— Notes —

7.3 Solving Systems Using Elimination

Name:
Date:

Addition and Subtraction Property:

If $a=b$ and $c=d$ then $a+c=b+d$

If $a=b$ and $c=d$ then $a-c=b-d$

Elimination Method: need the same coefficient in front of the variable, BUT opposite sign so they will cancel

Steps: 1) Add or subtract the 2 equations to "get rid of" one of the variables.

2) Solve for the remaining variable.

3) "Plug" the solved "x" or "y" value in EITHER ORIGINAL equation and solve for the other variable.

4) Reality Check in BOTH equations : plug x + y into both equations

Adding Equations :

EX1) $5x - 6y = -32$
$3x + 6y = 48$

$\frac{8x}{8} = \frac{16}{8}$

$\boxed{x=2}$

$5(2)-6y=-32$
$10-6y=-32$
$\frac{-6y}{-6} = \frac{-42}{-6}$

$\boxed{y=7}$

$(2,7)$

Reality Check: plug x + y into both

$5(2)-6(7)=-32$
$10-42=-32$
$-32=-32$ ✓

$3(2)+6(7)=48$
$6+42=48$
$48=48$ ✓

EX2) $6x - 3y = 3$
$-6x + 5y = 3$

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

$\boxed{y=3}$

$6x-3(3)=3$
$6x-9=3$
$\frac{6x}{6} = \frac{12}{6}$

$\boxed{x=2}$

$(2,3)$

Reality Check:

$6(2)-3(3)=3$
$12-9=3$
$3=3$ ✓

$-6(2)+5(3)=3$
$-12+15=3$
$3=3$ ✓

Multiplying One Equations

EX3) $(2x + 5y = -22)-5 \longrightarrow$ $-10x-25y=110$
$10x + 3y = 22 \longrightarrow$ $10x+3y=22$

$\frac{-22y}{-22} = \frac{132}{-22}$

$\boxed{y=-6}$

$2x+5(-6)=-22$
$2x-30=-22$
$\frac{2x}{2} = \frac{8}{2}$

$\boxed{x=4}$

$(4,-6)$

Reality Check:

$2(4)+5(-6)=-22$
$8-30=-22$
$-22=-22$ ✓

$10(4)+3(-6)=22$
$40-18=22$
$22=22$ ✓

EX4) $-2x + 15y = -32 \rightarrow -2x + 15y = -32$

$3(7x - 5y = 17) \rightarrow 21x - 15y = 51$

$\frac{19x}{19} = \frac{19}{19}$

$\boxed{x = 1}$

$-2(1) + 15y = -32$

$-2 + 15y = -32$

$\frac{15y}{15} = \frac{-30}{15}$

$\boxed{y = -2}$

$\boxed{(1, -2)}$

Reality Check:

$-2(1) + 15(-2) = -32$

$-2 - 30 = -32$

$-32 = -32$ ✓

$7(1) - 5(-2) = 17$

$7 + 10 = 17$

$17 = 17$ ✓

Multiplying Both Equations

EX5) $(4x + 2y = 14)\,3 \rightarrow 12x + 6y = 42$

$(7x - 3y = +18)\,2 \rightarrow 14x - 6y = +36$

change to +18

$\frac{26x}{26} = \frac{78}{26}$

$\boxed{x = 3}$

$4(3) + 2y = 14$

$12 + 2y = 14$

$2y = 2$

$\boxed{y = 1}$

$\boxed{(3, 1)}$

Reality Check:

$4(3) + 2(1) = 14$

$12 + 2 = 14$ ✓

$7(3) - 3(1) = 18$

$21 - 3 = 18$ ✓

EX6) $(15x + 3y = 9)\,7 \rightarrow 105x + 21y = 63$

$(10x + 7y = -4)\,-3 \rightarrow -30x - 21y = 12$

$\frac{75x}{75} = \frac{75}{75}$

$\boxed{x = 1}$

$15(1) + 3y = 9$

$15 + 3y = 9$

$3y = -6$

$\boxed{y = -2}$

$\boxed{(1, -2)}$

Reality Check:

$15(1) + 3(-2) = 9$

$15 - 6 = 9$ ✓

$10(1) + 7(-2) = -4$

$10 - 14 = -4$ ✓