

Objective 15

Rearrange a formula to isolate a variable of interest where the formula is linear in that variable

PROBLEM

Solve $C = 4n + 10nk$ for n .

STEP 1

Factor n out of $4n + 10nk$.

$$\begin{aligned} C &= 4n + 10nk \\ &= n \cdot (4) + n \cdot (10k) \\ &= n(4 + 10k) \end{aligned}$$

STEP 2

Divide both sides of the equation by $4 + 10k$. Simplify the right side of the equation.

$$\begin{aligned} C &= n(4 + 10k) \\ \frac{C}{(4 + 10k)} &= \frac{\cancel{n(4 + 10k)}}{\cancel{(4 + 10k)}} \\ \frac{C}{4 + 10k} &= n \end{aligned}$$

When solved for n , the equation is $n = \frac{C}{4 + 10k}$.

ANSWER

$$n = \frac{C}{4 + 10k}$$

Guided Practice:

Rearrange a formula to isolate a variable of interest where the formula is linear in that variable

1. Solve $S = \pi l + \pi r^2$ for l . Assume all variables represent positive values.

[A] $l = \frac{S - \pi r^2}{\pi}$ [B] $l = \frac{S - \pi^2}{r^3}$ [C] $l = S - r$ [D] $l = S\pi - \pi^2 r^3$

2. Solve $T = 9c - 8d$ for d . Assume all variables represent positive values.

3. Solve $A = P + Prt$ for r . Assume all variables represent positive values.

[A] $r = \frac{Pt}{A - P}$ [B] $r = \frac{Pt}{A + P}$ [C] $r = \frac{A - P}{t}$ [D] $r = \frac{A - P}{Pt}$

4. Solve $IR + Ir = E$ for r . Assume all variables represent positive values.

Practice:

Solve $d = v_0t + \frac{1}{2}at^2$ for a . Assume all variables represent positive values.

[A] $a = \frac{1}{2}(d - v_0)t^2$ [B] $a = \frac{2d - 2v_0t}{t^2}$ [C] $a = 2d - 2v_0t - t^2$ [D] $a = \frac{d - v_0t}{t^2}$

Solve $IR + Ir = E$ for r . Assume all variables represent positive values.

[A] $r = \frac{E - R}{I}$ [B] $r = \frac{E - IR}{I}$ [C] $r = \frac{I}{E - IR}$ [D] $r = \frac{I}{E + IR}$

Solve $A = \frac{\pi r^2 s}{360}$ for s . Assume all variables represent positive values.

[A] $s = \frac{360A}{\pi r^2}$ [B] $s = 360A - \pi r^2$ [C] $s = \frac{360\pi}{Ar^2}$ [D] $s = \frac{Ar^2}{360\pi}$

Additional Help:

https://www.khanacademy.org/math/algebra/solving-linear-equations-and-inequalities/solving_for_variable/v/rearrange-formulas-to-isolate-specific-variables

<http://www.virtualnerd.com/algebra-2/equations-inequalities/linear-equations/solve-multi-step-equations/isolate-variable-from-formula>