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3.1

1. (a) $6x + y = 9$
$+ \quad 4x - y = 1$
$10x = 20$
$x = \frac{20}{10}$
$x = 2$
sub in $x = 2$
$6(2) + y = 9$
$12 + y = 9$
$y = 9 - 12$
$y = -3$
$x = 2, x = -3$

(b) $2x + 3y = 8 \quad (\times 1.5)$
$3x + 2y = 7$
$- \quad 3x + 4.5y = 12$
$3x + 2y = 7$
$0 + 2.5y = 5$
$y = \frac{5}{2.5}$
$y = 2$
sub in $y = 2$
$3x + 2(2) = 7$
$3x + 4 = 7$
$3x = 3$
$x = 1$
$x = 1, y = 2$

(c) $4x - 3y = 2 \quad (\times 5)$
$5x - 7y = 9 \quad (\times 4)$
$20x - 15y = 10$
$- \quad 20x - 28y = 36$
$0 + 13y = -26$
$y = \frac{-26}{13}$
$y = -2$
sub in $y = -2$
$4x - 3(-2) = 2$
$4x + 6 = 2$
$4x = 2 - 6$
$4x = -4$
$x = -1$

2. (a) Rearrange
$x + 4y = 5$
$\rightarrow x = 5 - 4y$
sub $x = 5 - 4y$ into 2nd equation
$5(5 - 4y) - 2y = 3$
$25 - 20y - 2y = 3$
$25 - 22y = 3$
$-22y = 3 - 25$
$-22y = -22$
$y = 1$

(2.a) sub $y=1$

$x + 4(1) = 5$

$x + 4 = 5$

$x = 5 - 4$

$x = 1$

(b) sub $y = 11 - 2x$ into $2x + 5y = 37$

$2x + 5(11 - 2x) = 37$

$2x + 55 - 10x = 37$

$55 - 8x = 37$

$-8x = 37 - 55$

$-8x = -18$

$x = \frac{18}{8}$

sub $x = 2.25$

$y = 11 - 2(2.25)$

$y = 11 - 4.5$

$y = 6.5$

$x = 2.25$, $y = 6.5$.

(c) Rearrange $4x + 3y = 5$

$3y = 5 - 4x$

$y = \frac{5 - 4x}{3}$

$y = \frac{5}{3} - \frac{4}{3}x$

↳ sub into 2nd equation

$2x - 6(\frac{5}{3} - \frac{4}{3}x) = -5$

$2x - 10 + 8x = -5$

$10x = 5$

$x = \frac{5}{10}$

$x = 0.5$

sub in $x = 0.5$

$4(0.5) + 3y = 5$

$2 + 3y = 5$

$3y = 5 - 2$

$y = 1$

$x = 0.5$, $y = 1$.

3: (a) $3x - 3y + 6 = 0$

$y + x = 8$

$x = 8 - y$

$3(8 - y) - 3y + 6 = 0$

$24 - 3y - 3y + 6 = 0$

$-6y = -30$

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

$y = 5$

sub in $y = 5$

$5 + x = 8$

$x = 3$

3. (b) $5x - 5 = -2y$

$3x - 29 = 4y$

$5x + 2y = 5 \quad (\times -2)$

$3x - 4y = 29$

$-10x - 4y = -10$

$3x - 4y = 29$

$-13x = -39$

$x = \frac{-39}{-13}$

$x = 3$

sub in $x = 3$

$3(3) - 29 = 4y$

$9 - 29 = 4y$

$-20 = 4y$

$y = \frac{-20}{4}$

$y = -5$

(c) $4x - y = 22 \quad (\times -5)$

$3x + 5y = 5$

$-20x + 5y = -110$

$3x + 5y = 5$

$-23x = -115$

$x = \frac{-115}{-23}$

$x = 5$

sub in $x = 5$

3. (c) $\frac{5 - 3(5)}{5} = y$

$\frac{5 - 15}{5} = y$

$y = -2$

Exam practice.

Q4. $x + y = 2$

$2y = 18x - 6$

Rearrange: $x + y = 2$

to: $y = 2 - x$

$2(2 - x) = 18x - 6$

$4 - 2x = 18x - 6$

$4 + 6 = 18x + 2x$

$10 = 20x$

$x = \frac{10}{20}$

$x = 0.5 \ (\frac{1}{2})$

sub $x = 0.5$

$2 - 0.5 = 1.5$

$y = 1.5$

5. $3x - y = -5$

$0.5y + 2x = 4$

Rearrange: $3x - y = -5$

$y = 3x + 5$

Q5. sub $y = 3x + 5$

$0.5(3x + 5) + 2x = 4$

$\frac{3}{2}x + \frac{5}{2} + 2x = 4$

$\frac{7}{2}x = 4 - \frac{5}{2}$

$x = \frac{3}{2} \div \frac{7}{2}$

$x = \frac{3}{7}$

sub in $x = \frac{3}{7}$

$3(\frac{3}{7}) + 5 = y$

$y = \frac{44}{7}$

6. $6ky + 9x = 12$

$ky - x = 4.5$

sub $x = -1$ to both equations

$6ky + 9(-1) = 12$

$6ky - 9 = 12$

$6ky = 12 + 9$

$6ky = 21$

$ky = \frac{21}{6} = \frac{7}{2}$

$ky - (-1) = 4.5$

$ky = 4.5 - 1$

$ky = \frac{7}{2}$

7. Nisha. You can rearrange each equation to get the other. So any pair of values will satisfy both equations

e.g if $x = 2$

$4(2) + 6y = 10$

$8 + 6y = 10$

$6y = 10 - 8$

$6y = 2$

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

$2(2) = 5 - 3y$

$4 = 5 - 3y$

$4 - 5 = -3y$

$-1 = -3y$

$\frac{-1}{-3} = y$

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