

Grade 10

Mathematics

Equations

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LITERAL EQUATIONS

Literal Equations involve working with letters (sometimes more than just x and y) and numbers. The way you solve the equation is the same way as normal.

DO THE FOLLOWING EXAMPLES WITHOUT LOOKING AT ANSWERS FIRST AND THEN CHECK YOUR ANSWERS AGAINST THE ANSWERS GIVEN

Example 1

Solve for x in the following formula: $2x + 4y = 2$.

Answer

$$2x = 2 - 4y$$
$$\frac{1}{2}(2x) = \frac{1}{2}(2 - 4y)$$
$$x = 1 - 2y$$

Multiply each side by $\frac{1}{2}$ to get x alone

Example 2

Make a **the subject** of the formula:

$$s = ut + \frac{1}{2}at^2$$

Answer

$$s - ut = \frac{1}{2}at^2$$
$$2s - 2ut = at^2$$
$$\frac{2s - 2ut}{t^2} = a$$
$$a = \frac{2s - 2ut}{t^2}$$
$$a = \frac{2(s - ut)}{t^2}$$

RESTRICTIONS $t \neq 0$

Multiply each side by 2

Divide each side by t^2

If $t = 0$ then the expression is undefined

Example 3

3. Solve for n: $pV = nRT$.
Solution:

$$pV = nRT$$
$$\frac{pV}{RT} = n$$

Note restrictions: $R \neq 0, T \neq 0$

Example 4

4. Make x the subject of the formula: $\frac{1}{b} + \frac{2b}{x} = 2$.
Solution:

$$\frac{1}{b} + \frac{2b}{x} = 2$$
$$\frac{x + b(2b)}{bx} = 2$$
$$x + 2b^2 = 2bx$$
$$x - 2bx = -2b^2$$
$$x(1 - 2b) = -2b^2$$
$$x = \frac{-2b^2}{1 - 2b}$$

Note restriction: $1 \neq 2b$

Example 5

5. Solve for r : $V = \pi r^2 h$.

Solution:

$$V = \pi r^2 h$$

$$\frac{V}{\pi h} = r^2$$

$$\pm \sqrt{\frac{V}{\pi h}} = r$$

Note restriction: $h \neq 0$

Example 6

6. Solve for h : $E = \frac{hc}{\lambda}$.

Solution:

$$E = \frac{hc}{\lambda}$$

$$E\lambda = hc$$

$$\frac{E\lambda}{c} = h$$

Note restriction: $c \neq 0$

GREEK LETTERS (FOR INTEREST ONLY)

Greek alphabet

Aα Alpha	Nν Nu
Bβ Beta	Ξξ Xi
Γγ Gamma	Οο Omicron
Δδ Delta	Ππ Pi
Εε Epsilon	Ρρ Rho
Ζζ Zeta	Σσς Sigma
Ηη Eta	Ττ Tau
Θθ Theta	Υυ Upsilon
Ιι Iota	Φφ Phi
Κκ Kappa	Χχ Chi
Λλ Lambda	Ψψ Psi
Μμ Mu	Ωω Omega

Lambda, 11th letter of the Greek alphabet, (λ) ,indicates the wavelength of any wave, especially in physics, electronics engineering, and mathematics. It is just part of the formula and must be treated as any other letter. We do not have to work out the wavelength.

Example 7

7. Solve for h : $A = 2\pi rh + 2\pi r$.

Solution:

$$A = 2\pi rh + 2\pi r$$

$$A - 2\pi r = 2\pi rh$$

$$\frac{A - 2\pi r}{2\pi r} = h$$

Note restriction: $r \neq 0$

Example 8

8. Make λ the subject of the formula: $t = \frac{D}{f\lambda}$.

Solution:

$$t = \frac{D}{f\lambda}$$

$$t(\lambda) = \frac{D}{f}$$

$$\lambda = \frac{D}{tf}$$

Note restrictions: $t \neq 0, f \neq 0$

Example 9

9. Solve for m : $E = mgh + \frac{1}{2}mv^2$.

Solution:

$$E = mgh + \frac{1}{2}mv^2$$

$$E = m \left(gh + \frac{1}{2}v^2 \right)$$

$$\frac{E}{gh + \frac{1}{2}v^2} = m$$

Note restriction: $gh + \frac{1}{2}v^2 \neq 0$