Math 1   Name____Key____

3-2 Solving Systems by Graphing and Substitution Practice

Learning Goals:
- *I can explain why and identify some systems of equations that have no solutions and some that have infinitely many solutions.*
- *I can solve systems of equations graphically, using elimination and substitution.*
- *I can identify the solution of a system of equations as an intersection point on a graph.*
- *I can write, solve and graph the system of equations and/or inequalities that best models the real-world problem.*
- *I can infer that since $y = f(x)$ and $y = g(x)$, $f(x) = g(x)$ by the substitution property.*

Solve the following systems using substitution. Show your work and check your answer.

1. $\begin{cases} 2x - 3y = -1 \\ y = x - 1 \end{cases}$

$2x - 3(x-1) = -1$

$2x - 3x + 3 = -1$

$-x = -4$

$x = 4$

$y = 3$

$\boxed{(4, 3)}$

2. $\begin{cases} x = 5y - 7 \\ -3y - 2x = -12 \end{cases}$

$-3y - 2(5y - 7) = -12$

$-3y - 10y + 14 = -12$

$-13y = -26$

$y = 2$

$x = 10 - 7$

$x = 3$

$\boxed{(3, 2)}$

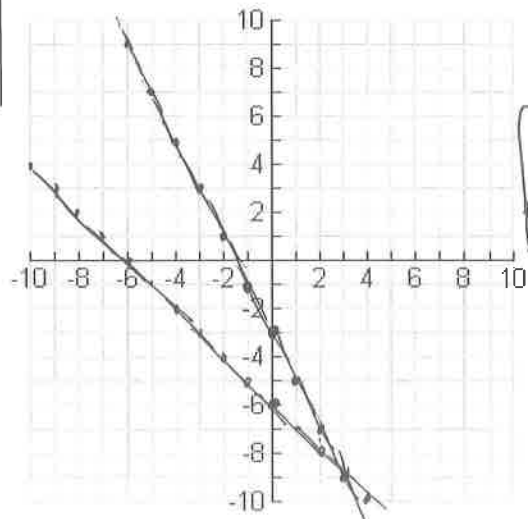3. $\begin{cases} y = 6 + 4x \\ y = -5x - 21 \end{cases}$

$6 + 4x = -5x - 21$
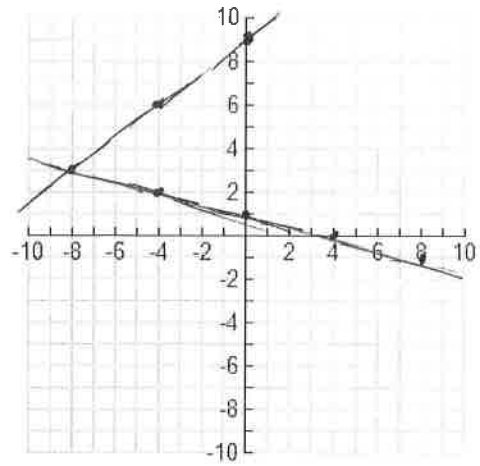
$9x = -27$

$x = -3$

$y = -6$

$\boxed{(-3, -6)}$

4. Solve by graphing: $\begin{cases} x + y = -6 \rightarrow y = -6 - x \\ \dfrac{-2y = 4x + 6}{-2} \rightarrow y = -2x - 3 \end{cases}$

$\boxed{(3, -9)}$

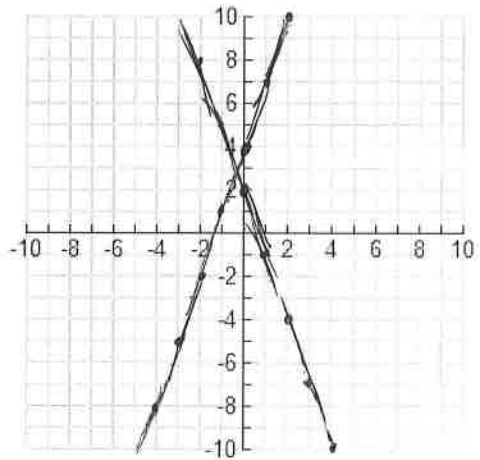5. Graph the following on the coordinate plane.

a. $\begin{cases} f(x)=\dfrac{3}{4}x+9 \\[2mm] g(x)=-\dfrac{1}{4}x+1 \end{cases}$

b. What is the solution to the system? $\left(-8, 3\right)$

6. Graph the following on the coordinate plane.

a. $\begin{cases} f(x)=3x+4 \\ g(x)=-3x+2 \end{cases}$

b. What is the solution to the system? $\left(-\dfrac{1}{2}, 3\right)$

Solve the system using substitution.

