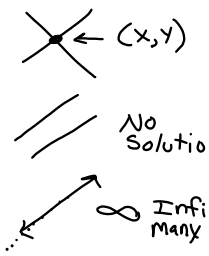
Systems of Equations



3 Ways TO find solution

1. Graph
2. Substitution
3. Elimination

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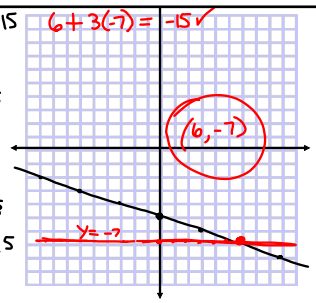
⑤ $x + 3y = -15$
$y = -7$

$6 + 3(-7) = -15$ ✓

$x + 3y = -15$
$\frac{3y}{3} = \frac{-15}{3}$
$y = -5$

$m = \frac{-a}{b} = -\frac{1}{3}$

$x + 3y = -15$
$\frac{3y}{3} = \frac{-x}{3} - \frac{15}{3}$
$\boxed{y = -\frac{1}{3} - 5}$



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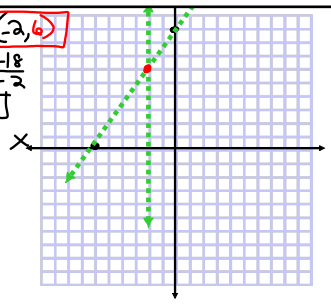
8 $x = -2$
$3x - 2y = -18$

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

$\frac{3x}{3} = \frac{-18}{3}$ $\frac{-2y}{-2} = \frac{-18}{-2}$
$\boxed{x = -6}$ $\boxed{y = 9}$

$3x - 2y = -18$
$m = \frac{-3}{-2} = \frac{3}{2}$



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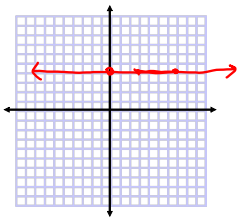
$(7,4)(3,4)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$m = \frac{4-4}{3-7} = \frac{0}{-4}$

$m = 0$



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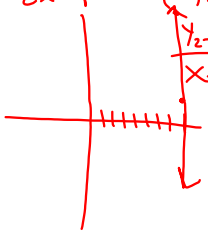
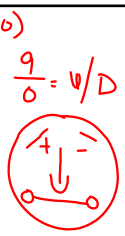
Example $(8,1)(8,10)$



$\frac{y_2 - y_1}{x_2 - x_1} = \frac{9}{0} = \text{U/D}$



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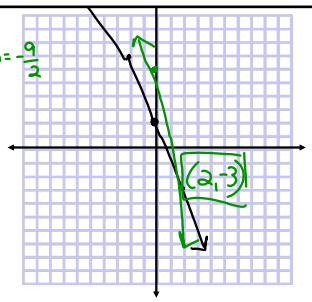
4) $5x + 2y = 4$
$9x + 2y = 12$

$m = -\frac{9}{2}$

$5x + 2y = 4$
$-5x \quad -5x$
$\frac{2y}{2} = \frac{-5x}{2} + \frac{4}{2}$
$y = -\frac{5}{2}x + 2$



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5) $2x - 6y = 30$

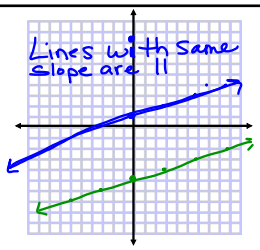
$y = \frac{1}{3}x + 1$

$\frac{-6y}{-6} = \frac{30}{-6}$

$y = -5$

$m = \frac{-2}{-6} = \frac{1}{3}$

Lines with same slope are ||



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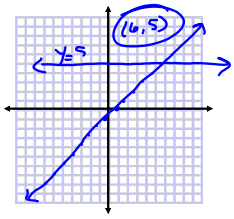
7) $x - y = 1$

$y = 5$

$x - y = 1$



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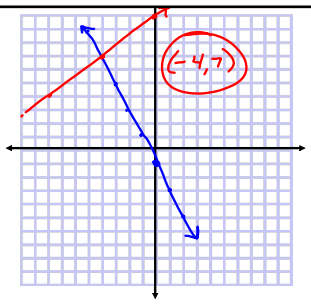
8) $y = -2x - 1$

$3x - 4y = -40$

$m = \frac{-3}{-4}$ $\frac{3}{4}$

$y = \frac{3}{4}x + 10$



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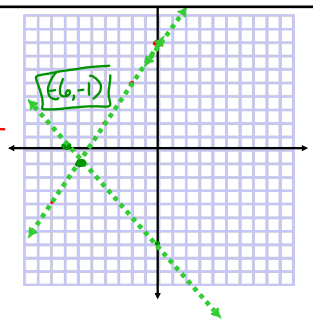
9) $3x - 2y = -16$

$x + y = -7$

$m = \frac{-3}{-2} = \frac{3}{2}$

$y = \frac{3}{2}x + 8$



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$3x - 12y = -24$

$6x - 2y = 6$

$4x + 2y = -8$

$5x + 6y = 30$

$7x - y = 21$

$4x + 2y = 16$

$3x + 4y = 32$

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Substitution

4) $x = 4y + 7$

$2x - 6y = 12$

$2(4y + 7) - 6y = 12$

$8y + 14 - 6y = 12$

$2y + 14 = 12$

$2y = -2$

$y = -1$

$x = 4y + 7$

$x = 4(-1) + 7$

$x = -4 + 7$

$x = 3$

$(3, -1)$

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5

$2x + y = -2$
$5x + 3y = -8$

$2x + y = -2$
$-2x \quad -2x$
$y = -2x - 2$

$5x + 3(-2x-2) = -8$
$5x - 6x - 6 = -8$
$-x - 6 = -8$
$+6 \quad +6$
$-x = -2$
$\boxed{x = 2}$

$y = -2x - 2$
$y = -2(2) - 2$
$-4 - 2$
$\boxed{y = -6}$

$(2,-6)$

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6

$2x - 3y = -11$
$2x + y = 9 \rightarrow y = \boxed{-2x+9}$

$2x - 3(-2x+9) = -11$
$2x + 6x - 27 = -11$
$8x - 27 = -11$
$+27 \quad +27$
$8x = 16$
$\boxed{x = 2}$

$y = -2x + 9$
$y = -2(2) + 9$
$-4 + 9$
$\boxed{y = 5}$

$(2,5)$

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8

$x + 4y = 0 \rightarrow x = -4y$
$3x + 2y = 20$

$x = -4y$
$x = -4(-2)$
$x = 8$

$3(-4y) + 2y = 20$
$-12y + 2y = 20$
$-10y = 20$
$y = -2$

$\boxed{(8,-2)}$

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10)

$x - 3y = -2$
$10x + 8y = -20$

$x - 3y = -2$
$+3y \quad +3y$
$x = 3y - 2$

$10(3y-2) + 8y = -20$
$30y - 20 + 8y = -20$
$+20 \quad +20$
$38y = 0$
$y = \frac{0}{38}$
$\boxed{y = 0}$

$x = 3(0) - 2$
$\boxed{x = -2}$

$-2,0$

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11)

$3x - y = -8$
$5x + 2y = 5$

$-y = -3x - 8$
$y = 3x + 8$

$5x + 2(3x+8) = 5$
$5x + 6x + 16 = 5$
$11x = -11$
$\boxed{x = -1}$

$y = 3x + 8$
$3(-1) + 8$
$\boxed{y = 5}$

$(-1,5)$

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