

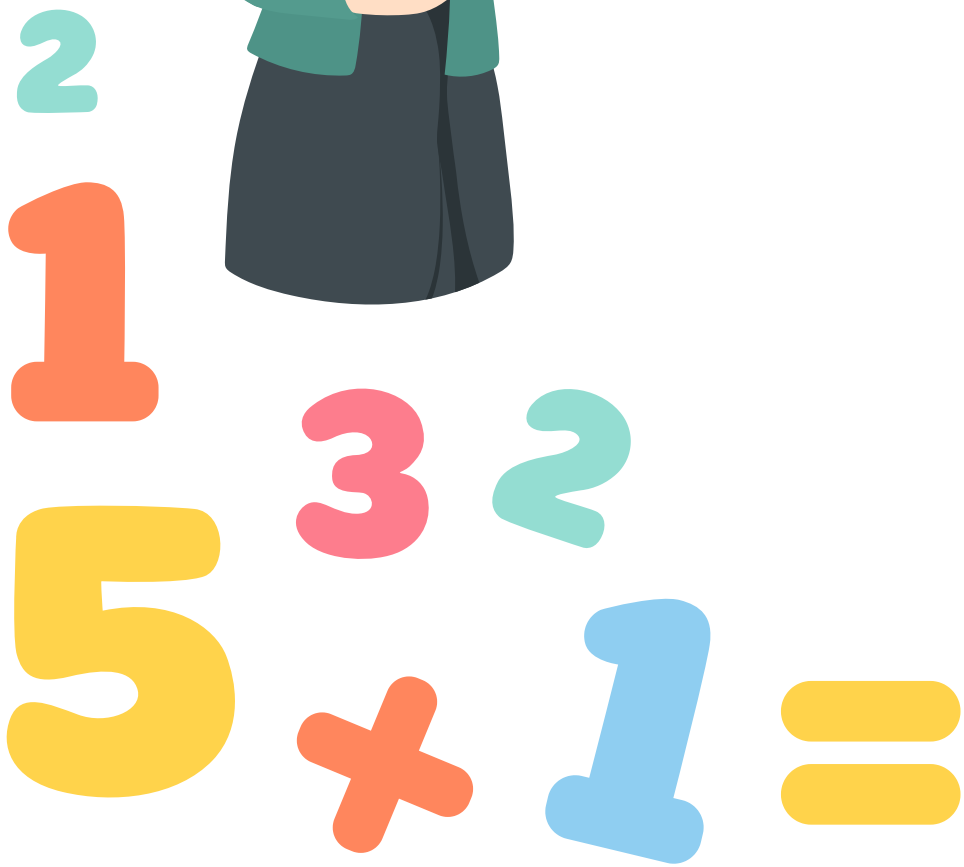
# DAILY MATH - DAY 3

PHANIE'S MOM (DG)

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13 NOVEMBER 2025

Linear Equations Practice Set



$$\begin{aligned} 1. \quad \begin{bmatrix} 2 & 3 \\ 4 & -5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} 7 \\ 3 \end{bmatrix} \\ \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{-10-12} \begin{bmatrix} -5 & -3 \\ -4 & 2 \end{bmatrix} \begin{bmatrix} 7 \\ 3 \end{bmatrix} \\ &= \frac{-1}{22} \begin{bmatrix} -35-9 \\ -28+6 \end{bmatrix} \\ &= \frac{-1}{22} \begin{bmatrix} -44 \\ -22 \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \end{bmatrix}_{//} \end{aligned}$$

$$\begin{aligned} 2. \quad \begin{bmatrix} 5 & -2 \\ -3 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} -13 \\ 31 \end{bmatrix} \\ \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{35-6} \begin{bmatrix} 7 & 2 \\ 3 & 5 \end{bmatrix} \begin{bmatrix} -13 \\ 31 \end{bmatrix} \\ &= \frac{1}{29} \begin{bmatrix} -91+62 \\ -39+155 \end{bmatrix} \\ &= \begin{bmatrix} -29/29 \\ 116/29 \end{bmatrix} = \begin{bmatrix} -1 \\ 4 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} 3. \quad \begin{bmatrix} 7 & 4 \\ 6 & -11 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} &= \begin{bmatrix} 26 \\ -97 \end{bmatrix} \\ \begin{bmatrix} x \\ y \end{bmatrix} &= \frac{1}{-77-24} \begin{bmatrix} -11 & -4 \\ -6 & 7 \end{bmatrix} \begin{bmatrix} 26 \\ -97 \end{bmatrix} \end{aligned}$$

