

Linear equations

Starter

1. **(Review of last lesson)** Daniel puts one-and-a-half times as much money into a business as his partner Elsie. They share the profits in that same ratio. How much of a £5700 profit does Daniel get?

Working: Number of parts = $1.5 + 1 = 2.5$
 1 part is worth $\frac{5700}{2.5} = 2280$
 Daniel gets $1.5 \times 2280 = \text{£}3420$ profit
Alternatively
 If Elsie puts in x then Daniel puts in $1.5x$.
 $x + 1.5x = 5700$
 $2.5x = 5700$
 $x = 3420$
 Daniel gets $1.5x = 1.5 \times 2280 = \text{£}3420$ profit

2. **(Review of last lesson)** Mr Lee left his fortune to his 3 sons, 4 nieces and his wife. Each son received twice as much as each niece and his wife received £6000, which was a quarter of the money. How much did each son receive?

Working: If $\frac{1}{4}$ of money is £6000, then Mr Lee's total fortune was $4 \times 6000 = 24000$
 Amount to be shared between sons and nieces is $24000 - 6000 = 18000$
 Let each niece receive x so each son receives $2x$.
 3 sons, 4 nieces: $3 \times 2x + 4 \times x = 18000$
 $6x + 4x = 18000$
 $10x = 18000$
 $x = 1800$
 Each son receives $2x = 2 \times 1800 = \text{£}3600$

3. **(Review of previous material)**
 Solve these equations: (a) $2x - 5 = 17$ (b) $47 - 9x = 11$

Working: (a) $2x - 5 = 17$
Add 5 to both sides: $2x = 22$
Divide both sides by 2: $x = 11$

(b) $47 - 9x = 11$ **...or...** $47 - 9x = 11$
 $47 = 11 + 9x$ $-9x = -36$
 $36 = 9x$ $x = \frac{-36}{-9} = 4$
 $4 = x$
 $x = 4$

E.g. 1 Solve: (a) $a - 3 = 3a - 7$ (b) $2y - 1 = 4 - 3y$

Working:

(a) $a - 3 = 3a - 7$
Subtract a from both sides: $-3 = 2a - 7$
Add 7 to both sides: $4 = 2a$
Divide both sides by 2: $2 = a$
Make sure the unknown is on the LHS: $a = 2$

(b) $2y - 1 = 4 - 3y$
Add $3y$ to both sides: $5y - 1 = 4$
Add 1 to both sides: $5y = 5$
Divide both sides by 5: $y = 1$

E.g. 2 Solve: (a) $\frac{6}{x} = \frac{5}{4}$ (b) $14 - \frac{x}{5} = 16$ (c) $\frac{x}{4} - 7 = 12$

Working:

(a) *Cross-multiply to get x in the denominator:* $\frac{6}{x} = \frac{5}{4}$
 $6 \times 4 = 5 \times x$
 $24 = 5x$
 $\frac{24}{5} = x$
 $4.8 = x$
Divide both sides by 5:
Make sure the unknown is on the LHS: $x = 4.8$

(b) $\frac{x}{4} - 7 = 12$
Add 7 to both sides: $\frac{x}{4} = 19$
Multiply both sides by 4: $x = 76$

(c) $14 - \frac{x}{5} = 16$
It is a good idea to get the coefficient of x to be positive:
Add $\frac{x}{5}$ to both sides: $14 = 16 + \frac{x}{5}$
Subtract 16 from both sides: $-2 = \frac{x}{5}$
Multiply both sides by 5: $-10 = x$
Make sure the unknown is on the LHS: $x = -10$

Video: [Solving linear equations](#)

[Solutions to Starter and E.g.s](#)

Exercise

- 9-1 class textbook: p158 M6.1 Qu 17-44 odd
- A*-G class textbook: p148 M6.1 Qu 17-47 odd
- 9-1 homework book: p55 M6.1 Qu 1-37 odd
- A*-G homework book: p40 M6.1 Qu 1-37 odd