Simultaneous Linear Equations 2

Ex 1

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

(1) × 2

$$10x - 4y = 24 \quad (3)$$

(3) − (2)

$$7x = 14$$
$$x = \frac{14}{7} \qquad \underline{x = 2}$$

Sub for x in (1)

$$5(2) - 2y = 12$$
$$10 - 2y = 12$$
$$-2y = 12 - 10$$
$$-2y = 2$$
$$y = \frac{2}{-2} \qquad \underline{y = -1}$$

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

Ex 2

$$5x + 2y = 24 \quad (1)$$
$$3x - 3y = 6 \quad (2)$$

(1) × 3

$$15x + 6y = 72 \quad (3)$$

(2) × 2

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

(3) + (4)

$$21x = 84$$
$$x = \frac{84}{21} \qquad \underline{x = 4}$$

Sub for x in ①

$$5(4) + 2y = 24$$
$$20 + 2y = 24$$
$$2y = 24 - 20$$
$$2y = 4$$
$$y = \frac{4}{2}$$

$$\underline{y = 2}$$

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

Exercise

1)

$$4x - 10y = 6 \quad ①$$
$$3x - 5y = 7 \quad ②$$

② $\times 2$

$$6x - 10y = 14 \quad ③$$

③ $-$ ①

$$2x = 8$$
$$x = \frac{8}{2}$$

$$\underline{x = 4}$$

Sub for x in ①

$$4(4) - 10y = 6$$
$$16 - 10y = 6$$
$$-10y = 6 - 16$$
$$-10y = -10$$
$$y = \frac{-10}{-10}$$

$$\underline{y = 1}$$

2)

$$4x + 5y = 21 \quad ①$$
$$2x - 2y = 6 \quad ②$$

① × 2 $\quad 8x + 10y = 42$ ③

② × 5 $\quad 10x - 10y = 30$ ④

③ + ④ $\quad 18x = 72$

$x = \frac{72}{18}$ $\qquad \underline{x = 4}$

Sub for x in ①

$8(4) + 10y = 42$

$32 + 10y = 42$

$10y = 42 - 32$

$10y = 10$

$y = \frac{10}{10}$ $\qquad \underline{y = 1}$

Exam Standard Question

14 Solve, algebraically, these simultaneous equations.

$2x - 3y = 14$ ①

$6x + 4y = 3$ ②

① × 4 $\quad 8x - 12y = 56$ ③

② × 3 $\quad 18x + 12y = 9$ ④

③ + ④ $\quad 26x = 65$

$x = \frac{65}{26} = 2.5$

$x = 2\frac{1}{2}$

Sub for x in ①

$$2(2.5) - 3y = 14$$

$$5 - 3y = 14$$

$$-3y = 14 - 5$$

$$-3y = 9$$

$$y = \frac{9}{-3}$$

$$\underline{y = -3}$$

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16 **(a)** Solve, algebraically, these simultaneous equations.

$$3x - 5y = 111 \quad ①$$
$$4x + 3y = -26 \quad ②$$

① × 3 $\quad 9x - 15y = 333 \quad ③$

② × 5 $\quad 20x + 15y = -130 \quad ④$

③ + ④ $\quad 29x = 203$

$$x = \frac{203}{29} = 7$$

$$\underline{x = 7}$$

Sub for x in ②

$$4(7) + 3y = -26$$

$$28 + 3y = -26$$

$$3y = -26 - 28$$

$$3y = -54$$

$$y = \frac{-54}{3}$$

$$\underline{y = -18}$$

Cinema Tickets

3 Adults and 2 children costs £33

5 Adults and 4 children costs £58

How much is an adult ticket and how much is a child ticket

$$3A + 2C = 33 \quad (1)$$

$$5A + 4C = 58 \quad (2)$$

$$6A + 4C = 66 \quad (3)$$

(1) × 2

(3) − (2)

$$\underline{A = 8}$$

Sub for A in (1)

$$3(8) + 2C = 33$$

$$24 + 2C = 33$$

$$2C = 33 - 24$$

$$2C = 9$$

$$C = \frac{9}{2} \qquad \underline{C = 4.5}$$

Adult = £8 Child £4.50