7. $\begin{cases} m-2n=-6 \\ m=-1-3n \end{cases}$

$-1-3n-2n=-6$

$-1-5n=-6$

$-5n=-5$

$n=1$

$m=-1-3$

$m=-4$

$\boxed{(-4,1)}$

8. $\begin{cases} y=x+6 \\ y=-2x-3 \end{cases}$

$x+6=-2x-3$

$3x=-9$

$x=-3$

$y=3$

$\boxed{(-3,3)}$

9. $\begin{cases} g+2h=-14 \\ h=-3g-17 \end{cases}$

$9+2(-3g-17)=-14$

$9-6g-34=-14$

$-5g=20$

$g=-4$

$h=-3(-4)-17$ $\boxed{(-4,-5)}$

$h=12-17$

$h=-5$

10. $\begin{cases} 3g+4h=-25 \\ h=3g+5 \end{cases}$

$3g+4(3g+5)=-25$

$3g+12g+20=-25$

$15g=-45$

$g=-3$

$h=-9+5$ $\boxed{(-3,-4)}$

$h=-4$

11. $\begin{cases} y=6x-11 \\ -2x-3y=-7 \end{cases}$

$-2x-3(6x-11)=-7$

$-2x-18x+33=-7$

$-20x=-40$

$x=2$

$y=12-11$

$y=1$

$\boxed{(2,1)}$

12. $\begin{cases} 2x-3y=-1 \\ y=x-1 \end{cases}$

$2x-3(x-1)=-1$

$2x-3x+3=-1$

$-x=-4$

$x=4$

$y=3$

$\boxed{(4,3)}$

13. $\begin{cases} f(x)=\dfrac{1}{3}x-4 \\ f(x)=\dfrac{2}{3}x-6 \end{cases}$

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

$x-12=2x-18$

$6=x$

$y=\dfrac{1}{3}(6)-4$

$y=-2$

$\boxed{(6,-2)}$

14. $\begin{cases} -3x-3y=3 \\ y=-5x-17 \end{cases}$

$-3x-3(-5x-17)=3$

$-3x+15x+51=3$

$12x=-48$

$x=-4$

$y=20-17$

$y=3$

$\boxed{(-4,3)}$

15. $\begin{cases} x=-2 \\ -3x+4y=18 \end{cases}$

$6+4y=18$

$4y=12$

$y=3$

$\boxed{(-2,3)}$

16. $\begin{cases} x=5y-7 \\ -2x-3y=-12 \end{cases}$

$-2(5y-7)-3y=-12$

$-10y+14-3y=-12$

$-13y=-26$

$y=2$

$x=10-7$

$x=3$

$\boxed{(3,2)}$

17. $\begin{cases} -4x+y=6 \rightarrow y=6+4x \\ -5x-y=21 \end{cases}$

$-5x-6-4x=21$

$-9x=27$

$x=-3$

$y=6+4(-3)$

$y=6-12$

$y=-6$

$\boxed{(-3,-6)}$

18. $\begin{cases} -7x-2y=-13 \\ x-2y=11 \rightarrow x=11+2y \end{cases}$

$-7(11+2y)-2y=-13$

$-77-14y-2y=-13$

$-16y=64$

$y=-4$

$x=11-8$

$x=3$

$\boxed{(3,-4)}$

19. $\begin{cases} -5x+y=-2 \rightarrow y=-2+5x \\ -3x+6y=-12 \end{cases}$

$-3x+6(-2+5x)=-12$

$-3x-12+30x=-12$

$27x=0$

$x=0$

$y=-2$

$(0,-2)$

20. $\begin{cases} -5x+y=-3 \rightarrow y=-3+5x \\ 3x-8y=24 \end{cases}$

$3x-8(-3+5x)=24$

$3x+24-40x=24$

$-37x=0$

$x=0$

$y=-3$

$\boxed{(0,-3)}$