Principles of rearranging formulae

Recall:

- we can do anything to an equation as long as we **do the same thing to both sides**;
- we simplify/rearrange equations **step by step** by applying **inverse operations**;
- apply the same inverse operations to both sides of the equation.

Variables represent physical quantities and are the names agreed by scientists within a specific discipline. These names aren't necessarily just one symbol (letter) but often are a combination of symbols, sometimes also involving subscripts. Just like name Mary involves more than one letter, change in temperature and concentration of chemical 1 are usually denoted (named) by ΔT and C_1.

Examples

1.　$Q = m \cdot c \cdot \Delta T$　　　$\boldsymbol{m} =?$	**4.**　$P = RI^2$　　　$\boldsymbol{I} =?$
2.　$C_1 V_1 = C_2 V_2$　　　$\boldsymbol{V_1} =?$	**5.**　$\omega = \sqrt{\dfrac{g}{L}}$　　　$\boldsymbol{g} =?$
3.　$\rho = \dfrac{m}{V}$　　　$\boldsymbol{m} =?$	

<u>Hint</u>: factorising

Sometimes the variable of interest can appear more than once in an equation. Rearrange the equation to have **all terms with the variable** of interest **on one side**, then **factorise**.

Examples

Rearrange $xy + z = x$ to make $\boldsymbol{x}$ the subject.

Rearrange $at - u = 5t$ to make $\boldsymbol{t}$ the subject.

<u>Hint</u>: fractions

When rearranging equations that involve fractions, it can be helpful to **'get rid' of the fractions by multiplying both sides of the equation by the denominator**(s). This is particularly helpful when the variable of interest is present in the denominator.

Examples

Rearrange $\frac{1}{2+x} - 4 = 5$ to make $\boldsymbol{x}$ the subject.

Rearrange $\frac{2}{a-2} = 5$ to make $\boldsymbol{a}$ the subject.

<u>Hint</u>: several fractions

If there are **several fractions** present in an equation, we can 'get rid' of all the denominators in one step by **multiplying both sides by the product of the denominators**.

Examples

Rearrange $\frac{1}{R} + \frac{1}{R_1} = \frac{1}{R_2}$ to make $\boldsymbol{R}$ the subject.

Rearrange $\frac{1}{a} + \frac{1}{b} = 5$ to make $\boldsymbol{a}$ the subject.

Homework 3

1. Rearrange $\dfrac{M}{I} = \dfrac{E}{R}$ to make R the subject.

2. Rearrange $y = \dfrac{n\lambda L}{d}$ to make L the subject.

3. Rearrange $\dfrac{1}{u} + \dfrac{1}{v} = \dfrac{1}{f}$ to make v the subject.