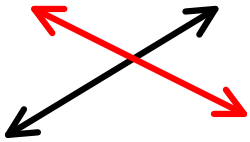
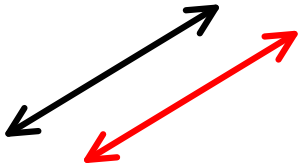
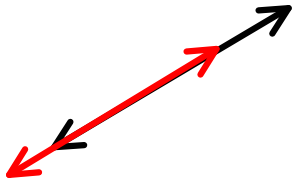
Solving Systems of Equations by Substitution



Intersecting Lines
One Solution
Consistent
Independent



Parallel Lines
No Solution
Inconsistent



Coinciding Lines
Infinite Solutions
Consistent
Dependent

Step 1: Solve for one of the variables in one of the equations. y= x=
Step 2: Substitute into the other equation and solve for the variables.
Step 3: Check your answer.

Directions: Solve each system of equations by the substitution method.

1. $y = x + 3$
   $3x + 2y = 26$

$3x+2(x+3)=26$
$3x+2x+6=26$
$5x+6=26$
$-6 \quad -6$
$\frac{5x}{5}=\frac{20}{5}$
$x=4$

$y=x+3$
$y=4+3$
$y=7$

(4,7)

Check
$3x+2y=26$
$3(4)+2(7)=26$
$12+14=26$
$26=26$ ✓

2. $7x-3y=23$

$x+2y=13$

$-2y \quad -2y$

$x=13-2y$

$7(13-2y)-3y=23$

$91-14y-3y=23$

$91-17y=23$

$-91 \quad -91$

$\frac{-17y}{-17}=\frac{-68}{-17}$

$y=4$

$7x-3y=23$

$7x-3(4)=23$

$7x-12=23$

$+12 \quad +12$

$\frac{7x}{7}=\frac{35}{7}$

$x=5$

Check

$x+2y=13$

$5+2(4)=13$

$5+8=13$

$13=13$ ✓

$(5,4)$

3. $y=3x$

$\frac{1}{3}x+\frac{1}{2}y=11$

$y=3x$

$y=3(6)$

$y=18$

$(6,18)$

$\frac{1}{3}x+\frac{1}{2}(3x)=11$

$\frac{x\cdot 2}{3\cdot 2}+\frac{3x\cdot 3}{2\cdot 3}=\frac{11\cdot 6}{1\cdot 6}$ LCD=6

$\frac{2x}{6}+\frac{9x}{6}=\frac{66}{6}$

$2x+9x=66$

$\frac{11x}{11}=\frac{66}{11}$

$x=6$

Check

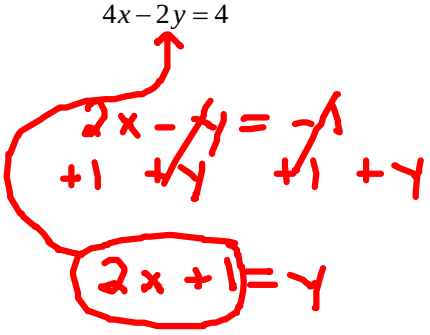
$\frac{1}{3}\cdot\frac{6}{1}+\frac{1}{2}\cdot\frac{18}{1}=11$

$\frac{6}{3}+\frac{18}{2}$

$2+9=11$

$11=11$ ✓

4. $2x - y = -1$
$4x - 2y = 4$



$4x - 2(2x+1) = 4$
$4x - 4x - 2 = 4$
$-2 \neq 4$

NO SOLUTION
INCONSISTENT

5. $y = 2x - 3$
$3y = 6x - 9$

$3(2x-3) = 6x - 9$
$6x - 9 = 6x - 9$

INFINITE SOLUTIONS
CONSISTENT
DEPENDENT