Simultaneous Equations Revision

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Ex 1

$$2x + 3y = 14 \quad (1)$$
$$5x + 6y = 32 \quad (2)$$

(1) × 2

$$4x + 6y = 28 \quad (3)$$

(2) − (3)

$$x = 4$$

Sub for x in (1)

$$2(4) + 3y = 14$$
$$8 + 3y = 14$$
$$3y = 14 - 8$$
$$3y = 6$$
$$y = \frac{6}{3}$$
$$y = 2$$

$$\begin{cases} x = 4 \\ y = 2 \end{cases}$$

Ex 2

$$5x - 3y = 12 \quad (1)$$
$$4x - 2y = 10 \quad (2)$$

(1) × 2

$$10x - 6y = 24 \quad (3)$$

(2) × 3

$$12x - 6y = 30 \quad (4)$$

(4) − (3)

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

$$x = 3$$

Sub for x in ①

$$5(3) - 3y = 12$$
$$15 - 3y = 12$$
$$-3y = 12 - 15$$
$$-3y = -3$$
$$y = \frac{-3}{-3}$$
$$y = +1$$

$$\begin{cases} x = 3 \\ y = 1 \end{cases}$$

Ex 3

$$5x - 2y = 12 \quad ①$$
$$3x + 4y = 2 \quad ②$$

① ×2

$$10x - 4y = 24 \quad ③$$

② + ③

$$13x = 26$$
$$x = \frac{26}{13}$$

$$\underline{x = 2}$$

Sub for x in ②

$$3(2) + 4y = 2$$
$$6 + 4y = 2$$
$$4y = 2 - 6$$
$$4y = -4$$

$$\begin{cases} x = 2 \\ y = -1 \end{cases}$$

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

$$y = -1$$

Exercise

1) $$\begin{aligned} 4x + 5y &= 23 \\ 3x + 2y &= 12 \end{aligned}$$

$x = 2$

$y = 3$

2) $$\begin{aligned} 5x - 4y &= 27 \\ 2x - y &= 9 \end{aligned}$$

$x = 3$

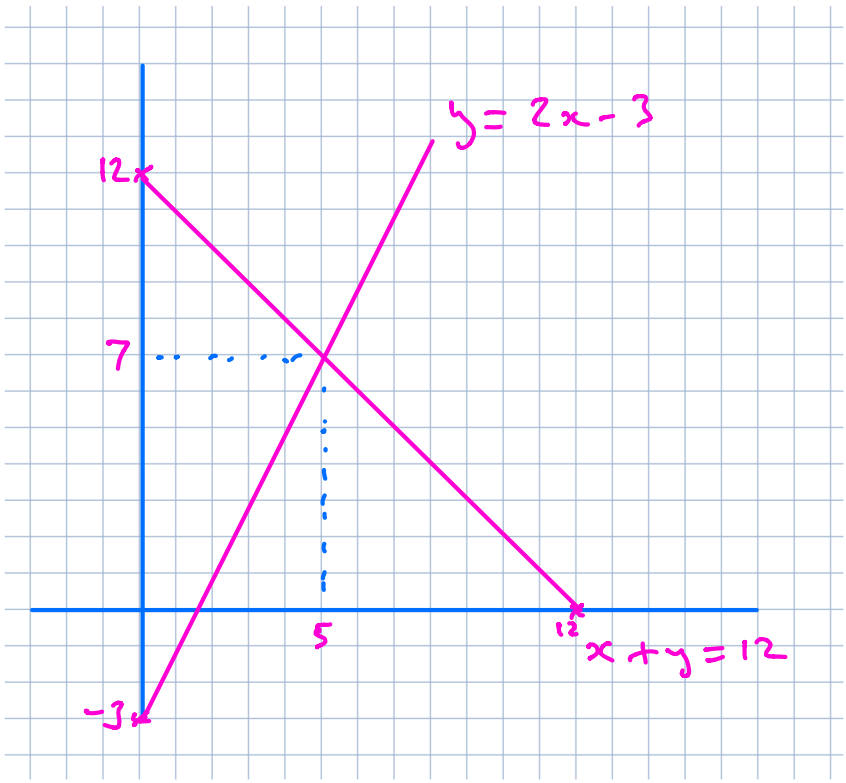
$y = -3$

3) $$\begin{aligned} 4x + 3y &= 20 \\ x - 2y &= -6 \end{aligned}$$

$x = 2$

$y = 4$

Graphical Solution



Solve

$x + y = 12$

$y = 2x - 3$

$x = 5$

$y = 7$

Forming and solving simultaneous equations

Alison is 5 years older than her twin brothers Bill and Colin. Their total ages add up to 29. How old is each child?

Let Alison be x

Bill and Colin be each age y

$$x = y + 5$$

$$\therefore \quad \underline{x - y = 5} \qquad (1)$$

$x + y + y = 29$

$$\underline{x + 2y = 29} \qquad (2)$$

② − ①

$$3y = 24$$

$$y = \frac{24}{3}$$

$$y = 8$$

sub in $x = y + 5$

$$x = 8 + 5$$

$$x = 13$$

Alison is 13

Bill and Colin are 8

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5 teas and 3 coffees cost £13.60

2 teas and 4 coffees cost £11.60

How much is each type of drink?

$$5T + 3C = 13.60 \quad ①$$

$$2T + 4C = 11.60 \quad ②$$

① × 4 $\quad 20T + 12C = 54.40 \quad ③$

② × 3 $\quad 6T + 12C = 34.80 \quad ④$

③ − ④ $\quad 14T = 19.60$

$$T = \frac{19.60}{14} = £1.40$$

Sub in ① $\quad 5(1.40) + 3C = 13.60$

$$7.00 + 3c = 13.60$$

$$3c = 13.60 - 7.00$$

$$3c = 6.60$$

$$c = \frac{6.60}{3}$$

$$\underline{c = £2.20}$$

Tea = £1.40

Coffee = £2.20