CHAPTER 4

Algebraic Equations and Inequalities

Lesson 4.1 Understanding Equivalent Equations

Tell whether each pair of equations are equivalent. Give a reason for your answer.

1. $4x + 1 = 9$ and $2x + 1 = 5$
   $4x = 8$ and $2x = 4$  
   $x = 2$ and $x = 2$  
   \textbf{Yes}

2. $y + 5 = 7$ and $5y = 10$
   $y = 2$ and $y = 2$  
   \textbf{Yes}

3. $5z - 3 = 4$ and $z = -1$
   $5(-1) - 3 = 4$  
   $-5 - 3 \neq 4$  
   \textbf{No!}

4. $3p - 4 = 8$ and $2p = 4$
   $3p = 12$ and $p = 2$
   $p = 4$  
   \textbf{No!}

5. $7m + 6 - 5 = 15$ and $2m + 5 = 9$
   $7m + 1 = 15$ and $2m = 4$
   $m = 2$ and $m = 2$  
   \textbf{Yes!}

6. $7x + 3 = -4$ and $5x = -5$
   $7x = -7$ and $5x = -5$
   $x = -1$ and $x = -1$  
   \textbf{Yes!}

7. $3x - 5 + 3x = 7$ and $3x + 1 = 7$
   $6x = 7$ and $3x = 6$
   $x = 2$ and $x = 2$  
   \textbf{Yes}

8. $2x - 3 = 0$ and $x + 3 = 0$
   $2x = -3$ and $x = -3$
   $x = -3$  
   \textbf{No}

9. \( \frac{5}{3}x - 3 = 1 \) and \( \frac{3}{4}x = \frac{15}{2} \)
   \( \frac{5}{3}x = 4 \) and \( \frac{3}{4}x = \frac{15}{2} \)
   \( x = 10 \) and \( x = 7 \frac{1}{2} \)
   \( x = 10 \)  
   \textbf{Yes}

10. \( -3x + 4 = 1 \) and \( x = -1 \)
    \( -3x = -3 \) and \( x = -1 \)
    \( x = 1 \)  
    \textbf{No}
Match each equation with an equivalent equation.

11. $8x = 16$
   \[ x = 2 \]
   a) $x = 1$

12. $x + 3 = 6$
   \[ x = 3 \]
   b) $x = 2$

13. $2x + 13 = 9$
   \[ 2x = -4 \]
   \[ x = -2 \]
   c) $2x = 6$
   \[ x = 3 \]

14. $4 - 5x = 1$
   \[ -5x = -5 \]
   \[ x = 1 \]
   d) $3x = 4$
   \[ 3x = 14 \]
   \[ x = 6 \]

15. $\frac{1}{3}x - 2 = 0$
   \[ \frac{1}{3}x = 2 \]
   \[ x = 6 \]
   e) \[ 1 + x = -1 \]
   \[ x = -2 \]