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$$\begin{aligned} &= \frac{-1}{101} \begin{bmatrix} -286 + 388 \\ -156 - 679 \end{bmatrix} \\ &= \begin{bmatrix} -102/101 \\ 835/101 \end{bmatrix} \end{aligned}$$

4

$$\begin{bmatrix} 1 & 2 & -1 \\ 2 & 5 & 1 \\ 3 & -1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 14 \\ 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 2 & 5 & 1 & 14 \\ 3 & -1 & 2 & 9 \end{bmatrix} \begin{array}{l} \rightarrow R_2 + R_1 \times (-2) \\ \rightarrow R_3 + R_1 \times (-3) \end{array}$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 0 & 1 & 3 & 8 \\ 0 & -7 & 5 & 0 \end{bmatrix} \rightarrow R_2 \times 7 + R_3$$

$$\begin{bmatrix} 1 & 2 & -1 & 3 \\ 0 & 1 & 3 & 8 \\ 0 & 0 & 26 & 56 \end{bmatrix}$$

$$\begin{aligned} 26z &= 56 \\ z &= 56/26 = 28/13 \end{aligned}$$

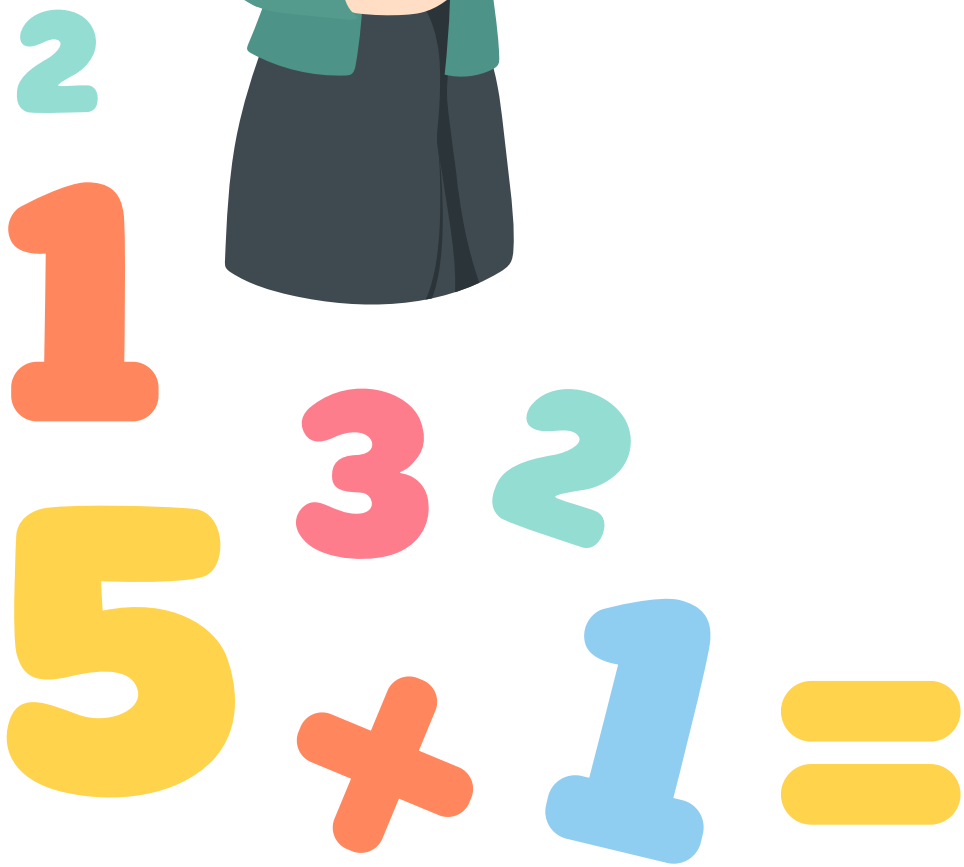
$$\begin{aligned} y + 3z &= 8 \\ y + 3(28/13) &= 8 \end{aligned}$$

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## Continuing number 4

$$y = \frac{20}{13}$$
$$x + 2y - z = 3$$
$$x + \frac{40}{13} - \frac{28}{13} = 3$$
$$x = \frac{27}{13}$$
$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 27 \\ 20 \\ 28 \end{bmatrix} \times \frac{1}{13}$$





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2  
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x  
1  
=

