1 a) $x + y = 4$

$x - y = 2$; $(3, 1)$

$x + y = 4$ $x - y = 2$

$3 + 1 = 4$ ☑ $3 - 1 = 2$ ☑

Hence $(\underline{3}, 1)$ is a solution

2 b).
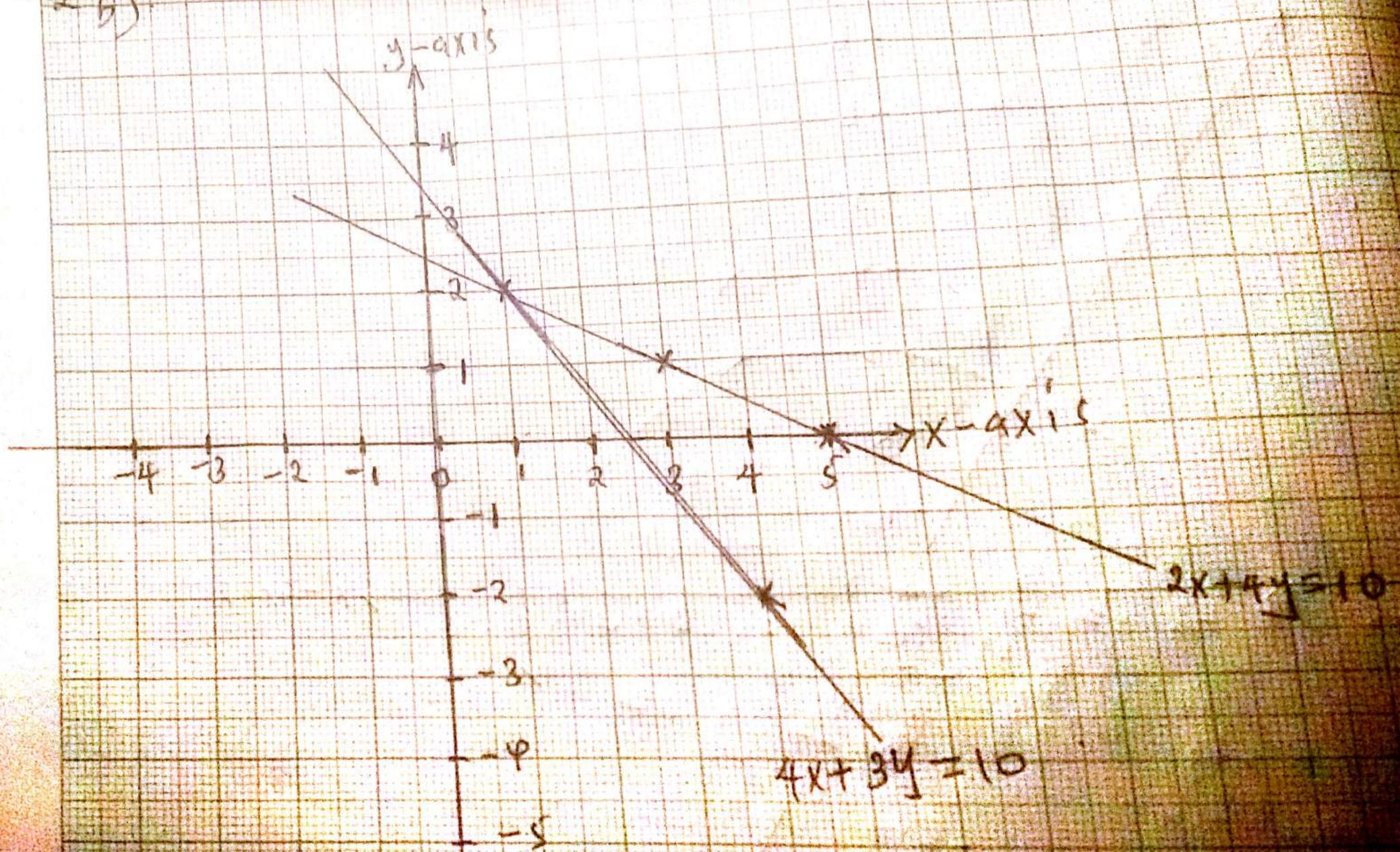
3 c) $y = -3x + 8$

$12x + 4y = 32$

$\Rightarrow 12x + 4(-3x + 8) = 32$

$12x + 32 - 12x = 32$

$12x - 12x = 32 - 32$

$0 = 0$

Hence the system of equations has ~~no solution~~ infinitely many solutions.

$$x = -15$$

d) $\begin{cases} 3x + 6y = 3 \\ 2x + 9y = -8 \end{cases} \begin{matrix} 2 \\ 3 \end{matrix}$

$6x + 12y = 6$

$6x + 27y = -24$

———————————

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

$y = -2$

$2x + 9y = -8$

$2x + 9(-2) = -8$

$2x - 18 = -8$

$2x = -8 + 18$

$2x = 10$

$x = 5$

$\therefore x = 5, \ y = -2$

e) $6x - 8y = 8$

$12x = 16y + 24$

$3x - 4y = 4$

$3x - 4y = 6$ —

——————

$0 = -2$

$\left(\begin{array}{c} 6x - 8y = 8 \\ 12x - 16y = 24 \end{array} \right) \begin{array}{c} 12 \\ 6 \end{array}$

$72x - 96y = 96$

$72x - 96y = 144$

——————

$0 = 48$

∴ The system of equations has no solution.

———————————————

f) $-6x - 4y = -2$

$-12y = -6 + 18x$

$3x + 2y = 1$

$3x + 2y = +1$

——————

$0 = 0$

∴ The system of equations has infinitely many solutions

System of linear equations and problem solving:

1. a)

2nd no.	One number
y	x

$$y - x = 5.$$
$$5x - 2y = 2$$

$$\left(\begin{array}{l} y - x = 5 \\ -2y + 5x = 2 \end{array}\right) \begin{array}{l} 2 \\ 1 \end{array}$$

$$2y - 2x = 10$$
$$-2y + 5x = 2 \quad +$$
_____
$$3x = 12$$
$$x = 4$$

$$y - x = 5$$
$$y - 4 = 5$$
$$y = 5 + 4$$
$$y = 9.$$

One number = 4

Second number = 9.

b). fast truck speed = x miles/hour

Slower truck speed = y miles/hr.

after 7 hrs.

fast truck $D = s \times 7$

$$= 7 \times x$$

$$= 7x \text{ miles}.$$

Slower truck. $= 7 \times y$

$$= 7y \text{ miles}.$$

$7x - 7y = 56. \Rightarrow x - y = 8.$

$$\frac{7y}{7} = \frac{301}{7}$$

$x - 43 = 8$

$y = 43 \text{ miles/hour}$

$x = 8 + 43$

$x = 51 \text{ miles/ho}$

$\therefore$ faster truck $= 51 \text{ miles/hour}$

slower truck $= 43 \text{ miles/hour}.$

2. b) $C(x) = 0.3x + 1400$

$R(x) = 1.3x$.

Break even

$C(x) = R(x)$

$0.3x + 1400 = 1.3x$

$1.3x - 0.3x = 1400$

$x = 1400$.

∴ 1400 units must be sold to break even.

c) Let the number of boxes be x

Money out: $1000 + 0.50x$ $C(x)$

Money in: $3.0x$ $R(x)$

Break even $C(x) = R(x)$

$$1000 + 0.50x = 3.0x$$

$$3.0x - 0.50x = 1000$$

$$\frac{2.5x}{2.5} = \frac{1000}{2.5}$$

$$x = 400.$$

∴ 400 packages must be sold to break even