2021 MCAS Sample Student Work and Scoring Guide

Grade 8 Mathematics
Question 8: Constructed-Response

Reporting Category: The Number System and Expressions and Equations
Standard: 8.EE.C.7 - Solve linear equations in one variable.
Item Description: Solve linear equations in one variable and create a linear equation, given the number of solutions.
Calculator: Not allowed

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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 solving linear equations in one variable. The student determines the number of solutions for different equations.
4B	
3	The student response demonstrates a good understanding of the Expressions and Equations concepts involved in solving linear equations in one variable. 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 solving linear equations in one variable. 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 solving linear equations in one variable.
0	The student response contains insufficient evidence of an understanding of the Expressions and Equations concepts involved in solving linear equations in one variable. 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.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

The solution tho the equation is $x = 20$. i know this because when I isolate the variable x from the -4 by subtracting it from the side of the equation with the variable I get the equation $x = 20$ which shows that x is 20.

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

$4 + 2x = 4 + 2x$ has infinately many solutions.

$4 + 2x = 4 + 2x$

$4 - 4 + 2x = 4 - 4 + 2x$

$2x = 2x$

$2x \div 2 = 2x \div 2$

$x = x$

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

This equation has no solutions. I know this because when you simplify this equation you get $18 = 0$ which is not true. I simplified the equation like so,

$3(4 + x) = 7x - 2(2x + 3)$

$12 + 3x = 7x - 4x - 6$

$12 + 3x = 3x - 6$

$12 + 6 + 3x = 3x - 6 + 6$

$18 + 3x = 3x$

$18 + 3x - 3x = 3x - 3x$

$18 = 0$

$18 \neq 0$. In a simplified equation when the variables cancel eachother out and the most simplified equation is not true such as $18 = 0$ is not true the equation has no solution.

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

This equation has one solution which is $9\frac{1}{7}$. I know this because when simplified this equation is just $9\frac{1}{7}$. I simplified the equation like so,

$\frac{3}{8}$ x $-6 = \frac{1}{2}(4 - x)$

$\frac{3}{8}x - 6 = 2 - \frac{1}{2}x$

$\frac{3}{8}x + \frac{4}{8}x - 6 = 2 - \frac{4}{8}x + \frac{4}{8}$ x

$\frac{7}{8}x - 6 - 2 = 2 - 2$

$\frac{7}{8}x - 8 = 0$

$\frac{7}{8}x - 8 + 8 = 0 + 8$

$\frac{7}{8}x = 8$

$\frac{7}{8}x \div \frac{7}{8} = 8 \div \frac{7}{8}$

$x = 9\frac{1}{7}$. Since the completely simplified equation is true and not $x = x$ the equation has one answer.

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Score Point 4B

This question has four parts.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

The solution to this equation is $x = 20$. I got my answer by taking the equation $x - 4 = 16$ and moving the -4 to the other side of the equal sign. To do that, I had to add 4 to both sides of the equal sign. Doing that, canceled out the -4 and added 4 onto 16, making the equation $x = 20$

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

A linear equation that has infinitely many solutions is $3\,(2x) = 6x$

when you simplify it, you multiply 3 and $2x$, and get $6x$, then the equation is $6x = 6x$, and you can put any value in for x and it will still be a true statement

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

This equation has no solutions, when you simplify it it equals $12 + 3x = 3x - 6$. Then, to simplify it even further, you'd have to move one of the $3x$ to the other side of the equal sign, so you'd subtract $3x$ from both sides. But by doing that it gets rid of the both of the $3x$s and the equation would end up like $12 = -6$ which is not a true statement.

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

This equation only has one solution. When you simplify the equation you get $\frac{3}{8}x - 6 = 2 - \frac{1}{2}x$, which you can simplify further to $\frac{7}{8}x = 8$, which only has one possible solution, which is $\frac{64}{7}$

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Score Point 3

This question has four parts.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

$x - 4 = 16$ here you add 4 on each side
$x = 20$

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

$100 = x + 100$
$subract$ 100 from each side to get $x = 0$

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

$3\,(4 + x) = 7x - 2\,(2x + 3)$
$12 + 3x = 7x - 4x - 6$
$12 + 3x = 3x - 6$
$12 = -6$
$12 \neq -6$
No solutions

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

$\frac{3}{8}$x $-6 = \frac{1}{2}(4 - x)$

$\frac{3}{8}x - 6 = 2 - \frac{1}{2}x$

$\frac{3}{8}x = 8 - \frac{1}{2}x$

$\frac{7}{8}x = 8$

$8 \div \frac{7}{8} = \frac{64}{7}$

1 solution

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Score Point 2

This question has four parts.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

$x - 4 = 16$
$4 + x - 4 = 16 + 4$
$x = 20$

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

$2y = 12$
$\frac{2y}{2} = \frac{12}{2}$
$y = 6$

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

$3(4 + x) = 7x - 2(2x + 3)$
$12 + 3x = 7x - 4x - 6$
$12 + 3x = 3x - 6$
$12 \neq -6$
there are no solutions

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

$\frac{3}{2}x - 6 = \frac{1}{2}(4 - x)$
$\frac{3}{2}x - 6 = 2 - \frac{1}{2}x$
$\frac{4}{2}x - 6 = 2$
$2x = 8$
$x = 4$
infinitely many solutions

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Score Point 1

This question has four parts.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

The solution to the equation is 20. I got this answer by adding 16 and 4 together and I got 20 then I plugged 20 in as x and the equation was right.

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

$5 = -6$

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

infinetly many. i got $12 = -6$ as my answer.

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

The equation has no solution because you cannot divide a fraction.

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Score Point 0

This question has four parts.

Part A

Consider this equation.

$$x - 4 = 16$$

What is the solution to the equation? Show or explain how you got your answer.

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

There is no solution because there is no number behind x

Part B

Write a linear equation in one variable that has infinitely many solutions. Show the process of simplifying the equation to prove that it has infinitely many solutions.

Enter your equation and your work in the space provided.

$3 \times \pi$

Part C

Consider this equation.

$$3(4 + x) = 7x - 2(2x + 3)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

it has one solution because there is only one equal sign.

Part D

Consider this equation.

$$\frac{3}{8}x - 6 = \frac{1}{2}\left(4 - x\right)$$

How many solutions does the equation have? Show or explain how you got your answer.

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

two because one solution after the equal sign and one in the parenthasees

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