5. 
$$\begin{bmatrix} 1 & -2 & 3 \\ 2 & 1 & 1 \\ -3 & 2 & -2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 7 \\ 4 \\ -10 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 2 & 1 & 1 & 4 \\ -3 & 2 & -2 & -10 \end{bmatrix} \rightarrow \begin{matrix} R_1 \times (-2) + R_2 \\ R_1 \times (3) + R_3 \end{matrix}$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 5 & -5 & -10 \\ 0 & -4 & 7 & 11 \end{bmatrix} \rightarrow R_2 : 5 \quad \begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & -4 & 7 & 11 \end{bmatrix} \rightarrow R_2 \times 4 + R_3$$

$$\begin{bmatrix} 1 & -2 & 3 & 7 \\ 0 & 1 & -1 & -2 \\ 0 & 0 & 3 & 3 \end{bmatrix} \rightarrow \begin{matrix} 3Z = 3 \\ Z = 1 \\ y - Z = -2 \\ y = -2 + 1 = -1 \end{matrix} \quad \begin{matrix} X - 2y + 3Z = 7 \\ X + 2 + 3 = 7 \\ X = 2 \end{matrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ -1 \\ 1 \end{bmatrix}$$

6. 
$$\begin{matrix} 2x - 3y = -4 \\ x + z = 5 \\ 3x - y + 2z = 16 \end{matrix} \quad \begin{bmatrix} 2 & -3 & 0 & -4 \\ 1 & 0 & 1 & 5 \\ 3 & -1 & 2 & 16 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_2} \begin{bmatrix} 1 & 0 & 1 & 5 \\ 2 & -3 & 0 & -4 \\ 3 & -1 & 2 & 16 \end{bmatrix}$$

$$\begin{matrix} R_1 \times (-2) + R_2 \\ R_1 \times (-3) + R_3 \end{matrix} \quad \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -3 & -2 & -14 \\ 0 & -1 & -1 & 1 \end{bmatrix} \rightarrow R_2 \leftrightarrow R_3 \quad \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -1 & -1 & 1 \\ 0 & -3 & -2 & -14 \end{bmatrix}$$

$$\begin{matrix} R_2 \times (-3) + R_3 \end{matrix} \quad \begin{bmatrix} 1 & 0 & 1 & 5 \\ 0 & -1 & -1 & 1 \\ 0 & 0 & 1 & -17 \end{bmatrix} \quad \begin{matrix} Z = -17 \\ -y - z = 1 \\ -y + 17 = 1 \\ y = 16 \end{matrix} \quad \begin{matrix} X + Z = 5 \\ X - 17 = 5 \\ X = 22 \end{matrix}$$

7. 
$$\begin{bmatrix} 2 & 3 & 1 & 1 \\ 3 & 3 & 1 & 2 \\ 2 & 4 & 1 & -2 \end{bmatrix} \leftrightarrow \begin{bmatrix} 1 & 3 & 2 & 1 \\ 1 & 3 & 3 & 2 \\ 1 & 4 & 2 & -2 \end{bmatrix} \rightarrow \begin{matrix} R_1 \times (-1) + R_2 \\ R_1 \times (-1) + R_3 \end{matrix}$$

$$\begin{matrix} C_1 \leftrightarrow C_3 \\ \begin{bmatrix} 2 & y & x \\ 1 & 3 & 2 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & -3 \end{bmatrix} \rightarrow \begin{matrix} Z + 3y + 2x = 1 \\ X = 1 \\ y = -3 \end{matrix} \end{matrix}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ -3 \\ 8 \end{bmatrix} \quad Z = 1 - 2 + 9 = 8$$

8. 
$$\begin{bmatrix} 1 & 1 & 1 & 6 \\ 1 & -1 & 1 & 2 \\ 1 & 2 & -1 & 2 \end{bmatrix} \rightarrow \begin{matrix} R_1 \times (-1) + R_2 \\ R_1 \times (-1) + R_3 \end{matrix} \quad \begin{bmatrix} 1 & 1 & 1 & 6 \\ 0 & -2 & 0 & -4 \\ 0 & 1 & -2 & -4 \end{bmatrix}$$

$$\begin{matrix} -2y = -4 \\ y = 2 \end{matrix} \quad \begin{matrix} y - 2z = -4 \\ 2 - 2z = -4 \\ -2z = -6 \\ z = 3 \end{matrix} \quad \begin{matrix} x + y + z = 6 \\ x + 2 + 3 = 6 \\ x = 1 \end{matrix} \quad \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

