



Example

Make A the subject of the equation:

$$a^2 = b^2 + c^2 - 2bc \cos(A)$$

Answer

We begin by adding $2bc \cos(A)$ to both sides:

$$a^2 + 2bc \cos(A) = b^2 + c^2 - 2bc \cos(A) + 2bc \cos(A)$$

and then simplify:

$$a^2 + 2bc \cos(A) = b^2 + c^2$$

We then minus a^2 from both sides and simplify:

$$2bc \cos(A) = b^2 + c^2 - a^2$$

We then divide both sides by $2bc$:

$$\frac{2bc \cos(A)}{2bc} = \frac{b^2 + c^2 - a^2}{2bc}$$

and then simplify:

$$\cos(A) = \frac{b^2 + c^2 - a^2}{2bc}$$

We then take \cos^{-1} of both sides:

$$\cos^{-1}(\cos(A)) = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$$

and then simplify:

$$A = \cos^{-1}\left(\frac{b^2 + c^2 - a^2}{2bc}\right)$$

Questions

1. Make distance the subject of the equation: $\text{speed} = \frac{\text{distance}}{\text{time}}$
2. Make H the subject of the equation: $\sin(\theta) = \frac{O}{H}$
3. Make v the subject of the equation: $E_k = \frac{1}{2}mv^2$
4. Make u the subject of the equation: $v^2 - u^2 = 2as$
5. Make A the subject of the equation: $\frac{a}{\sin(A)} = \frac{b}{\sin(B)}$
6. Make y the subject of the equation: $xy - 2y = \alpha$
7. Make t the subject of the equation: $N = Me^{kt}$

Answers

1. Multiply both sides by time:

$$\text{speed} \times \text{time} = \frac{\text{distance} \times \text{time}}{\text{time}}$$

then simplify:

$$\text{speed} \times \text{time} = \text{distance}$$

2. Multiply both sides by H :

$$H \times \sin(\theta) = 0$$

Divide both sides by $\sin(\theta)$:

$$H = \frac{0}{\sin(\theta)}$$

3. Multiply both sides by 2:

$$2E_k = mv^2$$

Then divide both sides by m :

$$\frac{2E_k}{m} = v^2$$

Finally, take the square root of both sides:

$$\sqrt{\frac{2E_k}{m}} = v$$



4. Add u^2 to both sides:

$$v^2 = 2as + u^2$$

Minus $2as$ from both sides:

$$v^2 - 2as = u^2$$

Finally, take the square root of both sides:

$$\sqrt{v^2 - 2as} = u$$

5. Multiply both sides by $\sin(A)$:

$$a = \frac{b \sin(A)}{\sin(B)}$$

Then multiply both sides by $\sin(B)$:

$$a \sin(B) = b \sin(A)$$

Divide both sides by b :

$$\frac{a \sin(B)}{b} = \sin(A)$$

Finally, take \sin^{-1} of both sides:

$$\sin^{-1}\left(\frac{a \sin(B)}{b}\right) = A$$

6. Factorise the left-hand side to get

$$y(x - 2) = \alpha$$

Then divide both sides by $x - 2$:

$$y = \frac{\alpha}{x - 2}$$

7. Divide both sides by M :

$$\frac{N}{M} = e^{kt}$$

Take logs of both sides:

$$\log\left(\frac{N}{M}\right) = \log(e^{kt})$$

Then simplify:

$$\log\left(\frac{N}{M}\right) = kt$$

Divide both sides by k :

$$\frac{1}{k} \log\left(\frac{N}{M}\right) = t$$

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