Revision 5

Simultaneous Equations

Ex 1

$$3x + 2y = 14 \quad (1)$$
$$5x + 3y = 22 \quad (2)$$

(1) × 3 $\quad 9x + 6y = 42 \quad (3)$

(2) × 2 $\quad 10x + 6y = 44 \quad (4)$

(4) − (3) $\quad \underline{x = 2}$

Subst for x in (1)

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

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

Exercise

$$4x + 5y = 22 \quad (1)$$
$$3x + 2y = 13 \quad (2)$$

(1) × 2 $\quad 8x + 10y = 44 \quad (3)$

(2) × 5 $\quad 15x + 10y = 65 \quad (4)$

④ - ③

$$7x = 21$$
$$x = \frac{21}{7}$$
$$\underline{x = 3}$$

Sub for x in ①

$$4(3) + 5y = 22$$
$$12 + 5y = 22$$
$$5y = 22 - 12$$
$$5y = 10$$
$$y = \frac{10}{5}$$
$$\underline{y = 2}$$

$$\begin{cases} x = 3 \\ y = 2 \end{cases}$$

Example

$$7x + 4y = 25 \quad ①$$
$$5x - 2y = 13 \quad ②$$

② x 2

$$10x - 4y = 26 \quad ③$$

① + ③

$$17x = 51$$
$$x = \frac{51}{17}$$
$$\underline{x = 3}$$

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

Sub for x in ①

$$7(3) + 4y = 25$$
$$21 + 4y = 25$$
$$4y = 25 - 21$$
$$4y = 4$$

$$\underline{y = 1}$$

Exercise

$$2x + 3y = 22 \quad (1)$$
$$5x - 6y = 1 \quad (2)$$

(1) × 2

$$4x + 6y = 44 \quad (3)$$

(2) + (3)

$$9x = 45$$
$$x = \frac{45}{9}$$
$$\underline{x = 5}$$

sub for x in (1)

$$2(5) + 3y = 22$$
$$10 + 3y = 22$$
$$3y = 22 - 10$$
$$3y = 12$$
$$y = \frac{12}{3}$$
$$\underline{y = 4}$$

$$\begin{cases} x = 5 \\ y = 4 \end{cases}$$

Ex 3

$$5x - 3y = 19 \quad (1)$$
$$3x - 4y = 7 \quad (2)$$

(1) × 4

$$20x - 12y = 76 \quad (3)$$

(2) × 3

$$9x - 12y = 21 \quad (4)$$

(3) − (4)

$$11x = 55$$
$$x = \frac{55}{11}$$

$$\underline{x = 5}$$

Sub in ①

$$5(5) - 3y = 19$$
$$25 - 3y = 19$$
$$-3y = 19 - 25$$
$$-3y = -6$$
$$y = \frac{-6}{-3}$$
$$\underline{y = 2}$$

$$\begin{cases} x = 5 \\ y = 2 \end{cases}$$

Exercise

$$7x - 6y = 16 \quad ①$$
$$5x + 3y = 26 \quad ②$$

② × 2 $\quad 10x + 6y = 52 \quad ③$

① + ③ $\quad 17x = 68$

$$x = \frac{68}{17}$$
$$\underline{x = 4}$$

Sub for x in ②

$$5(4) + 3y = 26$$
$$20 + 3y = 26$$
$$3y = 26 - 20$$

$3y = 6$

$y = \frac{6}{3}$ $\quad$ $\underline{y = 2}$

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11 3 teas and 2 coffees have a total cost of £7.80
5 teas and 4 coffees have a total cost of £14.20

Work out the cost of one tea and the cost of one coffee.

$3t + 2c = 7.80$ (1)

$5t + 4c = 14.20$ (2)

$6t + 4c = 15.60$ (3)

(1) ×2

(3) − (2) $\quad t = 1.40$

sub for t in (1)

$3(1.40) + 2c = 7.80$

$4.20 + 2c = 7.80$

$2c = 7.80 - 4.20$

$2c = 3.60$

$c = \frac{3.60}{2} = 1.80$

tea £ 1.40

coffee £ 1.80

(Total for Question 11 is 4 marks)

Standard Form

Used to represent very large and very small numbers

In standard form a number is written as a number between 1 and 10 multiplied by a power of 10

eg $\quad 365 = 3.65 \times 10^2$

$63{,}000 = 6.3 \times 10^4$

$0.0000784 = 7.84 \times 10^{-5}$

$0.0036 = 3.6 \times 10^{-3}$

Examples

Mass of Earth	5.972×10^{24} kg
Mass of Sun	1.989×10^{30} kg
Mass of electron	9.109×10^{-31} kg

How many times the mass of the Earth is the mass of the sun

$$\frac{1.989 \times 10^{30}}{5.972 \times 10^{24}} = 333054$$
