Simultaneous Equations

Method 1: Elimination

Make the co-efficient of either the x or y terms the same, by multiplying through.

$2x+3y = 5$ $\times 3$

$3x - 4y = 12$ $\times 2$

$6x + 9y = 15$

$6x - 8y = 24$

$17y = -9$

$y = \frac{-9}{17}$

$2x + 3\left(\frac{-9}{17}\right) = 5$

$2x = 5 + \frac{27}{17}$

$2x = 6\frac{10}{17}$

p182
C1 e)
C2 b) and e)
C4 and C10

Simultaneous Equations

Method 2: Substitution

Re-arrange one equation to make x (or y) the subject.
Substitute it into the second equation.

Make 2y the subject

$2y + 3x = 4$ ①
$2x - 4y = 12$ ②

$2y = 4 - 3x$ ③

Substituting ③ into ②

$2x - 2(4 - 3x) = 12$

$2x - 8 + 6x = 12$

$8x - 8 = 12$

$8x = 20$

$x = \frac{20}{8} = 2\frac{1}{2}$

$2x - 4y = 12$ ②

$5 - 4y = 12$

$5 - 12 = 4y$

$-7 = 4y$

$\frac{-7}{4} = y$ $\quad y = -1\frac{3}{4}$

P184 Q1 c

$2f - 10e = 1$ ①
$2f + 5e = 7$ ②

Substituting ① into ②

$(10e - 1) + 5e = 2$

$15e - 1 = 2$

$15e = 3$

Substituting $e = \frac{1}{5}$ into ① $\quad e = \frac{3}{15} = \frac{1}{5}$

$2f = 10e - 1$

$2f = 2 - 1 = 1$

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

$\frac{3n}{m} = 1 \times m$ $3n = m$ ②

$m = 4n - 7$ ③

substituting ② into ③

$3n = 4n - 7$

$7 = 4n - 3n$

$7 = n$

$n = 7$ into ②

$m = 3 \times 7$

$m = 21$

D1 a) i)

D2 a) b)

Simultaneous Equations

Method 3: Graphical

Draw graphs and find out where they intersect.

$2y + 3x = 4$

$2x - 4y = 12$

Will there always be a solution?

page 185