9. 
$$\begin{bmatrix} 1 & 1 & -1 & 4 \\ 2 & -1 & 3 & 9 \\ 3 & 2 & -2 & 1 \end{bmatrix} \rightarrow \begin{matrix} R_1 \times (-2) + R_2 \\ R_1 \times (-3) + R_3 \end{matrix} \quad \begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & -3 & 5 & 1 \\ 0 & -1 & 1 & -11 \end{bmatrix} \rightarrow R_2 \leftrightarrow R_3$$

$$\begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & -1 & 1 & -11 \\ 0 & -3 & 5 & 1 \end{bmatrix} \rightarrow R_2 \times (-3) + R_3 \quad \begin{bmatrix} 1 & 1 & -1 & 4 \\ 0 & -1 & 1 & -11 \\ 0 & 0 & 2 & 34 \end{bmatrix}$$

$$\begin{matrix} 2z = 34 \\ z = 17 \end{matrix} \quad \begin{matrix} -y + z = -11 \\ -y = -11 - 17 \\ y = 28 \end{matrix} \quad \begin{matrix} x + y - z = 4 \\ x + 28 - 17 = 4 \\ x = 4 - 11 = -7 \end{matrix} \quad \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -7 \\ 28 \\ 17 \end{bmatrix}$$



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2  
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x  
1  
=

10. 
$$\begin{bmatrix} 3 & 2 & 4 & 13 \\ 2 & 1 & 3 & 9 \\ 1 & 3 & 2 & 5 \end{bmatrix} \xrightarrow{R_3 \leftrightarrow R_1} \begin{bmatrix} 1 & 3 & 2 & 5 \\ 2 & 1 & 3 & 9 \\ 3 & 2 & 4 & 13 \end{bmatrix} \begin{array}{l} R_1 \times -2 + R_2 \\ R_1 \times -3 + R_3 \end{array}$$

$$\begin{bmatrix} 1 & 3 & 2 & 5 \\ 0 & -5 & -1 & -1 \\ 0 & -7 & -2 & -2 \end{bmatrix} \xrightarrow{C_2 \leftrightarrow C_3} \begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & -2 & -7 & -2 \end{bmatrix} \rightarrow R_2 \times (-2) + R_3$$

$$\begin{bmatrix} 1 & 2 & 3 & 5 \\ 0 & -1 & -5 & -1 \\ 0 & 0 & 3 & 0 \end{bmatrix} \begin{array}{l} 3y = 0 \\ \boxed{y = 0} \\ -z - 5y = -1 \\ \boxed{z = 1} \end{array}$$

$$x + 2z + 3y = 5$$
  
$$x + 2 = 5$$
  
$$\boxed{x = 3}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}$$

11. 
$$\begin{bmatrix} -1 & 5 & -2 & -5 \\ 2 & -1 & 3 & 20 \\ 3 & 2 & -4 & -1 \end{bmatrix} \rightarrow \begin{array}{l} R_1 \times 2 + R_2 \\ R_1 \times 3 + R_3 \end{array}$$

$$\begin{bmatrix} -1 & 5 & -2 & -5 \\ 0 & 9 & -1 & 10 \\ 0 & 17 & -10 & -16 \end{bmatrix} \xrightarrow{C_2 \leftrightarrow C_3} \begin{bmatrix} -1 & -2 & 5 & -5 \\ 0 & -1 & 9 & 10 \\ 0 & -10 & 17 & -16 \end{bmatrix} \rightarrow R_2 \times 10 + R_3$$

$$\begin{bmatrix} -1 & -2 & 5 & -5 \\ 0 & -1 & 9 & 10 \\ 0 & 0 & -73 & -116 \end{bmatrix} \begin{array}{l} -z + 9y = 10 \\ 9\left(\frac{116}{73}\right) - \frac{730}{73} = z \\ \boxed{z = \frac{314}{73}} \end{array}$$

$$-x - 2y + 5z = -5$$
  
$$\boxed{x = \frac{317}{73}}$$

$$\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{1}{73} \begin{bmatrix} 317 \\ 116 \\ 314 \end{bmatrix}$$

