average weight of an elephant than the average weight of a tiger? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Elephant: 10000.0

Tiger: 625.0

Part D

The researchers note that there are $3{,}200$ tigers living in the wild. Using 6.25×10^2 pounds as the average weight of a tiger, what is the total weight, in pounds, of all the tigers living in the wild? Show or explain how you got your answer. Write your answer in scientific notation.

Enter your answer and your work or explanation in the space provided.

3.825

Back to Scoring Guide