National 5 Mathematics

Simultaneous Equations - Solutions

Marks are indicated in brackets after each question number

2014 Paper 2 Question 3, (2)

a) $5a + 3c = 158.25$

b) $3a + 2c = 98$

c) $5a + 3c = 158.25$ (1)

$3a + 2c = 98$ (2)

Multiplying (1) by 2 and (2) by 3 gives

$10a + 6c = 316.5$ (3)

$9a + 6c = 294$ (4)

$(3) - (4)$ gives

$a = 316.5 - 294 = 22.5$

Substituting into (2) gives

$(3\ x\ 22.5) + 2c = 98$

$c = 15.25$

So, an adult ticket costs £22.50 and a child ticket costs £15.25.

2015 Paper 1 Question 11, (3)

$3x + 2y = 17$ (1)

$2x + 5y = 4$ (2)

Multiply (1) by 2 and (2) by 3 to give

$6x + 4y = 34$ (3)

$6x + 15y = 12$ (4)

$(4) - (3)$ gives

$11y = -22$

$y = -2$

Substituting $y = -2$ into (2) gives

$2x + 5 \cdot (-2) = 4$

$2x - 10 = 4$

$2x = 14$

$x = 7$

2016 Paper 1 Question 4, (1) (1) (4)

a) $2c + 3d = 9.6$

b) $3c + 4d = 13.3$

c) $2c + 3d = 9.6$ (1)

$3c + 4d = 13.3$ (2)

Multiply (1) by 3 and (2) by 2 to give

$6c + 9d = 28.8$ (3)

$6c + 8d = 26.6$ (4)

(3) – (4) gives

$d = 2.2$

Substitute $d = 2.2$ into (1) to give

$2c + (3\ x\ 2.2) = 9.6$

$2c + 6.6 = 9.6$

$2c = 3$

$c = 1.5$

Dress requires 2.2 m^2 and cloak requires 1.5 m^2.

2017 Paper 1 Question 13, (3)

$3x - y = 2$ (1)

$x + 3y = 19$ (2)

Multiplying (1) by three gives

$9x - 3y = 6$ (3)

$x + 3y = 19$ (2)

(3) + (2) gives

$10x = 25$

$x = 2.5$

Substitute $x = 2.5$ into (1) to give

$(3\ x\ 2.5) - y = 2$

$7.5 - y = 2$

$y = 5.5$

So, P $= (2.5, 5.5)$.

2018 Paper 1 Question 3, (3)

$4x + 5y = -3$ (1)

$6x - 2y = 5$ (2)

Multiply (1) by 2 and multiply (2) by 5 to give

$8x + 10y = -6$ (3)

$30x - 10y = 25$ (4)

(3) + (4) gives

$38x = 19$

$x = 0.5$

Substitute $x = 0.5$ into (1) to give

$4\ x\ 0.5 + 5y = -3$

$2 + 5y = -3$

$5y = -5,\ y = -1$

2019 Paper 1 Question 8, (1) (1) (4)

a) $7c + 3g = 215$

b) $5c + 4g = 200$

c) $7c + 3g = 215$ (1)

$5c + 4g = 200$ (2)

Multiply (1) by 4 and multiply (2) by 3 to give

$28c + 12g = 860$ (3)

$15c + 12g = 600$ (4)

(3) – (4) gives

$13c = 260$

$c = 20$

2022 Paper 2 Question 4, (1) (1) (4)

a) $4m + 3a = 4.25$

b) $5m + 2a = 4.70$

c) $4m + 3a = 4.25$ (1)

$5m + 2a = 4.70$ (2)

Multiply (1) by 2 and (2) by 3 to give

$8m + 6a = 8.5$ (3)

$15m + 6a = 14.1$ (4)

(4) – (3) gives

$7m = 5.6$

$m = 0.8$

Substitute $m = 0.8$ into (1) to give

$4(0.8) + 3a = 4.25$

$3.2 + 3a = 4.25$

$3a = 1.05$

$a = 0.35$

So, a mango costs 80p and an apple costs 35p.

2023 Paper 1 Question 3, (3)

$2x + 3y = 8$ (1)

$5x + 2y = -2$ (2)

Multiply (1) by 2 and multiply (2) by 3 to give

$4x + 6y = 16$ (3)

$15x + 6y = -6$ (4)

(4) − (3) gives

$11x = -22$

$x = -2$

Substitute $x = -2$ into (1) to give

$2(-2) + 3y = 8$

$-4 + 3y = 8$

$3y = 12$

$y = 4$

2024 Paper 1 Question 7, (3) (1)

$2p - 7r = 11$ (1)

$3p + 2r = 4$ (2)

Multiply (1) by 3 and multiply (2) by 2 to give

$6p - 21r = 33$ (3)

$6p + 4r = 8$ (4)

(4) – (3) gives

$25r = -25$

$r = -1$

Substitute $r = -1$ into (2) to give

$3p + 2(-1) = 4$

$3p - 2 = 4$

$3p = 6$

$p = 2$

2025 Paper 2 Question 10, (1) (1) (4)

a) $7p + 3e = 2400$

b) $3p + 4e = 1300$

c) $7p + 3e = 2400$ (1)

$3p + 4e = 1300$ (2)

Multiply (1) by 4 and (2) by 3 to give

$28p + 12e = 9600$ (3)

$9p + 12e = 3900$ (4)

Equation (3) – (4) gives

$19p = 5700$

$p = 300$

Substitute $p = 19$ into (2) to give

$3(19) + 4e = 1300$

$57 + 4e = 1300$

$4e = 1243$

$e = 310.75$

Beth's total weight is $(6 \times 300) + (5 \times 310.75) = 3{,}353.75$

So, 3,353.75 kg