12. 
$$\begin{array}{l} 4x + z = 7 \\ 2x - 3y = -10 \\ y + 2z = 8 \end{array} \left| \begin{array}{l} 4x + z = 7 \\ 4x - 6y = -20 \\ \hline 6y + z = 27 \\ y + 2z = 8 \end{array} \right. \begin{array}{l} 12y + 2z = 54 \\ y + 2z = 8 \\ \hline 11y = 46 \\ y = \frac{46}{11} \end{array}$$

$$\begin{array}{l} 46/11 + 2z = 88/11 \\ 2z = 88/11 - 46/11 \\ \boxed{z = 21/11} \end{array} \quad \begin{array}{l} 4x + 21/11 = 77/11 \\ 4x = 56/11 \\ \boxed{x = 14/11} \end{array} \quad \begin{array}{l} x = 14/11 \\ y = 46/11 \\ z = 21/11 \end{array}$$

13. 
$$\begin{array}{l} 5x - 2y + z = 4 \\ 2x + 3y - 2z = 7 \\ 3x + y + z = 5 \end{array} \rightarrow \begin{bmatrix} 1 & 5 & -2 & 4 \\ -2 & 2 & 3 & 7 \\ 1 & 3 & 1 & 5 \end{bmatrix} \rightarrow \begin{array}{l} R_1 \times 2 + R_2 \\ R_1 \times -1 + R_3 \end{array}$$

$$\begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & 12 & -1 & 15 \\ 0 & -2 & 3 & 1 \end{bmatrix} \xrightarrow{R_3 \leftrightarrow R_2} \begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 12 & -1 & 15 \end{bmatrix} \rightarrow R_2 \times (6) + R_3$$

$$\begin{bmatrix} 1 & 5 & -2 & 4 \\ 0 & -2 & 3 & 1 \\ 0 & 0 & 17 & 21 \end{bmatrix} \begin{array}{l} 17y = 21 \\ \boxed{y = 21/17} \\ -2x + 3y = 1 \\ 3\left(\frac{21}{17}\right) - \frac{17}{17} = 2x \\ \boxed{x = \frac{23}{17}} \end{array}$$

$$z + 5x - 2y = 4$$
  
$$z + 5\left(\frac{23}{17}\right) - 2\left(\frac{21}{17}\right) = 4\left(\frac{17}{17}\right)$$
  
$$\boxed{z = -\frac{5}{17}}$$

14. 
$$\begin{array}{l} x + 2y + 3z = 14 \\ x + 2y + z = 6 \\ x + y + 2z = 8 \end{array} \left\{ \begin{array}{l} x + 2y + 3z = 14 \\ x + 2y + z = 6 \\ \hline 2z = 8 \\ \boxed{z = 4} \end{array} \right.$$

$$\begin{array}{l} x + 2y + 4 = 6^2 \\ x + y + 8 = 8 \end{array} \left\{ \begin{array}{l} x + 2(2) + 3(4) = 14 \\ x + 4 + 12 = 14 \\ \boxed{x = -2} \end{array} \right.$$



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$$\begin{array}{l} 15. \quad 2x + 5y - 3z = -7 \\ \quad \quad 4x + 3y + 2z = 21 \\ \quad \quad -2x + y + 5z = 23 \end{array} \quad \left| \quad \begin{array}{cccc} 2 & 5 & -3 & -7 \\ 4 & 3 & 2 & 21 \\ -2 & 1 & 5 & 23 \end{array} \right. \begin{array}{l} \rightarrow R_1 \times (-2) + R_2 \\ \rightarrow R_1 \times (1) + R_3 \end{array}$$

$$\left[ \begin{array}{cccc} 2 & 5 & -3 & -7 \\ 0 & -7 & 8 & 35 \\ 0 & 6 & 2 & 16 \end{array} \right] \rightarrow \begin{array}{l} -7y + 8z = 35 \quad | \cdot 1 \\ 3y + z = 8 \quad | \cdot 8 \end{array}$$

$$\begin{array}{r} -7y + 8z = 35 \\ 24y + 8z = 64 \\ \hline \end{array}$$

$$-31y = -29$$

$$\boxed{y = \frac{29}{31}}$$

$$3\left(\frac{29}{31}\right) + z = 8\left(\frac{31}{31}\right)$$

$$z = \frac{8 \times 31 - 3(29)}{31}$$

$$\boxed{z = \frac{161}{31}}$$

$$2x + 5y - 3z = -7$$

$$2x + 5\left(\frac{29}{31}\right) - 3\left(\frac{161}{31}\right) = -7\left(\frac{31}{31}\right)$$

$$2x = \frac{121}{31}, \quad \boxed{x = \frac{121}{62}}$$